*A Supplementary Note on the Fossil Marine Fauna from Okinawa-zima, Ryûkyû Islands**

By

Hisakatsu YABE and Kotori M. HATAI

Contribution from the Institute of Geology and Palaeontology, Tôhoku Imperial University, Sendai.

(Read and received May 24th, 1941.)

The fossils previously treated with by S. NOMURA and K. HATAI (A Note of the Fossil Marine Fauna from Okinawa-zima, Ryûkyû Group, Trans. Pal. Soc. Japan, No. 12, pp. 39-42, 1936), are from a collection of Mr. K. TSUJITA, then teacher of the Okinawa Girls Normal School, and were collected by him from a locality near the city of Naha in Okinawa-zima. The authors reported on the occurrence of,

Pelecypoda 11 species
Gastropoda 7 species
Cirripedia 1 species

Brachiopoda 2 species
Echinodermata 1 species
Anthozoa 1 species

and laying particular emphasis upon the occurrence of *Pecten praesignis* YOKOYAMA, *Thyasira nipponica* YABE and NOMURA, and *Coronula diadema* LINNAEUS, arrived to the conclusion that the limestone from which their fossils came, belongs to and is a limestone facies of the Simaziri beds and not a member of the Ryûkyû limestone, which, after S. HANZAWA (Topography and Geology of the Riûkiû Islands, Sci. Rep., Tôhoku Imp. Univ., Ser. 2, Vol. 17, pp. 34-35, 1935), unconformably overlies the Simaziri beds.

Fortunately, one of us (H. YABE) during a geological trip in the winter of 1939-1940 to the Ryûkyû Islands,* was favoured with the opportunity and with the kind guidance of Mr. K. TSUJITA to see the locality from where S. NOMURA and K. HATAI's fossils were found. The locality is a limestone quarry near the famous temple Sôgenzi close to the eastern border of the City of Naha.

The kind guidance of Mr. TSUJITA resulted in the collecting of a scallop referable to *Pecten naganumanus* YOKOYAMA, one of which is here figured (fig. 2) and several other molluscan fossils; unfortunately *Pecten praesignis* YOKOYAMA was not obtained. However, that both species occur in the same limestone is beyond dispute, the limestone being less than 10 m thick in exposure, and rather massive, with no distinct trace of stratification. On the other hand from a "Ryûkyû" limestone quarry near Syûri, a specimen of *Pecten praesignis* (fig. 1.) was obtained. *Pecten praesignis* is a characteristic and common fossil in the Simaziri beds, and its occurrence in the limestone of this district once referred to the Ryûkyû limestone by S. HANZAWA is now confirmed.

* Transactions of the Palaeontological Society of Japan, No. 133.

The occurrence of *Pecten praesignis* and *P. naganumanus* both of YOKOYAMA, in the same bed is a fact hitherto unknown to the geology of Japan.

Pecten praesignis was first described by M. YOKOYAMA (On a New Species of *Pecten* from the Neogene of Japan, Jour. Geol. Soc. Tokyo, Vol. 29, No. 350, pp. 1-2, pl. 5, figs. 1-3, 1922), on some specimens without label denoting its locality, in the collection of the Geological Institute of the Tôkyô Imperial University. The original description is as follows.

Shell large, rather thin, much compressed, orbicular, somewhat broader than high, a little inequivalve, the left valve being slightly flatter than the right, equilateral, radiately ribbed on the surface. The ribs are about sixteen in number, the lateral ones often splitting into two or more riblets, broad, low and flat, straight, longitudinally striate, flattening towards the margins; the interspaces on the right valve are narrower than the ribs themselves, while on the left just the opposite is the case. Incremental lines more or less distinct, in some parts looking like striations. Ears subequal, the anterior on the right valve with the anterior margin somewhat wavy, and the corner acute, while the posterior ear is obliquely truncate behind; byssal notch hardly indicated. Right valve 123 mm. broad and 109 mm. high. Left valve 120 mm. broad and 110 mm. high. Thickness 18 mm. of which about 10 mm. belongs to the right valve.

The same author (Tertiary Mollusca from Southern Tôtômi, Jour. Fac. Sci., Imp. Univ., Tokyo, Sec. 2, Vol. 1, Pt. 9, p. 357, pl. 40, figs. 1, 2, pl. 41, fig. 1, 1926), further recorded this species from Hirugaya (Sagara beds), Senba (Horinouti beds), Hatumma (Utida beds), and Asuka (Satuka beds), and stated that "It has now become almost certain that its locality lies somewhere in southern Tôtômi", owing to that the type was described on specimens from an unknown locality. In the following year he (Pliocene Shells from Hyûga, Jour. Fac. Sci., Imp. Univ., Tokyo, Sec. 2, Vol. 2, Pt. 7, p. 335, 1927) recorded the same species from Kôunzi and Uwae near Takanabe in Hyûga Province, Kyûsyû. According to Y. OTUKA (Early Pliocene Crustal Movement in the Outer Zone of Southwest Japan and in the NAUMANN'S Fossil Magna, Bull. Earth. Res. Inst., Vol. 9, Pt. 3, pp. 341-343, 1931), *Pecten praesignis* occurs in the Takanabe group (of Hyûga), a fossiliferous complex which is referred by him to the Lower Pliocene age.

Subsequently, J. MAKIYAMA (Molluscan Fauna of the Lower Part of the Kakegawa Series in the Province of Tôtômi, Japan, Mem. Coll. Sci., Kyoto Imp. Univ., Ser. B, Vol. 3, Art. 1, No. 1, p. 34, 1927) recorded this species from the lower part of the Kakegawa series at Tennôyama, Nitô, Tennô-shrine, Saigô-bridge and Iwasibara; it is said to be one of the most characteristic species in the lower Kakegawa fauna.

S. NOMURA and H. NIINO (Fossil Mollusca from Izu and Hakone, Sci. Rep., Tôhoku Imp. Univ., Ser. 2, Vol. 15, No. 3, p. 180, 1932), discovered this species from the Yugasima group (R. TAYAMA and H. NIINO, Geology of Izu Peninsula, SAITO Ho-on Kai Ann. Rep., No. 7, p. 260, 1931) in southern Izu Peninsula; their specimen consists of a cast still preserving the outer sculpture, while S. NOMURA (Catalogue of the Tertiary and Quaternary Mollusca from the Island of Taiwan, etc., Sci. Rep., Tôhoku Imp. Univ., Ser. 2, Vol. 16, No. 1, p. 60, 1933) found it in

the Kaizan beds of Mt. Arisan, in the Island of Taiwan.

S. NOMURA and N. ZINBÔ (Molluscan Fossils from the Simaziri Beds of Okinawa-zima, Ryûkyû Islands, Sci. Rep., Tôhoku Imp. Univ., Ser. 2, Vol. 18, No. 3, p. 237, 1936) mentioned the occurrence of this scallop from Gabusoga and Nakôsi, two localities of the Simaziri beds, while S. NOMURA and K. HATAI as stated above recorded it from a limestone complex near Naha.

S. NOMURA (The Molluscan Fauna from the Pliocene of Tosa, Jap. Jour. Geol. Geogr., Vol. 14, No. 2/3, p. 71, 1937), listed this species from the Tônohama beds at Anai, Ioki, Tônohama and Ôno, Aki-gun, Tosa Province, in Sikoku.

Thus as known at present, *Pecten praesignis* YOKOYAMA is distributed in the Miocene (of Tôtômi and ? Izu) and Pliocene (Tôtômi) of Honsyû, the Pliocene of Sikoku (Tosa), Kyûsyû (Hyûga), and Okinawa-zima, and in the Miocene of Taiwan; but does not seem to be represented in deposits younger than the Lower Pliocene or in those older than the Miocene.

Pecten (Oopecten) gigas (SCHLOTHEIM, 1813), described and figured by L. R. Cox (Fossil Mollusca from Southern Persia (Iran) and Bahrein Island, Pal. Indica, N.S., Vol. 22, Mem. No. 2, p. 53, pl. 6, figs. 2-5, 1936) closely resembles *Pecten praesignis* in general features, the former one has 14-15 ribs while the latter has 12-18; however, the ribs are less elevated and the concentric lines stronger in the Japanese form. *Pecten gigas* is from the Miocene of Central Persia. Species similar to the Japanese one do not appear to be represented in the Neogene rocks of India.

Although a large number of fossils have been reported by K. MARTIN and others from the Tertiary rocks of Java, there seem to be none which are close to the Japanese form. *Pecten hulshofi* MARTIN (Die Fossilien von Java, Samml. Geol. R.-Mus., in Leiden, N.F., Bd. 1, p. 349, pl. 49, figs. 46-49, 1909) from the Lower Miocene (Rembang beds) of Java and the Pliocene (?) of the Aroe Islands is more or less related to *Pecten praesignis*. However, the number of radial ribs, strength of the concentric lines and other features serve to readily distinguish them from one another. There do not appear to be any other closely allied ones to which urgent mentioning is needed.

It is interesting to notice that the most closely allied species to the present one occurs in the Miocene of Central Persia. Probably allied ones are yet to be found in the Neogene deposits of India, Java and neighbouring islands.

Pecten naganumanus YOKOYAMA was dealt by us (On the Stratigraphical Significance of *Pecten naganumanus* YOKOYAMA, and Its Bearing on the Japanese Neogene, Trans. Pal. Soc. Japan, No. 51, pp. 153-168, 1937), and recently it was again remarked upon (Some Fossil Mollusca from Kagosima-ken, Kyûsyû, a paper submitted to the 23rd meeting of the Palaeontological Society of Japan, held in Tokyo, May 24, 1941), and here we wish to give a few more remarks.

In the former report we mentioned that, "*Pecten naganumanus* from the Byôritu beds generally has about 12 ribs on the right valve, the ones from the Naganuma beds generally show but 11, those from Ninomiya beds about 10, and the

specimens from Higasa number about 12. Thus, it may be possible that the number of ribs on the right valve and their relation to the age of the beds in which they occur may yet prove to be of some aid in distinction of the Pleistocene from the Pliocene in the Kwantô region, Central Japan. However, from the number of ribs only taken into consideration, it appears as if the beds at Higasa and the Byôritu beds were of the same age, and that the Naganuma beds were geologically older than the Ninomiya beds; providing that the decrease in number of ribs on the right valve is in accordance with the succession of strata."

The specimens now before us all show that the ribs on the right valve exceed 13 in number (although the specimens are not perfect), thus if the number of ribs is taken into consideration, the present specimens should be youngest in age. However, there is a great possibility of the number of ribs showing an increase and decrease in accordance with the succession of strata, viz., those occurring in strata of early age may have a number of ribs even greater than those occurring in strata of later age, or possibly their number may alter. This view has not yet been settled owing to some problems in stratigraphy and correlation of the geographically isolated localities in which this species occurs.

Since we are now preparing a report in concern to *Pecten naganumanus* YOKOYAMA and its related species, further remarks are here withheld.

Here we wish to record our thanks to Mr. TSUJITA, then teacher of the Girls Normal School at Naha in Okinawa-zima for kindly guiding one of us (H. YABE) to the fossil localities in that Island. Acknowledgements are also due to Mr. K. KUMAGAI for taking the necessary photographs.

Explanation of Plate 11(4)

Fig. 1. *Pecten praesignis* YOKOYAMA (natural size) from the "Ryûkyû" limestone quarry near Syûri, Okinawa-ken. (Reg. No. 63498.)

Fig. 2. *Pecten naganumanus* YOKOYAMA (natural size) from the "Ryûkyû" limestone quarry near Sôgenzi, Naha, Okinawa-ken. (Reg. No. 63499.)

琉球群島沖縄島の海成化石 (摘要)

矢部長克・畑井小虎

沖縄島那覇附近に發達する石灰岩中より *Pecten praesignis* YOKOYAMA, *Thyasira nipponica* YABE and NOMURA 及び *Coronula diadema* LINNAEUS が産することは野村・畑井により報告されて居る。矢部は辻田氏の案内により其の産地を観察し *Pecten naganumanus* YOKOYAMA を採集した。首里附近に發達する同石灰岩中よりは *Pecten praesignis* YOKOYAMA を得た。此の兩種の帆立貝が同一層準より産することは在來の記録に見られない事實である。後者は島尻層特有の化石であり、此の附近の石灰岩中より産することが確定された。