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ON SOME RECENT AND FOSSIL BRACHIOPODS FROM HOKKAIDO

By

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(With 1 figures)

Contribution from the Department of Geology and Mineralogy,
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Our present knowledge on the Recent brachiopods from around Hokkaido is very scanty, but it does not seem to signify that they are very scarce.

In the classical monographic works on the malacology by SCHRENCK (1859-67), ADAMS (1863), LISCHKE (1869), BRAUNS (1881), DUNKER (1882), DAVIDSON (1886-88), PILSBRY (1895) and DALL (1920) the following species of brachiopods are recorded to occur in the neighborhood of Hakodate :[1]

Terbratulina caput-serpentis DAVIDSON
T. *japonica* SOWERBY
Terbratalia coreanica (ADAMS and REEVE)
T. *gouldi* (DALL)
Laqueus xanthica DALL
L. *suffusus* DALL
L. *rubellus* (SOWERBY)
Coptothyris grayi (DAVIDSON)
Hemithyris psittacea (GMELIN)
Neohemithyris lucida (GOULD)
Discinisca sparselineata DALL

Until recently very little has been added to these records of the Hokkaido brachiopods in spite that the list of the Cenozoic and Recent brachiopod species of Japan outside Hokkaido has been greatly increased in recent years chiefly by HATAI. After the publication of the occurrence of *Laqueus rubellus obesuss*, a new sub-species, by YABE and HATAI

1) For much of reference the writers owe to HATAI's monograph "Cenozoic Branchiopoda from Japan" 1940. Not all the species are valid in the light of recent taxonomy.

in 1936[2] among the specimens dredged by the surveying ship Sôyô-maru at the station 652 (41°27′08″ N, 140°23′ E[3]), HATAI's comprehensive work appeaed in 1940. In this work the author dealt with the materials collected by several surveying ships including Sôyô-maru, which is the only boat extended the work over the area close to the southern coast of Hokkaido. Among the numerous stations dredged 76, 79, 80 and 81 may be taken into consideration as localitites in the sea around Hokkaido,[4] although HATAI says that "brachiopods were not dredged" from his "Hokkaido-Tisima" province. From these stations the following species are recorded to have occurred.

Hemithyris psittacea (GMELIN)
H. psittacea woodwardi (A. ADAMS)
Gryphus davidsoni (A. ADAMS)
Pictothyris picta (DILLWYN)
Laqueus rubellus (SOWERBY)
L. blanfordi (DUNKER)
L. quadratus YABE and HATAI
Terbratulina crossei DAVIDSON

Besides, there are forms that have been found in the sea in the Behring and Kurile regions, that would be expected also from Hokkaido. In the "Annotated List" of DALL (1920),[5] for instance, *Cnismatocentrum sakhalinensis* DALL and *Diestothyris frontalis* (MIDDENDORFF) are mentioned. Moreover, *Diestothyris tisimana*, n. sp. was described by NOMURA and HATAI[6] from the Islands, and *Laques blanfordi* DUNKER from Kamtchatka is found in THOMSON'S work.[7]

In the collection of the Department of Geology and Mineralogy, Hokkaido University, there is a small lot of Recent brachiopods, obtained by several menbers of the Department at beaches from time to time. Recently H. OSANAI happened to have a chance of collecting a number

2) YABE, H. and HATAI, K.: The Recent Brachiopod Fauna of Japan, 3, Notes on the subfamily Laqueinae: Proceedings of Imperial Academy, XII (2), pp. 44-46, 1936.
3) This station is in the north-western side of Tsugaru Strait, close to the southern peniusular part of Hokkaido.
4) HATAI, K.: *op. cit.*, 1940.
5) W. H. DALL: Annotaled List of the Recent Brachiopoda in the Collection of the United State National Museum, with Descriptions of Thirty-three New Forms: Proc. U.S. National Museum, Vol. 57, pp. 261-377, 1920.
6) NOMURA, S. and HATAI, K.: *Diestothyris tisimana*, New species of Brachiopoda from the Northern Pacific: Venus, Vol. (3), pp. 131-134, Pl. 1, 1936.
7) THOMSON, J. A.: Brachiopod Morphology and Genera (Recent and Tertiary), p. 259, 1927.

of specimens stranded in Muroran region. A few specimens were added to the collection from the bottom materials from off Kushiro in the possession of N. NAGABUCHI, geologist of the Taiheiyô Mining Company.

Thus, the occurrence of brachiopods is not very rare, but the number of species we have is very small. They are:

Hemithyris psittacea (GMELIN) *woodwardi* (A. ADAMS)
Terebratalia coreanica (ADAMS and REEVE)
Coptothyris grayi (DAVIDSON) *aomoriensis* HAYASAKA
Diestothyris frontalis (MIDDENDORFF)

Compared with the lists quoted above the species at hand are too few. This may, no doubt, be due to the fact that no particular efforts have hitherto been done by scientists in Hokkaido for collecting brachiopods. Paleontologists' interest does not seem to have been drawn to this group of animal because only very little has been known of its fossil occurrence, although it has long been known that there are a couple of species in the Cretaceous as well as the Tertiary formations.

T. NAGAO and Y. SASA once mentioned *Terebratalia gouldi*, *T. coreanica*, *Terebratulina septentrionalis* (?), *Hemithyris psittacea woodwardi* and an undetermined species of *Terebratalia* as menbers of the Upper Pliocene Setana series of south-western Hokkaido,[8] which is very rich in molluscan and foraminiferal remains. But none of them has been described or illustrated since.

Moreover, it seems that these specimens have been lost in some way or other. Judging from the list in NAGAO-SASA's paper referred to above brachiopods are by no means an important group in the whole fauna. Of the 20 fossil localities 3 yielded 1 species each, and the other 2 species were found in another locality.

The fossil species at our disposal are from two different localities. One lot comes from the Pleistocene deposit of Shishinai,[9] about 20 km. NNE of Sapporo: here, together with numerous mollcuscs, foraminifers and bryozoans, we find *Coptothyris grayi aomoriensis* and *Terebratalia coreanica*.

8) NAGAO, T. and SASA, Y.: The Cenosoic formation and the Recent Geological History of the south-western part of Hokkaido (Japanese): Jour. Geol. Soc. Jap. Vol. 41, p. 232 (list), 1934.

9) NAGAO, T.: Post-Setana fossiliferous Beds in Hokkaido, Jour. Geol. Soc. Jap. Vol. 41, No. 487, pp. 205-207, 1934.
OINOMIKADO, T: Molluscan fossils from the Pleistocene Deposit of Sisinai in Tobetu-mura, Ishikari-gun, Hokkaido. Jour. Geol Soc. Jap. Vol. 44, pp. 65-70.

According to NAGAO and OINOMIKADO, there are in association 67 molluscan species mostly living in the northern parts of Japan.

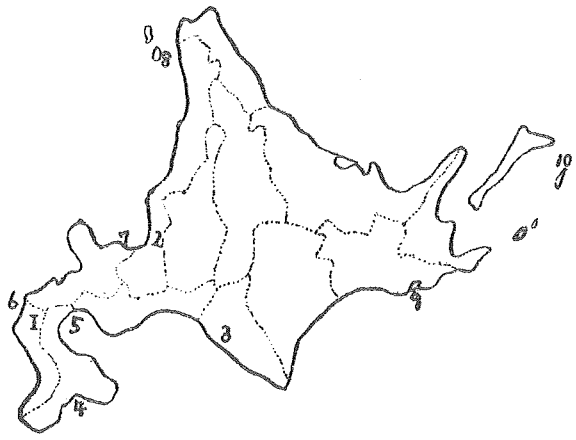
Another occurrence is in the Shunbetsu[10] beds, consisting mainly of conglomerates and sandstones, found along the coast of south western Hidaka District.

In this formation the following brachiopods are identified by us, namely, *Hemithyris psittacea* (GMELIN) *woodwardi* (ADAMS) and *Terebratalia coreanica* (ADAMS and Reeve).

All the fossils examined are species living at present around Hokkaido. The Pliocene species mentioned by NAGAO and SASA from the Setana series also seem to be living species, though the identification can not be said valid.

Beside these there are two forms, one from the Oligocene Poronai shale and the other from the Shunbetu beds referred to above; these are not well preserved, on the one hand, and the materials are scanty, on the other. These are left out of the present paper for a future investigation.

The annexed figure shows the localitites of the brachiopods, Recent and fossil, described in this note.



1) Setana beds: Kuromatunai-mura, Suttu-gun.
2) Sisinai beds: Tobetu-mura, Isikari-gun.
3) Shunbetu beds: Yamamonbetu, Monbetu-mura.
4) Hakodate.
5) Utiura bay.
6) Setana.
7) Zenibako.
8) Risiri Island.
9) Akkeshi bay.
10) Sikotan (Kurile Island).

10) TAKEUCHI, K. and SANBONSUGI, M.: An Explanation Text to the Urakawa Geological Sheet.: Rep. Geol. Surv., Industrial Laboratory of Hokkaido, Vol. 1, p. 18, (Japanese).

Description of Species

Hemithyris psittacea GMELIN subsp. *woodwardi* ADAMS

1863. *Rhynochonella woodwardi* ADAMS: Ann. Mag. Nat. Hist. 3rd. ser. Vol. XI, p. 100.
1886. *R. woodwardi* DAVIDSON: Trans. Linn. Soc. London. 2nd. ser. Vol. IV, p. 168, pl. XXIV, Fig. 12, 13.
1932. *Hemithyris psittacea woodwardi* HAYASAKA: Sci. Rep. Tohoku Imp. Univ. 4th. ser. Vol. VII, no. 1, p. 4, pl. 1, Fig. 2, pl. 2, Fig. 2.
1938. *H. psittacea woodwardi* HAYASAKA: Sci. Rep. Tohoku, Imp. Univ. 4th. ser. Vol. XIII, no. 1, p. 3.
1938. *H. psittasea woodwardi* HATAI: Jour. Geol. Geogr. Jap. Vol. XVI, nos. 1-2, p. 303.
1938. *H. psittacea woodwardi* HAYASAKA: Jour. Geol. Geogr. Jap. Vol. XVII, nos. 1-2, p. 65.
1940. *H. psittacea woodwardi* HATAI: Sci. Rep. Tohoku. Imp. Univ. 2nd. ser. Vol. XX, p. 203.
1946. *H. psittacea woodwardi* HAYASAKA: Bull. Oceanographical Inst. Taiwan, no. 1, p. 12.

The specimens at hand are in general larger than the fossils hitherto described from other parts of Japan outside Hokkaido. Moreover, the outline of the shell is rather triangularly globose, longer than wide, and is trilobate, with a deeply and broadly uniplicate anterior commissure: lateral lobes or wings are more or less expanded. However, the shell surface is completely destitute of radial striae, not recongnized even under a magnifying lens, but covered only by thin concentric growth-lines that are particularly densely crowded on the wings and along the anterior commissure. These last two features are characteristic of the subspecies *woodwardi*. The size difference may be either a geographical or a geological variation, because the specimens hitherto known from Japan are, most of them, fossils of Tertiary or Quaternary age. However, the specimens being not so complete as to allow us examine the inside of the valves, a discussion on the relation with the subspecies and the species *H. psittacea* is reserved for a future occasion.

Dimensions (in mm.):—

Length	20.0	19.5	18.0	21.0
Width	19.5	21.0	17.0	20.0
Thickness	14.5	13.0	10.0	12.5

Localities of the Recent specimens examined:

Off Akkesi Bay, Coast of Utiura Bay, Coast of Setana, Coast of Sikotan, Tisima Group (Kurile Islands).

Fossil Occurences:

Shunbetu beds, Yamamonbetu, Monbetu-mura, Hidaka: Setana beds, Kuromatunai-mura, Suttu-gun, (According to NAGAO and SASA, *op. cit.*, 1934).

Distribution:—

This species is quite commonly found as fossil in the northern part of Japan, the southern limit of the distribution having been belived to be around western Kyusyu, until it was recently recored by HAYASAKA to occur in the Pleistocene reef limestone sequence in southern Taiwan.

This species has been reported from the following places:

Recent:—

Sikotan, Tisima Group (Kurile Island): Hokkaido; Off Fugishima and Tairadate, Mutu Bay (HAYASAKA); 41° 33′ 25″ N, 140° 56′ 50″ E; 41° 17′ 30″ N, 141° 29′ E; 41° 30′ N, 140° 03′ E; 40° 13′ N, 140° 12′ E; 40° 03′ 24″ N, 142° 11′ 13″ E; 39° 21′ 50″ N, 140° 04′ 50″ E; 39° 52′ N, 142° 13′ 50″ E; off Arakawa Tiba; Iwade, Kimitu-gun Kazusa; 33° 49′ 30″ N, 128° 40′ E; 31° 55′ 15″ N, 128° 17″ E; (HATAI); "off Rihunsiri Islands Gotto" (DAVISION);

Fossil:—

Daisaka Osugi-mura, Higasi-tugaru-gun, Mutu (HATAI); Sueomatuyama Series (Mainosawa, Numakubo, Saragasawa), Mutu, (OTUKA); Kimoto, Wakito-mura, Kitaakita-gun, Ugo (HATAI); Simoyasiki, Aikawa-mura, Yuri-gun; Anden, Oga Peniusula (YOKOYAMA); Koki, Koki-mura, Misima, Etigo; Karida-mura Nakauraha-gun, Etigo, (HATAI); Hanzoganemura and Yomogidaira, Kosi-gun, Etigo, (HAYASAKA); Sawao-mura, Sakegun, Sado (HATAI); Sigarami Kanimisunai-gun, Sinano, (YOKOYAMA); Takada Shito-mura Kazusa YOKOYAMA, Kimitu-gun, Kazusa; Simo-sinden, Sito-mura, Itihaga-gun, Kazusa, Akai Kanasawa-mura, Karaki-gun, Musashi; Simomiyato, Hatuse-mura, Miura-gun, Sagami, (HATAI); Kaii Miyato, Sagami, Maoweiton Kaohsiunghsien, Formosa, so-called "Riukiu limestone" (HAYASAKA).

Terbratalia coreancia (ADAMS and REEVE)

1887. *Terbratalia coreanica* DAVIDSON: Trans. Linn. Soc. London, 2nd. ser. Vol. IV, p. 81, pl. XXXIII, Figs. 4-7.

1892. *T. coreanica* DALL and PILSBRY: Rroc. Acad. Nat. Sci. Phila. pp. 165-171.

1932. *T. coreanica* HAYASAKA: Sci. Rep. Tohoku Imp. Univ. 4th. ser. Vol. VII, no. 1, p. 7, pl. 1, Fig. 4, pl. II, Fig. 5, 6, 7.

1935. *T. coreanica* NOMURA and HATAI: Venus. Vol. 5, p. 10.

1938. *Terbratalia coreanica* HAYASAKA: Sci. Rep. Tohoku Imp. Univ. 4th. ser. Vol. XIII, p. 3.
1940. *T. coreanica* HATAI: Sci. Rep. Tohoku Imp. Univ. 2nd ser. Vol. XX, p. 276, pl. 11, Fig. 1-9, 20, pl. III, Fig. 36, 47-49, 54.
1940. *T. coreanica* HAYASAKA: Jap. Jour. Geol. Geogr. Vol. XVII, nos. 1-2, p. 66.

This species is very common in the waters around north Japan and in the Neogene Tertiary thereof, and has quite a wide range of variation, in both the external and the internal characters.

Most of the specimens at hand have a long hinge-line which is rather straight, and are very much allied to the type of those reported from Mutu-bay by HAYASAKA,[11] and a few specimens are young and slighty transverse in outline.

Fossils of this species occur rather commonly in the Sisinai beds, together with many other fossils, and these fossils are not different from the Recent specimens at hand, but one individual from Setana beds shows some deviation.

Conerning this species, HATAI[12]: says "Judging from the unusually large size of the specimens before us, the great number of individuals, the wide range of variation shown in the interior peculiarities of the isolated valves and the nature of the sediment in which they were embedded, it is assumed that this species must have flourished luxuriantly at that period (Lower Pliocene), and that physical conditions were favorable to its growth."

Dimentions (in mm.):

Lenght	41.5	48.0	47.0	30.0	30.5
Width	40.0	46.5	44.0	31.0	30.0
Thickness	23.0	28.5	28.0	15.5	15.0

Localities of the Recent specimens:—

Coast of Utiura bay, coast of Risiri Island, coast of Kamiiso (near Hakodate), coast of Hakodate.

Fossil occurrences:—

Tobetu-mura, Isikari-gun, Sisinai beds, Kuromatunai-mura, Sutt-gun, Setana beds, (according to NAGAO and SASA, *op. cit.*).

Distribution:—

This species is one of the commonest of the Recent and younger Cenozoic brachiopods of Japan. It has been discovered in various parts

11) HAYASAKA, I.: *op. cit.*, p. 7, 1932.
12) HATAI, K.: *op. cit.*, p. 10, 1935.

of the country, having been reported from Hokkaidô, Tugaru Strait, Iwaki, Ugo, Rikuzen, Etigo, Sagami, Musasi, Kazusa, Izu, Totomi, Awa, Okinawa (Ryukyu Island), Korea Strait, as well as Korea, and Shantung Province, China.

This species is found in the following places :—

Recent :—

Hokkaido ; Mutu-bay, Simokita, Penisula, Mutu ; Aomori bay, Mutu (HAYASAKA) ;41° 39′ N, 141° 33′ 27″ E ; 41° 33′ 25″ N, 140° 23′ E ; 41° 16′ 30″ N, 140° 24′ E ; 41° 06′ 17″ N, 140° 09′ 15″E ; 40° 20′ 37″ N, 139° 01′ 50″ E ; 40° 31′ 15″ N, 139° 31′ 45″ E ; 40° 30′ N, 141° 41′ E ; 40° 16′ 30″ N, 141° 51′ E ; 40° 41′ 30″ N, 141° 48′ 30″ E ; 40° 28′ 40″ N, 142° 01′ 51″ E ; (HATAI) ; Onahama bay Iwaki, Rikuzen Enosima (HAYASAKA) ; coast of Rikuzen : 37° 13′ 30″ N, 141° 30′ 40″ E ; 36° 06′ N, 140° 46′ E ; 36° 22″ N, 140° 44′ 30″ E ; 37° 01′ 35″ N, 137° 04′ 55″ E ; 37° 17′ 50″ N, 137° 17′ 10″ E ; 37° 40′ N, 137° 18′ E ; 37° 47′ 05″ N, 136° 50′ 15″ E ; off Hiranosinden, Tiba ; 33° 57′ 30″ N, 140° 06′ E ; 35° 08′ N, 140° 47′ E ; 35° 41′ 20″ N, 133° 39′ E ; 35° 43′ N, 133° 07′ 30″ E ; 35° 51′ 45″ N, 138° 18′ 45″ E ; 35° 51′ 30″ N, 134° 18′ 30″ E ; 35° 39′ N, 130° 04′ 30″ E ; 35° 59′ 45″ N, 132° 57′ E ; 35° 03′ 30″N, 131° 32′ 10″ E ; 32° 12′ 15″ N, 129° 06′ 30″ E ; 33° 49′ 30″ N, 128° 40′ E ; Okinawa-zima, Ryukyu, (HATAI).

Fossils :—

Daisyaka, Osugi-mura Mutu ; Kita-Tugagu-gun, Mutu (HATAI) ; Anden, Oga-Peniusula ; (YOKOYAMA) ; Kurosuwa, Tukui-mura, Tukui-gun, Sagami ; Ninomiya, Naka-gun, Sagami ; Hongo-mura, Kamakura-mura, Kamakura-gun, Sagami. ; Miyata, Taga-gun, Hitati ; Kanasawa-mura, Kuraki-gun, Musasi ; Muturasô-mura, Musasi. ; Ogawa Nasa-gun, Simotuke ; Nogi-mura, Yatuka-gun, Izumo. (HATAI) ; Huzina, Hukutomi, Izumo. ; Isonesaki, Kazusa ; Toka-mura, Itihara-gun, Kazusa. : Oyaru, Kosiba-mura, Kimitu-gun Kazusa, ; Makita-mura, Sakama-mati, Akimoto-mura, Seki-mura, Kosiba-mura, Simidu, Itihara-gun, Higasi-mura Kazusa. ; Simo-Sinden, Yamasi-mura, Kazusa. ; Takikawa, Dizoo, Makita Kimitu-gun, Kazusa ; Iwade, Kimitu-gun, Kazusa. ; Kosiba-mura, Kazusa. ; Mandono-yama Kimitu-gun, Kazusa. ; Itihara-gun, Kazusa ; Mihama, Kamo-gun, Izu ; Ogaso-gun, Totomi ; Kuno-mura Abe-gun, Idu. ; Haranoya-mura, Ogasa-gun, Idu : Nakanura, Naga-mati, Awa ; Toyohusa-mura, Awa-gun, Awa ; Awa Primary School Awa ; (HATAI).

Coptothyris grayi (DAVIDSON) subsp. *aomoriensis* HAYASAKA

1922. *Perendesia grayi* var. *transversa* HAYASAKA : Sci. Rep. Tohoku Imp.

Univ. 2nd, ser. Vol. 6, no. 2, p. 154, pl. 8, Fig. 14.

1932. *Coptothyris grayi* subsp. *aomoriensis* HAYASAKA: Sci. Rep. Tohoku Imp. Univ. 4th. ser. Vol. 7, no. 1, p. 9, pl. 1, Fig. 5, 6, 7.

1933. *C. grayi aomoriensis* HAYASAKA: Jap. Jour. Geol. Geogr. Vol. X, nos. 3-4, p.c 125, pl. 12, Fig. 1-7.

1940. *C. grayi* HATAI (*pars*): Sci. Rep. Tohoku Imp. Univ. 2nd. ser. Vol. XX, p. 302, pl. III, Fig. 50-53, pl. IV, Fig. 48.

This species, as has been dealt with by various authors, comprizes three types more or less distinct from each other in point of the outline of the shell as well as of the number and form of the radial ribs. The typical form of the species *Coptothyris grayi* from the south-western Japan is more or less roundly quadrate in outline, and ornamented with a number of wide irregular radial ribs. The forms commonly met with in northern Japan are orbicular in outline, and have numerous radial ribs considerably more abundant and eventually narrower than in the former. Considering that only such latter forms had been found in northern Japan, HAYASAKA proposed to call them *Coptothyris grayi aomoriensis*,[13] signigying that they are the northern representatives of *C. grayi*.

The third type is more or less transverse and is ornamented with rather a small number of wide radial ribs. The first and the third types have in common the fewer number of broad, flat-topped and low radial ribs, separated by wide but irregular interspaces.

HATAI considers the local variation concept invalid, and insists to include all the specimens in *C. grayi*.

The fossil specimens from Sisinai, now under consideration, are slighyly transverse in the outline of the shell, and somewhat resembles those represented by the figures 4a and 4b on pl. 10 of DAVIDSON'S monograph.[14] However, the radial ribs are by far the more numerous in the former than in the latter, and are more prominent too. In the latter point the fossil species at hand have to be regarded to belong to the subspecies *aomoriensis*. Thus, it seems that these fossils are, in a sense, intermediate between *C. grayi* and *C. grayi aomoriensis*.

Dimensions:—

Length	26.5	31.0	19.0
Width	31.0	30.0	14.0
Thickness	13.0	11.5	

Localities of the Recent specimens:—

Coast of Utiura bay, coast of Zenibako (near Otaru), coast of Yoichi

13) HAYASAKA, I.: *op. cit.*, 1932.

14) DAVIDSON.: *op. cit.*, 1886.

(near Otaru).

Fossil occurences :—

Sisinai beds, Tôbetu-mura, Isikari-gun, Setana beds : Kuromatunai-mura Suttu-gun (According to NAGAO and SASA, *op. cit.*).

Distribution :—

This species in a wider sense including the present subspecies, has a wide range of distribution, although the latter was first described as the northern type by HAYASAKA in 1932.

Recent :—

Off Itanozaki and Okunai, Mutu bay (HAYASAKA) ; Onagawa bay, Rikuzen ; Hannoura (near Noto) (HAYASAKA).

Fossil :—

Yamagawa-mati Date-gun, Iwaki ; Nagamine, Hukuoka-mati, and Kamayashiki, Tomai-mura Mutu ; (HAYASAKA). Numakubo, Mainosawa, Anausi, Nagamine, and Suenomatuyama-pass, Mutu; Hosoguti, and Iwaya, Nanao, Noto ; (OTUKA).[15]

Diestothyris frontalis (MIDDENDORFF)

1873. *Terebratalia frontalis*, DALL : Proc. Acad. Nat. Sci. Phill. p. 184.
1887. *T. frontalis* DAVIDSON : Trans. Linn. Soc. 2nd. ser. Vol. 4, pt. 2, p. 86, pl. 15, Fig. 1-8.
1937. *Diestothyris frontalis* HATAI : Jap. Jour. Geol. Geogr. Vol. 14, p. 64.
1940. *D. frontalis* HATAI : Sci. Rep. Tohoku Imp. Univ. 2nd, ser. Vol. XX, p. 273, p. IX, Fig. 14-18.

Shell small, broadly ovate in outline, both valves equally convex ; lateral sides regularly rounded and the commissure gently and weakly curved, broadly rounded anteriorly, and sulcate or ventrally uniplicate. Beak obtuse, beak-ridge obscure ; foramen large, transversely elliptical in shape. Surface sculpture consists of concentric growth lines, thinner in posterior and coaser in anterior parts, and crowded on lateral sides of shell.

Dimensions (in mm.) :—

Length	17.0	14.0	12.5	16.0	13.5	12.5
Width	15.5	12.5	11.5	14.5	13.0	11.0
Thickness	11.5	8.0	6.5	6.0	9.0	9.0

Localities of Recent specimens examined are from : off Akkesi bay,

15) OTUKA, Y. : Jap. Bull. Earthq. Res. Inst. Imp. Univ. Tokyo. Vol. 13. pt. 4, pp. 822-823, 1935, Vol. 14, pt. 3, pp. 438-452 (neither described nor figured)). The determination of species in this report can not be said reliable paleontologically : this reference is to show the rather common occurrence of brachipods in this region.

and Sikotan, Tisima group. (Kurile Island).

Distribution :—

This species has been known to be widely distributed in the northern hemisphere, namely, Canada, Alaska, Aleutian Islands, Tisima (Kurile) Islands, and Hokkaido, and the southernmost occurrence of this species is in Sado, where it is found in the Pliocene formation as was described by YOKOYAMA and HATAI, respectively.

The following is the list of the localities that have been known in Japan.

Recent :—

South Karahuto (Saghalin) ; 41° 39′ N, 141° 33′ 27″ E (HATAI).

Fossil :—

Wakimoto sandy shale beds of Ugo ; Hanzogame-mura, Kosi-gun, and Yomogi-daira, Etigo, Natukawa beds ; Lower Sawane beds of Sado (HATAI) ; Upper Sawane beds of Sado (YOKOYAMA).