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209. ON THE MUTATION OF THE FOSSIL *GLYCYMERIS ROTUNDA*

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化石 *Glycymeris rotunda* の轉異： 靜岡縣下掛川層群上部（結緣寺階）に出る *Glycymeris rotunda* の計測の結果を報告した。地質時代間に於ける僅少な變化を見出すのを目的とする。測り易いパラメタを選定し無用に複雑化することを避けた。LB 比は長さと最長の殼頂からの径との比であり，脹度は殼のもつともふくらんでいる部と內緣面との距離である。腹緣の刻みと靱帶の數も數えた。資料は結緣寺階のこの水準から得たものである。貝は次第にふくらみが少くなり，斜めでなくなつている傾向が認められる。比較のため千葉縣更新統，高知縣現生も扱つたが一般的な進化傾向はただ比だけにある。最後に結論として轉異は頻度曲線の時の經過と共に移動することに思い付いている。しかしこの事は一のバイオトープに限定される。 槇山次郎

Abstract

A conchometric study of *Glycymeris rotunda* from the Upper Pliocene or the Kechienjian stage in Shizuoka prefecture, Japan. The object is to examine minor changes during the geological age. Measurable parameters such as LB ratio (length—largest umbonal diameter ratio), inflation, crenation and ligament growth are only chosen to deal with. The samples were obtained from the two different horizons of the Kechienjian rocks. The shell had passed into a less inflated and less oblique form of the upper horizon—the Nango formation—from that of the lower horizon—the Hosoya formation. Some materials of the later ages and remote places are also measured for comparison.

Introduction

Glycymeris rotunda (Dunker) is a very common bivalve in the Pliocene rocks of the Kakegawa group in Shizuoka prefecture. It is especially abundant in a few horizons of the upper part of the Kakegawa, to which, a stage name "Kechienjian"[1)] was given so as to represent the Japonic Upper Pliocene. The mutation is more precisely shown by a statistic method than in usual observation. The method has been appraised by the writer several years ago with *Glycymeris yessoensis* (Sowerby)[2)] of the Pleistocene.

Dr. Tokubei Kuroda of Kyoto University kindly afforded living specimens for comparison. This note appears as Kechienjian fauna series no. 2[3)]; and is a partial result of the work granted by Goverment—Science Research fund, Educational Department.

Locality and Stratigraphy

The sequence of members in the Kakegawa groups has been described elsewhere in former papers, but the

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1) Read Feb. 19 1949; received June 28, 1951.

1) formerly spelled "Ketienzian" *Mem. Sci., Kyoto Univ. B-16, 15*, 1941.

2) On the variation of the fossil *Glycymeris yessoensis*, *The Venus vol. 2*, 102-116, 1930.

3) The Kechienjian fauna series no. 1: Evolution of the gastropod genus *Siphonalia* etc. *Mem. Sci. Kyoto Univ. B-16*, 75-93, 1941.

generalized column may be given here, in ascending order:

Suchian Stage	1. Dainichi sand, 30m. 2. Lower Tenno fine sand, 40m. 3. Upper Tenno transitional beds, 30m.
Kechienjian Stage	4. Hosoya formation, silt and tuff, 30m. 5. Nango formation, alternating sands and muds, 280m. 6. Hijikata formation, chiefly massive mud, 220m.

The lower stage name "Suchian" is proposed herewith, replacing "Dainichian=Dainitian", which is homonymous with Dainichi sand. Also no. 6. Hijikata formation will be used . instead of "Kechienji Bed."

Glycymeris rotunda is rather rare below the Hosoya, but is very common in the lower part of the Kechienjian stage. A considerable number of specimens has been collected from the Nango at a locality (Loc. 431), a road side cutting near Tonbe about 4 km. northwest of Kakegawa (E 138°1′; N 34°46′).

Other two lots have been obtained from the Hosoya in Ugari and Iida about 8 km. WNW of Kakegawa and north of Fukuroi station, Tokaido RR. These are Loc. 530 and 524 respectively. Not enough quantity of sample was able to be taken from other exposures of the Kechienjian sediments.

METHOD OF MEASUREMENT

Shells of *Glycymeris* are rather less variable than other forms of bivalves in view of descriptive conchology. The variation can be made clear by an exact conchometric method. To avoid a tedious work, a few parameters were only measured. The parameters are not necessarilly the same as the dimensions usually measured in descriptive conchology. In this case, a more acculately measurable dimensions should be chosen. The shells of normal species of *Glycymeris* are orbicular in outline, even higher than long in some forms. Length of such a shell is not very difficult to measure directly with ordinal watch-maker's callipers, being the distance between the anterior and posterior ends. It is more convenient to fix the greatest diameter from the beak to the posterior ventral margin (bb′ in Fig. 1.), instead of the height right angles to the length. As an observance, the length is parallel to the hinge line. This is observed in a

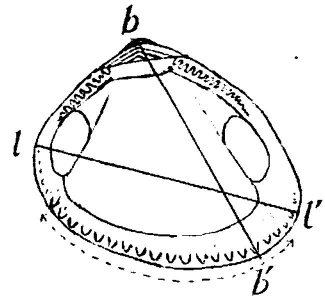

Fig. 1.

majority of pelecypods. The basal line of the low triangle of the ligament area in *Glycymeris* is well defined. However, it is not parallel to ll′, the length, in *G. rotunda*. *G. totomiensis*, Suchian species is differentiate from the present species under consideration being the basal line parallel to ll′. The largest umbonal diameter bb′ of *G. rotunda* does not coincide with the height and its length ll′ lies low in the ventral side. In *G. yessoensis*, the height is at about bb′ and ll′ lies at the middle of the shell height. These well-marked keys to the species of Japonic *Glycymeris* have been mentioned in a former paper.[4]

4) Loc. cit., see (2)

To make errors as small as possible, every parameter of each valve has been measured repeatedly, at least eight times. In doing this, a valve is disposed its inside up at first, then it was turned over; the pair of callipers is applied from right and left in turn. For instance, a length is measured from the dorsal side and the ventral side in alternation. So, there are four different ways, each of which is repeated at least twice. The median of these eight or more measures is chosen as the measured value of the parameter of that individual.

Not only parameters, but also numbers of the ligament ridges and the crenation of the inner margins were counted. The crenation, however, becomes too small and faint toward the both ends to read. Carefully observing the inner surface of the shell, there are found two well-marked lines that are extending from the beak to the ventral margin, often making a more or less strong ridges, one just behind the anterior adductor scar, and the other just in front of the posterior adductor scar. The crenae of the ventral margin between both the limits are well impressed.

Inflation

Inflation is the ratio of thickness to length. As has been mentioned, the fossil materials at hand are all of detached left and right valves, Therefore, true thickness of closed valves is unknown. Here a thickness is defined as the distance from the plane of inside margin to the most inflated point of the outer surface. This distance is measurable with callipers.

To test similarity of the left and right inflations, they were measured separately. For instance, the data of Loc. 524 may well show the equivalency of the left and right inflations.

The difference of the means is 0.003 and the square root of the addition of squares of each standard error of mean is 0.073919. Therefore the inflations of

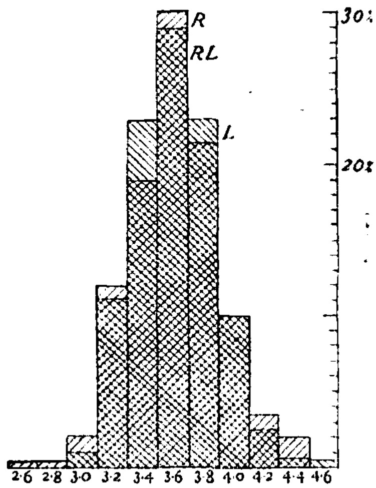

Fig. 2. Overlapped histograms of left and right inflations; R. right, L: left, RL: overlapped column; frequency in percent.

Table 1. Inflations of left and right valves from Loc. 524.

	number	mean inflation	standard deviation
Right valve	263	3.6012±0.05138	0.8332
Left valve	242	3.6009±0.05314	0.8267

left and right valves are insignificantly different from each other at least in *G. rotunda* of Loc. 524. The case of Loc. 431 was also attested. Samples of other series of the same species may be assumed to be equivalve. The table below shows mean inflations thus fixed. Although the data of II, IV and V were estimated with small numbers of samples, the values may worth in comparison.

Table 2. Mean inflation.

	formation	Loc.	mean inflation ± standard error	Standard deviation	Number
I	Hosoya f.	Loc. 524	3.60118 ± 0.05314	0.8332	304
II	〃	Loc. 530	3.65342 ± 0.01461	0.2923	20
III	Nango f.	Loc. 431	3.24300 ± 0.08889	0.8889	100
IV	Jizodo f.	Nishi-Kuniyoshi, Chiba	4.32410 ± 0.17315	0.5475	10
V	Living	Off Kochi, Shikoku	3.64535 ± 0.06433	0.3151	20

Table 3. *t* values and differences in inflation.

	V	IV	III	II
I	0.53 insignificant	3.98 significant	3.46 significant	0.95 insignificant
II	1.23 significant	3.86 significant	4.54 significant	
III	3.67 significant	5.56 significant		
IV	3.63 significant			

Looking over the two tables, it is noticed that the inflation became smaller during the evolution course from the Hosoya to the Nango time. But this is not a general evolutionary tendency of *G. rotunda*, as shown by another group of material. The shell has never been getting less inflated since the Pliocene. The Pleistocene specimens (IV) are more swollen, while the living form (V) is a resemblant to the Pliocene Hosoya form.

The histogram (Fig. 3) shows the inflations of the two groups—I, Loc. 524 and III, Loc. 431, frequencies represented in percent. The overlapped area is a little larger than a third of the entire.

LB RATIO

The ratio ll′ : bb′ is called LB ratio in short. The estimated means and their standard deviations of the five groups are as follows:

Table 4. Mean LB Ratio.

	formation	Loc.	Means ± Standard error	Standard deviation	Number
I	Hosoya f.	Loc. 524	1.0638±0.00216	0.03626	304
II	〃	Loc. 530	1.0590±0.00155	0.03109	20
III	Nango f.	Loc. 431	1.0546±0.00371	0.03711	100
IV	Jizodo f.	Nishikuniyoshi, Chiba	1.0408±0.01053	0.03328	10
V	Living	Off Kochi, Shikoku	1.0231±0.00517	0.02426	22

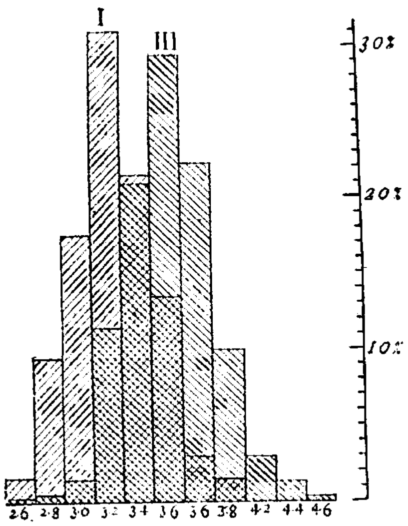

Fig. 3. Overlapped histogram of the inflations I and III; frequency in per cent.

The above table shows that the LB ratio is getting smaller and smaller from the late Pliocene to the Recent. The tendency is affirmed by the calculation of *t* values.

Significancies of the compared means are also shown in the above table. The difference between the groups of Loc. 524 and Loc. 530 is insignificant, inasmuch as they belong to the same horizon. However, the difference from the Nango set is considerable. The Pliocene forms are evidently very different from the living representative.

Crenation

A crenation is the number of crenae between the inside edges of the adductor scars. Each inside edge is clearly marked by a radial line as has been stated. *G. rotunda* of the Hosoya formation at Loc. 524 has a crenation between 18 and 33. The examined samples consist of 324 left and 284 right valves. In both cases, the mode is 25, but the mode coefficient is 17.59% by the left valves and 19.68% by the right valves. The coefficient of variation is 9.624% and 8.737% respectively. The mean number of valves is 304, the mean crenation is 25.304 and the standard deviation is 2.250. Material from the other locality of the same horizon (Loc. 530) is so poor in number as only 20, but the crenation is different from that of Loc. 524. 135 valves of Loc. 431 in the Nango formation give significantly different values of the mode and mean. The Pleistocene and Recent examples are also different in crenetion from the Kechienjian valves.

Table 5. *t* values and differences in LB ratio

	V	IV	III	II
I	7.04 very significant	2.14 p≒0.02	2.14 p≒0.02	1.74 insignificant
II	6.62 very significant	1.72 insignificant	1.11 insignificant	
III	4.92 significant	2.83 p≒0.01		
IV	2.90 p≒0.01			

Table 6. Mode and mean of crenation.

	formation	Locality	mode	mean±s. e.	Standard deviation	Number
I	Hosoya f.	Loc. 524	25	25.304±0.129	2.250	304
II	〃	Loc. 530	25	25.400±0.471	2.107	20
III	Nango f.	Loc. 431	23	23.437±0.193	2.224	135
IV	Jizodo f.	Nishi-Kuniyoshi, Chiba	31	31.200±0.810	2.561	10
V	Living	Off Kochi, Shikoku	29	28.773±0.500	1.985	22

Table 7. *t* values and differences in crenation.

	V	IV	III	II
I	2.18 p≒0.02	15.33 very significant	8.18 very significant	1.36 insignificant
II	2.52 p≒0.02	6.19 very significant	3.93 significant	
III	3.15 significant	2.95 significant		
IV	2.52 p≒0.02			

It is evident that there is no definite tendency of evolution in crenation of *G. rotunda* since the Pliocene. A Suchian form *G. totomiensis* MAKIYAMA has been supposed akin to *G. rotunda*. But the Suchian species has a smaller crenation, the mode being 20 and the mean being 19.9.

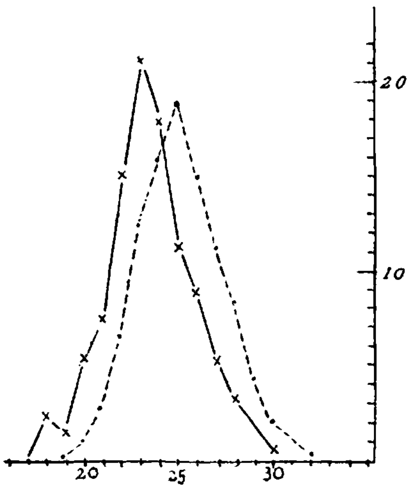

Fig. 4. Frequency curves of crenations (pen cent)
-------- Loc. 524.
—×— Loc. 431.

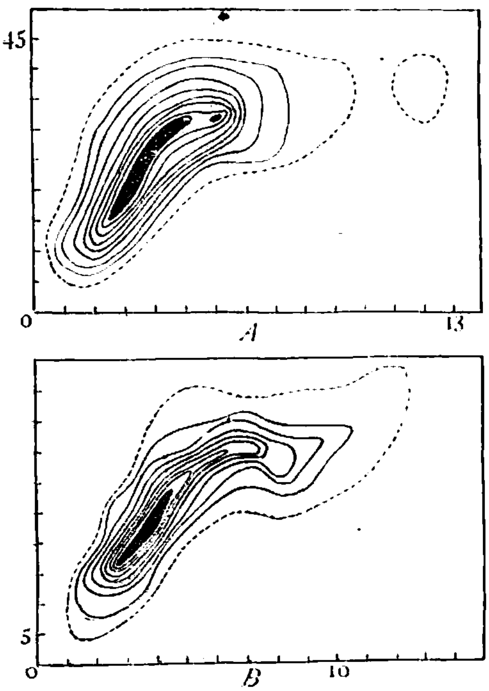

Fig. 5. Length-Ligament Correlation Diagrams
A, Loc. 431, 135 shells;
B, Loc. 524, 550 shells;
Maxima>8 %,
Contour lines, 7%-1%;
Broken line, 0.1%;
Abscissa, ligament

LIGAMENT RIDGES

Multiplication of the ligament ridges has been tested with *G. yessoensis*. The correlation between the number and the length has been shown fairly well. This is also made clear with the materials at disposal as shown in fig 5 a, b, which are not essentially different. The correlation coefficient of 550 valves from Loc. 524 is 0.6392 with SHEPPARD's correction, and that of 135 individuals from Loc. 431 is 6.3323.

SUMMARY AND CONCLUSION

The conchometric study of *G. rotunda* of the Kechienjian stage reveals minor changes of characters durng the geological ages. There is an evident evolution, shell getting less oblique as shown by LB ratios. But there is no definite tendency throughout the geologic ages in other parameters. The races are different from place to place as well as from time to time. A race is fairly uniform in its minor characters. The race of Loc. 524 is the same race as that of Loc. 540. In the Kakegawa Pliocene sea at the early Kechienjian Hosoya times, there lived a race of *G. rotunda* well differentiated from the others. But the shell became thinner entering the middle Kechienjian Nango times.

The Pleistocene of Chiba prefecture far away from the Kakegawa area yields a quite different type of *G. rotunda* which suggests no direct connection with the Kechienjian pedigree. The living specimens from the sea off Kochi, Shikoku, belong to a different race from those of the Kechienjian stage and the Pleistocene of Chiba.

G. rotunda is an inhabitant of the warm waters around Western Japan, while *G. yessoensis* takes the place in the northeastern colder waters. The latter species from the Pliocene and Pleistocene rocks have been worked out several years ago in the same investigation. The result is very much like the present work.

With these criteria, it is not impossible to come to a conclusion that at least within a limited biotope a species evolves step by step with a definite tendency. But it is not clear whether the mode of character shifts continuously or jumps spasmodically. A new character may arise by saltation (mutation in DE VRIES' sense). At the same time, such a saltatory character appeared in a few individuals among a large population may have not an effect to the statistic datum of that population. Therefore a continuous movement of a frequency curve, which represents a parameter of a biocharacter, to a definite direction *pari passu* the passage of time, may be more probable than accidental revolutions of the same biocharacter in a majority of the entire population.

Trans. Proc. Palaeont. Soc. Japan N.S., No. 5 pp. 139–144, Feb. 15, 1952.

210. STRATIGRAPHICAL AND PALEONTOLOGICAL STUDIES OF THE LATER PALEOZOIC CALCAREOUS ALGAE IN JAPAN II.

—Several previously described species from the Sakamotozawa section, Hikoroichi-mura, Kesen-gun, in the Kitakami Mountainous Land[1]—

RIUJI ENDO[2]

日本産上部古生代石灰藻の層位学的及古生物学的研究 第二報「岩手県気仙郡日頃市村坂本沢産数種について」岩手県気仙郡日頃市村坂本沢の坂本沢セクションから採集した上部古生代石灰藻化石中，新属新種は第1報で発表したが今回は，先人の記載にかゝるもの4種，種名の判定し得ないもの2種を記載した。遠藤隆次

INTRODUCTION AND ACKNOWLEDGEMENTS

This is the second paper on the fossil algae from the Sakamotozawa section, Hikoroichi-mura, Kesen-gun, Iwate Pref., belonging to the Dasycladaceae. The description include 6 genera, namely *Macroporella*, *Diplopora*, *Teutloporella*, *Atractyliopsis* (?), *Mizzia*, and *Anthracoporella*.

I take this opportunity to express my hearty thanks to Prof. J. Harlan JOHNSON, Colorado School of Mines, for his helpful suggestions and criticisms. I express also my graditude for the financial help provided by the Educational Department.

SYSTEMATIC DESCRIPTION

For the symbols used for the measurements in this description, see Art. 208 in the preceding number of this journal.

Class CHLOROPHYTA

Subclass CHLOROPHYCEAE

Order SIPHONOCLADALES

Family Dasycladaceae

Genus *Anthracoporella* PIA, 1920

Anthracoporella Spectabilis PIA

Plate 12, Figures 6-7

1920. *Anthracoporella spectabilis* PIA, *Zool-Botan. Gesell. in Wien, Band 11, Heft 2*, pp. 15-18, Pl. 1, Figs. 7-11.

Measurements	*Anthracoporella spectabilis* PIA				
	D	d	p	s	w
No. 72	5.21 mm.	3.647 mm.	0.0419 mm.	0.7815 mm.	
No. 70a.	8.9	6.7	0.0521	1.0941	about 150±

Descriptions:—Specimen may indicate the presence of crusty base from which cylindrical thalli develop. Thalli relatively thick, winding, pinching and swelling. They finely dichotomously branched, and some of them is 18.5 mm. long.

1) Read April 5, 1951; received June, 28, 1951.

2) Contribution from the Laboratory of Earth Sciences, Liberal Arts, Saitama University in Urawa.

There are several thalli in one slide which have different diameters. It means that a thallus is many times branched and develops small as well as large branches at different places. The specimens show a thick calcareous wall which probably included the area from the exterior to the stem cell. The branches are represented by "pores" in the fossils. In the present species there are many pores in a whirl, more than 170 pores are found 1 mm² of outer surface pores extend outwardly with about same diameters from the inner surfaces to the outer surfaces of the calcareous wall and bifurcate on its midway, some of them may tertiary, dichotomously branched. Diameter of ordinary pores 0.00419–0.0521 mm. and that of finer bifurcate pores about 0.003 mm. Pores are nearly perpendicular to the outer surfaces and usually opened to the exterior, but some specimens show an outer thin calcareous wall, in the latter case, the outside openings of pore are closed. No sporangia were observed. Since the inner side of stem cell is densely filled by calcareous matter, no structure was observed.

Comparisons:—The present specimens appear identical with European specimens described by PIA in having dichotomously branching thalli, bifurcate pores and about the same numerical values of diameters of different parts.

Remarks:—The observed specimens are associated with *Hikorocodium elegantae*.

Occurrence:—Lower Carboniferous, Onimaru Series: in the grey limestone bed which rests on the Permian strata by faulting in the north Sakamotozawa section.

Cotypes:—L. E. S., Saitama Univ., Slides 70, 72, Specimen 10759.

Mizzia Velebitana SCHUBERT

Plate 12, Figure 5

1907. *Mizzia* SCHUBERT, *K. k. Geol. Reichsanstalt, Verhandl. Wien, no. 8*, p. 212.
1908. *Mizzia velebitana* SCHUBERT, *K. k. Geol. Reichsanstalt, Wien, Jahrbuch Band 58, Heft 2*, p. 382, Pl. 16, Figs. 8-12.
1903. *Mizzia velebitana* KARPINSKY, *Russ. Min. Gesell. Verh., Ser. 2, Vol. 46*, p. 262, Pl. 3, Figs. 6-9.
1908. *Mizzia* cf. *velebitana* KARPINSKY, *idem.* p. 266, Pl. 3, Figs. 1, 3, 4, 10-13.
1908. *Guadalupia*? sp. GIRTY, *U. S. Geol. Survey, Prof. Paper 58*, p. 85, Pl. 5, Figs. 7-11.
1920. *Mizzia velebitana* PIA, *Zool-Botan. Gesell., Wien, Abh., Band 11, Heft 2*, p. 19, Pl. 1, Figs. 12–23.
1925. *Mizzia velebitana* OZAWA, *Jour. Coll. Sci. Tokyo Univ., Vol. 45, Art. 6*, p. 5, Pl. 1, Figs. 1a, 2a; Pl. 2, Figs. 6b, 7c.
1937. *Mizzia velebitana* PIA, *2me Cong. Strat. Carbonif. Heerlen 1935, Compte rendu*, p. 765, Pl. 9, Fig. 3.
1940. *Mizzia velebitana* PIA, *Adad. Wiss. Wien, Math.-natur. Kl., Sitzungsber.*
1942. *Mizzia velebitana* JOHNSON and DORR, *Jour. Pale. Vol. 16, No. 1*, pp 71–73, Pl. 9, Figs. 1-3; Pl. 10, Figs. 2, 3, 5; Pl. 11, Figs. 1-2.
1942. *Mizzia velebitana* JOHNSON, *Geol. Soc. America Bull., Vol. 53*, pp. 203-205, Pl. 2; Figs. 1, 2, 4; Pl. 3, Figs. 1, 2, 3.
1951. *Mizzia velebitana* JOHNSON, *Jour. Pale. Bull., Vol. 25*, No. 1, pp. 23-24, Pl. 7, Figs. 1-4.

Measurements	*Mizzia velebitana* SCHUBERT					
	D	d	p	g(w)	st	s
No. 82	1.6151 mm.	1.4588 mm.	0.2307 mm.	25±	1.0420 mm.	0.064 mm.

Descriptions:—The measurements, bead-like structure of thallus, characters of pores of the present specimens indicate that they are identical with the typical European species of *Mizzia velebitana* SCHUBERT.

Remarks:—The calcification is greatly valiable in these specimens. In specimen No. 67 (not illustrated), it extends inward nearly to the stem cell, while specimen No. 82 has a very thin calcareous layer which may cover nearely all the outlines of important structures of the plant.

Occurrence:—Middle Permian: in the banded limestone of the upper part of the Sakamotozawa section.

Plesiotypes:—L. E. S., Saitama Univ., Slides 82, Specimen 10761.

Genus *Atractyliopsis* PIA, 1937

Atractyliopsis (?) sp.

Plate 12, Figure 4.

Measurements	*Atractyliopsis* (?) sp.			
	D	d	p	s
No. 29	3.126 mm.	2.084 mm.	0.3674 mm.	0.521 mm.

Descriptions:—Illustrated specimen broad, longitudinal quadrilateral, tapering slightly to apical portion. Pores round and unbranched, usually closed in the calcareous body, but appear to be opened in two or three instances. The pores may be interpreted as the sporangia. The illustrated specimen may constitute a detached member from the thallus. The thallus breaks off into the individual members similarly to *Mizzia*.

Remarks:—All the features stated above show its very close affinity to the genus *Atractyliopsis* described by PIA in 1937 from Europe. The present specimen seems to belong to a new species, but until better specimens can be obtained it is not wise to give specific name.

This specimen is found in associated with *Mizzia velebitana* SCHUBERT.

Occurrence:—Middle Permian: in the limestone of upper part (No. 2) in the Sakamotozawa section.

Cotype:—L. E. S., Saitama University, Slide 29, Specimen 10762.

Genus *Teutloporella* PIA, 1912

Teutloporella cfr. *Triasina* SCHAUROTH

Plate 12, Figure 3.

1859. *Chaetetes? triasinus* SCHAUROTH, *Verzeichnis*, p. 285.

1912. *Teutloporella triasina* PIA, *Neue Studien*, p. 39, Pl. 4, Figs. 12-19.

1920. *Teutloporella triasina* PIA, *Zool-Botan. Gesell., Wien, Abh, Band 11, Heft 2*, p. 49.

Measurements in mm	*Teutloporella* cfr. triasina SCHAUROTH					
	D	d	st	s	p	Height of a segment of annulation
No. 63	6.5	4.0	2.709	1.3025	0.2084 broadest part.	0.9899

Though the present species is based by only one fragmental specimen, yet it has many characteristic features which show closely affinities with *Teutloporella triasina.* The writer described as fallows.

Description:—The calcareous body, 10.5 mm. long, broadly cylindrical, straight and consising of fine annulations. The annulated body shows rather deep furrows which sometimes attained to the central axis. Branches (pores) given off from the central stem as rather broad expantions which gradually into very slender hair-like passages toward exterior. Pores are somewhat ascending towards exterior and arranged as definite whorls. The basal, spherical part of pores seem to be sporangia. Diameters of pore are rather large in the lowest vertisillate series in a annulation, then gradually become narrower upward until the uppermost series in a same annulation. Then they expand again in the basal part of the next annulation, again narrowing gradually upward to the top layer of the ring.

Remarks:—As seen from the above description, the present specimen is very similar to *Teutloporella triasina* SCHAUROTH from European Triassic formations. Nevertheless, the Japanese specimen differs slightly in having more discoidal (shorter) annulation. If in the future the writer may able to get more and better specimens, a more detailed comparison with European species may show whether this species is exactly identical with *T. triasina.* At present, it does not appear wise to attempt to identify them as exactly the same. The writer has therefore described this as an allied species.

Occurrence:—Middle Permian: The observed specimen is collected from the limestone bed at the uppermost part (No. 2) in the Sakamotozawa section.

Plesiotype:—L. E. S., Saitama Univ., Slide No. 63, Specimen No. 10766.

Diplopora Phanerospora PIA

Plate 12, Figure 2.

1920. *Diplopora phanerospora* PIA, *Zool-Botan. Gesell., Wien, Abh., Band 11, Heft 2,* p. 59, Pl. 4, Figs. 1-10.
1926. *Diplopora phnerospora* PIA, *Pflanzen als Gesteins.* p. 121, 5 Text-figs.
1930. *Diplopora phanerospora* PIA, *Rec. Geol. Surv. India.* Vol. 63, Part 1, p. 177, Text-fig. 1, Pl. 4, Figs. 10-12.

Measurements	*Diplopora phanerospora* PIA			
	D	d	s	p
No. 27.	1.980mm.	0.938mm. broadest part 0.625 narrowest part	0.469mm.	0.156mm.

Description:—Thallus may composed of spherical members, suggesting a string of beads, so the thallus shows an innerannulation, its diameter of the broadest and narrowest parts are measured respectively as 0.938 and 0.625. In the spheroidal inner chamber, one may be able to find several hollow spheres, 0.156 mm. in diameter, which may be interpreted as the sporangia. Branches expand moderately from the central axis toward to the exterior, then they gradually narrow and give rise to tufts of finer branches at its middle part. Branches are almost perpendicular and they extend to the exteriors. Specimen shows rather thick calcareous walls which probably included the area from the exterior to near the stem cell. However a very narrow uncalcified space may be developed between the central stem cell and outer calcareous part. A thin black calcareous layer may cover the outside of stem cell.

Remarks:—The exact geological ages of formerly described specimens of *D. phanerospora* were unknown however, PIA suggested that it is probably Triassic. The present specimen was collected by the writer himself in the Lower Permian in associated with *Epimastopora japonica* and *Anchicodium magnum*. As may be seen from the above description, the general features of the present specimen are almostly identical with that of the type specimen in Europe and one may not find any specific difference between Japanese and European specimens. This is believed to be the first reported occurrence of this genus in Japan and the first record of it in Permian strata.

Occurrence:—Lower Permian: In the limestone of lower part of the Sakamotozawa section.

Plesiotype:—L. E. S., Saitama Univ., Slide 27, Specimen 10767.

Genus *Macroporella* PIA, 1912

Macroporella ? sp.

Plate 12, Figure 1

Measurements	*Macroporella* ? sp.			
	D	d	s	p
No. 14	1.5630 mm	1.042 mm	0 2034 mm	0.0783 mm

Descriptions:—Thallus rather long and slender, tapering gradually to a rounded end. Pores slender, gradually expand toward exterior and usually opening to exterior. These features of the pores are characteristic of the genus *Macroporella* some of pores in this species sometimes may develop from the central stem at slender pedicel like filament with a globular termination which suggests those characteristic of genus *Gyroporella*. The pores are spaces at regular intervals along the thallus. They appear to have been developed approximately perpendicular to the main stem. The specimens show rather thick calcareous walls which probably incrusted the area from the exterior to the stem cell. No reproductive organs were observed.

Remarks:—The specimen seems to belong to a new species. However, since this specimen is too poorly preserved to be given any special name, I describe it here as an undetermined species. The present specimen is found in associated with *Anchicodium magnum*, *Epimastopora japonica*, *Hikorocodium elegantae* and *Osagia* sp.

Occurrence:—Lower Permian: In the banded limestone at the middle and lower parts of the Sakamotozawa section.

Types:—L. E. S., Saitama Univ., Slides 14, Specimen. 10764.

For BIBLIOGRAPHY, see Art. 208 in the preceding number of this journal.

Explanation of Plate 12

H. no = Fossil horizon number N. = North section
S. = South section S. no. = Slide number

Macroporella, Diplopora, Teutloporella, Atractylopsis, Mizzia and Anthracoporella.

Fig. 1. *Macroporella* sp. (×15).
Oblique longitudinal section. (S. no 14).
Lower Permian: Limestone in the north and south Sakamotozawa sections. (H. nos. N. 11, S. 15).

Fig. 2. *Diplopora phanerospora* PIA. (×15).
Rather fragmental longitudinal section showing spherical inner chamber, several hollow spheres and outlines of pores. (S. no. 27).
Locality the same as fig. 1. (H. no. S. 12).

Fig. 3. *Teutloporella* cfr. *triasina* SCHAUROTH. (×9).
A longitudinal section showing annulation of body, a systematical regular arrangement of pores. (S. no. 63).
Middle Permian: Limestone in the uppermost part of the north Sakamotozawa section. (H. no. N. 2).

Fig. 4. *Atractyliopsis* (?) sp. (×15).
A longitudinal section showing characteristic pores and well-defined wall. (S. no. 29).
Middle Permian: Limestone in the uppermost part of the south Sakamotozawa section. (H. no. S. 2).

Fig. 5. *Mizzia velebitana* SCHUBERT. (×15).
Transverse section. (S. no. 82).
Middle Permian: Limestone in the upper part of the Sakamotozawa section. (H. nos. N. 5, 7, 10, S. 2, 5).

Figs. 6-7. *Anthracoporella spectabilis* PIA. (×9).
6. Transverse section, showing dichotomously branching of pores. (S. no. 70).
7. Longitudinal section, showing pinching and swelling of thallus. (S. no. 72).
Lower Carboniferous, Onimaru Series: Limestone in the north Sakamotozawa section. (H. no. N. 1).


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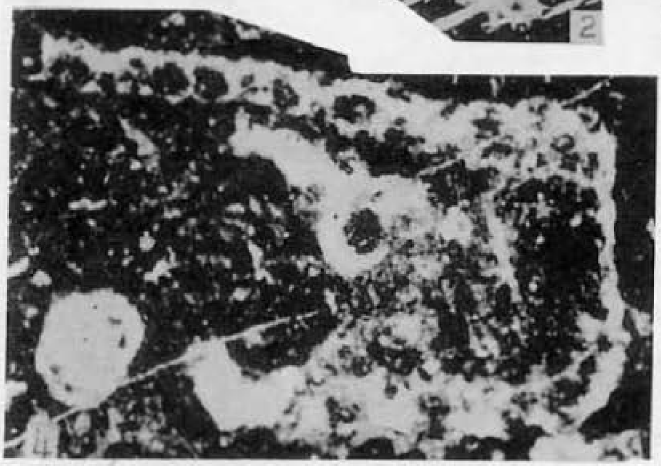
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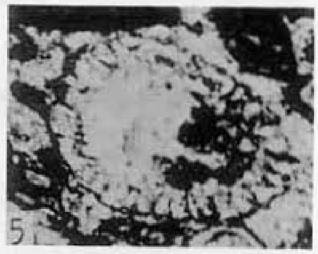
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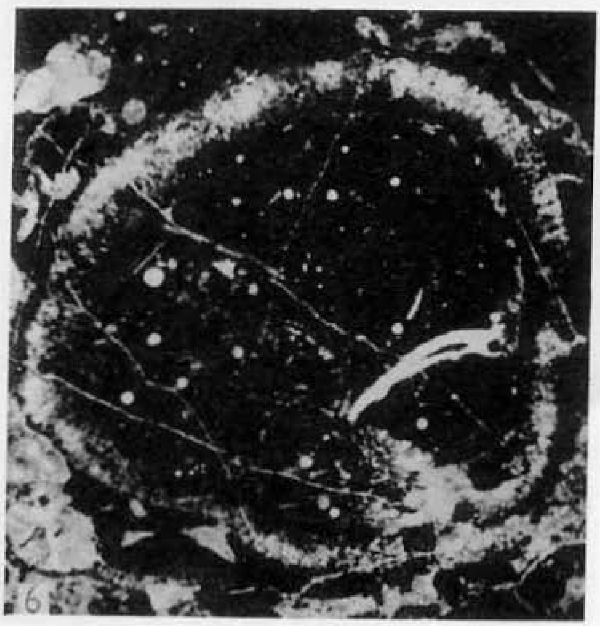
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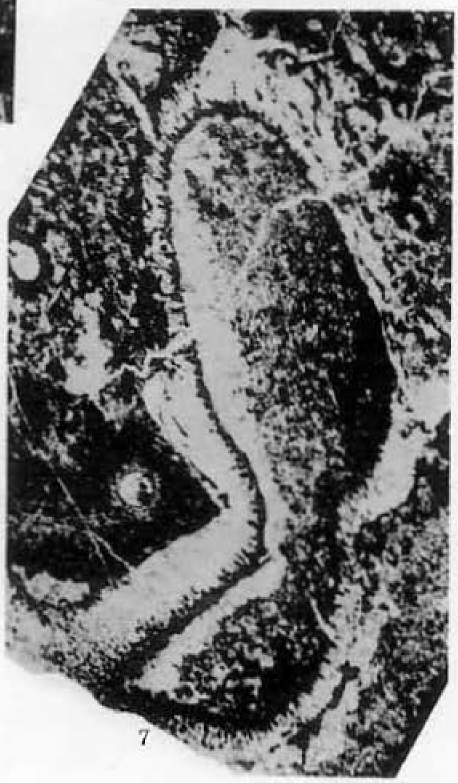
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Trans. Proc. Palaeont. Soc. Japan, N.S., No. 5, pp. 145–154, 2 text-figs. Feb. 15, 1952.

Miscellaneous Notes on the Cambro-Ordovician Geology and Palaeontology No. XXIV.

211. ON *MANSUYIA* AND THE TSINANIDAE[1)]

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Mansuyia と Tsinanidae に就いて—*Mansujia* に関する分類上の混乱を解き本属が *Prochuangia* と *Tsinania* との連鎖である事を指摘した。更に Tsinanidae を *Tsinania, Dictyites, Dictyella* に限定し之等属の分類を検討し，*Tsinania canens* の形態に関する観察を記述・図示している。その頭部腹面の殻の腕曲はカブトガニのそれによく似ている。小林貞一

Mansuyia is one of the Upper Cambrian trilobite genera with a pair of spines on the pygidium. Its taxonomic confusion is tried here to straighten out as far as possible. Its generic concept thus grasped reveals a connecting link with *Prochuangia* on one side and with the Tsinanidae on the other. Namely, *Mansuyia* is thought to be introduced from *Prochuangia* by narrowing of its cranidum; the Tsinanidae may be derived by effacement from *Mansuyia* or any similar form having a subquadrate glabella and probably a pair of spines on the pygidium because gradual disappearance of the paired spines is thoroughly demonstrated in *Tsinania humilis*. Further, it is noted that the cranidium referred to *Mansuyia tani* (figs. 16～18) is quite similar to that of *Tsinania canens* in the effacement and convexity. Incidentally, the preglabellar triangular depression must not be overlooked in *M. tani*, because it is also seen in *Proceratopyge* (Westergård, 1947, pl. 2, fig. 1, 1948, pl. 1, fig. 11).

Tsinania is ubiquitous in the Fengshanian of Eastern Asia. But nevertheless, nothing is known of its ventral side and its dorsal shield has so far been imperfectly known. The Fengshanian fauna in a red micaceous sandstone near Huangluohsien, Eastern Jehol, (loc. 16, Kobayashi, 1951) is fairly depauparate specifically, but very prolific in detached carapaces of *Tsinania canens*. Its free cheeks, thoracic segments and a hypostoma were included in the collection at hand. Their reference to the species is quite warranted because of its effacement and large size. In fact many of them are larger than as usual, the status together with the abundance suggesting the condition which was the optimum for this creature.

A pygidium some 5.5 cm. in breadth is really the largest of this species which I have ever seen. Assuming that this trilobite had ten thoracic segments or so, the dorsal shield must have been over 10 cm.

It is certainly interesting to see that the doublure of the cheek is very wide and sharply bent up on its inner side, because the aspect is somewhat similar to the part of *Limulus*. A thin membrane remaining on the further inner side is probably the thin ventral test.

Before entering into the detailed description I wish to record my thanks to

1) Read June 30, 1951; received Oct. 10, 1951.

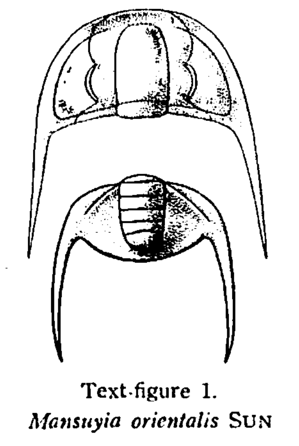
Mr. Takeo ICHIKAWA for his careful preparation of this material for study.

Family Leiostegiidae BRADLEY,

Genus *Mansuyia* SUN, 1924, em. 1935

1924 *Mansuyia* SUN (pars). *Palaeontol. Sinica, ser. B, vol. 1, fasc. 4*, p. 50.
1935 *Mansuyia* SUN, *Palaeontol. Sinica, ser. B, vol. 7, fasc. 2*, p. 57.
1937 *Parama suyella* ENDO, in RESSER and ENDO, *Manchurian Sci. Mus. Bull. 1*, p. 356.
1939 *Paramansuyia* ENDO, *Jubilae Publ. Comm. Prof. Yabe's 60th Birthday, vol. 1*, p. 9.
1912 *Mansuyia* RESSER, *Smithson. Misc. Coll. vol. 101, No. 15*, p. 30.

Diagnosis:—Leiostegiidae with a pair of lateral spines on the pygidium; similar to *Prochuangia* but the cranidium is broader and the glabella generally a little shorter, leaving a narrow space behind the frontal border.



Text-figure 1.
Mansuyia orientalis SUN

Type Species:—*Mansuyia orientalis* SUN, 1924, em. 1935. (Plate 13, figures 13-15, text-fig. 1)

Remark:—WALCOTT was the first to report this kind of pygidia to occur in Eastern Asia, in calling *Hysterolenus*? spp. undt. (1913). Later. GRABAU (1923-24) paid attention to the occurrence of *Ceratopyge* like form for which he intended to give a new name *Ceratopyge orientalis*. This manuscript name of the species was adopted by SUN to a new genus, *Mansuyia*, when he established it (1924). Later however, he excluded the cranidium from this species and referred it to his *Taishania taianensis*. The cranidium then referred to *M. orientalis* was identical with *Paramansuyella planilimbata* ENDO, 1937, (pl. 70, figs. 16-17).

Notwithstanding that SUN's *Mansuyia* thus became based on the pygidium, ENDO applied *Mansuyia orientalis* to *Taishania taianensis* and gave a new name, *Paramansuyia chinensis*, for a *Mansuyia* having the same cephalon with SUN's *Chuangia batia*, 1924, non WALCOTT, 1925. *Paramansuyia* ENDO, 1939 is evidently a misspelling of *Paramansuyella* ENDO, 1937, which is a synonym of *Mansuyia* because *Paramansuyella puteata* ENDO, 1937, which is the type of the genus, is congeneric with *Mansuyia orientalis*. But *P. granulosa* ENDO, 1937, is certainly located more properly in *Kaolishania* because of its distinct segmentation, broader fixed cheek and granulated test.

Another confusion was brought about by RESSER (1912) through his misunderstanding of the type of *M. orientalis*. Expressing the opinion that the types should be the Fengshanian i.e. late Upper Cambrian ones from the Kaiping basin in Chihli. instead of those from the middle Upper Cambrian *Kaolishania* zone at Kaolishan in Shantung, he proposed a new name, *M. endoi* for *M. orientalis* s. str. It is, however, quite evident in SUN's works (1924, 35) that the type of *M. orientalis* in his mind is the pygidium from the *Kaolishania* zone in Shantung which has incurved lateral spines issuing from a pair of the thick second pleural ribs divergent from each other with the angle of about 45 degrees in between. Therefore the lectoholotype must be the specimen in fig. 7g on pl. 3 in SUN, 1924. Accordingly RESSER's *endoi* is a superflous name. Further his *Paramansuyella taianensis* (1942) is another superflous one. As mentioned above, *Paramansuyella* is a synonym of *Mansuyia*. The minor differances he pointed out between the specimens of *M. orientalis* of Shantung by SUN, 1924 and 1935, are no more than individualities as endorsed by the fact that *taianensis* occurs in association with *Kaolishania pustulosa* at Tawenkou as does *M. orientalis* at Kaolishan, both locolities being closely set in the same province.

It is a question whether the cranidia of *Mansuyia tani* and *Paramansuyella glabra* ENDO, 1937, especially the latter, belongs really to *Mansuyia*. The former appears closer to *Tsinania* except the peculiar triangular depression in front of the glabella. Nevertheless its pygidium can safely be referred to the genus. SUN is of opinion that the two pygidia of WALCOTT's *Hysterolenus*? sp. above mentioned, belongs to *M. tani*, but in the absence of the depressed border, they are closer to *M. orientalis*. The spines, however, issue from the more posterior point in WALCOTT's than in *M. orientalis*. Furthermore their occurrences from the *Tsinania-Dictyites* zone must be taken into consideration. One of them in fig. 9 on pl. 22 is on the other hand intimately related to, if not identical with ENDO's *Hysterolenus* sp. undt. (1937, pl. 71, fig. 3) from the *Tsinania* zone for which I wish to give a new name, *Mansuyia manchurica*. Because their axial lobes are prominent, they are referred to *Mansuyia*. The Fengshanian pygidia of *Mansuyia orientalis* (SUN, 1924, pl. 3, figs. 7i–j) on which GRABAU has first given *Ceratopyge orientalis* (non. nud.) in his manuscript, may also be in the fold of this species, s.l. Another pygidium of WALCOTT's (pl. 22, fig. 9a) on the contrary may be referred to *Tsinania humilis*.

In conclusion the greatly confused taxonomy of *Mansuyia* is straightened out in the following manner, where the latter is valid and the former invalid.—

Ceratopyge orientalis GRABAU, MS. in SUN, 1924, (from Kaiping)	*Mansuyia manchurica* KOBAYASHI
Chuangia batia SUN, 1924, non WALCOTT	*Mansuyia chinensis* (ENDO)
Hysterolenus sp. undt. ENDO 1937	*Mansuyia manchurica* KOBAYASHI
Hysterolenus (?) sp. undt. WALCOTT, 1913	{ *Mansuyia manchurica* KOBAYASHI { *Tsinania humilis* KOBAYASHI*
Mansuyia SUN, 1924	{ *Mansuyia* SUN, 1924, em. 1935 { *Taishania* SUN, 1935
Mansuyia endoi RESSER, 1942	*Mansuyia orientalis* SUN
Mansuyia orientalis ENDO, 1939, non SUN	*Taishania taianensis* SUN
Mansuyia orientalis SUN, 1924	{ *Mansuyia orientalis* SUN { *Mansuyia* cfr. *manchurica* KOBAYASHI { *Taishania taianensis* SUN
Mansuyia tani SUN, 1935	*Mansuyia* (?) *tani* SUN
Paramansuyia ENDO, 1939, (nom. nud.)	*Mansuyia* SUN, 1924, em. 1935
Paramansuyia chinensis ENDO, 1939	*Mansuyia chinensis* (ENDO)
Paramansuyella ENDO, 1937	*Mansuyia* SUN, 1924, em. 1935

Paramansuyella glabra EDNO, 1937	*Mansuyia* (?) *glabra* (ENDO)
Paramansuyella granulosa ENDO, 1939	*Kaolishania*
Paramansuyia planilimbata ENDO, 1937	*Mansuyia orientalis* SUN
Paramansuyella puteata ENDO, 1937	*Mansuyia puteata* (ENDO)
Paramansuyella taianensis RESSER, 1942	*Mansuyia orientalis* SUN

Finally *Mansuyia orientalis* is quite similar to *Prochuangia mansuyi* KOBAYASHI, 1935, but they are distinguished on account of not only the above mentioned differences but also the time interval from early Changshanian to Daizanian in which the transformation has taken place.

Distribution:—*M. orientalis*, *M. chinensis* and *M. puteata* and possibly *M. tani*, all from the Daizanian, and *M. manchurica* from the Fengshanian belongs to this genus.

Mansuyia manchurica KOBAYASHI, new species

1913 aff. *Hysterolenus?* sp. undt. WALCOTT, *Research in China 3*, p. 219, pl. 22, fig. 9, 9'.
1924 aff. *Mansuyia orientalis* SUN, *Pal. Sinica. B, 1, 4*, p. 50, pl. 3, figs. 7i–j only.
1937 *Hysterolenus* sp. undt. ENDO, *Manchurian Sci. Mus. Bull. 1*, p. 342, pl. 71, fig. 3.

ENDO's holotype pygidium has unfurrowed pleural lobes. Their anterior parts whence a pair of spines are projected far back, are distinctly elevated above their posterior.

Because SUN's pygidium is remarkably parallel sided and the spines of WALCOTT's appears to be directed more laterally, they may be readily distinguishable specifically, if more will be known of them. No cephalon is however known of them.

Occurrence:—Fengshanian at the neck of the Liautung peninsula (Paichiashan), Hopei (Machiakou) and Shantung (Chaumitien).

Family Tsinanidae KOBAYASHI, 1931

This includes effaced trilobite genera as typified by *Tsinania*, but a posterior spine or a pair of lateral spines may be present on the pygidium. The glabella subquadrate or a little narrowing forward, if can be figured out. The eyes are medium in size and located always slightly posterior to the middle; fixed cheek not very broad. The anterior facial suture reveals a weak lateral convexity; posterior one short and diagonal.

Camaraspis, *Plethopeltis*, *Plethometopus*, *Stenopilus* and *Leiocoryphe* once refered to the family were excluded from it (KOBAYASHI, 1935, Raymond, 1937). *Maryvillia* and *Giordanella* may also better be excluded from the family because their pygidia are quite different and the glabella of the former narrows forward. *Homodictya* which was .added to the family with a query by RAYMOND (1937), may not be a member of the family, because its glabella is highly elevated and has a rounded anterior outline. The family comprises *Tsinania*, *Dictyites*, *Dictyella*, and possibly *Jubileia* (KOBAYASHI, 1938) and *Esseigania* (KOBAYASHI, 1943), but the reference of the last two genera to the family is not quite convincing.

Distribution:—Common in Fengshanian, but rare in Daizanian.

Genns Tsinania WALCOTT, 1914

1914 *Tsinania* WALCOTT, *Smiths. Misc. Coll. vol. 64*, p. 43.
1916 *Tsinania* WALCOTT, *Smiths. Misc. Coll. vol. 64*, p. 227.

1931 *Tsinania* KOBAYASHI, *Japan. Jour. Geol. Geogr. vol. 11*, p. 134.
1935 *Tsinania* KOBAYASHI, *Jour. Fac. Sci. Imp. Univ. Tokyo, sect. 2, vol. 4*, pt. 2, p. 303.

Historical Review:—On the basis of *Illaenurus canens* WALCOTT instituted this genus (1914), and later added two species from Utah and British Columbia (1916), which were, however, later excluded from the genus by RAYMOND (1922). After discussing smooth trilobites KOBAYASHI splitted this genus into *Tsinania* s. str. and *Dictya* (1931) which the latter was renamed as *Dictyites* (1935). Subsequently Raymond (1937) described *T. scrinium* from the Rockledge conglomerate in Vermont. It is represented by a pygidium similar to that of *Tsinania*, but as it is a solitary species outside of Eastern Asia, its generic reference cannot be warranted until its cranidium will be found.

Diagnosis:—Tsinanidae without any concave or depressed border on the cephalon; pygidium generally entire, but may have a pair of lateral spines.

WALCOTT's original diagnosis is read as follows:—

Cranidium subrhomboidal in outline; moderately convex; slight traces of an occipital ring at base of the glabella. Palpebral lobes just back of the center of the cranidium, and of medium size. Postero-lateral limbs subtriangular, short. Facial sutures curving inward so as to give a rounded front to the cranidium.

Surface smooth or minutely punctate.

Associated pygidia of species referred to the genus a little broader than long and with a slightly defined, narrow, long median lobe marked by obscure transverse furrows that may be faintly outlined on the broad lateral lobes.

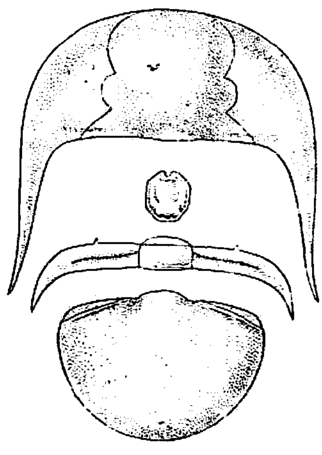
Type.—*Illaenurus canens* WALCOTT, 1905.

Specific list.—*Illaenurus ceres* WALCOTT, 1905, *Illaenurus pagoda* SUN, 1924, *Tsinania longa* KOBAYASHI, 1933, *Tsinania* (?) *humilis* KOBAYASHI, 1933, *Tsinania ceres* var. *shansiensis* SUN, 1935, *Tsinania peipingense* SUN, 1935, *Tsinania acuta* SUN, 1935, *Tsinania tingtaohengi* SUN, 1935, *Tsinania vulgaris* RESSER and ENDO, 1937, *Tsinania convexa* RESSER and ENDO, 1937, *Tsinania longicephala* RESSER and ENDO, 1937, all from Eastern Asia; *Tsinania* (?) *scrilnium* RAYMOND, 1937, from eastern North America.

Remark:—Since the key to the genus had been given (KOBAYASHI, 1933), many species were added. As the result of their comparison, I think that *T. canens* with *pagoda* and *shansiensis* as its varieties, *T. longa*, *T. humilis* and possibly *T. shansiensis* are all valid species. The glabella and the axial lobe of the pygidium are clearly outlined in var. *shansiensis*, while the effacement is most advanced in var. *pagoda*. The distinct punctation on the test distinguishes *T. tingtaohengi* from *T. canens*. As noted already (KOBAYASHI, 1942), *T. peipingense* and *T. acuta* are probably deformed *T. canens*. ENDO (1944) noted that *T. vulgaris* and *T. longicephala* are synonyma of *T. canens* but, in my opinion, the latter may be a member of *Dictyites* and a part of the former (pl. 56, figs. 21–22) is referable to *T. humilis*.

WALCOTT's *T. canens* comprises two distinct cranidia. One (WALCOTT, 1913, pl. 23, fig. 3) having a quadrate anterior outline is the holotype, and it is more rounded in the other (fig. 3a), *T. ceres* (fig. 4) being intermediate. Other biocharacters are also variable in *T. canens* to some extent. The outline of the glabella seen on the exfoliate surface is subquadrate (KOBAYASHI, 1933, pl. 14, fig. 4). It is more distinctly outlined by the dorsal furrow in var. *shansiensis.* In this variety the axial lobe on the pygidium is also distinct, but less so in the typical form and almost indiscernible in var. *pagoda* except the insision on the articulating margin. The breadth to height proportion of the pygidium varies from 10 to 7.4 in *T. canens.* It is much longer or shorter respectively in *T. longa* or *T. humilis,* both of which are, however, represented by pygidia only.

Distribution:—*Tsinania* is the best index to the Fengshanian in Eastern Asia, because its occurrence is restricted to the series in which, however, it is ubiquitous and abundant and because it is easy to recognize by its smooth convex carapace. It is, however, unknown in Southeastern Asia.



Text-figure 2.

Tsinania canens (WALCOTT)

Tsinania canens WALCOTT, 1905

Plate 13, figures 1-8, text-fig. 2.

1905 *Illaenurus canens* WALCOTT, *Proc. U. S. Nat. Mus. vol. 29,* p. 96.

1905 *Illaenurus ceres* WALCOTT, *ibid.* p. 97.

1905 *Illaenurus canens* WALCOTT, *Research in China, vol. 3,* p. 222, pl. 23, figs. 3, 3a-c.

1913 *Illaenurus ceres* WALCOTT, *ibid.* p. 223, pl. 23, figs. 4, 4a.

1913 *Illaenurus* sp. undt. *ibid.* pl. 23, figs. 6, 6′.

1922 *Illaenurus pagoda* SUN, *Pal. Sinica, B, I. 4,* p. 81, pl. 5, figs. 10a-c.

1931 *Tsinania canens* KOBAYASHI, *Japan. Jour. Geol. Geogr. 8,* p. 186, pl. 20, figs. 7-9.

1931 *Tsinania canens* var. *pagoda* KOBAYASHI, *ibid.* p. 20, pl. 20, fig. 10.

1935 *Tsinania canens* KOBAYASHI, *Jour. Fac. Sci: Imp. Univ. Tokyo 2, IV, 2,* p. 306, pl. 5, fig. 20, pl. 6, figs. 13-14.

1935 *Tsinania canens* var. *shansiensis* SUN, *Pal. Sinica, B, 7, 2,* p. 53, pl. 5, figs. 20-21.

1935 *Tsinania ceres* SUN, *ibid.* p. 54, pl. 6, figs. 26-27.

1935 *Tsinania peipingensis* SUN, *ibid.* p. 55, pl. 5, figs. 22-23, text-fig. 6

1935 *Tsinania acuta* SUN. *ibid.* p 55, pl. 5, fig. 24, text-fig. 7.

1937 *Tsinania vulgaris* RESSER and ENDO, *Manchurian Sci. Mus. Bull. 1,* p 295, pl. 56, figs. 13-18, not 21-22.

1937 *Tsinania convexa* RESSER and ENDO, *ibid.* p. 296; pl. 56, figs. 19-20.

1944 *Tsinania canens* ENDO, *Bull. Centr. Nat. Mus. Manchoukuo, 7,* p. 95.

Description:—Cephalon exclusive of a pair of spines semi-elliptical, a little broader than twice the height, smooth and gently convex, attaining the highest at the median point between the eyes. Cranidium broader than long; glabella merely marked by a pair of pits on the occipital margin where it is as wide as one-third the cranidium; eyes semicircular and located a little posterior to the mid-length of the cranidium. Free cheek provided with a large long genal spine and a deep depression inside of the root of the spine which however, dies out laterally in a short distance. Facial suture anterior to the eyes gradually curving outward, then inward and cutting the anterior margin inside of the eye; that to the posterior to the eye nearly diagonal, though slightly undulated sigmoidally.

Doublure of the free cheek very wide, occupying a half or more from the antero-lateral margin to the eye and then bent abruptly; it becomes, however narrower backwardly and extended into the genal spine. Hypostoma longer than broad, subquadrate, but obliquely truncated on the postero-lateral sides and bordered by a rim with a furrow on its inner side; central body large and oblong; a stout prominent crescentic ridge separated from it by a furrow which however, becomes shallower toward the axis.

Thoracic pleura bears a deep mesial furrow by which the inner half of the pleura is divided into two bands of the same breadth; the outer half flat and broadly falcate; very small but distinct projection located in front of the end of the pleural furrow.

Pygidium about two-thirds as long as broad, well rounded and fairly convex, the convexity becoming stronger near the periphery; anterior margin broadly arcuate; axial lobe marked by a pair of pits on the margin, one-fourth as broad as the pygidium, its length from the anterior to the terminus indicated by a tiny elevation, corresponding to four-fifths of the pygidial length; facet on the lateral side of the pit forming a sharp ridge on its posterior margin. Doublure narrow.

Carapace entirely smooth.

Observation:—In the Jehol collection there are two kinds of thoracic segments one of which (fig. 4) is described above. The other has a wide diagonal furrow and is truncated at the lateral end. The facet is absent, but there is a small but distinct projection on the anterior margin. Because the former agrees well with the posterior aspect of the cephalon, its reference to this species is quite reasonable. The latter may belong to *Hamashania* or else.

It is certainly interesting that the doublure (fig. 3) is subhorizontal but moderately convex for some distance from the periphery and then abruptly bent with the convexity on the outer side. Caused by rock pressure the convexity may be emphasized in different degrees, seeing its variation among the specimens. By the same reason the inner part of the free cheek where the doublure was absent, is strongly depressed in most specimens. It is especially interesting to see in one of them that a thin film thought to be a ventral test is gently convex in this part. The ventral view thus figured out is somewhat similar to that of *Limulus* in that the depressed inner part is surrounded by an elevated border.

The narrow marginal border is seen on a small pygidium about 4 mm. long (fig. 6) and also on another 9 mm. long, both more or less flattened, but not seen on still another of the same length as the latter (fig. 7), which is however, convex. Therefore it is probable that the border was produced or at least emphasized secondarily when the pygidium was flattened. While the axil lobe is segmented in the first, the segmentation is oboslete in the third, although the axial terminus is indicated by a node-like elevation.

In the collection there is a large but incomplete pygldium about 5.5 cm. broad. Its articulating margin is more strongly arcuate than as usual and its axial lobe appears broader. It is the largest so far known of *Tsinania.*

Occurrence:—This is extensively distributed in the Fengshanian in North China, South Manchuria and Korea.

The new observation is made on the specimens from Huangluohsien in Eastern Jehol (loc. 16. in KOBAYASHI, 1911, 1951).

Tsinania humilis KOBAYASHI, 1933

Plate 13, figures 9–11.

1913 *Hysterolenus* ? sp. undt. WALCOTT, *Research in China, 3*, p. 219, pl. 22, fig. 9a.
1933 *Tsinania* ? *humilis* KOBAYASHI. *Japan. Jour. Geol. Geogr. vol. 11*, p. 137, pl. 14, figs. 18-19.
1937 *Tsinania vulgaris* RESSER and ENDO (pars), *Manchurian Sci. Mus. Bull. 1*, p. 56, pl. 56, figs. 21-22, non. 13-18.

It is certainly interesting to see in some specimens of this species from its type locality that there are gradations of loosing the lateral spines. In the specimen in fig. 9 the spine issuing from a point a little behind the antero-lateral angle is, though narrow and broken, thought to have been fairly long, but it is no more than a short projection in the second specimen (fig. 10). In the third (fig. 11 a–b) there is no spine but its vestige is indicated by an up-fold of the periphery at the same place.

As noted by RESSER and ENDO, a pygidium of *T. vulgaris* (fig. 21) has the spine extending beyond the rear end of the pygidium, while the pygidia of similar outline (fig. 22) have none. The spiniferous pygidium of *humilis* resembles that of *Mansuyia manchurica* but is different in the effacement of the axial lobe.

Occurrence:—Paichiashan, Wuhutsui basin, at the neck of the Liaotung peninsula; RESSER and ENDO's specimens from Tangshihling, 2 miles southeast of Yentai.

Genus *Dictyites* KOBAYASHI, 1936

1933 *Dictya* KOBAYSAHI, *Japan. Jour. Geol. Geogr. vol. 11*, p. 137.
1936 *Dictyites* KOBAYASHI, *Jour. Geol Soc. Japan, vol. 43*, p. 932.

Similar to *Tsinania*, but has a concave or depressed border on the cephalon and pygidium.

Because *Dictya* KOBAYASHI was found to be preoccupied by FABRICUS (1905) and others, *Dictyites* was proposed for it.

Specific list.—*Illaenurus dictys* WALCOTT, 1905 (type), *Dictya dolichocephala* KOBAYASHI, 1933, *Dictya trigonalis* KOBAYASHI, 1933, *Dictya depressa* KOBAYASHI, 1935, *Dictya longicauda* KOBAYASHI, 1935, *Dictya taianfuensis* ENDO, 1939.

Remark:—WALCOTT's cranidium is the lectotype of *D. dictys.* The pygidium referred to it is, however, closer to *T. humilis*, except for its relatively prominent axial lobe.

The facial suture appears to be sagittal in *D. depressa.* In this species as well as in *D. longicauda* the border of the pygidium is distinctly depressed. No less than 11 rings are countable on the exfoliated axial lobe on the pygidium of *D. depressa.* The lobe is fairly prominent in *trigonalis.* The cranidium is narrow in the anterior where the sutures are parallel to each other in *D. dolichocephala*, and the glabella is fairly prominent in *D. taianfuensis.* Nevertheless whether these difference bear specific value is a question.

Distribution:—Mostly Fengshanian, but *D. trigonalis* is reported to occur with *Kaolishania, Mansuyia* and *Taishania* at Kaolishan in Shantung. (ENDO, 1939).

Genus *Dictyella* KOBAYASHI, 1933

1933 *Dictyella* KOBAYASHI, *Japan. Jour. Geol. Geogr. vol. 11*, p. 140.

Similar to *Dictyites*, but the marginal border of the pygidium is protruded into a short posterior spine.

This includes *Dictyella wuhuensis* KOBAYASHI, 1933, the type species, and *Dictyella ozawai* KOBAYASHI, and probably *Dictyella* (?) *mansuyi* KOBAYASHI, 1933, i.e. MANSUY'S *Illaenurus ceres*, 1915, non WALCOTT. The cranidium pointed in front in the last mentioned. No cephalon is known of the two others. The generic reference of *Dictyella* (?) *longicephalina* KOBAYASHI, 1933 and *Dictyella*? *transversa* ENDO, 1937, all represented by cranidia, is very tentative. As illustrated in fig. 12, *D. ozawai* occurs at Wafangtien, at the neck of the Liaotung Peninsula. RESSER (1942) referred *Hysterolenus*? *manchuricus* KOBAYASHI, 1933 to *Dictyella* but it belongs to some other genus because it bas no spine but has punctae on the pleurae.

Distribution:—Late Fengshanian in South Manchuria and Haut-Tonkin.

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Addendum 1. *Mansuyia maladiformis* KOBAYASHI, (1935, p. 302, pl. 4, figs. 1-2) which was overlooked in the revision on page 142, is probably a member of the Kainellidae, if not of *Taishania.*

Addendum 2. *Pseudosaukia* KOBAYASHI, 1951, (Art 203 of this journal, n. s. no. 3, p. 78) is found to be preoccupied by *Pseudosaukia* RASETTI, 1941 (Jour. Pal. vol. 18, no. 3, p. 252). Therefore the former is replaced here by *Saukioides.*

Explanation of Plate 13

Figures 1-8. *Tsinania canans* (WALCOTT) ....

1. Cranidium, ×1 2. Free cheek, ×1½
3. Free cheek, ×1½, white line showing the vertical section of the carapace.
4. Thoracic pleura, ×1½ 5. Cranidium, ×1½
6. Pygidium, ×3 7. Pygidium, ×1½
8. Hypostoma, ×2½, anterior part broken off.

Huangluohsien, Eastern Jehol.

Figures 9-11. *Tsinania humilis* KOBAYASHI ....

9. Pygidium with a lateral spine, ×3½, Paichiashan (loc. a_9)
10. Pygidium with a rudimentary lateral spine, ×3½, Taitzushan, (loc. W_{27})
11. Pygidium with vestiges of lateral spines, ×4, Taitzushan, (loc. W_{27})

Chingchiachengtzu, Liaotung peninsula.

Figure 12. *Dictyella czawai* KOBAYASHI ....

Incomp'ete pygidium, ×1½, on the railroad side, at Yüntaishan, Wafangtien, at the neck of the Liaotung peninsula.

Figures 13-15. *Mansuyia orientalis* SUN ....

13. Crandium, ×2, pl. 2, fig. 20 in SUN, 1935
14. Free cheek, ×2, pl. 2, fig. 22 in SUN, 1935
15. Pygidium, ×2, pl. 2, fig. 24 in SUN, 1935.

Tawenkou formation; Tawenkou, Taian, Shantung.

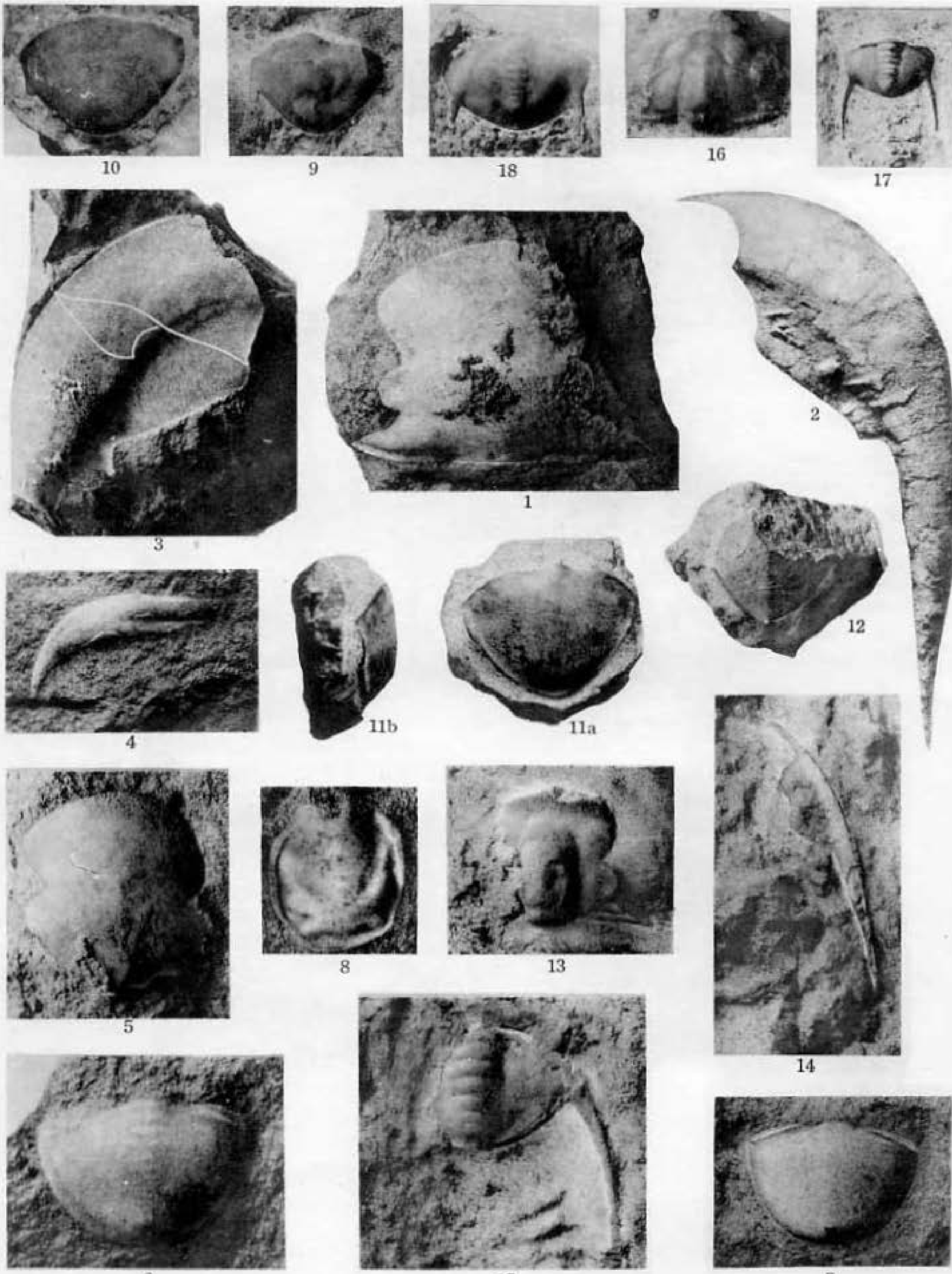
Figures 16-18. *Mansyuia tani* SUN ....

16. Cranidium, ×2, pl. 5, fig. 12 in SUN, 1935
17. Pygidium, ×2, pl. 5, fig. 14 in SUN, 1935

Tawenkou formation; Tawenkou, Taian, Shantung.

18. Pygidium ×2, Upper Cambrian; Kaolisnan, Taian, Shantung.

All the speciemns are kept in Geol. Inst., Univ. of Tokyo, except the one in fig. 18 in the collection of Geol. and Pal. Inst., Tohoku Univ. at Sendai and those in figs 13-17 in the collection of Nat. Univ. of Peking.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Trans. Proc. Palaeont. Soc. Japan N.S., No. 5, pp. 155—165, 1 text-fig., Feb. 15, 1952.

212. PERMIAN MICROFOSSILS IN THE DODO CONGLOMERATE OF THE YASUBA-TYPE[1) 2)]

KENJI KONISHI

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百々礫岩中の二畳紀化石；かねて時代論に異見のあつた岡山県柵原鉱山北方 5.5 km. 勝田郡北和気村百百附近の礫岩は本邦二畳系下部の上部に多い所謂薄衣・休場式礫岩の一員であることを報告し併せて石灰岩“礫”中の化石若干種の記載を行つた。 小 西 健 二

In Hyogo Pref. and its adjacence there is a formation of unknown age. At first, it was thought either Paleozoic or Mesozoic by KOCHIBE (1895). When a conglomerate was found therein at Dodo 5.5 km. north of Yanahara Mine in Okayama Pref., he referred it to Jurassic. This opinion was upheld by YAMAKI (1903) with some doubt. Later Triassic was suggested by KATO (1923) for its age because *Neoschwagerina* limestone was found in the pebbles of the Dodo conglomerate and because the formation mostly sandy and slaty except the conglomerate, appears to merge northerly with the *Entomonotis*-bearing formation. Lately, KOBAYASHI (1950) cast a question on its Triassic age because limestone has never been found in the Upper Triassic formation or its conglomerate at Nariwa and other places in the same region, about 60 km. south-west of Dodo, although it is abundant in the conglomerate of the Cretaceous "Inkstone Formation".

To decide the dubious age of the conglomerate the writer visited the locality alone at one time and with KOBAYASHI at another with the result it was found that *the Dodo conglomerate is a Permian conglomerate of the Yasuba-type* (KONISHI, 1951).

Salient facts obtained by the writer are summarized as follows:

1) The Upper Triassic Nariwa Group 7km. north of Dodo belongs to a different "zone" from the "zone" where Dodo conglomerate exists, because the two zones are seperated by various intrusive rocks.

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1) Read June 29, 1951; received Oct. 28, 1951.

2) Of the Permian conglomerate the Usuginu conglomerate has first attracted our attention (KOBAYASHI; 1941). Subsequently the Usuginu- and Yasuba-types, besides normal one, were distinguished in the Permo-Carboniferous conglomerates in Japan, where the Usuginu type is rich in granitic boulders and the Yasuba type rich in limestone boulders. Through TORIYAMA's study (1942-47) on the fusulinid limestones in the Yasuba-type of conglomerate two kinds were distinguished, one containing pre-Permian fusulinids only and the other containing Permian and older ones. Because the former lies below the latter in the Sakuradani area in Tokushima Pref. (KOBAYASHI & IWAYA, 1941) and the Yasuba conglomerate at Yasuba in Kochi Pref. belongs to the former kind, the latter was named *Sakuradani conglomerate* by KOBAYASHI (1951).

2) The conglomerate occurs in form of a wedge or lens, as usual for the conglomerate of the Yasuba-type, which measures about 20 m. at the thickest.
3) Pebbles of the conglomerate are mostly igneous rocks, slate, hornstone or chert and "limestone". Igneous rocks are mostly fist-size, fairly rounded and highly altered but referable to rhyodacite, porphyry and porphyrite. In addition there are andesitic to basaltic rocks, serpentine and other plutonic rocks as rock fragments and cobbles.
4) Matrix of this conglomerate consists of sandy grains, argillaceous and small fragments of the above-mentioned rocks.

A: Matrix; B: "Limestone pebble"; ※ Abundance	A	B
1. *Gyroporella* sp. nov.		×
2. *Macroporella* sp.		×
3. *Mizzia velebitana* SCHUBERT?		×
4. Algae gen. & sp. indet.	×	
5. *Staffella* or *Nankinella* (?) sp.		※
6. *Schwagerina pseudochihsiaensis* (CHEN)	×	×
7. *S.* sp. indet.	×	
8. *Neoschwagerina craticulifera* (SCHWAGER)		×
9. *N. minoensis* DEPRAT em. OZAWA		×
10. *Cfr. Sumatrina annae* VOLZ		×
11. *Sumatrina longissima* DEPRAT		×
12. *Yabeina* sp.	×	×
13. "Large fusuline" gen. & sp. indet.	×	
14. *Pachyphloia multiseptata* LANGE		※
15. *P.* sp.		×
16. *Glomospira* spp.		×
17. "*Nodosaria radicula* (LINNE)" in BRADY (1876)		×
18. Crinoid stem joints	×	×

5) Fusulinid individuals with a little eroded test occur not only in the matrix but also in the "limestone pebbles" in the latter of which crinoid stem joints and calcareous algae are also common, as tabulated above.

These fossil assemblage must be late Early Permian which probably corresponds to the age of THOMPSON's "Zone of *Yabeina*" or GERTH's "Sosio Stufe des Unterperms".

Some twenty years ago, it was the current opinion among Japanese geologists that the Permo-Carboniferous formations in Japan contain no conglomerate, but now several kinds of conglomerates are found at numerous places; among them the localities of the Usuginu- and Yasuba[2] types are shown in the annexed map (Text-Figure 1, p. 164). The provenance of the limestone and igneous boulders contained therein is naturally a moot question. Whatever its answer may be, it is certain that the Dodo conglomerate must be Permian because it is intercalated in the formation, although it soon tails out laterally.[3]

Here the writer expresses his sincere thanks to Prof. Teiichi KOBAYASHI, for his instruction and guidance. His thanks are also due to Prof. Riuji ENDO of the Saitama University for his advices on the fossil algae and to Mr. T. ARAI of the Yanahara Mine for the facility in field work.

Systematic Descriptions

Note:—Materials dealt herewith are all obtained from Dodo conglemerate and stored in Geol. Inst., University of Tokyo. Measurement in tables given in mm.

3) Black slate facies represents the Upper Permian deposits in certain places in Japan; peculiar conglomeate like the Dode conglomerate frequently imbedded in the facies.

Family Dasycladaceae

(Order Siphonocladales)

Genus *Gyroporella* GUMBEL, 1872

em. BENECKE, 1876

Gyroporella sp. nov.

Plate 14, Figures 15-16

In two cross sections the thallus oval, its axial cavity wide, if compared with the outer diameter of the calcareous wall. Branches in characteristic drumstick to dumb-bell shape (See Fig. 15) closely arranged on a horizontal whorl. End of every pores covered by a thin calcified wall. No sporangia seen.

Because the wall is exceedingly thin, the find of its longitudinal section may show its being a new species.

Outside diameters of fragment		2,72×2,32	2,23×1,92
Thickness calcification (mean value)		1,72×1,62 (0 21)	1,23×1,08 (0,22)
Diameter central stem		2,12×1,84	1 77×1,41
Diameter branches	d1	0,132 0,067	0,125
	d2	0,17-0,125	0,16
No. of branches in a whorl		25	? (15)

Genus *Macroporella* PIA, 1912

Macroporella sp.

Plate 14, Figures 13-14

Represented by a tangential fragment and several cross sections.

Thallus nearly circular in cross section; central stem of medium thickness; branches broadened gradually toward the top where they open with the maximum diameter. Sporangia unknown.

This does not fit with any described species, I am aware, but a new name is not given because there is no longitudinal section.

Diameter of thallus		2,81×2,46	1,90×1,41
Diameter central stem		1,72×1,62	1,23×1,08
Thickness calcification		0,31—0,46	0,25—0,38
Diameter branches	base	0,025-0,034	0,05-0,067
	top	0,084-0,142	0,101-0,133

Genus *Mizzia* SCHUBERT, 1915

em. JOHNSON, 1942

Mizzia velebitana SCHUBERT?

1951. *Mizzia velebitana* JOHNSON: pp. 23-24, pl. 7. figs. 1-4.

(Synonymic references on this species prior to 1951 are shown in JOHNSON's paper (1951; p. 23).

Several transverse sections questionably referred to the species occur in the Dodo material and some of them are illustrated in Figs. 11 & 12.

Family Fusulinidae MÖLLER, 1878

(Order Foraminifera)

Subfamily Ozawainellinae

THOMPSON & FOSTER, 1937

Genus *Staffella* OZAWA, 1925

or *Nankinella* LEE, 1934

Staffella or *Nankinella* (?) sp.

Many individuals, all ill-preserved, being either one of the two genera. A nearly axial section is illustrated in Fig. 8.

Subfamily Schwagerininae
DUNBAR & HENBEST, 1930

Genus *Schwagerina* MÖLLER, 1877
em. THOMPSON, 1948[4)]

Schwagerina pseudochihsiaensis (CHEN)

Plate 14, Figures 9-10

1934. *Pseudofusulina pseudochihsiaensis* CHEN: pp. 78-79, pl. IX, fig. 13, pl. XI, figs. 8-9.

Description:—Test elongate fusiform, gradually vaulted in the median part, tapering toward rounded poles, composed of seven to seven and a half volutions, 5 to 7 mm. long and 1,6 to 2,2 mm. wide; form ratio 3,30 to 3,60. (Proloculus can not be seen in any section of Dodo material but its diameter may be rather small).

Spirothecal thickness gradually increases from 0,017 mm. in the 1st to 0,110 mm. in the 8th volution; wall consists of a tectum and a thick keriotheca with rather coarse alveoli. Septa fluted narrowly and so highly that the septa reach to the top of the chamber especially near the polar regions all through the whorls; fluting, however, becomes somewhat irregular near the last volution. Septal spaces wide and regular. Both chomata and cuniculi-like structure indistinct, while the two, especially the latter, is distinct in American schwagerinids from Upper Permian; phrenotheca also undeveloped; light axial fillings deposited along the polar regions of the inner volutions.

4) Distinctions of this genus from *Pseudofusulina* ever confused are pointed out by THOMPSON (1948).

Measurement:

S. pseudochihsiaensis		1	2	3
Length		6,82	--	5,74
Width		1,92	2,10	1,74
Form ratio		3,56	--	3,30
No. of volut.		7½	7	7 ?
Height of volut.	1	0,27	?	--
	2	0,36	0,31	--
	3	0,49	0,46	--
	4	0,71	0,69	--
	5	0,99	0,96	--
	6	1,45	1,46	---
	7	1,92	1,96	--
Thickness of spirotheca	1	0,017	--	--
	2	0,018	0,017	--
	3	0,025	0,030	--
	4	0,035	0.037	--
	5	0,054	0,055	?
	6	0,067	0,072	0,091
	7	0,084	0,092	0,110
	7½	0,110	--	--
Diam. of proloculus		(0,19 ?)	?	--

		1	2
Form ratio of volut.	3	3,85	-
	4	3 55	-
	5	3,25	-
	6	3,06	-
	7	3,18	-
Septal count	4	--	16
	5	--	19
	6	--	22
	7	--	27

Remarks:—The three measured specimens coincide with *Pseudofusulina pseudochihsiaensis* from Chihsia limestone. Although the material before hand contains no exactly oriented section, the description is given because of the first occurrence of this species in Japan.

Subfamily Neoschwagerininae
DUNBAR & CONDRA, 1928

Genus *Neoschwagerina* YABE, 1903

Neoschwagerina craticulifera
(SCHWAGER)

1903. *Neoschwagerina craticulifera* YABE: pp. 3~5, pl. I, fig. 3, pl. III, fig. 3.

N. craticulifera		1	2[5]	3
Length		5,18	2,45	9,80
Width		2,74	1,41	5,00
Form ratio		1,85	1,4	1,96
No. of volut.		13	11 ?	11
	1	--	--	--
	2	--	--	--
	3	0,33	--	--
	4	0,45	0,46	--
	5	0,64	0,62	--
Height	6	0,86	0,79	--
of	7	1,00	0,99	---
volut.	8	1,25	1,41	--
	9	1,54	1,54	--
	10	1,84	1,80	--
	11	2,10	2,10	--
	12	2,40	--	--
	13	2,74	--	--

1947. *Neoschwagerina craticulifera* TORIYAMA; pp 76-77, pl. XVII, figs. 4-7. (Many synonymic references omitted.)

This famous cosmopolitan species appears to have a wide range of variation; Dodo form is somewhat slender than the holotype of this species.

Neoschwagerina minoensis
DEPRAT em. OZAWA

1914. *Neoschwagerina craticulifera* var. *minoensis* DEPRAT; p. 27, pl. VII, figs. 9?-10 (non figs. 1-5).

1914. *Neoschwagerina multicircumvoluta* DEPRAT; p. 27, pl. VIII, figs. 2-3 (non figs. 1, 4 & 5).

1927. *Neoschwagerina minoensis* OZAWA; pp. 156-157, pl. XLI, figs. 4-8, 10-15, pl. XLIII, fig. 26.

1936. *Neoschwagerina minoensis* FUJIMOTO; pp. 115-116, pl. XXII, figs. 10-15.

Shell, characteristically rhomboidal. An eccentric axial section consists of more than 10 volutions, the 8th of which is 3,00 mm. long and 2,50 mm. wide (form ratio; 1,16).

Genus *Sumatrina* VOLZ, 1904
em. THOMPSON, 1946

Cfr. Sumatrina annae VOLZ

Plate 14, Figures 2-5, 7.

Observation:—Shell is elongate fusiform with bluntly pointed extremities. Its median region is somewhat bulked gently, but rather irregular forms are seen (Fig. 5) among some immature individuals. Axial coiling is straight to a little arcuate. One of the illustrated specimens in Fig. 3 consists of 12 vo-

5) 2. *Neoschwagerina craticulifera* ?

lutions and measures 8,23 mm. in length and 2,78 mm. in width; accordingly form ratio is 3,0:1. Number of volutions ranges from 8 to 12 in maturity. Spirotheca is composed of a compact thin layer of opaque material with obscure alveolar keriotheca in its lower part. Thickness of spirotheca in a specimen is 15 microns in the 6th volution.

Spherical proloculus is 0,32 mm. to 0,27 mm. in outside diameter with thicker wall than the other spirothecal one, but its structure is indistinct.

The septal structure is composed of the septa, primary transverse septula, axial septula and secondary transverse septula. Primary transverse septula occur throughout the whorls of the shell and reach the base of the spirotheca except for very small pores near the center of the chambers. A secondary transverse septulum is inserted between

Cfr. S. annae		1	2	3	4	5	6	7
Length		8,23	--	3,74	9,32	2,04	2,14	--
Width		2,78	1,84	1,21	2,30	0,86	0,63	1,56
Form ratio		2,98	--	3,13	2,63	2,38	3,42	--
No. of volut.		12	8	6 ?	10 ?	7	3	4 1/4
Diam. of proloculus		0,315	0,275	--	--	0,14	0,30	0,32
Height of volut.	1	0,45	0,47	?	--	0,36	3,39	0,89
	2	0,57	0,56	?		0,49	0,49	1,05
	3	0,71	0,69	0,60		0,63	0,61	1.33
	4	0,84	0,86	0,80		0,82	--	1,56
	5	1,00	1,04	0,98		1,07		--
	6	1,19	1,32	1,21		1,34		
	7	1,41	1,57	--		1,67		
	8	1,59	1,84			--		
	9	1,79	--					
	10	2,13						
	11	2,47						
	12	2,77						
Septal count	1		8					?
	2		?					19
	3		-					25
	4							?

the adjacent primary septula from the fourth or fifth volution. At the same time appears one secondary septulum. From the fifth or sixth to the ultimate volution, two secondary septula develop between the adjacent primary transverse septula, which are in uniform pendant shape but their length in the outer volutions twice to twice and one-half longer than the inner ones. An axial septulum appears from the first or second volution. Beyond the third, its number increases gradually,—two in 4th, two to three in 5th and 6th, and three or more in 7th and 8th volution. They are club-shaped but not uniform in length.

Remarks:—The Dodo form resembles *S. annae* with the elongate fusiform and the arrangement of the axial septula. In the spirothecal structure and arrangement of the secondary transverse septula, however, it is rather similar to afghanellids. Compared with the FUJIMOTO's (1936) *S. japonica* (=*Afghanella*?) which seems to be different from sumatrinids (THOMPSON, 1946 & 48), particularly with regard to the arrangement of the secondary transverse septula, the specimens here referred to *Cfr. S. annae* VOLZ may be an intermediate form between "*S.*" *japonica* and *S. annae.* Although the successive order of the species in the following table may not represent any evolutional trend and relations among afghanellids and sumatrinids, the decreasing tendency of the keriothecal structure, the increasing number of the septula and gradual or continuous changes in many other charcters from *A. schencki* to *S. annae* can hardly be overlooked. Thus *Sumatrina* (s. str.) and *Afghanella* are connected by intermediate forms. Any further discussion is, however, defered until some other occasion and here the Dodo form is tentatively referred to *Sumatrina annae.*[6]

Af.: *Afghnella* *S.*: *Sumatrina*		*Af.* *schencki*	*Af.* *pesulinensis*	*S* (?) *japonica*	*Cfr. S.* *annae*	*S.* *annae*
Form		Af.-type	Af.-type	S.-type	S.-type	S.-type
Spirotheca		Af.-type	Af. type	Af.-type ?	Af.-type	S.-type
1	a	8rd vol.	?	?	1st-2nd v.	1st v.
	b	1 (4)	?	?	1 (4 ?)	1 (7)
2	a′	4th-5th v.	8th v.	8th v.	4th 5th v.	1st v.
	b′	1 (2)	1 (2)	1 (2)	1 (2)	2 (4)

1. Number of volution (a) where one or more axial septula (b) appear.
2. Number of volution (a′) where one or more secondary transverse septula (b′) appear.
Number in ( ), either b & b′, shows number of septula at the ultimate volution.

6) According to THOMPSON's opinion, it is probable that *S. sumatrinaeformis* may be a member of afghanellids. But neither its original description nor illustration is accessible to the writer.

Sumatrina longissima DEPRAT

Plate 14, Figure 12

1914. *Sumatrina longissima* DEPRAT: pp. 36-37, pl. V, figs. 1-6

DEPRAT (1914) segregated extraordinary elongate sumatrinids from *S. annae* and gave a new name, *S. longissima*. It was found associated with "*Fusulina granum-avenae* ROEMER" and "*Schwagerina douvillei* DEPRAT". Its distinctions he noted were (1) form ratio, (2) number of volutions, and (3) smaller number of secondary transverse septula. But the diameter of proloculus, height of volutions, number of septa are about the same between the two. The species was ignored by OZAWA (1927). The Dodo specimen at hand is, however, tentatively identified with *longissima* with some question, because its eccentric axial section is unusually elongate as DEPRAT's.

S. longissima	1	2
Length	8 9	10,24
Width	(1,8-1 9)	2,33
Form ratio	4,5	4,4
No. of volut.	9-10	5+?

1. Type from Cambodge
2. Specimen from Dodo

Genus *Yabeina* DEPRAT, 1914

Yabeina sp. indet.

Plate 14, Figure 1

This is a common member as represented by many oblique sections.

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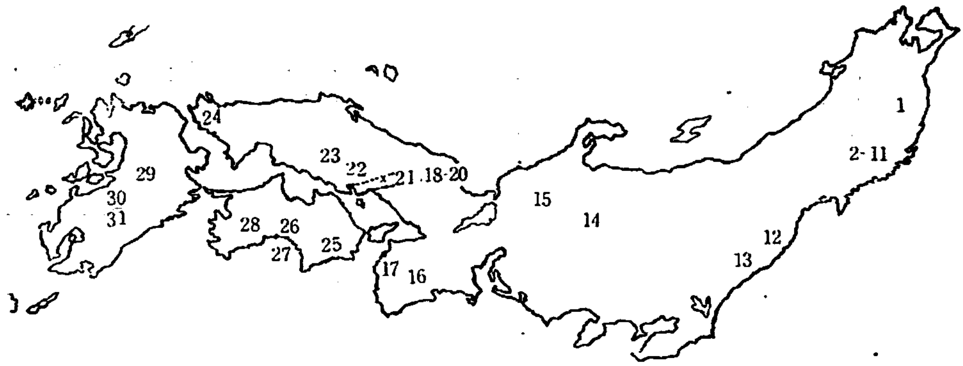
Text-figure 1. Map showing the distribution of the conglomerates of the Yasuba- and Usuginu types in Japan.



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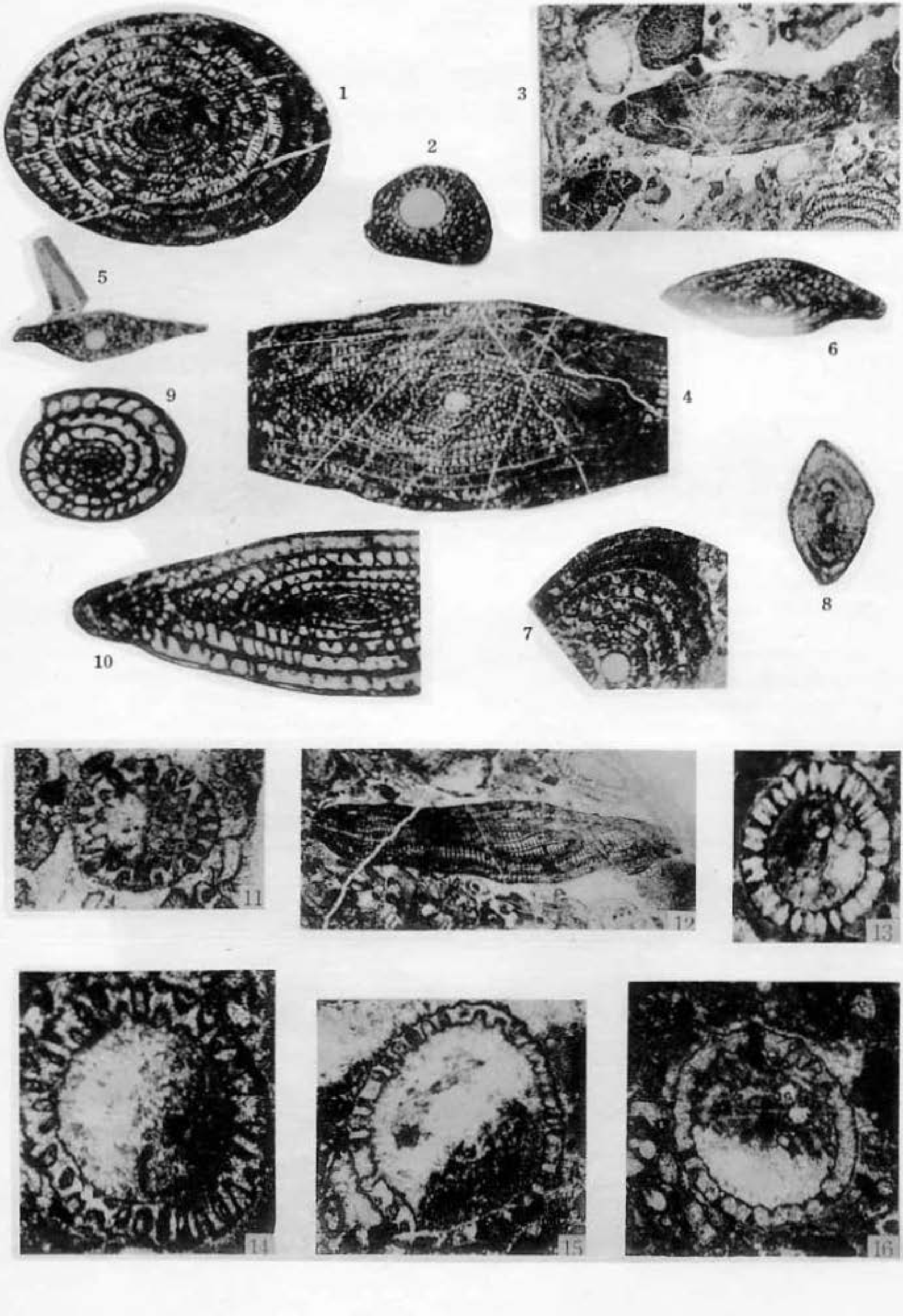
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Explanation of Plate 14

Fig. 1. *Yabeina* sp., oblique section (×16).
Figs. 2-5, 7. *Cfr. Sumatrina annae* VOLZ.
2. Imperfect sagittal section (×21) (rather large proloculus).
3. Axial section (×5).
4. Enlarged part of Fig. 3 (×12).
5. Axial section of an immature individual, with *Pachyphloia multiseptata* LANGE. (×15).
7. Imperfect sagittal section (×18).
Fig. 6. *Neoschwagerina craticulifera* (SCHWAGER) ?, imperfect axial section. (×15).
Fig. 8. *Staffella* or *Nankinella* (?) sp., nearly axial section. (×20).
Fig. 9-10. *Schwagerina pseudochihsiaensis* (CHEN).
9. Eccentric but nearly axial section. (×15).
10. Parallel section. (×14).
Fig. 11. *Mizzia velebitana* SCHUBERT? (×15).
Fig. 12. *Sumatrina longissima* DEPRAT, eccentric axial section with *Mizzia velebitana* SCHUBERT? (×6).
Figs. 13-14 *Macroporella* sp.
13. Obliquely cross section. (×15).
14. Same. (×16).
Figs. 15-16 *Gyroporella* sp. nov.
15. Cross section. (×15).
16. Obliquely cross section. (×14).

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PROCEEDINGS OF THE PALAEONTOLOGICAL SOCIETY OF JAPAN

「日本古生物学会第47回例会」昭和26年10月20日東北大学理学部地質学古生物学教室に於て開催す（参会者47名）。講演者並に演題目次の如し。

Fossil Diatoms from the Owazawa Formation of the Hirosaki Basin ...... Taro KANAYA
那須火山泥流中より得られた化石木に就いて（代読）............亘理俊次・山内 文
熊本県飽託郡芳野村川床産化石植物 遠藤誠道
大分県産二・三の化石植物..............遠藤誠道
宮城県米谷附近の二畳紀石灰藻について ....遠藤隆次
Noté à propos de quelques plantes fossiles du groupe du Ennichi de la Corée—2（代読）.........Toshimasa TANAI
植物遺体と花粉分析結果との比較 ...奥津春生
On the so-called *Gigantopteris* .... Kazuo ASAMA
仙台附近旗立層の化石有孔虫群について ....高柳洋吉
Some Permian Microfossils from Imogadaira, Fukui Prefecture（代読）..... Kenji KONISHI
Schwagerina having cuniculi（代読）...... Rokuro MORIKAWA
熱河の凿山化石群 ....小林貞一
熱河の秋樹溝化石群 ....小林貞一
福島県信夫郡中野村大平産のカニ化石（予報）..............今泉力蔵
仙台附近産中新世アナジャコ化石 ...今泉力蔵
岩手県湯田産のカニ化石 ....今泉力蔵

「日本古生物学会第48回例会」昭和26年12月12日北海道大学理学部地質学鉱物学教室に於て開催す（参会者21名）。講演者並に講演題目次の如し。

On Some Mesozoic Plants having Leaves of Annularian Type（代読）.............. Nobuo KOBATAKE
Existence of the Phrenothecal Structure in Some Parafusulinids of Japan（代読）..............Kenji KONISHI
Recent and Fossil *Baculogypsinoides* YABE and HANZAWA from the Ryukyu Islands and their Adjacent Sea, with Remarks on Some Recent and Fossil Spinose Foraminifera（代読）... Shôshirô HANZAWA
川端統の二・三の化石 ....魚住 悟
北海道産化石 *Neptunea* 属の二・三種... 松井 愈
宮古白堊紀産 Neritidae に就いて（代読）.............. 花井哲郎
Acanthoceras について ....深田淳夫
日本産二畳紀腕足類の研究（第1報）...... 早坂一郎・湊 正雄
Reticulinae と Martininae のあるものについて ....湊 正雄
Apatokepharids と Remopleurids との関係について（代読）..................小林貞一
化石 *Estherites* の産状から見た湖の底流に就いて（代読）.........小林貞一・楠見 久
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Announcement

Bibliography of Japanese Palaeontology and Related Sciences
1941-1950

including papers published by Japanese authors as well as those by others which concern Japan and its surroundings

Compiled by

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CONSTITUTION
of the
PALAEONTOLOGICAL SOCIETY OF JAPAN

ARTICLE 1. Name

The Society shall be known as the Palaeontological Society of Japan. The Society is a section of the Geological Society of Japan.

ARTICLE 2. Object

The object of the Society shall be to promote the study of palaeontology and related sciences.

ARTICLE 3. Achievement

The Society in order to execute Article 2 shall (a) issue the Society journal and other publications, (b) hold or sponsor scientific lectures and meetings, and (c) sponsor collecting or field trips, and lectures.

ARTICLE 4. Membership

The Society shall be composed of persons who are active of interested in palaeontology or related sciences, and shall be known as regular members, honorary members, and patrons.

ARTICLE 5. The members of the Society shall be obliged to pay annual dues to the Society, for which they shall enjoy the privilege of receiving the Society's journal and of submitting papers which have been read and discussed at the meetings for publication in the Society's journal.

ARTICLE 6. Administration

The Society shall have the following organizations for its administration.

(a) General meeting. The general meeting shall be composed of the Society members. More than one tenth of regular members shall be present to hold general meetings. Administrative affairs shall be decided during the general meeting.

(b) President. The president shall be elected from among the regular members. The president shall represent the Society and supervise its business matters.

(c) Council. The council shall be composed of councillors who are elected from among the regular members. The council shall discuss administrative affairs.

(d) Business council. The business councillors shall be elected from among the council members, and shall administer business affairs.

(e) Officers shall be elected by vote of returned mail ballots, as a general rule.

ARTICLE 7. Amendments to the constitution shall be by decision of the general meeting.

By-Laws and Administration

ARTICLE 8. The Society's journal shall be issued three times a year.

ARTICLE 9. Regular members shall be persons who have knowledge, experience, or interest in palaeontology or related sciences.

ARTICLE 10. Patrons shall be selected individuals or organizations who give special support to the objectives of the Society.

ARTICLE 11. Honorary members shall be persons of distinguished achievement in palaeontology. The council shall nominate honorary members for decision by the general meeting.

ARTICLE 12. Applicants for membership to the Society shall submit their full name, mailing address, date of birth, occupation, and name of school from which they graduated.

Dues

ARTICLE 13. Rates for annual dues of the Society shall be decided during the general meeting. Annual dues for regular members is Yen 400.00 (domestic members) and U.S. $2.00 (foreign members). Patrons are individuals or organizations donating more than Yen 10,000.00 annually. Honorary members are free from obligations.

ARTICLE 14. The Society income shall be from membership dues and bestowals.

ARTICLE 15. The Society shall have one chairman, fifteen councillors, and several business councillors, whose term of office shall be one year. They may be re-elected.

Addendum

ARTICLE 1. There shall be four business councillors for the present.

ARTICLE 2. The Society journal shall be issued twice a year for the present.