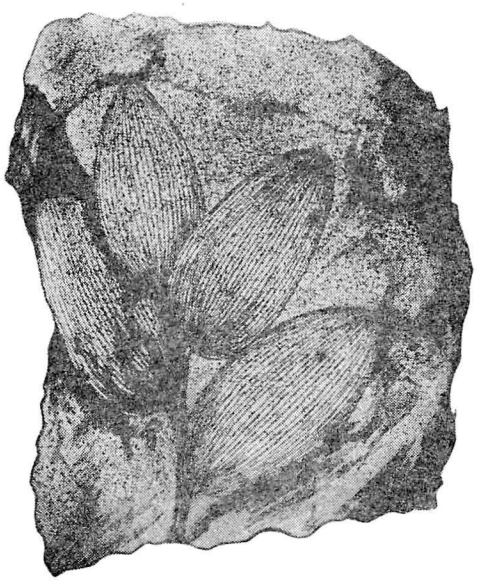
ISSN 0031-0204

日本古生物学會報告・紀事

Transactions and Proceedings of the Palaeontological Society of Japan

New Series No. 110



日本古生物学会

Palaeontological Society of Japan
June 30, 1978

Officers for 1977 – 1978

The fossil on the cover: Original figure of *Podozamites Reinii* GEYLER, 1877, from the Tetori group. GEYLER's description marked the onset of modern palaeontology in Japan.

All communications relating to this Journal should be addressed to the
PALAEONTOLOGICAL SOCIETY OF JAPAN,
c/o Business Center for Academic Societies,
Yayoi 2-4-16, Bunkyo-ku, Tokyo 113, Japan.
Sole agent: University of Tokyo Press, Hongo 7-3-1, Tokyo, Japan.

Trans. Proc. Palaeont. Soc. Japan, N.S., No. 110, pp. 297-305, pls. 40, 41, June 30, 1978

688. TRIASSIC CORALS FROM MT. DAIFUGEN, NARA PREFECTURE, SOUTHWEST JAPAN*

HISASHI OKUDA

Osakabe Primary School, Yao City, 581

and

NOBUO YAMAGIWA

Department of Earth Science, Osaka Kyoiku University, Osaka City, 543

Abstract. Nine species including one new species and one new subspecies of hexacoral described in this article were found from "limestone blocks" which are contained in greenstone at Wasabidani in the eastern part of Mt. Daifugen, Nara Prefecture, Southwest Japan. Judging from the paleontological data, we consider that the age of the present hexacoral assemblage is Late Triassic.

Introduction and geological summary

Recently, some hexacorals and fusulinids were collected by the members of the Yamato Ominé Research Group from "limestone blocks" which are contained in greenstone at Wasabidani (Wasabi Valley) in the eastern part of Mt. Daifugen, Nara Prefecture, Southwest Japan. In this article nine species including one new species and one new subspecies of hexacorals are described, and the age of the hexacoral assemblage is discussed.

The geology around Mt. Daifugen was investigated by SHIIDA (1962) and the Yamato Ominé Research Group (1976). According to the Yamato Ominé Research Group, the strata of this area can be divided into three formations called A, B and C at Wasabidani. They have a general strike of N 60°-80° E and dip northward at about 5-20 degrees.

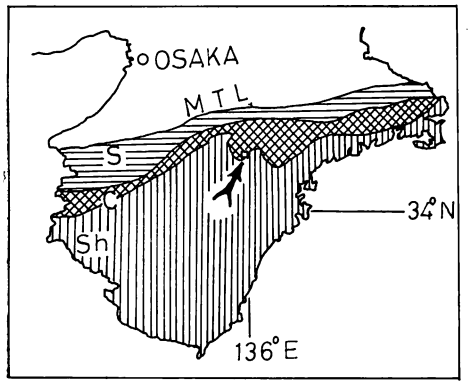
*Received June 30, 1977; read Jan. 30, 1976 at Naruko.

The A formation (450 m+ thick) is characterized by sandstone, and alternation of mudstone and sandstone. No fossil occurs in this formation. The boundary between the A and B formations is considered to be a fault with a gentle dip nearly parallel to their bedding planes.

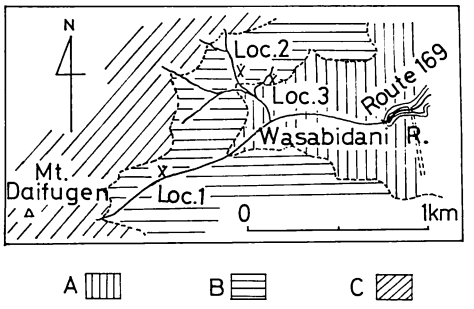
The B formation (100-450 m+ thick) consists of greenstone, chert and limestone. Late Triassic hexacorals and Middle Permian fusulinids (*Yabeina globosa* and others) are found from "subangular limestone blocks" of pebble to boulder size contained in greenstone. From the evidence of the hexacoral assemblage, this formation may be Late Triassic or younger. It is overlain conformably by the C formation.

The C formation (700 m+ thick) is composed mainly of sandstone and chert, and subordinately associating mudstone and greenstone. No fossil has been found.

According to the Yamato Ominé Research Group, the A formation geotec-



Text-fig. 1. Index map of Mt. Daifugen. S: Sambagawa belt, C: Chichbu belt, Sh: Shimanto belt, MTL: Median tectonic line.



Text-fig. 2. Map showing the fossil localities at Wasabidani in Mt. Daifugen. A: A formation, B: B formation, C: C formation.

tonically belongs to the Shimanto belt, and the B and C to the southern subbelt in the Chichibu belt. Therefore, the fault between the A and B formations corresponds to the Butsuzo tectonic line.

Palaeontology and correlation

Some hexacorals were discovered from three localities (text-figs. 2, 3) at Wasabidani (Table 1).

1) Species from loc. 1

Montlivaltia norica ominensis subsp. nov. resembles *M. norica norica*. The latter was reported by FRECH (1890) from the Zlambach Formation in Austria, by VINASSA

Table 1. List of Late Triassic corals from Mt. Daifugen.

Species and subspecies \ Localites	Loc. 1	Loc. 2	Loc. 3
Montlivaltia norica ominensis subsp. nov.	×		
M. sp. aff. *M. stylophylloides*		×	
M. sp. indet.	×		
Thecosmilia wasabidaniensis sp. nov.	×		
T. sp. aff. *T. eguchii*	×		
Pinacophyllum ? sp. indet.	×		
Thamnastrea (*Thamnastrea*) sp. indet.	×		
Procyclolites ? sp. indet.		×	
Isastrea sp. aff. *I. major*	×		
I. sp. indet.	×		
Procyclolitidae gen. sp. indet.			×

(1915) from the Upper Triassic at Pualaca, Timor, by SMITH (1927) and SQUIRES (1956) from Carno-Norian in Idaho, Oregon and Alaska. It is also similar to the species described by KANMERA (1964) as *Montlivaltia* sp. cf. *M. norica* from the Koguchi Formation of the Konosé Group, Kyusyu, Japan.

Montlivaltia sp. indet. is related to *M. stylophylloides* from the Upper Triassic in Timor (VINASSA, 1915) and *M.* sp. cf. *M. stylophylloides* from the Koguchi Formation of the Konosé Group (KANMERA, 1964).

Thecosmilia wasabidaniensis sp. nov. resembles *T. badiotica* from the St. Cassian Formation in southern Tyrol (VOLZ, 1896). It is also allied to *Thecosmilia eguchii* from the Koguchi Formation of the Konosé Group (KANMERA, 1964).

Thecosmilia sp. aff. *T. eguchii* is allied to *T. eguchii* described by KANMERA (1964). The latter occurs in the Koguchi Formation of the Konosé Group.

Pinacophyllum ? sp. indet. is similar to *P. gracile* reported by VOLZ (1896) from St. Cassian Formation in southern Tyrol.

Isastrea sp. aff. *I. major* is related to *I. major* from the Zlambach Formation (FRECH, 1890) and the Carno-Norian in Idaho (SQUIRES 1956). It is also similar to *Elyastraea* ? sp. from the Koguchi Formation of the Konosé Group (KANMERA, 1964).

Isastrea sp. indet. resembles *I. austriaca* var. *sprendes* FRECH (1890) from the Zlambach Formation, *I. guembeli* var. *minor* VINASSA (1915) from the Upper Triassic in Timor and *Actinastrea* ? sp. indet. by YAMAGIWA (1963) from the Upper Triassic in Timor.

Thamnasteria (*Thamnasteria*) sp. indet. closely resembles *T.* (*T.*) sp. from the Koguchi Formation of the Konosé Group (KANMERA, 1964) and *T.* (*T.*) *loretzi* from St. Cassian Formation in southern Tyrol (VOLZ, 1896).

2) Species from loc. 2

Montlivaltia sp. aff. *M. stylophylloides* is similar to *M. stylophylloides*. The latter was reported by VINASSA (1915) from the Upper Triassic in Timor. The present species also resembles *Montlivaltia* sp. cf. *M. stylophylloides* from the Koguchi Formation of the Konosé Group (KANMERA, 1964).

Procyclolites ? sp. indet. resembles *P. timoricus* described by VINASSA (1915) from the Upper Triassic in Timor and *P.* ? sp. aff. *P. timoricus* by KANMERA (1964) from the Koguchi Formation of the Konosé Group.

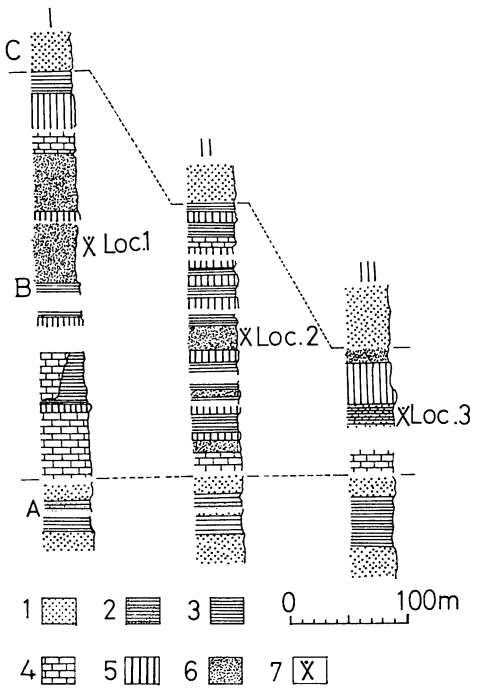
In addition, fusulinids such as *Yabeina globosa* and Schwagerininae gen. and sp. indet. were found from other limestone blocks at the same locality.

3) Species from loc. 3

One species belonging to the family Procyclolitidae occurs at this locality. As its generic assignment is not yet clear, it is not described in this article. It appears to resemble the species described by KANMERA (1964) as *Procyclolites* sp. cf. *P. triadicus* from the Koguchi Formation of the Konosé Group.

Some fusulinids such as *Yabeina globosa*, *Colania* sp. indet., *Reichelina* sp. indet. etc. were obtained from other limestone blocks at the same locality.

Judging from the above mentioned palaeontological data at the three localities, the present hexacoral assemblage show certain affinity with those from the Zlambach Formation of Rhaetian (-Late Norian) age in Austria, the St. Cassian Formation of Carnian age in southern Tyrol, the Carno-Norian in northwestern North America, the Upper Triassic at Pualaca, Timor and the Carno-Norian Koguchi Formation of the Konosé group, Kyusyu, Japan. Therefore, we consider that the age of the present coral assem-



Text-fig. 3. Columnar sections at Wasabidani in Mt. Daifugen.
1. Sandstone, 2. Alternation of sandstone and mudstone, 3. Mudstone, 4. Limestone, 5. Chert, 6. Greenstone, 7. Fossil locality, A: A formation, B: B formation, C: C formation.

blage is Late Triassic.

Acknowledgements

We wish to express our hearty thanks to Professor Koichiro ICHIKAWA of the Osaka City University for his kind guidance and critical reading of the manuscript, to Dr. Akira YAO of the Osaka City University who gave us kind advice and to the members of the Yamato Ominé Research Group who permitted us to study some interesting materials collected by them.

Systematic description

Order Scleractinia BOURNE, 1900

Suborder Faviina VAUGHAN and WELLS, 1943

Superfamily Faviicae GREGORY, 1900

Family Montlivaltiidae DIETRICH, 1926

Subfamily Montlivaltiinae DIETRICH, 1926

Genus *Montlivaltia* LAMOUROUX, 1821

Montlivaltia norica ominensis subsp. nov.

Pl. 40, figs. 1, 2

Corallum simple. Corallite subcircular in transverse section; about 33.0 mm in the shortest diameter. Corallite wall distinct, mostly 0.5 to 1.0 mm in thickness. Septa straight or slightly sinuous, and numerous, about 250 in number, arranged in seven cycles. Septa of the first four cycles reach or nearly reach the central part of the corallite, not meeting in a point but on a line, keeping with the elliptical form. Septa of the first two cycles are thick, and those of the fifth to seventh cycles thinner than the first four. Those of the fifth cycle are about three-fourths to two-thirds of the radius of corallite, those of the sixth cycle generally shorter than a half of the radius, and those of the seventh cycle very short or rudimentary. Columella indistinct. Dissepiments distinct.

In longitudinal section, dissepiments show somewhat elongate form with their convex sides facing inwards as well as upwards.

Comparison: The present new subspecies is similar to *Montlivaltia norica norica* described by FRECH (1890, pp. 39-40, pl. 3, figs. 8, 9, pl. 10, figs. 1-5, pl. 13, figs. 1-7, pl. 18, figs. 17, 17a) in many respects. However, its septa are much

more numerous, and its dissepiments show somewhat elongate form with their convex sides facing inwards as well as upwards and larger size in longitudinal section. It is also related to *Montlivaltia norica norica* by SMITH (1927, pp. 126-127, pl. 111, fig. 10) and SQUIRES (1956, p. 21, figs. 32-47), but differs from the latter in having much more numerous septa and larger corallite. It is separable from *Montlivaltia* sp. cf. *M. norica norica* by KANMERA (1964, pp. 120-121, pl. 12, figs. 6-10) in having much more numerous septa, larger corallite and thicker corallite wall.

Repository: OMNH (Osaka Museum of Natural History), M341 (holotype).

Montlivaltia sp. aff. *M. stylophylloides* VINASSA

Pl. 40, fig. 3

Aff.—

1915. *Montlivaltia stylophylloides* VINASSA, *Pal. Timor*, vol. 4, no. 8, pp. 100-101, pl. 6, figs. 3-6.
1964. *Montlivaltia* sp. cf. *M. stylophylloides*, KANMERA, *Mem. Fac. Sci., Kyusyu Univ., ser. D*, vol. 15, no. 1, pp. 123-124, pl. 12, figs. 1-3.

Corallum simple. Corallite subelliptical in transverse section; 13.0 mm in the shortest diameter and 23.0 mm in the longest. Corallite wall missing. Septa very thick, straight or slightly flexuous; they show elongate fusiform in shape in transverse section, about 48 in number, arranged in five cycles. Septa of the first three cycles about 20 in number, extending to or near the central part of corallite. Those of the fourth cycle two-thirds to a half of the radius. Septa of the fifth cycle less numerous and very short. Synapticulae and dissepiments develop. No columella. There is no longitudinal section.

Comparison: The present species resembles *Montlivaltia stylophylloides* described by VINASSA (1915, pp. 100-101, pl. 6, figs. 3-6) and *M.* sp. cf. *M. stylophylloides* by KANMERA (1964, pp. 123-124, pl. 12, figs. 1-3) in many important characters. The former differs, however, from the latter two in having smaller corallite and more distinct synapticulae.

Repository: OMNH, M342.

Montlivaltia sp. indet.

Pl. 40, fig. 4

Corallum simple. Corallite subcircular in transverse section; 12.0 mm and 15.0 mm in the shortest and longest diameter. Corallite wall is recognized in part, being 0.1-0.2 mm in thickness. Septa straight or slightly flexuous; thick near the corallite wall, thinning towards both ends. Septa about 68 in number, arranged in five cycles. About 14-15 septa of the first two cycles reach the central part of the corallite. Those of the third cycle slightly shorter than the first two. Those of the fourth cycle one-third to two-thirds of the length of the first two. Those of the fifth cycle very short or rudimentary. Synapticulae and dissepiments present.

No longitudinal section is seen.

Comparison: It is related to *Montlivaltia stylophylloides* VINASSA (1915, pp. 100-101, pl. 6, figs. 3-6) and the allied species (KANMERA, 1964, pp. 123-124, pl. 2, figs. 1-3; OKUDA and YAMAGIWA, this article). However, the former one can be distinguished from the latter ones in the following characters, 1) more numerous septa, 2) different shape of septa, 3) smaller corallite.

Repositoryy: OMNH, M343.

Genus *Thecosmilia* M. EDWARDS and HAIME, 1848

Thecosmilia wasabidaniensis sp. nov.

Pl. 40, fig. 5

Corallum fasciculate. Corallites subcircular in transverse section; usually 6.5-8.5 mm in diameter. Corallite wall thin, mostly 0.1 mm. Septa 54-80 in number, arranged in four or five cycles, almost straight, and thick in the middle part, thinning towards both ends. About 16-18 septa of the first two cycles reach the central part of the corallite, those of the third cycle near the central part, and the fouth cycle about a half as long as the radius; those of the fifth cycle short and thin, mostly rudimentary. Dissepiments numerous. Synapticulae scarce. Columella absent. There is no longitudinal section.

Comparison: The present new species is allied to *Thecosmilia eguchii* KANMERA (1964, pp. 124-125, pl. 17, figs. 1-7, pl. 18, fig. 7) in many respects, but differs from the latter in having thick septa in the middle part and larger corallites. It is also similar to *Thecosmilia badiotica* VOLZ (1896, pp. 26-30, pl. 2, figs. 14-19), but differs in its thinner corallite wall and thick septa in the middle part.

Repository: OMNH, M344 (holotype).

Thecosmia sp. aff. *T. eguchii* KANMERA

Pl. 40, fig. 6

Aff.—

1964. *Thecosmilia eguchii* KANMERA, *Mem. Fac. Sci., Kyusyu Univ., Ser. D*, vol. 15, no. 1, pp. 124-125, pl. 17, figs. 1-7, pl. 18, fig. 7.

The preservation of the present material is not good. However, it resembles *Thecosmila eguchii* KANMERA (1964, pp. 124-125, pl. 17, figs. 1-7, pl. 18, fig. 7) in the following respects, 1) size and shape of the corallites, 2) shape, number, length and arrangement of the septa and 3) distinct dissepiments. Therefore, we think that the former may be referable to the latter.

Repository: OMNH, M345.

Suborder Astrocoeniina VAUGHAN and WELLS, 1943

Family Astrocoeniidae KOBY, 1890

Subfamily Pinacophyllinae VAUGHAN and WELLS, 1943

Genus *Pinacophyllum* FRECH, 1890

Pinacophyllum ? sp. indet.

Pl. 41, fig. 1

Explanation of Plate 40

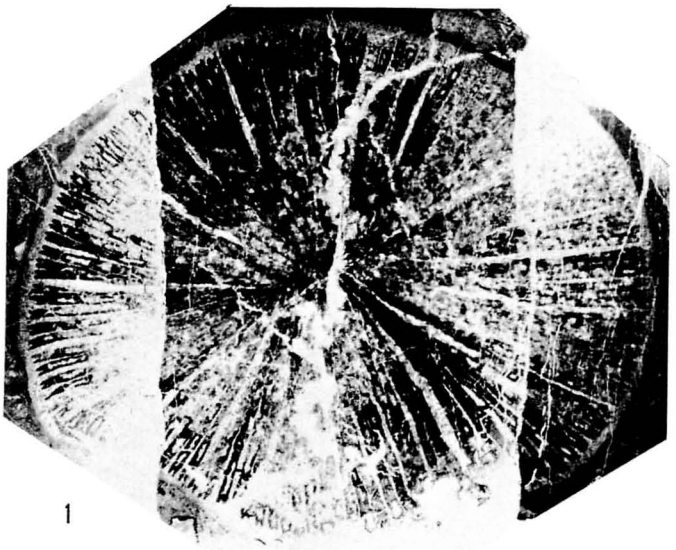
Figs. 1-2. *Montlivaltia norica ominensis* subsp. nov.
1. Transverse section ..... ×2.0 (OMNH, M341a)
2. Longitudinal section ..... ×3.0 (OMNH, M341b)

Fig. 3. *Montlivaltia* sp. aff. *M. stylophylloides* VINASSA
3. Transverse section ..... ×3.0 (OMNH, M342)

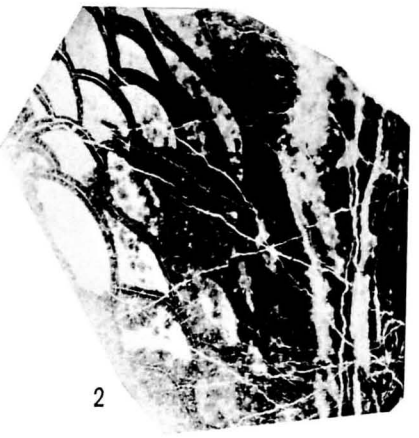
Fig. 4. *Montlivaltia* sp. indet.
4. Transverse section ..... ×3.0 (OMNH, M343)

Fig. 5. *Thecosmilia wasabidaniensis* sp. nov.
5. Transverse section ..... ×3.0 (OMNH, M344)

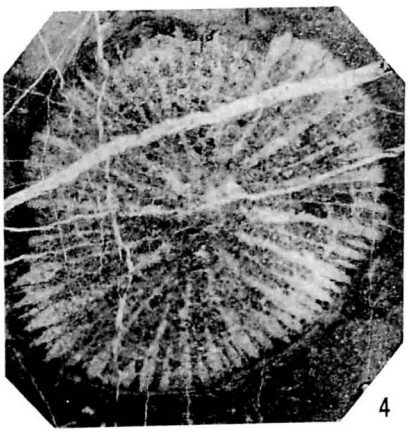
Fig. 6. *Thecosmilia* sp. aff. *T. eguchii* KANMERA
6. Transverse section ..... ×3.0 (OMNH, M345)



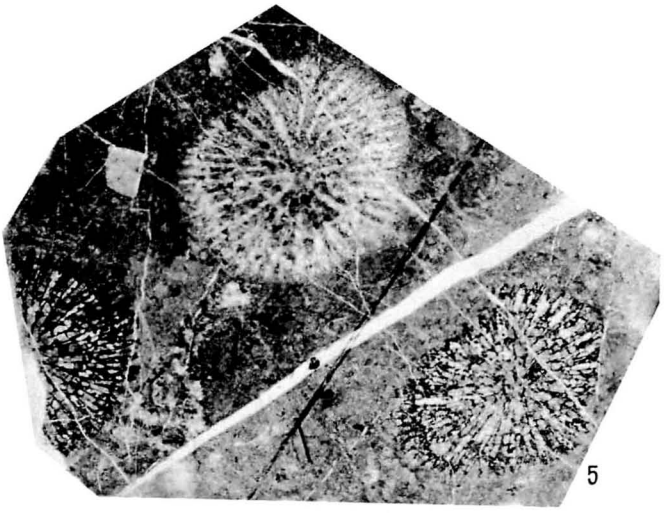
1



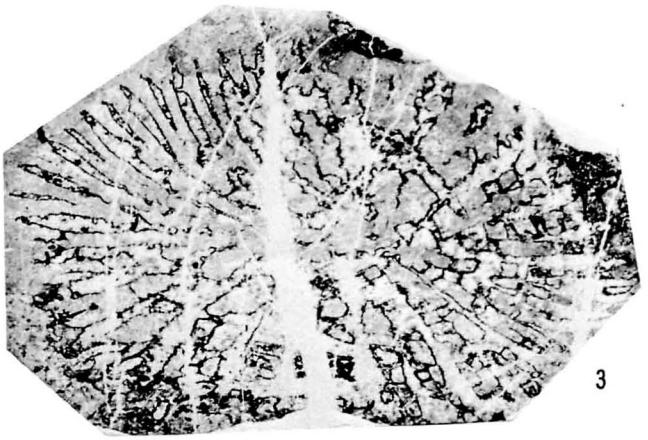
2



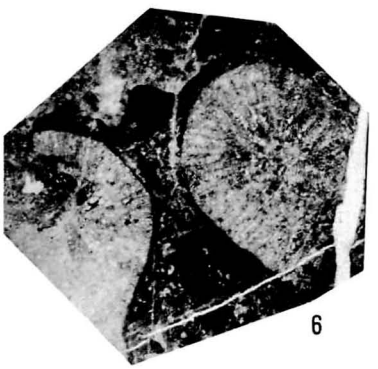
4



5



3



6

Corallum probably fasciculate, subcircular in transverse section, with shortest diameter of about 6.5 mm. Corallite wall distinct and thick. Septa 34 in number and straight or slightly sinuous; most of them two-thirds to a half of the radius of the corallite in length. They gradually thinning distally, and very thick in peripheral area, so as to be laterally in contact with the neighbouring ones. No columella. No longitudinal section.

Comparison: It has only one corallite. Except for this point, it is related to the species of the genus *Pinacophyllum* in many important characters. It is allied to *Pinacophyllum gracile* described by VOLZ (1896, pp. 82-84, pl. 10, figs. 14-28). However, the latter has smaller corallites than the former, and consists of fasiculate corallum.

Repository: OMNH, M346.

Family Thamnasteriidae VAUGHAN and WELLS, 1943

Genus *Thamnasteria* LESAUVAGE, 1823

Subgenus *Thamnasteria* LESAUVAGE, 1823

Thamnasteria (*Thamnasteria*) sp. indet.

Pl. 41, fig. 2

Corallum massive and thamnasterioid. Corallites variable in size; central distance 1.0-2.2 mm. Septa relatively thin, confluent with those of the adjacent corallites, 15-24 in number; about 10-12 of them extending to the central part of corallite, and some of them join with a columella. They slightly sinuous or geniculate; perforations generally scarce. Synapticulae well observed. Columella distinct, subelliptical to subcircular in transverse section; about 0.10-0.15 mm in shortest diameter. No longitudinal section is seen.

Comparison: The present material has the following characters, 1) small corallites, 2) not numerous septa, 3) abundant synapticulae, 4) geniculated septa, 5) distinct columella. The features mentioned above practically agree with those of *Thamnasteria* (*Thamnasteria*) sp. described by KANMERA (1964, pp. 134-135, pl. 13, figs. 6-9). It is also similar to *Thamnasteria* (*Thamnasteria*) *loretzi* VOLZ (1896, pp. 59-60, pl. 6, figs. 12, 12a-c), but differs from the latter in having smaller corallites and less numerous septa.

Repository: OMNH, M347.

Suborder Fungiina VERRILL, 1865

Superfamily Agariciicae GRAY, 1847

Family Procyclolitidae VAUGHAN and WELLS, 1943

Genus *Procyclolites* FRECH, 1890

Procyclolites ? sp. indet.

Pl. 41, fig. 3

Corallum simple. Corallite probably subcircular in transverse section; Radius of the corallite about 12.0mm. Corallite wall thin, recognizable in part. Septa thin, straight or slightly flexuous, and numerous, about 35 in number in a quadrant circular of the corallite; those of the first two cycles reach the central part, those of the third cycle near the central part, those of the fourth two-thirds of the radius, and those of the fifth shorter than a half of the radius or rudimentary. Synapticulae and dissepiments present. Columella indistinct. There is no longitudinal section.

Comparison: The present specimen resembles the species described by VINASSA (1915, pp. 101-102, pl. 9, figs. 11-13) as *Myriophyllia timorica* in many respects. However, it is represented only by one incomplete transverse section, and is not

well preserved. It is also related to *Procyclolites* ? sp. aff. *P. timoricus* by KANMERA (1964, pp. 131-132, pl. 13, figs. 1-5), but differs in larger corallite and more numerous septa.

Repository: OMNH, M348.

Family Calamophyllidae VAUGHAN and WELLS, 1943

Genus *Isastrea* M. EDWARDS and HAIME, 1851

Isastrea sp. aff. *I. major* FRECH

Pl. 41, fig. 4

Aff.—

1890. *Isastrea profunda* var. *major* FRECH. *Palaeontographica*, vol. 37, pp. 22-23, pl. 5, figs. 4, 5.

1956. *Elysastraea major* SQUIRES. *Amer. Museum Novitates*, no. 1797, p. 26, figs. 52, 53.

Corallum massive and cerioid. Corallites mostly pentagonal or hexagonal in shape in transverse section; some of them tend to be elongate, measuring 3.0 to 4.0 mm in the shortest diameter, 5.5 to 8.5 mm in the longest. Corallite wall relatively thick. Septa 40 to 50 in number and straight or slightly sinuous, having distinct spines on their lateral surfaces; some of the spines connected with those of the neighbouring septa, forming synapticulae. Most septa of the first two or three cycles rather thick, extending to or near the central part of the corallite. Those of the fourth cycle thin and about a half of the radius. Those of the fifth poorly developed, but absent in immature stage. Dissepiments present. Columella indistinct. No logitudinal section is seen.

Comparison: The present species resembles *Isastrea major* FRECH (1890, pp. 22-23, pl. 5, figs. 4, 5; SQUIRES, 1956, p. 26, figs. 52, 53) in many important characters. However, the present material is not well preserved, and its corallites are somewhat smaller than those of that species. It is somewhat related to *Elyastraea* ? sp. by KANMERA (1964, p. 129, pl. 13, fig. 11), but differs from the that species in having different shape of septa. It is distinguished from *Isasrea* sp. indet. (OKUDA and YAMAGIWA, this paper) in having larger corallites and more numerous septa.

Repository: OMNH, M349.

Isastrea sp. indet.

Pl. 41, figs. 5, 6

Corallum massive and cerioid, mostly

Explanation of Plate 41

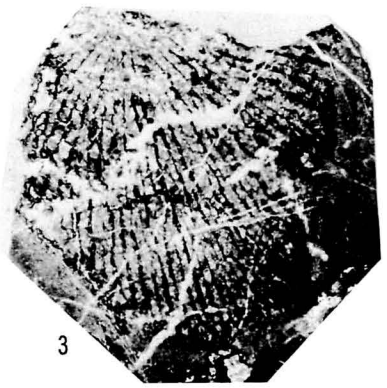
Fig. 1. *Pinacophyllum* ? sp. indet.
1. Transverse section ..... ×3.0 (OMNH, M346)

Fig. 2. *Thamnasteria* (*Thamnasteria*) sp. indet.
2. Transverse section ..... ×3.0 (OMNH, M347)

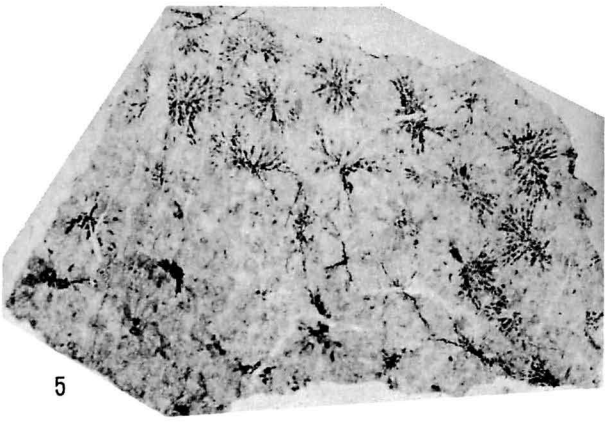
Fig. 3. *Procyclolites* ? sp. indet.
3. Transverse section ..... ×3.0 (OMNH, M348)

Fig. 4. *Isastrea* sp. aff. *I. major* FRECH
4. Transverse section ..... ×3.0 (OMNH, M349)

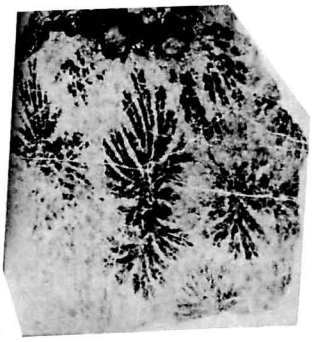
Figs. 5-6. *Isastrea* sp. indet.
5. Transverse section ..... ×3.0 (OMNH, M350a)
6. Longitudinal (somewhat oblique) section ..... ×3.0 (OMNH, M350b)



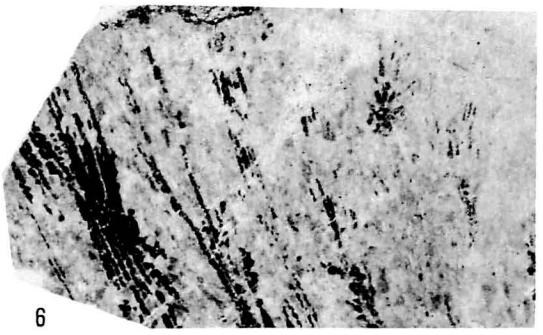
3



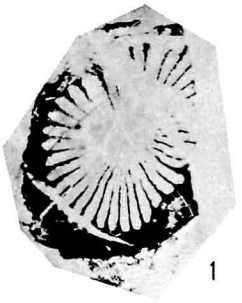
5



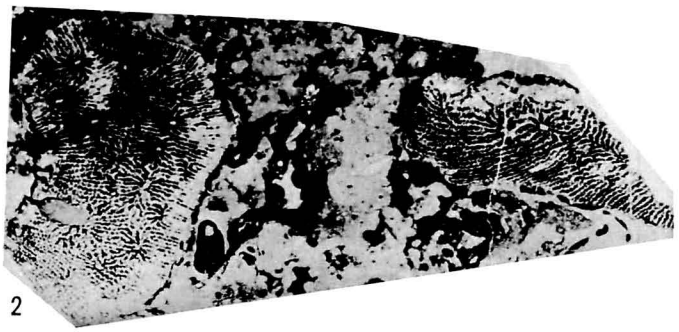
4



6



1



2

with pentagonal or hexagonal corallites; generally 1.5 to 2.3 mm in the shortest diameter. Thick corallite wall present, but partly absent with confluent septa. Septa rather thin and straight or gently flexuous. They have distinct processes on their lateral surfaces, and some of the processes connected with those of the adjacent septa. Corallites 30-38 in number, about 12 of them extending to the central part. Dissepiments present. Columella indistinct. Longitudinal (somewhat oblique) section present.

Comparison: It is similar to *Isastrea austriaca* var. *splendes* described by FRECH (1890, p. 24) in many respects. However, the former may be distinguished from the latter in having thicker corallite wall. It is also related to *Isastrea guembeli* var. *minor* by VINASSA (1915, p. 96, pl. 10, figs. 3-5). It differs, however, in having more numerous septa. It is somewhat allied to *Actinastrea* ? sp. indet. by YAMAGIWA (1963, p. 85, pl. 1, figs. 6, 7). However, the ma terial of that species is poorly preserved.

Repository: OMNH, M350.

References

FRECH, F. (1890): Die Korallenfauna der Trias. I. Die Korallen der Juvavischen Triasprovinz. *Palaeontographica*, vol. 37, p. 1-116, pls. 1-21.

KANMERA, K. (1964): Triassic coral fauna from the Konose group in Kyusyu. *Mem. Fac. Sci., Kyusyu Univ., ser. D*, vol. 15, no. 1, p. 117-147, pls. 12-19.

SHIIDA, I. (1962): Stratigraphical and geotectonic studies of the Paleozoic Chichibu and the Mesozoic Hitaka (Shimanto) terrains in the central part of the Kii Mountainland, Southern Kinki, Japan. *Research Bull. (Dep. Gen. Educ., Nagoya Univ.)*, no. 6, Separate vol. 1, p. 1-58. (J).

SMITH, J. P. (1927): Upper Triassic marine invertebrate fanna of North America. *U. S. Geol. Surv., Prof. Paper* 141, p. 1-262, pls. 1-121.

SQUIRES, D. F. (1956): A new Triassic fauna from Idaho. *Amer. Museum Novitates*, no. 1797, p. 1-27.

VINASSA DE REGNY, P. (1915): Triadische Algen, Spongien, Anthozoen und Bryozoen aus Timor. *Pal. Timor*, vol. 4, no. 8, p. 73-118, pls. 1-10.

VOLZ, W. (1896): Die Korallenfauna der Trias. II. Die Korallen der Schichten von St. Cassian in Süd-Tirol. *Palaeontographica*, vol. 43, p. 1-124, pls. 1-11.

YAMAGIWA, N. (1963): Some Triassic corals from Portuguese Timor (Palaeontological Study of Portuguese Timor (II)). *Mem. Osaka Univ. Lib. Art. and Educ.*, no. 12, p. 83-86, pl. 1.

YAMATO OMINÉ RESEARCH GROUP (1976): Paleozoic and Mesozoic systems in the central area of the Kii Mountains, Southwest Japan. pt. 1. Geology around Mt. Daifugen district, Nara Prefecture. *Chikyu Kagaku*, vol. 30, no. 5, p. 260-267. (J).

Daifugen 大普賢, Koguchi 小口, Konosé 神瀬, Ominé 大峯, Yamato 大和, Wasabidani, 山葵谷

奈良県大普賢岳から産出した後期トリアス紀珊瑚化石について： 奈良県大普賢岳東部に位置する山葵谷の緑色岩類中の礫状石灰岩から大和大峯研究グループによって採集された六射珊瑚化石を研究し，1新種をふくむ9種および1新亜種を記載報告すると共に，それらを主体とする六射珊瑚化石群集の年代が後期トリアス紀をしめすことを論述した。

奥田 尚・山際延夫

Trans. Proc. Palaeont. Soc. Japan, N.S., No. 110, pp. 306-318, pl. 42, June 30, 1978

689. A NEW TEXANITINE AMMONITE FROM HOKKAIDO (STUDIES OF CRETACEOUS AMMONITES FROM HOKKAIDO AND SAGHALIEN—XXXIV)*

TATSURO MATSUMOTO and YOSHIMITSU HARAGUCHI**

c/o Department of Geology, Kyushu University 33, Fukuoka 812

With Notes on the Santonian Biostratigraphy
(Tatsuro MATSUMOTO)

Abstract. This is an addition to a previously published monograph of the Texanitinae (MATSUMOTO, 1970). A new species of *Texanites* is described on the basis of a recently obtained specimen from about the middle of the Santonian in the Oyubari district, central Hokkaido. It is allied to *Texanites* (*Texanites*) *hourcqui* COLLIGNON, from the Middle Santonian of Madagascar, but is distinguished by its rursiradiate, distant ribs, inequidistant configuration of tubercles and diverging deep branches of L in the suture.

As an appendix, notes are given on the biostratigraphic subdivision and correlation of the Santonian primarily on the grounds of texanitine species.

Introduction

From the Upper Cretaceous of Japan and Saghalien altogether 23 species of the Texanitinae, a subfamily of the Collignoniceratidae, have hitherto been known, of which a majority is from Hokkaido (see MATSUMOTO, 1970). Their mode of occurrence in the Cretaceous muddy sediments in the basin of Hokkaido (the so-called Yezo geosyncline) is scattered and rather isolated, although they tend to be somewhat more common in the probably shallower facies, for example in fine-sandy siltstones of the Haboro-Kotambetsu-Obira areas of northwestern Hokkaido. In the Oyubari district of central Hokkaido, the sediments are more clayey and seem to represent comparatively more off-shore, somewhat deeper facies. From this area, however, a fairly large texanitine ammonite was reported about 50 years ago. That is *Mortoniceras nomii* YABE and SHIMIZU, 1925, recently revised to be called *Protexanites* (*Anatexanites*) *nomii* (YABE and SHIMIZU) (MATSUMOTO, 1970, p. 242). Its holotype is unfortunately missing and only its plaster cast is preserved in Tohoku University, Sendai. The type-locality of that holotype was "the cliff at the junction of the Shiyuparo and the Panke-mo-yuparo", which is now under the water of an artificial lake of the Shuparo [=Shiyuparo] dam.

While we are continuing a field work in the Oyubari district, we have sought so far in vain any example of the same

* Received August 26, 1977; read June 18, 1977 at Shizuoka.

** Present address of Y. HARAGUCHI: Meiji Consultant Co., 3-4-22, Otemon, Fukuoka 810.

species, aside from an immature specimen from the Haboro area (MATSUMOTO, 1970, pl. 32, fig. 1). Meanwhile, one of us (Y. H.) found another texanitine ammonate from another locality of the same Oyubari district. This represents an interesting new species which we describe in this paper.

Before going further we thank Messrs. Junichi YAZAKI, Yoshihiro MATSUBARA, Katsuo YAMAZAKI and Katsuo IRIE of the Oyubari Office of the Forestry Bureau, who gave us facilities for our field work. We also thank Drs. Hiromichi HIRANO and Kazushige TANABE, who helped us in both the field and laboratory works. Miss Mutsuko HAYASHIDA assisted us in preparing the manuscript.

Geological Setting

Fig. 1 is a geological map of the northern part of the Oyubari district, prepared tentatively by one of us (Y. H.). The area is partly overlapped with and primarily continued to the southwest of the Shiyubari [Shiyuparo] area, mapped 35 years ago by the other of us (MATSUMOTO, 1942, pl. 13). Broadly speaking, the Cretaceous outcrops become younger as we go westward, but in detail the structure is imbricated by minor thrusts and overturned folds.

On account of this geologic structure we see the repeated occurrence of the zones defined by the first appearance of the named inoceramid species as follows (in ascending order):

1: Zone of *Inoceramus* aff. *saxonicus* PETRASCHECK (temporarily called *Inoc.* aff. *teshioensis* in our field work)
2: Zone of *Inoceramus hobetsensis* NAGAO and MATSUMOTO
3: Zone of *Inoceramus teshioensis* NAGAO and MATSUMOTO
4: Zone of *Inoceramus uwajimensis* YEHARA (closely allied to but at least subspecifically distinguished from *Inoceramus stantoni* SOKOLOW)
5: Zone of *Inoceramus mihoensis* MATSUMOTO (somewhat allied to *Inoceramus erectus* MEEK)
6: Zone of *Inoceramus* (*Platyceramus*) *amakusensis* NAGAO and MATSUMOTO
7: Zone of *Inoceramus* (*Cladoceramus*?) *japonicus* NAGAO and MATSUMOTO

where zones 1, 2 and 3 are Turonian, 4 and 5 Coniacian, and 6 and 7 Santonian (see NODA and MATSUMOTO, 1976). The described ammonite was solitarily embedded in a mudstone which is assignable to zone 6 or 7 in the upper part of the Upper Yezo Group, exposed at a locality not far from the outcrops of the sandstones of the Hakobuchi Group.

Palaeontological Description

Family Collignoniceratidae WRIGHT & WRIGHT, 1951

Subfamily Texanitinae COLLIGNON, 1948

Genus *Texanites* SPATH, 1932

Type-species:—*Ammonites texanus* ROEMER, 1852.

Generic diagnosis:—See MATSUMOTO, 1970, p. 266.

Remarks:—Two subgenera, *Texanites* and *Plesiotexanites*, are distinguished (MATSUMOTO, 1970, p. 267). Nine species of *Texanites* have hitherto been described from Hokkaido and other areas in Japan of which three are referable to *Texanites* (*Texanites*). The new species described below is also assigned to *Texanites* (*Texanites*).

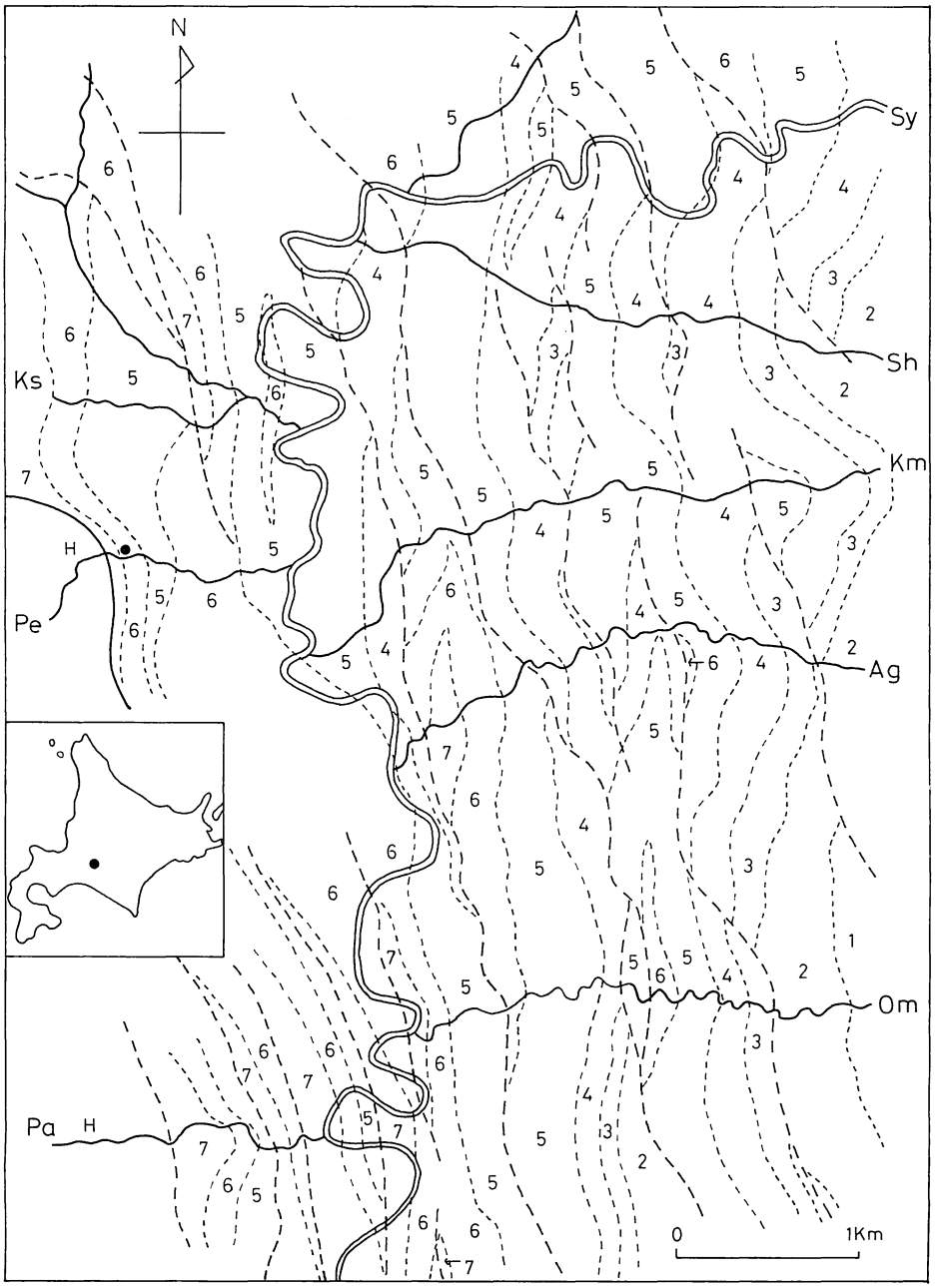


Fig. 1. Geological map of the northern part of the Oyubari area, central Hokkaido. 1-7: Zones of *Inoceramus* species in asending order as indicated in the text. H: Hakobuchi Group. Thick line: Major thrust. Thick broken lines: Minor thrusts and faults: Solid circle: Locality of the described *Texanites*. Abbreviations of the streams are Sy: Shiyuparo, Sh: Shimizu-zawa, Km: Komaki-zawa, Ag: Agemaki-zawa [=Kamimaki-zawa], Om: Omaki-zawa, Ks: Kosenzawa, Pe: Penke-horoka-yuparo, Pa: Panke-horoka-yuparo. Inset is a small map of Hokkaido, indicating Oyubari with a small solid circle. (prepared by Y. HARAGUCHI)

Texanites (*Texanites*) *yazakii* sp. nov.

Pl. 42, Fig. 1; Text-fig. 2

Holotype:—GK. H5865, from loc. Y1120, collected by Yoshimitsu HARAGUCHI, now preserved at Kyushu University.

Etymology:—This species is dedicated to Mr. Junichi YAZAKI, former Director of Oyubari Office, Bureau of Forestry.

Specific characters:—Shell fairly large, about 250 mm in diameter of restored figure, consisting of slowly enlarging evolute whorls, which are subrectangular in cross-section, higher than broad (with a proportion of height to breadth about 10 : 8), broadest in the lower part with slightly convergent flanks. Umbilicus wide, surrounded by low but steep wall and abruptly rounded shoulder.

Ribs strong, mostly somewhat rursiradiate and a few of them nearly rectiradiate, comparatively denser on the inner whorl separated by the interspaces which are as wide as the ribs, moderately distant with wider interspaces on the next whorl of probably adolescent stage, and much distant and coarse on the body-whorl of the adult stage. On the outer two whorls there is as a rule intercalation or branching of the ribs. The secondary ribs begin to appear somewhere near the mid-flank or near the umbilical shoulder. On the inner whorl the intercalation seems to be less frequent.

Tubercles unequally distributed in five rows. The distance between the first (i.e. umbilical) and the second (i.e. inner lateral) is longer than that between the second and the third (i.e. outer lateral), that between the third and the fourth (i.e. ventrolateral) is the shortest, and that between the fourth and fifth (i.e. ventral) is moderate. This configuration of tubercles is regularly maintained all through the observable three whorls.

The tubercles change with growth in strength and shape. On the body-whorl and the preceding part (about 300°) of the septate whorl the umbilical tubercles are the most prominent, the inner lateral ones on the long ribs the next in prominence, and the outer lateral the weakest. The ventrolateral tubercles of moderate intensity, indistinctly clavate on the late septate whorl but not clavate on the body-whorl. The ventral tubercles narrowly clavate all through the visible stages.

On the inner whorl (of 40 to 70 mm in diameter) the outer lateral as well as the ventrolateral tubercles are clavate and sharp-headed, the inner lateral ones indistinctly clavate and moderately strong, and the umbilical ones small but prominent, with a bullate base.

Sutures of general texanitine pattern and characterized by narrow and fairly deep branches diverging from the reversed omega-shaped stem of L, the tall second lateral saddle between L and U2 much narrowed near the base of its stem. These sutural characters appear already on the inner whorl of about 40 mm in diameter.

Measurements (in mm on the whorl of adolesent stage):—

Diameter	Umbilicus	Height	Breadth	B./H.
127.0	59.8	41.6	17.2×2	0.82
(1)	(0.47)	(0.32)	(0.27)	

Remarks:—One side of the specimen is incompletely preserved and the last part of the body-whorl squashed. Otherwise the characters are well shown at successive three stages. The extent of variation is unknown at present.

Comparison:—Although a single specimen (holotype) is available at present, it shows distinctive characters which enable us to regard it as representing a new species.

This species resembles *Texanites* (*Tex-*

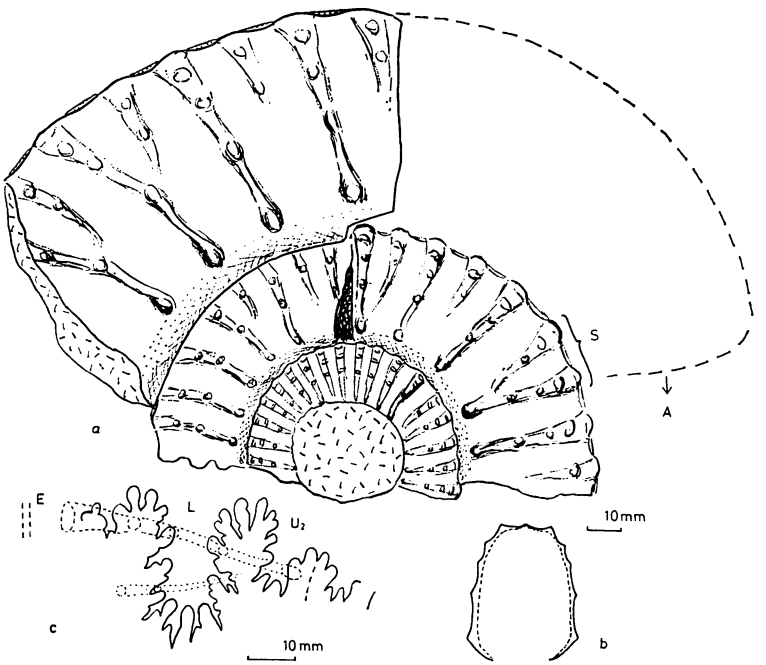


Fig. 2. *Texanites yazakii* sp. nov. Diagrammatic sketch of the holotype, GK. H 5856, from loc. Y 1120. Lateral view (a), in which the deformed last part is roughly outlined, with A towards anterior. Whorl-section (costal and intercostal) at the middle growth stage (b). External suture (c) at about S. (T. M. *delin.*)

anites) *hourcqui* COLLIGNON (1948, p. 78, pl. 10, fig. 1; pl. 7, fig. 1; 1966, p. 72, pl. 484, fig. 1957), from the Santonian of Madagascar, in the fairly large, widely umbilicate, evolute shell, slowly enlarging whorls with a subrectangular to subtrapezoidal cross-section, and strong straight ribs which show the intercalation or bifurcation occurring even on the adult whorl. It is, however, distinguished by its much more distant and somewhat rursiradiate ribs on the whorl of later growth-stages and the deeper, more diverging branches of L and the narrowed stem of the second lateral saddle. Tubercles are nearly equidistant in that Madagascar species, whilst they are arranged at unequal distance in our species as described above.

The present species is similar to *Texanites* (*Texanites*) *dichotomus* COLLIGNON (1948, p. 80, pl. 7, fig. 2; pl. 9, fig. 3; pl. 11, fig. 1), from the Upper Santonian of Madagascar, with respect to the frequent intercalation or branching of the secondary ribs and the deep branches diverged from the fairly narrow stem of L. That species from Madagascar is distinct from ours in its more rapidly growing whorls, narrower umbilicus, prorsiradiate (instead of rursiradiate) ribs, nearly equidistant configuration of the inner three rows of tubercles and on the average less compressed whorl. Moreover, a larger outer whorl has not yet been reported in that Madagascar species.

With respect to the configuration of

tubercles, the distant ribbing on the outer whorl, and the diverging branches of L, the present species is similar to *Texanites quadrangulatus* COLLIGNON (1966, p. 76, pl. 486, fig. 1961), from the Upper and the Middle Santonian of Madagascar, but its whorl is distinctly more compressed than the nearly square whorl (H.=B.) of *T. quadrangulatus* and this Madagascar species has simple, equally long ribs without notable intercalation or branching of the secondary rib.

The branching or intercalation of the ribs is characteristic of the genus *Submortoniceras*, which, however, is more involute, with rapidly growing whorls, and the ornaments (except for the umbilical tubercles) are weakened on the outer whorl. In the latter respect the present species is not related with *Submortoniceras*.

Occurrence:—The holotype was collected by one of us (Y. H.) from the mudstone exposed at loc. Y1120 on the left side of the creek called the Penkehoroka-yuparo, a tributary of the Shiyuparo in the Oyubari district, central Hokkaido; location approximately 7150 m east and 3150 m south from the northwestern corner (i. e. Lat. 43°10′N, Long. 142°0′E) of the geological map of Oyubari (NAGAO et al., 1954). It was embedded solitarily without accompanied macrofossils.

This locality is situated at about the middle of the "Santonian" sequence exposed along this stream, but whether it is assigned to the lower part of the Zone of *Inoceramus* (*Cladoceramus*?) *japonicus* or to the upper part of the Zone of *Inoceramus* (*Platyceramus*) *amakusensis* is not determined on a direct evidence. The assignment to the latter in Fig. 1 (geological map) is tentative.

Appendix

Notes on the Santonian Biostratigraphy

Tatsuro MATSUMOTO

Introductory:—I have already summarized the biostratigraphic implications of the collignoniceratid ammonites from Hokkaido (MATSUMOTO, 1971, p. 153-156). Here I should like to give some notes from the interregional standpoint on the biostratigraphic subdivision and correlation of the Santonian primarily on the grounds of species of the Texanitinae.

The genus *Texanites* in a revised sense (MATSUMOTO, 1970, p. 266), including the subgenera *Texanites* (s. s.) and *Plesiotexanites*, is widespread in various regions of the world. Regarding the biostratigraphic implications of *Texanites* in the Santonian, at least four regions should be taken into consideration. They are western Europe, Madagascar, Texas and Japan.

Zonal occurrences in the four regions:—From the district of Charente, southwestern France, where COQUAND (1857) established the Santonian stage, DE GROSSOUVRE (1894) described a small specimen of *Texanites texanus* (ROEMER), which, was subsequently designated by COLLIGNON (1948b, p. 42) as the type (i. e. holotype) of *Texanites texanus* var. *gallica* COLLIGNON, and also another example of the same species [the same variety according to COLLIGNON, 1948] from Aude, Southern France. DE GROSSOUVRE (1901) subdivided the type Santonian into the Zone of *Texanites texanus* in the lower part and the Zone of *Placenticeras syrtale* (ROEMER) in the upper. There is in France an attempt of tripartite zonation of the Santonian, with the Zone of *Muniericeras lapparenti* at the middle (see POMEROL, 1975, p. 247), but this does not seem to be based on sound grounds of the data in

the type sequence. *Muniericeras* is restricted to the Upper Santonian in the well studied sequence of Madagascar (COLLIGNON, 1966, p. 96).

In the Wessex-Paris Basin *Texanites* seems to be still rarer and *T.* cf. *texanus* was listed as a very rare species from the *Coranguinum* Zone of Kent (WRIGHT and WRIGHT, 1951, p. 30).

In the Münster Basin of Germany *Texanites pseudotexanus* (DE GROSSOUVRE) (1894) and *T.* (*P.*) *schlueteri* MATSUMOTO (1970) are known, but they are based on SCHLÜTER's old collections from the shafts in the Emscher Mergel, and it seems difficult to allocate them precisely in the up-to-date biostratigraphic sequence (letter from Dr. SEITZ).

Owing to the admirable works of COLLIGNON (1948a, b; 1966) and BESAIRIE and COLLIGNON (1972), the Texanitinae are best studied both palaeontologically and biostratigraphically in Madagascar, where species of *Texanites* occur in three zones of the Santonian as follows:

(1) Lower Santonian Zone of *Texanites oliveti* (BLANCKENHORN), from which *T. texanus gallicus, T. texanus hispanicus* COLLIGNON and *T.* cf. *roemeri* (LASSWITZ) are also recorded.

(2) Middle Santonian: Zone of *Texanites hourcqui*, in which *T. hourcqui* var. *souromarayensis* COLLIGNON, *T. oliveti* var. *spinosa* COLLIGNON, *T. texanus gallicus, T. rarecostatus* COLLIGNON, *T. quadrangulatus* COLLIGNON, *T. venustus* COLLIGNON, *T. soutoni* (BAILY), *T.* aff. *quinquenodosus* (REDTENBACHER) and *T.* (*Plesiotexanites*) *stangeri* (BAILY), including var. *densicosta* SPATH and var. *sparsicosta* SPATH, also occur.

(3) Upper Santonian: Zone of *Pseudoschloenbachia umbulazi* (BAILY), in which *T. dichotomus* COLLIGEON, *T. mikobokensis* COLLIGNON, *T. ralijaonai* COLLIGNON are characteristic and also *T. quadrangulatus, T. texanus gallicus, T. texanus hispanicus, T. hourcqui* var. *souromarayensis, T. pseudotexanus, T. quinquenodosus* and *T.* (*P.*) *stangeri* var. *densicosta* are reported to occur.

The list may give some question about the taxonomy and nomenclature of certain taxa, which will be discussed in later pages.

In Texas, where the type-locality of *Texanites texanus* is located, YOUNG (1963) has accomplished another admirable work, showing a scheme of zonation for the Santonian of Texas and also a range chart of selected species, in addition to the full palaeontological descriptions. YOUNG has subdivided the Santonian of Texas as follows, without using the term Middle Santonian.

Lower Santonian

(1) Zone of *Texanites stangeri densicostus*

(2) Zone of *Texanites texanus texanus*

(3) Zone of *Texanites texanus gallicus*

Upper Santonian

(4) Zone of *Texanites shiloensis* YOUNG

The last species occurs, according to YOUNG (1963, p. 90), abundantly in the lower part of the Dessau Limestone of Austin Group. It ranges upward into the lower part of the Zone of *Submortoniceras tequestiquense* YOUNG, which is assigned to the lower part of the Lower Campanian. From the same zone *Texanites roemeri* (YABE and SHIMIZU) and probably also *Texanites lonsdalei* are recorded. These two species show characters which suggest a close affinity with *Submortoniceras*.

Another diagnostic species, *Texanites americanus* (LASSWITZ) typically occurs with *Inoceramus* (*Cladoceramus*) *undulatoplicatus* ROEMER in the lower half of the Santonian, but seems to extend upward to the top of unit C of the Austin Group (YOUNG, 1963, p. 84).

In Japan the available records (MATSU-

MOTTO and UEDA, 1962; MATSUMOTO, 1970; TANAKA and TERAOKA, 1973 and this paper) of species of *Texanites* and *Protexanites* may be summarized into three parts as follows:

(1) Lower part of the Santonian equivalent, i.e. the Lower half of the Zone of *Inoceramus* (*Platyceramus*) *amakusensis: Texanites oliveti* was found here at the type locality of *I.* (*P.*) *amakusensis* in Amakusa, western Kyushu. In Hokkaido this species has not yet been confirmed, but *Texanites* aff. *quinquenodosus* and *Protexanites* (*Protexanites*) *bontanti shimizui* MATSUMOTO occur in this part.

(2) Middle part, i.e. the upper part of the Zone of *Inoceramus* (*Platyceramus*) *amakusensis* and the lower part of the Zone of *Inoceramus* (*Cladoceramus*?) *japonicus: Texanites* (*Plesiotexanites*) *kawasakii* (KAWADA), *T.* (*P.*) *pacificus* and *Protexanites* (*Anatexanites*) *fukazawai* (YABE and SHIMIZU) seem to characterize this part. *Texanites yazakii* sp. nov. is probably referred to this part.

(3) Upper part, i.e. the upper part of the Zone of *Inoceramus* (*Cladoceramus*?) *japonicus: Texanites* cf. *shiloensis* is probably from this part. Its occurrence in the Zone of *Inoceramus* (*Sphenoceramus*) *orientalis* SOKOLOW, lower part of the Campanian, has recently been confirmed in Koshiki-jima, western Kyushu.

There are a few other species whose stratigraphic positions are not precisely known but somewhere in the Santonian equivalent in Japan. They are *T.* (*P.*) *sanushibense* (YABE and SHIMIZU) and *T.* (*P.*) *yezoensis* MATSUMOTO. The last species seems to occur rather in the upper half, i.e. the Zone of *Inoc.* (*Cladoc.*?) *japonicus*, although its precise range is yet to be worked out.

Towards the interregional correlation:— Aside from the regions where a few texanitine species are known without records of successive occurrence, there is some difficulty in the zonal correlation of the Santonian between any two of the above mentioned better studied four regions. The difficulty comes from (1) that the widespread species which occur commonly between two regions are often rather long-ranging, as exemplified by *T. texanus, T. quinquenodosus* and *T.* (*P.*) *stangeri;* (2) that the zones are rather of provincial subdivisions defined on the basis of biostratigraphic records in respective regions, as best exemplified by YOUNG's (1963) work in the Gulf Coast province; and (3) that some of the characteristic species of a zone have a restricted geographical distribution and have not yet or scarcely been found from other regions, for instance, *T. hourcqui, T. mikobokensis, T. ralijaonai, T. quadrangulatus* and *T. dichotomus* in Madagascar, *T. americanus* in Texas, and *T.* (*P.*) *kawasakii, T.* (*P.*) *pacificus, T.* (*T.*) *yazakii* and *Protexanites* (*Anatexanites*) *fukazawai* in the Japanese province.

In connexion with these points the problem of speciation and phyletic evolution in *Texanites* and related genera should be worked out. Our present knowledge is not satisfactory for these requirements. *Texanites texanus* (ROEMER), for instance, was subdivided into "varieties" by COLLIGNON (1948a, b) with the implication of geographic subspecies: *T. texanus texanus* in Texas, *T. texanus gallicus* in France and other circum-Alpine area, and *T. texanus hispanicus* in Spain. Although COLLIGNON (1966) subsequently regarded them as distinct species, YOUNG (1973) has kept COLLIGNON's earlier intention and has added *T. texanus twiningi* from Trans-Pecos Texas. I should like to admit this subspecific separation as reasonable, if it

could fit the facts in the nature. Actually the extent of variation has not yet been so satisfactorily studied to make clear the relations of the nominal subspecies. It is difficult for me to understand the meaning of the fact that *T. texanus galicus* and *T. texanus hispanicus* both occur in Madagascar and are recorded from any of the three zones. In Texas *T. texanus galicus* does occur but in a zone above that of *T. texanus texanus*. Does this mean that the French subspecies migrated back to Texas in a delayed geological age? Or is *T. texanus galicus* a "chronological subspecies" of *T. texanus texanus*? In the latter case did *T. texanus galicus* migrate to France, Madagascar and other regions in that delayed age? The reason why the lower three zones in Texas were assigned to the Lower Santonian was that *T. texanus gallicus*, the same subspecies as the index of the Lower Santonian in France, characterizes the third zone (YOUNG, 1963, table 7). In view of the long range of *T. texanus gallicus*, as shown in Madagascar, such a reasoning would not necessarily be maintained in the interregional correlation. Thus, it seems me difficult to conclude an interregional correlation in such a fine scale by means of the hitherto known subspecies of *T. texanus* and furthermore, even the adequacy of this subspecific separation may become doubtful. Should we follow COLLIGNON's later interpretation of specific distinction, the separated species would be said useless for the correlation in a fine scale. It would be desirable to reexamine the true state through the concept of population palaeontology.

The hitherto admitted subspecies within *Texanites* (*Plesiotexanites*) *stangeri* (BAILY) is likewise meaningless, although SPATH's (1922) variety names *densicosta* and *sparsicosta* may be convenient to express certain forms in the variation of that species. Be that as it may, *T.* (*P.*) *stangeri* is widespread, being found even in Hokkaido, but seems to have a long vertical true range, since it is recorded to characterize the lower part of the Lower Santonian in Texas and to occur in the Middle and Upper Santonian of Madagascar. Thus, in the world scale the well known species *T. texanus* and *T.* (*P.*) *stangeri* can only indicate the Santonian stage and do not seem to be suitable for finer correlation.

Texanites (*T.*) *oliveti* seems to be a better index species, for it occurs in a comparatively lower part of the Santonian in both Madagascar and Japan. By courtesy of Dr. W. A. COBBAN I saw once a probable example of *Texanites oliveti* in the collection of the United States Geological Survey at Denver, which came from loc. USGS. 1467 in western Texas. As it is associated with *Clioscaphites vermiformis* (MEEK and HAYDEN), it records the occurrence of this species in the lower part of the Santonian in North America.

Texanites oliveti in the above discussion is in the sense of redefinition by COLLIGNON (1948a, p. 72). Whether this is truly identical with the original of *Mortoniceras oliveti* BLANCKENHORN (1905) or not may be a question, since the type specimen from the Middle East is secondarily much compressed. Furthermore, whether *T. oliveti* (of a larger size) from the Middle East is specifically well distinguished from *T. quinquenodosus* (of smaller sizes) may be another problem. In the Middle East, according to Dr. Z. LEWY (1977, personal information), *Texanites* sp. of the *quinquenodosus* subgroups occurs in the Lower Santonian closely associated with *Spinaptychus spinosus*. Whether *T. oliveti* var. *spinosa* COLLIGNON is a mere variant or has a meaning of the so-called chronological subspecies should also be reexamined.

Texanites (*Plesiotexanites*) *shiloensis* seems to be another good index of the Upper Santonian plus basal Campanian, because its occurence in Texas and Japan show a good correspondence. Certain associated species can tell the discrimination of the Upper Santonian from the Lower Campanian.

Despite a number of difficulties, I dare attempt to set forth a tentative scheme of a tripartite subdivision of the Santonian by ammonites as a step towards future refinement. The three zones in Madagascar are tentatively correlated with the tripartite units in Japan; the fourth zone in Texas with the upper unit in Japan; the second and the third zones in Texas are assumed to be approximately correlated with the Middle Santonian in Madagascar (and in Japan). When we admit this scheme, how the three parts are correlated respectively with what parts of the Santonian in France and other areas of western Europe is a keen problem. Anyhow, on the ground of this provisional correlation, a tentative range-chart of some selected species of the Texanitinae is shown in Fig. 3. In a few cases the range of a species is definitely known by the successive occurrence of its fossils in a measured sequence. In many other cases the locality records of a named species are scattered somewhere within a given unit. Even in such a case, the species is tentatively indicated in Fig. 3 as if it ranges throughout the unit. When the available records are still more uncertain, the presumed range is indicated by a broken line in the chart. These may be revised in the future, if more accurate locality records are enough assembled. The chart (Fig. 3) contains *Texanites* (*Plesiotexanites*) *thompsoni* (JONES) (see MATSUMOTO, 1970, p. 277), as an example from the West Coast of North America, for the age of which I depend on DOUGLAS (1969) who refined the record of JONES (1966). The chart may also be useful to know the general evolutionary pattern of *Texanites* species. As is shown in Fig. 3, the diverging speciation is considerable in *Texanites*, whilst little has been known about the successive phyletic evolution of a particular lineage. The dotted line connecting any set of two species in Fig. 3 means that the two species are described to be allied to each other, although the actual line of descent has not yet been traced with sufficient evidence. There are a few long-ranging species. Certain species of restricted distribution may have been diverged or specialized from a common root species simultaneously or at dissimilar times. Only a roughly parallel similarity is found between certain two species with respect to a certain character but they are dissimilar in other characters. *T. yazakii* and *T. hourcqui* may demonstrate such a case of seemingly similar but actually differentiated or diverged species. Their presumed contemporarity is by no means strictly evidenced. Therefore, they should not be too much relied upon for a precise interregional correlation, until their wider distribution be known.

Incidentally, *T. hourcqui* has been reported from bed 72 in the upper part of the Calendin Formation of Peru which is assigned to the Zone of *Lenticeras baltai* LISSON (BENAVIDES-CACERAS, 1956). The age of this zone was regarded by the same author as early Santonian. Presumably he must have depended on COLLIGNON's earlier paper (1948a, p. 79), in which the age of *T. hourcqui* was referred to the Upper Coniacian or the Lower Santonian. In the later works of COLLIGNON (1966) and BESAIRIE and COLLIGNON (1972) *T. hourcqui* has turned to be a zonal index of the Middle

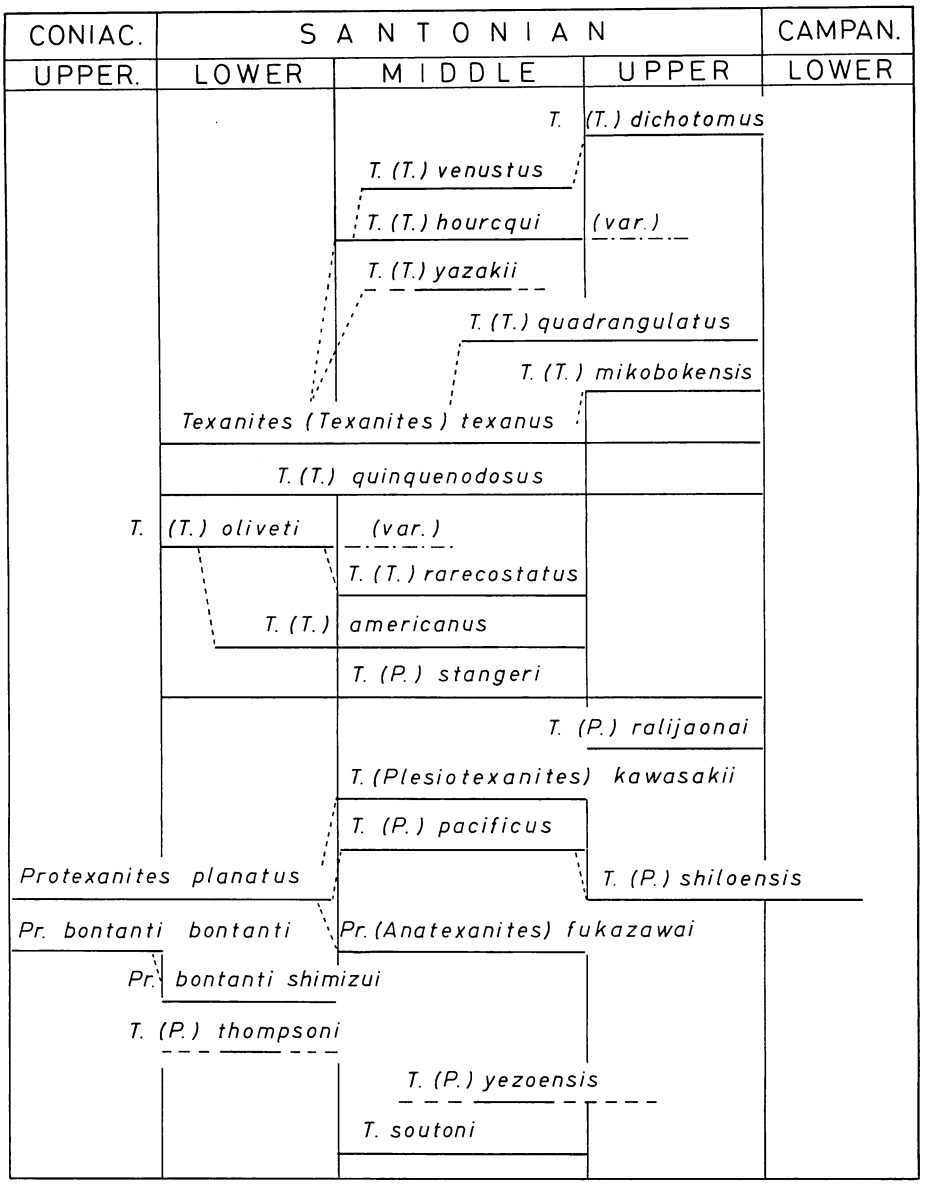


Fig. 3. Selected species of Santonian Texanitinae and their known stratigraphic ranges in the tentative scheme of subdivision.

Santonian.

Finally I must give comments on some inoceramid species. The well known species *Inoceramus* (*Cladoceramus*) *undulatoplicatus* ROEMER is regarded as a world-wide index of the Lower Santonian (KAUFFMAN, 1975, oral comm.). In Texas, the type area of this species, YOUNG (1963, text-fig. 4) has clearly indicated that it ranges in the lower part of the

Santonian, occurring in the first two zones of *Texanites*. As it is distributed widely in various regions and occurs more abundantly than any species of *Texanites*, it must be useful to check the age correlation between species of *Texanites* or other ammonites of scattered occurrence. This should, however, be maintained within the true distributional area of *I.* (*C.*) *undulatoplicatus*.

Inoceramus (*Cladoceramus*?) *japonicus* NAGAO and MATSUMOTO in a revised sense [see MATSUMOTO and UEDA (1962, p. 165) in which the best preserved SASA's specimen (forma γ of NAGAO and MATSUMOTO, 1940, pl. 9, fig. 1; MATSUMOTO and UEDA, 1962, pl. 24, fig. 1) was designated as the lectotype] characterizes the upper part of the Santonian correlative in Japan, while *Inoceramus* (*Platyceramus*) *amakusensis* is characteristic of the lower part. Now, *I.* (*C.*?) *japonicus* is seemingly very similar to *I.* (*C.*) *undulatoplicatus* and some authors (e.g. STEPHENSON, 1950) considered that they could be identical. If this was admitted, then the age discrepancy would be evident in the stratigraphic occurrence of this "identical species" between the Japanese (or northwestern Pacific) and the Euramerican provinces. The associated *Texanites* species may demonstrate this. I still hold the opinion of MATSUMOTO and UEDA (1962) that *I.* (*C.*?) *japonicus* is not identical with *I.* (*C.*) *undulatoplicatus* but that they show a convergence in the divergent ribbing between fairly close but not quite identical lineages. SEITZ (1961, p. 109) seems to have the same opinion.

In concluding the above discussions, a number of questions has been pointed out to be worked out in the future towards a refined scheme of Santonian zonation and correlation.

References Cited

BENAVIDES-CACERAS, V. E. (1956) : Cretaceous system in northern Peru. *Bull. Amer. Museum Nat. Hist.*, vol. 108, no. 4, p. 353-494, pls. 31-66.

BESAIRIE, H. and COLLIGNON, M. (1972) : Géologie de Madagascar I. Les terrain sédimentaires. *Ann. Géol. Madagascar*, no. 35, p. 1-463, pls. 1-89.

BLANCKENHORN, M. (1905) : Geologie der naheren Umgebung von Jerusalem. *Zeitsch. Deutsch. Palaestina-Vereins*, vol. 28, p. 75-120.

COLLIGNON, M. (1948 a, b) : Ammonites néocrétacées du Menabe (Madagascar). I. Les Texanitidae. *Ann. Géol. Serv. Mines*, no. 13, p. 49-107, pls. 7-20 (1948a) ; *Ibid.*, no. 14, p. 8-60, pls. 15-32 (1948b).

—— (1966) : *Atlas des Fossiles Caracteristiques de Madagascar* (*Ammonites*), fasc. 14 (Santonien), 134 p., pls. 455-515.

COQUAND, H. (1857) : Position des *Ostrea columba* et *biauriculata* dans le groupe de la craie inférieure. *Bull. Soc. Géol. France*, 2 ser., vol. 14 (1856-1857), p. 745-766.

DOUGLAS, R. G. (1969) : Upper Cretaceous biostratigraphy of northern California. *Proc. 1st Int. Conf. Planktonic Microfossils*, Geneva, 1967, vol. 2, 126-152.

GROSSOUVRE, A. DE (1894) : Recherches sur la Craie supérieure. II. Paléontologie. Les ammonites de la Craie supérieure *Mém. Carte Géol. Det. France*, 1893, p. 1-264, pls. 1-39.

—— (1901) : Recherches sur la Craie supérieure. I. Stratigraphie generale. *Ibid.*, 1901, (1), p. 1-558, (2), p. 560-1013.

JONES, D. L. (1966) : New Upper Cretaceous ammonite, *Protexanites thompsoni*, from California. *Jour. Paleont.*, vol. 40, p. 199-203.

MATSUMOTO, T. (1942) : Fundamentals in the Cretaceous stratigraphy of Japan. Part I. *Mem. Fac. Sci., Kyushu Imp. Univ.*, ser. D, vol. 1, p. 129-280, pls. 5-20.

—— (1965) : A monograph of the Collignoniceratidae from Hokkaido. Part I. *Mem. Fac. Sci., Kyushu Univ.* ser. D, vol. 16, no. 1, p. 1-80, pls. 1-18.

—— (1970) : *Ditto.* Part IV. *Ibid.*, vol. 20, no. 2, p. 225-304, pls. 30-47.
—— (1971) : *Ditto.* Part V. *Ibid.*, vol. 21, no. 1, p. 129-162, pls. 21-24.
—— and UEDA, Y. (1962) : Paleontological notes *in* UEDA, Y. (1962) : The type Himenoura Group. *Ibid.*, vol. 12, no. 2, p. 161-174, pls. 22-27.
NAGAO, S., OSANAI, H. and SAKO, S. (1954) : Oyubari. *Expl. Text. Geol. Map Japan*, scale 1 : 50,000, p. 1-12, pls. 1-9, 1 map, Hokkaido Development Agency, Sapporo.
NODA, M. and MATSUMOTO, T. (1976) : Mesozoic bivalves from Japan, 4 (Inocerami). *Atlas of Japanese Fossils*, no. 45, 24p. incl. 6pls., Tsukiji Shokan, Tokyo.
POMEROL, Ch. (1975) : *Stratigraphie et Paléogeographie. Ere Mesozoique*, 383p., doin, Paris.
SEITZ, O. (1961) : Die Inoceramen des Santon von Nordwestdeutschland. I. *Teil. Beih. Geol. Jahrb.*, no. 46, p. 1-186, pls. 1-15.
SPATH, L.F. (1922) : On the Senonian ammonite fauna of Pondoland. *Trans. Roy. Soc. S. Africa*, vol. 10, pt. 3, p. 118-147.
STEPHENSON, L.W. (1950) : Index fossils with particular reference to the Upper Cretaceous of eastern United States. *Jour. Geol. Soc. Japan*, vol. 56, p. 89-94.
TANAKA, K. and TERAOKA, Y. (1973) : Stratigraphy and sedimentation of the Upper Cretaceous Himenoura Group in Koshikijima, southwestern Kyushu. *Report Geol. Surv. Japan*, vol. 24, p. 157-184, pls. 15-24.
YOUNG, K. (1963) : Upper Cretaceous ammonites from the Gulf Coast of the United States. *Univ. Texas Publ.*, no. 6304, p. 1-373, incl. 82pls.
WRIGHT, C.W. and WRIGHT, E.V. (1951) : A survey of the fossil Cephalopoda of the Chalk of Great Britain. *Palaeontogr. Soc.*, 1951, p. 1-40.

Agemaki-zawa〔=Kamimaki-zawa〕(上巻沢), Amakusa (天草), Haboro (羽幌), Komakizawa (小巻沢), Kosen-zawa (鉱泉沢), Koshiki-jima (甑島), Kotambetsu (古丹別), Obira (小平), Omaki-zawa (大巻沢), Oyubari (大夕張), Panke-horoka-yuparo (パンケホロカユーパロ), Panke-mo-yuparo (パンケモユーパロ), Penke-horoka-yuparo (ペンケホロカユーパロ), Shimizu-zawa (清水沢), Shiyubari〔=Shiyuparo, Shuparo, Shuyubari〕(シユーパリ, シユーパロ, シューパロ, 主夕張)〔アイヌ語源の地名を和名化した場合の呼び方は人により, また場合により異なる〕

北海道産の新しいテキサナイテス: 北海道上部白亜系産の Texanitinae (Collignoniceratidae 科の中の1亜科) に属するアンモナイトは, MATSUMOTO (1970) のモノグラフに記載されているが, 最近大夕張地方を地質調査中に, 従来記載されていないテキサナイテスを採集した。これはマダガスカル産の *Texanites hourcqui* に, 殻形と肋の挿入や分岐が成年時まである点などが似ているが, 突起の配列の間隔や縫合線の L の性状などに明確な差異があり, 特異な1新種を代表するとみなされるので, ここに記載する。産出層はサントニアン相当部のほぼ中ほどであり, 住房を持ったやや大型の化石が, 比較的沖合相の泥岩に孤立して産したことも興味がある。 松本達郎・原口善光

附録: この機会に, サントニアンの化石層序学的区分と対比について, テキサナイト亜科の種を中心として, 国際的見地からの論議を試みる。 松本達郎

Explanation of Plate 42

Figs. 1-2. *Texanites yazakii* sp. nov..... Page 307
Holotype, GK. H5865, from loc. Y1120, collected by Y. HARAGUCHI.
1. Lateral (a), ventral (b) and frontal (c) views of the inner whorls, ×1.
2. Lateral view of the entire specimen, excluding the deformed last part, ×0.5.
Kyushu University (K. TANABE) photos without whitening.

2

1b

1c

1a

Trans. Proc. Palaeont. Soc. Japan, N.S., No. 110, pp. 319-329, pls. 43, 44, June 30, 1978

690. ON SOME INTERESTING BIVALVES FROM THE CRETACEOUS HIMENOURA GROUP IN KYUSHU

MASAYUKI TASHIRO*

Shokei Highschool, Kumamoto 862

Abstract. Here are described three new species and one new subspecies of the bivalves from the Santonian of the Himenoura Group in an area of Amakusa-Kamishima in Kyushu. *Atreta intulaevis* sp. nov. is characterized by a single adductor scar. Accordingly *Atreta* can undoubtedly be classified into the Plicatulidae as already suggested by Cox (1964). Since *Pycnodonte* and *Thyasira* prospered in Africa, Europe and N. America from the Campanian onward, *Pycnodonte amakusensis* sp. nov. and *Thyasira* (*Thyasira*) *himedoensis* sp. nov. from the Santonian were probably among the older forms in each genus. *Chlamys* (s. l.) *tamurai tamurai* and *Chlamys* (s. l.) *tamurai immodesta* subsp. nov. are characterized not only by the surface ornamentation of Mesozoic pectinids, e. g., *Camptonectes* and *Camptochlamys*, but also by that of Cenozoic ones, e. g., *Palliolum* and *Eburneopecten*.

Introduction and Acknowledgements

This paper treats the description of three new species and one new subspecies of Cretaceous bivalves under the genera *Atreta, Pycnodonte, Thyasira* and *Chlamys*, i. e. *Atreta intulaevis* sp. nov., *Pycnodonte amakusensis* sp. nov., *Thyasira* (*Thyasira*) *himedoensis* sp. nov. and *Chlamys* (s. l.) *tamurai immodesta* subsp. nov. from the Lower Formation of the Lower Himenoura Subgroup of the Himenoura Group in Amakusa-Kamishima island in Kumamoto Prefecture.

The species of *Atreta, Pycnodonte* and *Thyasira* in this paper may be the first record from the Japanese Mesozoic. *Chlamys tamurai tamurai* and *Chlamys tamurai immodesta* have very interesting sculpture on the surface for members of the genus *Chlamys* or the allied genera.

Before going into the description, I wish to express my sincere thanks to Professor Minoru TAMURA of Kumamoto University, for his kind encouragement and reading of this manuscript. I also thank to Dr. Ikuwo OBATA of the National Science Museum of Tokyo and Dr. Yasumitsu KANIE of the Yokosuka City Museum for supplying me many specimens of *Pycnodonte* from the Cretaceous of Madagascar. I am grateful to Mr. Tatsuya MATSUMOTO, a student of Tokai University, for supplying me some recent specimens of *Thyasira* and *Palliolum*.

Received September 19, 1977; read Oct. 4, 1976 at Sapporo

* Present address: Institute of Geology, Kochi University, Kochi 780.

Description of species

Family Pectinidae RAFINESQUE

Genus *Chlamys* RÖDING, 1778

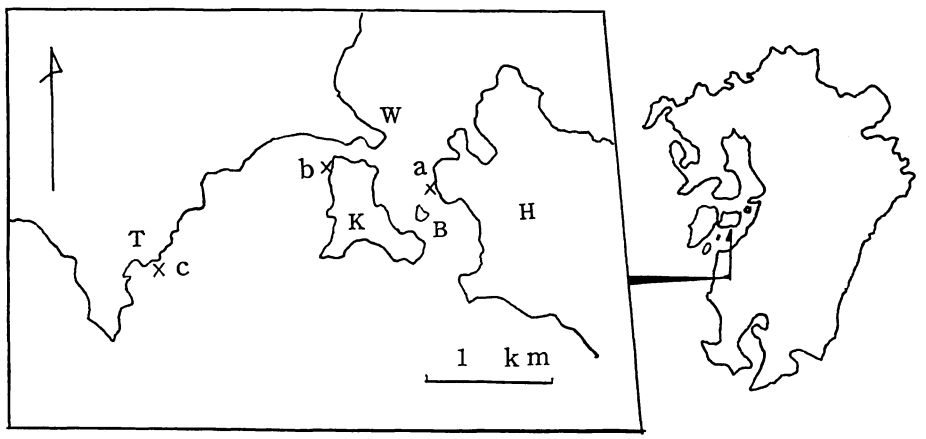
Chlamys (s. l.) *tamurai* TASHIRO, 1976

Chlamys (s. l.) *tamurai immodesta*, subsp. nov.

Plate 43, Figs. 1-4, Text-fig. 2

Material:—The holotype (KE 2751) is an external mould of a right valve collected from the Lower Formation of the Lower Himenoura Subgroup at Hinoshima island of Amakusa-Kamishima, Kumamoto Prefecture. The paratypes (KE 2752-KE 2757) were collected from the same locality. Another paratype (KE 2758) is an external mould of left valve collected from the same formation at Takagushi of Ryugadake-machi, Amakusa-Kamishima, Kumamoto Prefecture.

Description:—Shell roundly ovate, nearly equilateral, inequivalve, weakly inflated, somewhat higher than long; hinge line straight, occupying about a half of the valve length; anterior and posterior margins nearly straight; ventral margin semi-circular; umbo small, improminent, located nearly mid-point of valve length; apical angle about 75°; anterior ear larger than posterior, vertically truncated in left valve, forming a byssal notch in right; posterior ear obliquely truncated; external surface ornamented with two sorts of ribs except for fine crowded growth lines; one is primary and secondary radial ribs, which are narrower than their interspaces, finely spinose on ventral part, stronger and more numerous in left valve than in right, crowded and strong on anterior and posterior parts of the disk; the ribs counted about 70 in total number on left valve, and about 30 primaries and a little developed secondaries on anterior and posterior ventral parts of right valve; the secondary ribs of left valve beginning to appear at about 20 mm from umbo; the other sort of ribs very fine and numerous, divaricate, numbering about 10 within a distance of 5 mm on ventral margin in a mature specimen, and developed on marginal part of valve; ears ornamented in the same way as the disk; two pairs of cardinal crurae on hinge area; one pair on both sides of resilifer short; the other



Text-fig. 1: Map showing fossil localities
B: Bozujima islet H: Hinoshima island K: Kugushima islet T: Takagushi W; Wadanohana a: *Atreta intulaevis*, sp. nov., *Pycnodonte amakusensis*, sp. nov. and *Chlamys* (s. l.) *tamurai immodesta*, subsp. nov. b: *Thyasira* (*Thyasira*) *himedoensis*, sp. nov. c: *Chlamys* (s. l.) *tamurai immodesta*, subsp. nov.

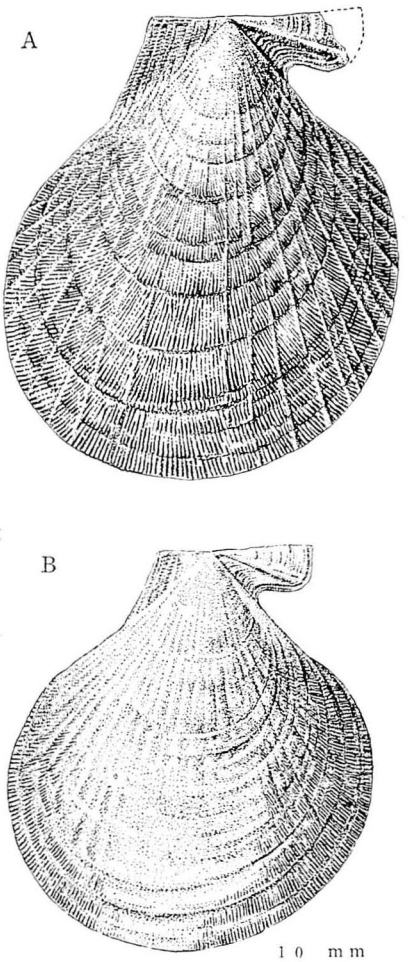
pair below hinge line elongated, parallel to cardinal axis; inner surface smooth; adductor scars indistinct; inner margin smooth.

Measurements (in mm):—

Specimen	Length	Height
KE 2751, right ex. mould	24.5	26.1
KE 2752, left ex. mould	26.7	28.8+
KE 2753, ditto	18.5	21.2+
KE 2754, ditto	24.1	25.9+
KE 2755, ditto	16.8+	26.3
KE 2756, left in. mould	26.5	30.4
KE 2757, right valve	18.0	19.5
KE 2758, left ex. mould	39.5	40.1+

Remarks:—This subspecies is discriminated from *Chlamys* (s.l.) *tamurai tamurai* from the Upper Campanian stage of the Himenoura Group and the Izumi Group in having the ill-developed diverging ribs on the main part of the disk, which are well developed only near ventral margin, and also in having more or less receded secondary radial ribs.

The generic position of these two subspecies, *tamurai* and *immodesta* is uncertain, although they are tentatively placed in *Chlamys* (s.l.) in this paper. They are different from hitherto described species of *Camptonectes, Camptochlamys* and *Chlamys* in followings features: such spinose radial ribs are unknown in any species of *Camptonectes* and *Camptochlamys*, such divaricate ribs do not appear in any species of *Camptochlamys* and *Chlamys*, and that the radial ribs are much stronger and more regularly spaced in the species of *Chlamys*. Some species of *Eburneopecten* from the Tertiary are similar to these forms in having two sorts of ribs (radial and divaricate). The two sorts of ribs in the species of *Eburneopecten*, however, are very fine and microscopic. And the species of *Eburneopecten* lack spines on the radial ribs. *Micronectes bellaturus* ICHIKAWA and MAEDA (1958; *Eburneopecten* (*Micronectes*) *bellaturus* (ICHIKAWA and MAEDA): HERTLEIN, 1969) from the Upper Cretaceous Izumi Group in Shikoku has also two sorts of ribs but differs from these forms in having the distinct concentric ribs or bundles which are widely spaced on the disk, and the more inflated and smaller shell than in these forms. The Recent species of *Palliolum, P. striatum* (MÜLLER)



Text-fig. 2. A: *Chlamys* (s.l.) *tamurai tamurai* TASHIRO, right valve B: *Chlamys* (s.l.) *tamurai immodesta*, subsp. nov. right valve.

(ABBOTT, 1955) and *P. macrocheiricola* HABE (1951) are closely similar to these two subspecies in the fine diverging ribs and spiny radial ribs on the disk. These subspecies, however, are much larger in size than the species of *Palliolum*.

HERTLEIN (1969) classified the genera of the Pectinidae into nine groups. In so far as I can see, these subspecies, *tamurai* and *immodesta*, belong to none of his groups, although they have some characteristic similar to the *Camptonectes* group, *Eburneopecten* group or *Chlamys* group. A new generic name may be required for these two subspecies, *tamurai* and *immodesta*.

Occurrence:—Siltstone or fine sandstone of the lower member of the Lower Formation of the Lower Himenoura Subgroup at the roadside exposure of northwest beach of Hinoshima island, Ryugadake-machi, Amakusa-gun, Kumamoto Prefecture. Siltstone of the same member at the seashore of Takagushi of Ryugadake-machi, Amakusa-gun, Kumamoto Prefecture. Middle Urakawan (Lower Santonian): *Inoceramus amakusensis* Zone.

Family Plicatulidae WATSON

Genus *Atreta* ÉTALLON, 1862

Atreta intulaevis, sp. nov.

Plate 44, Figs. 1-4, Text-fig. 3

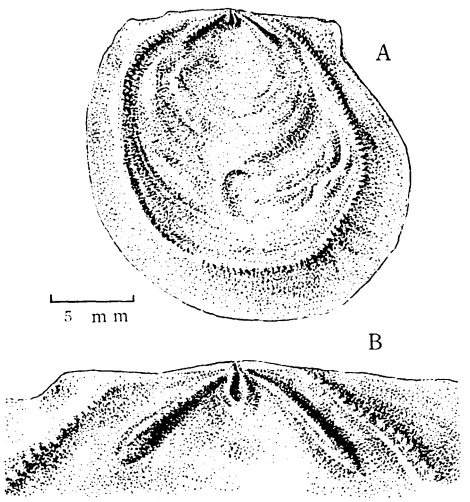
Material:—The holotype (KE 2759) is an internal mould of right valve collected from the Lower Formation of the Lower Himenoura Subgroup at Hinoshima island, Amakusa-Kamishima, Kumamoto Prefecture. The paratypes (KE 2760-KE 2764) were collected from the same locality.

Description:—Shell roundly subquadrate, slightly inflated, hinge line straight, about a half length of valve; umbo very small, located at about three-sevenths of length from front of valve; anterior margin subvertical near hinge margin but gradually arched on anterior ventral part; ventral margin well rounded; posterior margin obliquely subtruncated; postero-ventral part semi-circularly rounded; ligament area narrowly triangular, short and about one nineth of valve length; ligament groove very narrow, vertically set from umbo to central point of hinge line; internal surface of right valve divided into bowl-shaped shallow central part and ring-shaped flat marginal part by an elliptical and crenulated rim; central part ornamented with fine radial striae which are restricted near elliptical rim; striae very often weakened or disappeared in some specimens; an orbicular and elongated adductor scar indistinctly impressed on a little posterior area in central part; resilifer and two pairs of crurae present near mid-point of hinge; resilifer very small, triangular, located under umbo, connected with ligament groove on the top; a pair of crurae long, crenulated and obliquely extended from umbo to each anoterior and posterior margin; another pair of crurae short and very small, occupied radially on both lateral sides of resilifer; ventral margin smooth; external surface of left valve ornamented with fine concentric riblets; external surface of right valve unknown.

Measurements (in mm):—

Specimen	Length	Height
KE 2759, right in. mould	17.7	16.4
KE 2760, ditto	14.5	13.0
KE 2761, ditto	21.9	18.6
KE 2762, ditto	10.0	9.8
KE 2763, left ex. mould	12.0	11.5
KE 2764, ditto	10.0	9.0

Remarks:—This species occurs commonly on the surface of *Inoceramus amakusensis* NAGAO and MATSUMOTO



Text-fig. 3: *Atreta intulaevis*, sp. nov. A: internal view of right valve, showing the specimen with weak internal radial striae. B: ligamental view of right valve.

(1940), and rarely on the surface of *Chlamys* (s. l.) *tamurai immodesta*, subsp. nov.. Fine parallel striae appear on the inner surface of right valve in several specimens of this species (Pl. 2, fig. 3). The striae may be influenced by the growth line of the specimen of *Inoceramus amakusensis* to which the individual adheres. This species resembles the type species of *Dimyodon*, *D. schlumbergeri* MUNIER-CHALMAS (COX and HERTLEIN, 1969) from the Bathonian of Europe, and *Dimya*, *D. deshayesiana* RONAULT (ZITTEL, 1924, COX and HERTLEIN, 1969) from the Eocene of France, in having crenulated rim and the hinge structure, but differs from the two foreign species in the number of adductor scars, which are two in those European species and one in the present species. COX (1964) discriminated *Atreta* from the Dimyidae, which includes *Dimyodon* and *Dimya* by the number of adductor scars, because he was not able to detect the two adductor scars in the species belonging to *Atreta*. And he placed *Atreta* into the Plicatulidae. As one large adductor scar is faintly impressed on the inner surface, this species undoubtedly belongs to the Plicatulidae.

Comparison:—*Atreta blandina* (D'ORBIGNY) (emend COX, 1964) from the Oxfordian of France is similar to this species in the subquadrate outline of right valve, but differs from this species in having distinct radial or divaricating striae on the internal surface. This species is discriminated from *Atreta nilssoni* (HAGENOW) (*Plicatula sigillina* WOODWARD by WOODS, 1901) from the Lower Cretaceous of England by the nearly smooth inner surface. *Atreta cretacea* (CONRAD) (*Diploschiza cretacea* CONRAD: WHITFIELD, 1885) from the Upper Cretaceous of North America resembles this form in the orbicularly subquadrate outline, but differs from this species in the more strongly inflated left valve. *Atreta chavani* (COLLIGNON) (*Diploschiza chavani* COLLIGNON, 1951) from the Uppermost Cretaceous of Madagascar clearly differs from this species in the distinct internal divaricating riblets.

Occurrence:—Black siltstone of the lower member of the Lower Formation of the Lower Himenoura Subgroup at the roadside exposure of northwest beach of Hinoshima island of Ryugadake-machi, Amakusa-gun, Kumamoto Prefecture. Middle Urakawan (Lower Santonian): *Inoceramus amakusensis* Zone.

Family Gryphaeidae VYALOV

Subfamily Pycnodonteinae STENZEL, 1959

Genus *Pycnodonte* FISCHER de WALDHEIM, 1835

Pycnodonte amakusensis,, sp. nov.

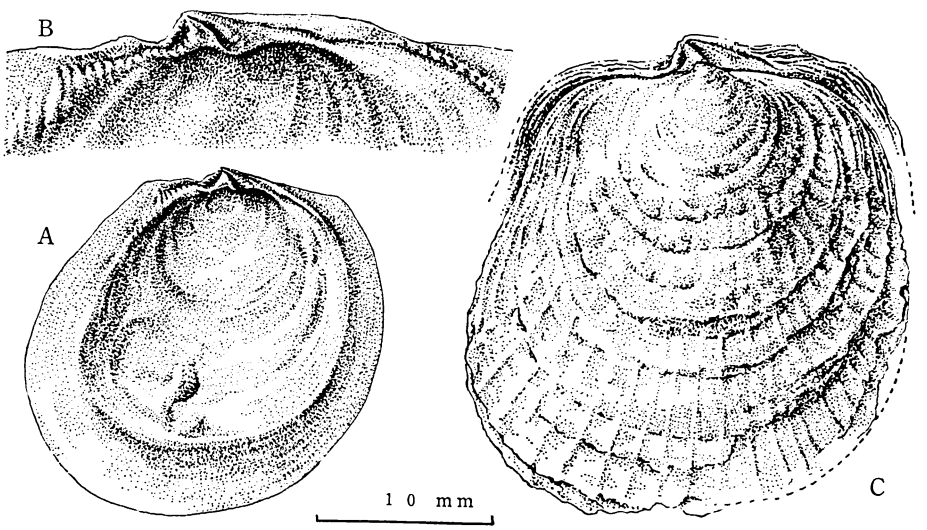
Plate 43, Fig. 9, Plate 44, Figs. 5-11, Text-fig. 4

Material:—The holotype (KE 2765) is an internal mould of left valve from the Lower Formation of the Lower Himenoura Subgroup at Hinoshima island, Amakusa-Kamishima, Kumamoto Prefecture. The paratypes (KE 2766-KE 2769) are internal moulds of left valve, the paratype (KE 2770) external mould of left valve, and the paratypes (KE 2771-KE 2772) external moulds of right valve. All the paratypes were collected from the type locality.

Description:—Shell inequilateral, highly inequivalve:

Right valve:—Shell roundly subquadlate, slightly inflated; anterior and posterior margins nearly straight near umbo but rounded on both lateral sides; anterior margin subvertical; ventral margin broadly arched; posterior margin obliquely subtruncated; umbo small, improminent, strongly opisthogyrous, located near the mid-point of valve length; surface ornamented with fine radial striae and widely spaced and irregularly waved growth lines.

Left valve:—Shell orbicular in outline; hinge margin straight, occupying about a half length of valve; anterior margin truncated, nearly vertical, gradually changing into broadly arched ventral margin; posterior margin obliquely truncated; postero-ventral margin well rounded; umbo small, improminent in younger stage, strongly opisthogyrous, located near the mid-point of valve length, and at about three-fifths from the anterior end of hinge margin; ligament area narrow, elongatedly triangular; ligament groove obliquely extended from umbo to central point of hinge line; internal surface divided into bowl-shaped shallow central part and ring-shaped flat marginal part by an elliptical rim; central part nearly smooth except for several blunt concentric wrinkles and a large orbicular adductor scar; numerous tooth-like chomata arranged on both sides of rim under hinge



Text-fig. 4: *Pycnodonte amakusensis*, sp. nov.
A: internal view of left valve. B: ligamental view of left valve. C: external view of right valve.

line ; external surface unknown in younger stage ; a strong sulcus running from umbo to postero-ventral margin ; surface nearly smooth except for irregularly waved growth striae.

Measurements (in mm) :—

Specimen	Length	Height
KE 2765, left in. mould	16.0	17.8
KE 2766, ditto	13.2	11.5
KE 2767, ditto	14.2	16.5
KE 2768, ditto	29.2	20.1+
KE 2769, ditto	9.0	9.2
KE 2770, left ex. mould	28.3	28.3
KE 2771, right ex. mould	23.3	25.8
KE 2772, ditto	29.9	28.2+

Remarks :—The internal surface of right valve is unknown. The umbonal part of left valve generally attaches itself to the surface of *Inoceramus amakusensis* NAGAO and MATSUMOTO. The convexity of left valve becomes stronger through the growth. The radial striae on the external surface of right valve number about 15 on the ventral margin.

Comparison :—This is similar to the immature stage of *Pycnodonte vesicularis* (LAMARCK) (WHITFIELD, 1885 ; FRENIEX, 1972) from the Upper Cretaceous of North America, Europe and Africa, in the elongated hinge margin and the rounded outline, but differ from *P. vesicularis* in the strongly opisthogylate umbo. *Pycnodonte subhippodium* (D'ARCHIAC) (STENZEL, 1959, 1971 ; *Ostrea* (*Biauris*) *subhippodium* : COSSMANN, 1922) from the Eocene of France also differs from this species in the orthogyrous umbo.

Occurrence :—Black siltstone of the lower member of the Lower Formation of the Lower Himenoura Subgroup at the roadside exposure of northwest beach of Hinoshima island of Ryugadake-machi, Amakusa-gun, Kumamoto Prefecture. Middle Urakawan (Lower Santonian) : *Inoceramus amakusensis* Zone.

Family Thyasiridae DALL

Genus *Thyasira* LEACH in LAMARCK, 1818

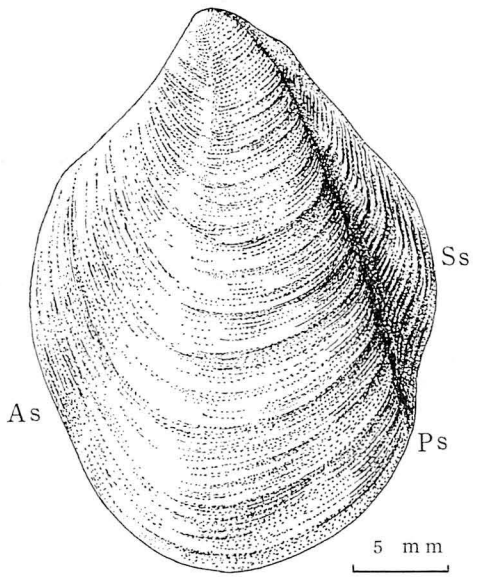
Thyasira (*Thyasira*) *himedoensis*, sp. nov.

Plate 43, Figs. 6-8, Text-fig. 5

1976. *Thyasira* sp. TASHIRO, *Palaeont. Soc. Japan, Sp. Pap.*, no. 19, p. 61, pl. 9, fig. 6.

Material—The holotype (KE 2165) is an internal mould of left valve. The paratypes (KE 2773-KE 2774) are deformed right valve and a conjoined specimen. These type specimens were collected from the Lower Formation of the Lower Himenoura Subgroup at Kugushima islet, Amakusa-Kamishima, Kumamoto Prefecture.

Description :—Shell orbicular, moderately inflated, much taller than long ; beak small, curving inward ; umbo prosogyrous, moderately inflated, located at a little anterior to mid-point of valve-length ; umbonal angle about 80° ; anterior dorsal margin slightly concave ; anterior margin weakly arched and gradually changing into well rounded ventral margin ; antero-ventral part slightly sinuated ; posterior margin moderately arched ; postero-ventral part weakly concave ; posterior dorsal margin not demarcated clearly from posterior margin ; surface marked with fine, closely and irregularly spaced growth lines ; anterior sulcus broad, very shallow, extending from umbo to anterior ventral margin ; a broad but prominent primary sulcus extending from umbo to postero-ventral margin along postero-dorsal slope of rounded umbonal ridge ; a ridge nearly straight ; submarginal sulcus or posterior sulcus very shallow, situated just below posterior dorsal margin ; a fold between primary sulcus and submarginal sulcus slightly convex ; lunule distinct, bounded by well defined low ridge ; ligament groove gently curved, elongated,



Text-fig. 5: *Thyasira (Thyasira) himedoensis*, sp. As.: anterior sulcus Ps: primary sulcus Ss: posterior sulcus or submarginal sulcus.

extending from behind umbo to posterior end of posterior dorsal margin; hinge teeth indistinct; internal surface ornamented with numerous and fine radial striae.

Measurements (in mm):—

Specimen	Length	Height
KE 2165, left valve	14.0	18.6
KE 2773, right valve	27.5	33.6
KE 2774, conjoint valve	31.2	35.1

Remarks:—This species occurs very rarely, and generally in broken or deformed states. As the surface ornamentation and the shell structure of the valve are well preserved in several specimens, the specific characters of this species are able to be described. Cretaceous *Thyasira* investigated in detail by KAUFFMAN (1976). According to him, Cretaceous *Thyasira* from the Western Interior of North America is classified into 7 species and 10 subspecies. They occur from the Campa-

Explanation of Plate 43

Figs. 1-4. *Chlamys* (s.l.) *tamurai immodesta*, subsp. nov.
1a: rubber cast of external mould, right valve holotype (KE 2751), ×1.2, Loc. roadside exposure of northwest beach of Hinoshima island, Amakusa-Kamishima, Kumamoto Prefecture.
1b: same specimen, ×2
2: rubber cast of external mould, left valve, paratype (KE 2758), ×1, Loc. eastern seashore of Takagushi of Ryugadake-machi, Amakusa-Kamishima, Kumamoto Prefecture.
3: internal mould of left valve, paratype (KE 2756), ×1.2, Loc. ditto.
4: rubber cast of external mould, left valve, (KE 2753), ×1.2, Loc. ditto.

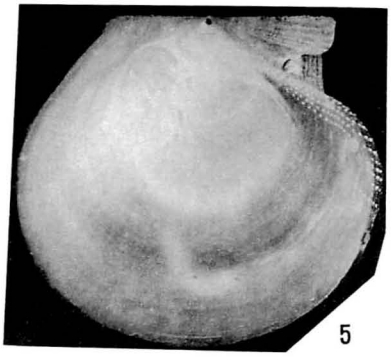
Fig. 5. *Palliolum macrocheiricola* HABE (for comparison)
5: external view of right valve, collected by Mr. Tatsuya MATSUMOTO, ×2, Loc. Tosa bay of Kochi Prefecture.

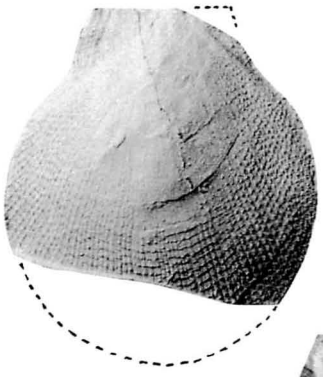
Figs. 6-8. *Thyasira (Thyasira) himedoensis*, sp. nov.
6a: external view of left valve, holotype (KE 2165), ×1.2, Loc. northern seashore of Kugushima islet, Ryugadake-machi, Amakusa-Kamishima, Kumamoto Prefecture.
6b: same specimen, ×2
7: external view of conjoined valves, showing the lunular area, paratype (KE 2774), ×1.2, Loc. ditto.
8: external view of right valve, deformed specimen, paratype (KE 2773), ×1.2, Loc. ditto.

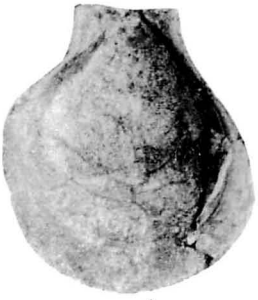
Fig. 9. *Pycnodonte amakusensis*, sp. nov.
9: internal mould of left valve, ×1.2, Loc. roadside exposure of northwest beach of Hinoshima island, Amakusa-Kamishima, Kumamoto Prefecture,

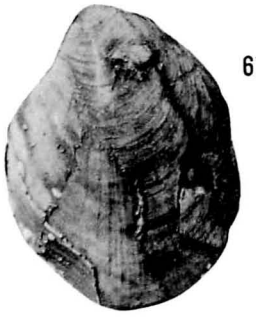

9


1a


5


2

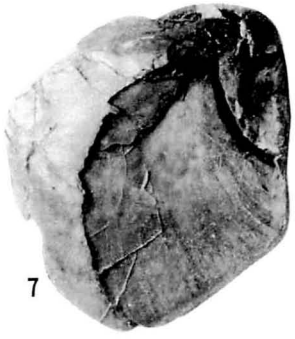

3

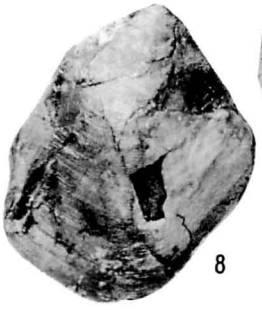

6b


1b


6a

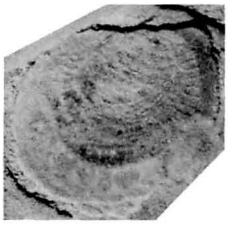

4


7


8

1a

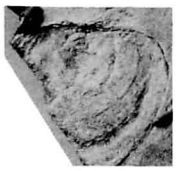
1c



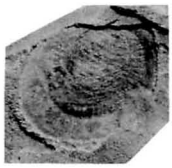
3b

1b

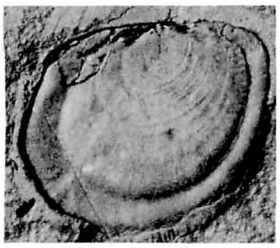
1d



4



3a



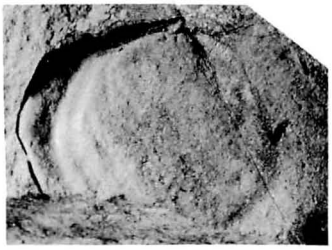
2

9

8

6

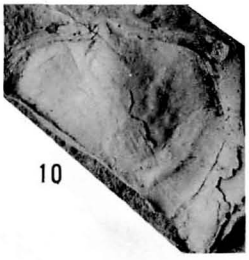
5a



7a

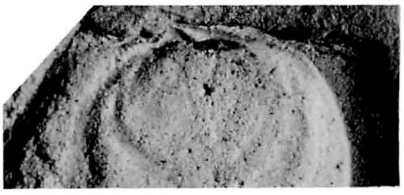
7b

11



10

5b



nian stage. KAUFFMAN (1967, 1969, 1976) figured the morphological changes of these species and subspecies through the Campanian. This species resembles *Thyasira* (s. str.) *beauchampi* s. str. which is one of the earliest species from the Lower Campanian of the Western Interior of North America, in the features of surface ornamentation, but differs from the American species in having taller valves and a weaker submarginal sulcus. It resembles more closely *Thyasira cretacea* WHITEAVES (ANDERSON, 1958) from the Cretaceous of California (Lower Campanian by MATSUMOTO, 1959) than the species and subspecies of the Western Interior, in the weak submarginal sulcus and the nearly straight primary sulcus. This is, however, more orbicular outline than *Thyasira cretacea*. *Thyasira* cf. *towsendi* WHITE (FRENEIX, 1960) from the Senonian of Noumea-Dumbea differs from this species in the more rounded and inflated valve.

Occurrence:—Black siltstone of the middle member of the Lower Formation of the Lower Himenoura Subgroup at northern seashore of Kugushima islet of Ryugadake-machi, Amakusa-gun, Kumamoto Prefecture. Middle Urakawan (Upper Santonian): *Inoceramus japonicus* Zone.

REPOSITORY

The specimens (KE) described in this paper are preserved in the Faculty of Education, Kumamoto University (Kumamoto 860).

References

ABBOT, P. T. (1955): American seashells. *R. Van Nostrand Co. Inc., New York.* 541 pp., 40 pls., 100 figs.

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

COLLIGNON, M. (1951): Le Crétacé supérieur d'Antonibe, Couches de passage du Crétacé au Tertiaire. *Annales Géologiques du Service des Mines*, Fascicule, no. 19, 186 pp., 7 pls.

COSSMANN, M. (1922): Synopsis illustre des mollusques de l'Eocene et de l'Oligocene en Aquitaine. *Soc. Géol. France, Mém, Paléont*, vol. 24, fasc. 1-2, 113-220, 7 pls.

COX, L. R. (1964): Notes concerning the taxonomy and nomenclature of fossil Bivalvia (Mainly Mesozoic). *Proc. Malac. Soc. London*, vol. 36, 39-48, pl. 1.

—— and HERTLEIN, L. G. (1969): Family Plicatulidae, *Treatise on Invertebrate Paleontology, (N) Mollusca 6, (1 of 3)*, p. N377-N382.

FRENEIX, S. (1960): Etude complémentaire des Lamellibranches du Crétacé de Nouvelle-Calédonie. *Sci. Terre*, Tome 6 (1958), nos. 1-2, p. 5-56, pls. 1-3.

—— (1972): Les Mollusques bivalves Crétcés du Bassin côtier de Tarfaya (Maroc méridional). *Notes and M. Serv. géol. Maroc.*, no. 228, p. 49-255, 18 pls.

HABE, T. (1951-1953): Genera of Japanese shells. Pts. 1-4, 326 pp. (in Japanese)

HAYAMI, I (1975): A systematic survey of the Mesozoic bivalvia from Japan. *Univ. Museum. Univ. Tokyo, Bull.*, no. 10, 249 pp., 10 pls.

HERTLEIN, L. G (1969): Family Pectinidae. *Treatise on Invertebrate Paleontology, (N) Mollusca 6, (1 of 3)*, p. N348-N373.

ICHIKAWA, K. and MAEDA, Y. (1958): Late Cretaceous pelecypods from the Izumi Group, Part 2, Order Taxodontida, Priodontida, Dysodontida, Desmodontida and Adapedontida. *Jour. Inst., Polytech., Osaka City Univ.*, ser. G., vol. 4, p. 71-122, pls. 3-7.

KAUFFMAN, E. G. (1967): Cretaceous *Thyasira* from the Western Interior of North America. *Smithsonian Misc. Coll.*, vol. 152, no. 1, 159 pp., 5 pls.

—— (1969): Form, Function and Evolution. *Treatise on Invertebrate Paleontology. (N) Mollusca 6 (1 of 3)*, p. N129-N204.

—— (1976): Dispersal and Biostratigraphic potential of Cretaceous Benthonic Bivalvia

in the Western Interior. *Geol. Assoc. Canada, Sp. Pap.*, no. 13, p. 163- 194.

MATSUMOTO, T. (1959) : Upper Cretaceous ammonites of California. Part 2, *Mem. Fac. Sci., Kyushu Univ.*, ser. D, geol., spec. vol. 1, 172 pp., 41 pls.

STENZEL, H.B. (1959) : Cretaceous oysters of southwestern North America *Cong. Geol. Internac., XXa sesion, Ciudad de Mexico, 1956, El sistema Cretacico*, vol. 1, 15-37, 19 figs.

—— (1971) : Family Gryphaeidae. *Treatise on Invertebrate Paleontology, (N) Mollusca (3 of 3)*. p. N1097-N1126.

TASHIRO, M. (1976) : Bivalve faunas of the Cretaceous Himenoura Group in Kyushu. *Palaeont. Soc. Japan, Sp. Pap.* no. 19, 102 pp. 12 pls.

WHITFIELD, R.P. (1885) : Brachiopoda and Lamellibranchiata of the Raritan Clay and Green Sand Marls of New Jersey. *U.S. Geol. Surv., Monogr.*, no. 9, 338 pp., 35 pls.

WOODS, H. (1899-1903) : A monograph of the Cretaceous Lamellibranchiata of England. *Paleontographical Soc. London*, vol. 1, 232 pp., 42 pls.

ZITTEL, K.A. (1924) : Palaeontologie, Invetebrata. *Verlag R. Oldenbourg, München und Berlin*, 733 pp.

Amakusa-Kamishima 天草上島, Bozujima 坊主島, Hinoshima 樋之島, Kugushima 椚島, Ryugadake 竜ヶ岳, Takagushi 高串, Wadanohana 和田鼻

Explanation of Plate 44

Figs. 1-4. *Atreta intulaevis*, sp. nov.
1a : internal mould of right valve, holotype (KE 2759), ×1,2, Loc. roadside exposure of northwest beach of Hinoshima island, Amakusa-Kamishima, Kumamoto Prefecture
1b : rubber cast of internal mould, the same specimen with 1a.
1c : umbonal view of the same specimen, ×3
1d : umbonal view of rubber cast, same specimen.
2 : subinternal mould of right valve, paratype (KE 2761), ×1, Loc. ditto.
3a : internal mould of right valve, paratype (KE 2760), ×1, Loc. ditto.
3b : the same specimen with 3a, showing radial striae and parallel threads of the inter nal surface, ×2
4 : external mould of left valve, paratype (KE 2763), ×1, Loc. ditto.

Figs. 5-11. *Pycnodonte amakusensis*, sp. nov.
5a : internal mould of left valve, holotype (KE 2765), ×1.2, Loc. roadside exposure of northwest beach of Hiroshima island, Amakusa-Kamishima, Kumamoto Prefecture.
6 : rubber cast of internal mould, left valve, paratype (KE 2766), ×1.2, Loc. ditto.
7a : internal mould of left valve, paratype (KE 2768), ×1, Loc. ditto.
7b : umbonal view of same specimen with 7a, ×2
8 : external view of left valve, rubber cast of paratype (KE 2770), ×1, Loc. ditto.
9 : external view of right valve, rubber cast (KE 2775), ×1, Loc. ditto.
10 : external view of right valve, rubber cast of paratype (KE 2771), ×1, Loc. ditto.
11 : external view of right valve, rubber cast (KE 2772), ×1, Loc. ditto.

九州の白亜系姫浦層群産の興味ある二枚貝： 熊本県天草郡竜ケ岳町の姫浦層群の下部亜層群下層部より産する二枚貝 *Atreta intuleavis*, sp. nov., *Pycnodonte amakusensis*, sp. nov., *Thyasira* (*Thyasira*) *himedoensis*, sp. nov., *Chlamys* (s. l.) *tamurai immodesta*, subsp. nov. の4属3新種1新亜種を記載した。そのうち *Atreta*, *Pycnodonte*, *Thyasira* は，本邦中生界では，おそらく最初の記載である（但し，*Pycnodonte*? sp., HAYAMI 1975; *Thysira* sp., TASHIRO 1976 を除く）．なお *Atreta* の所属については，Plicatulidae と Dimyidae のどちらに加えられるか疑問な点があったが，今回，前者に属することが判明した。*Pycnodonte* や *Thyasira* は，アフリカ，ヨーロッパ，北アメリカでは，カンパニアン以降にその発達が顕著であるが，本産地は，サントニアンの下部とされているので，姫浦層群産の *Pycnodonte*, *Thyasira* は，古い形態を示すものとして興味深い。また，*Chlamys* (s. l.) *tamurai*, *Chlamys* (s. l.) *tamurai immodesta* は，*Camptonectes*, *Camptochlamys* の中生代型の Pectinids と *Eburneopecten*, *Palliolum* の新生代型の Pectinids の双方にそれぞれ共通する表面装飾を有する点，分類学上，極めて，興味あるものである。 田代正之

PROCEEDINGS OF THE PALAEONTOLOGICAL SOCIETY OF JAPAN

学 会 記 事

○1978年6月2日の評議員会で承認された会員の動静は次の通りである。
〔入会者〕 大崎康吉，久保親弘，菊池芳文，安藤寿男，鈴木保宏，石川 享，杉本次郎，白木孝佳，平川昌登，立松泰夫，井田休夫，谷村好洋，安田尚登（13名）
〔退会者〕 片山貞昭，丸山文男（2名）

日本古生物学会第121回例会は1978年6月3日（土）に筑波大学において開催された（参加者97名）。

個 人 講 演

推古海山（北西太平洋）における珪藻層序およびそれと日本との関連について……小泉 格
Coscinodiscus "yabei" グループの系統分類について……小泉 格・谷村好洋
北海道天北上部新第三系産四縦溝形ケイソウ三新属……小村精一
本邦上部新第三系産 *Liquidambar* の分類学的検討……植村和彦
来馬層群ならびに手取層群産材化石について……岡田清史・山崎純夫
成羽層群より採取した材化石について……山崎純夫・岡田清史・綱田幸司
手取統植物群に産出する "タイ類" 状葉体について……松尾秀邦
Late Cretaceous Plants found from the Isla Quiriquina, Chile ……KIMURA, T. & OHANA, T.
Late early Cretaceous plants from Fukui Prefecture, in the Inner Zone of Japan ……KIMURA, T. & HORIUCHI, J.
Some coniferous and ginkgoalean remains from the Palaeogene Noda Group, Iwate Prefecture, Japan (Part 4) ……KIMURA, T. & HORIUCHI, J.
鳥取県辰己峠産バラ科化石について……尾崎公彦
On Phytosterol gained from Late Miocene fossil leaves……OZAKI, K.
岩手県久慈市付近の後期白亜紀フローラ……棚井敏雅
Maklayia, from the Kuchibora Formation, Gujohachiman, Mino Massif, Central Japan ……IGO, H.
兵庫県西部の石灰岩礫岩より産する紡錘虫化石（その1）一龍野市東部の *Afghanella* 化石群……後藤博弥
Fusulinids from the Madre de Dios de Chill and the Yaurichambi de Bolivia, South America……CHISAKA, T., CORVALAN, J. and URDININEA, R.
Revision of the Permian "stromatoporoids" reported from Japan……MORI, K.
石サンゴの骨格年代学（Sclerochronology）についての一考察……小西健二・大村明雄・富樫澄江・吉池英子
Cladochonus, *Amplexus*, *Lophophyllidium* and their associated fauna of the L wer part of the Ichinotani Formation, Hida Massif, Central Japan……IGO, H. and ADACHI, S.
志摩半島東部に分布する上部ジュラ系今浦層群産出の珊瑚化石の研究（予報）……山際延夫・辻井安喜・鳴橋憲一・藤田孝子・和田朋子
Some interesting fossils from the Late Paleozoic in Caraveli area, Southwest Peru……YAMAGIWA, N. and RANGEL, C.
白亜系御所浦層群及び川口層から産する巻貝 *"Glauconia"* について……岩崎泰穎・坂本省吾
アジア産新生代 *Amusium*……増田孝一郎
仙台付近槻木層産 Arcid-Potamid fauna について……小笠原憲四郎・野田浩司
北海道長万部町産 *Vicarya* 群集について……菅野三郎・天野和孝
Macoma tokyoensis MAKIYAMA と *Macoma totomiensis* MAKIYAMA について……菅野三郎・増田富士雄・天野和孝
第二次オオベソオウムガイ飼育実験の経過……浜田隆士他（JECOLN）

日本古生物学会特別号の原稿募集

PALAEONTOLOGICAL SOCIETY OF JAPAN, SPECIAL PAPERS, NUMBER 23 を 1979 年度に刊行したく，その原稿を公募します。適当な原稿をお持ちの方は，次の事項に合わせて申込書を作成し，原稿の写しを添えて，〒812　福岡市東区箱崎　九州大学理学部地質学教室気付，日本古生物学会特別号編集委員会（代表者勘米良亀齢）宛に申し込んで下さい。

(1) 古生物学に関する論文で，欧文の特別出版にふさわしい内容のもの。同一の大題目の下に数編の論文を集めたもの（例えばシンポジュウムの欧文論文集）でもよい。分量は従来発行の特別号に経費上ほぼ匹敵すること。学会以外からも経費が支出される見込のある場合には，その金額に応じて上記よりも分量が多くてよい。

(2) 内容・文章ともに十分検討済の完成した原稿で，印刷所に依頼して正確な見積りを算出できる状態にあること。申込書とともに必ず原稿の写しを提出して下さい。（用済の上は返却致します）。

(3) 申込用紙は自由ですが，次の事項を明記し，〔　〕内の注意を守って下さい。
  (a) 申込者氏名；所属機関または連絡住所・電話番号。〔本会会員であること〕。
  (b) 著者名；論文題目。〔和訳を付記すること〕。
  (c) 研究内容の要旨。〔800～1,200字程度，和文で可〕。
  (d) 内容ならびに欧文が十分検討済であることの証明。〔校閲者の手紙の写しでもよい〕。
  (e) 本文の頁数（刷上り見込頁数または原稿で欧文タイプ25行詰の場合の枚数――ただし，パイカーかエリート字体かを添記すること）；また本文中小活字（8ポ組み）に指定すべき部分があるときは，そのおよその内訳（総頁に対するパーセント）；挿図・表の各々の数と刷上り所要頁数；写真図版の枚数。
  (f) 他からの印刷経費支出の見込の有無，その予算額，支出源。〔その見込の証明となる書類またはその写しを添えて下さい〕。
  (g) その他参考事項。

(4) 申込及び原稿提出締切 1978 年 10月25日（必着）。採否は 1979 年1月の評議員会で審議決定の上，申込者に回答の予定です。ただしその前または後に，申込者との細部の交渉を，編集委員から求めることがあるかもしれません。

(5) 上記（f）の他からの印刷経費支出の見込みがない場合は，1979年度の文部省刊行助成金（「研究成果刊行費補助金」）を申請いたしますので，上記（2）の条件がみたされている場合にのみ考慮されます。

(6) 論文が完全な場合には，評議会での決定後できるだけ早く印刷にとりかかる予定です。文部省の刊行助成金の申請は，本会から行ない（例年は11月末に申請締切），その採否・金額など決定後印刷にとりかかります。その場合は文部省との約束により，その年の秋（前例では 10 月 20 日）までに初校が全部出なければ，補助金の交付が中止されることになっています。

(7) 特別号の投稿規定はとくにありません。会誌に準じ，前例を参考とし，不明の点は編集委員会に問い合わせて下さい。経費がかかるので，特別な場合を除き，別冊は作成せず，本刷 25 部を著者に無料進呈します。それ以上は購入（但し著者には割引）ということになります。いくつかの論文を集めて1冊にするときには，世話人の方から指示して，体裁上の不統一のないようにして下さい。印刷上の指示事項が記入できるよう，原稿の左右両側・上下に十分空白をとって，タイプで浄書して下さい。

行 事 予 定

	開 催 地	開 催 日	講演申込締切
第122回 例 会	山 形 大 学	1978年10月14日	1978年8月10日
1979年総会・年会	福 岡 大 学	1979年1月21, 22日	1978年11月20日

講演申込先：〒113 東京都文京区弥生 2-4-16 日本学会事務センター 日本古生物学会行事係

お 知 ら せ

○Recent Progress of Japanese Sciences (Geological Sciences) は日本自然科学集報 Vol. 3 として日本学術会議から出版された。

○1978年10月2日～5日筑波大学で東南アジア地質古生物に関する国際シンポジウムが開催される。

会 員 係 より

○新しい会員名簿を作成しますので，本誌前号（109号）に添付いたしました葉書を，変更の有無にかかわらず，お送りいただくようお願いします。

◎ 本会誌の出版費の一部は文部省研究成果刊行費による。

1978年6月25日 印 刷
1978年6月30日 発 行

ISSN 0031-0204

日本古生物学会報告・紀事

新 篇 110 号

2,000 円

発 行 者 日本古生物学会
文京区弥生 2-4-16
日本学会事務センター内
（振替口座東京 84780 番）

編 集 者 速 水 格

印 刷 者 東京都練馬区豊玉北2ノ13
学術図書印刷株式会社 富 田 潔

Transactions and Proceedings of the Palaeontological Society of Japan

New Series No. 110 June 30, 1978

CONTENTS