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ON THE MYARIAN PELECYPODS OF JAPAN

Part 1. Summary of the Study of the Genus *Mya* from Hokkaido

By

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(With 8 Plates and 4 Figures)

Contribution from the Department of Geology and Mineralogy,
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I. Introduction

Although the *Myarian* pelecypods are one of the Molluscan groups to have been most minutely studied in Japan, many more probably remain to be done. In this note the present writer wishes to give briefly the results of his investigation concerning all the fossil species obtained from the Cenozoic deposits in Hokkaido as well as the living species in the sea around this island.

As is well known, NAGAO and INOUE, and others have already minutely studied this group of pelecypods found in Hokkaido, however they treated only the typical form for each species of this genus and seem to have given little attention to the existence of the strong individual variations in some species, especially in respect to the size and outer configuration of shells, form of pallial sinus and position of beaks. In describing these species, the present writer wishes to take especial account of these characters.

Besides, the nature of the chondrophore of these species has never been minutely studied until the present day. In the course of his study, however it has become evident to the present writer that this structure is quite reliable for distinguishing specifically this group of pelecypods, so he also wishes to give a detailed description in this regard.

Further, he will also revise in this note the former statements in concern to the geological range of some species, in the light of the recent progress in the stratigraphical survey of the Cenozoic deposits in Hokkaido.

Until the present time, the following species are known in Japan:

- 1) *Mya ezoensis* NAGAO et INOUEfossil species
- 2) *M. ezoensis* var. *sagittaria* MINATO, MATSUI and UOZUMI .. ,,
- 3) *M. grewingki* MAKIYAMA ,,
- 4) *M. grewingki* var. *elongata* NAGAO et INOUE ,,
- 5) *M. grewingki* var. *kusiroensis* NAGAO et INOUE ,,
- 6) *M. cuneiformis* (BÖHM) ,,
- 7) *M. truncata* L.fossil and recent species
- 8) *M. japonica* JAY ,,
- 9) *M. japonica oonogai* MAKIYAMA ,,
- 10) *M. uzenensis* NOMURA et ZIMBOfossil species
- 11) *M. arenaria kitafukuokaensis* HATAI ,,
- 12) *M. miyagiensis* NOMURA ,,

Of these species above enumerated, species from 1) to 9) are known to occur from the Cenozoic deposits in Hokkaido as fossils, and three (7-9) of them are also ascertained to live in the sea around this island.

II. Description of species

Superfamily Myacea

Family MYACIDAE

Genus *Mya* LINNÉ*Mya* LINNAEUS: Syst. Nat., Ed. 10, p. 670.Type species: *Mya truncata* LINNÉ

Shell large in size, oblong, inequivalve; anterior end broadly round, posterior end narrow round or truncate, with a large gaping at the end; sculpture of concentric growth lines; hinge of left valve projecting a spoon-shape chondrophore, hinge of right valve depressed, excavate; pallial sinus large.

1. *Mya ezoensis* NAGAO et INOUE 1941 (= *M. ezoensis* var. *sagittaria*)

(Plate 8 Figures 1-10)

T. NAGAO and T. INOUE: Jour. Fac. Sci., Hokkaido Imp. Univ., ser. IV, Vol. 6, no. 273, p. 145, pl. XXXIV (III), figs. 2,7-9, 1941.

M. MINATO, M. MATSUI and S. UOZUMI: Study of the Cenozoic (Shin-seidai-no-Kenkyu, Japanese), No. 7, p. 106-7, pl. 10, figs. 75-81, 1950.

The specific name, *Mya ezoensis* was first proposed by NAGAO in collaboration with INOUE for the shells which had been collected from the Wakkanabe formation, which is abundant in marine facies and occupies stratigraphically the middle part of the Ishikari series, typically developed in the Ishikari coal field. In the ten years, since this species was established, MINATO and others have regarded some type of the specimens to be a variety of this species and treated them under the varietal name of *sagittaria*, also found from the Wakkanabe formation, which are apparently much acuminate in the posterior margin of the shell.

In re-examination of these species which were once treated by MINATO and others, however they seem to the writer to be quite in a poor state of preservation, and the shells of most of these specimens are at least partly destroyed. It is a matter of considerable difficulty to be certain of the original forms of this species, based upon such imperfect and deformed specimens, however in tracing the growth lines, the shells may be found not so acuminate in the posterior portion as MINATO and others considered.

The available specimens for this species counted as much as more than forty including the shells of so-called "*sagittaria*" are now stored

in the Department of Geology and Mineralogy, Faculty of Science, Hokkaido University. The outline of the shells of all these specimens coincides well with the original description, and it seems there is nothing needed beyond this. In general, this species is comparable to *Mya japonica oonogai* in the outer configuration, now commonly found in the sea around southwestern Honsyu.

On the internal structure of this species, especially as to the chondrophore little was known prior to the study of the present writer. In detailed observation, however the chondrophore of the left valve of this species projects perpendicular to the hinge line; the antero-middle portion of it inclines somewhat anteriorly. The chondrophore consists in two parts, antero-middle and posterior respectively, and the anterior leg is lacking. The antero-middle portion is sub-circular in outer form, bounded on both sides by two projected ridges and the inner surface of it is ornamented by fine concentric striae, while the posterior portion is a furrow which is relatively narrow trigonal in form. Of the two ridges, the anterior one is slightly elevated, but the posterior one is wider in thickness than the former and more highly projected.

It may be quite worthy of note that the every feature of the chondrophore above stated are quite similar to that of *Mya japonica oonogai*, besides there is to be recognizable a close similarity in the outer form of the shells between these two species, although the antero-middle portion of the chondrophore of the present species is slightly more round in its outer margin.

However, putting the slight difference observed in the chondrophore aside for a while, the present form is yet specifically distinguishable from the latter in having the left valve not thin in the umbonal region, while the reverse is the condition in the latter; the left valve of *Mya japonica oonogai* is commonly observed to be quite thin in the same region an almost worn away, through the rubbing by the right valve.

Meanwhile this species might have been misunderstood by some palaeontologists to be smaller in size but this is by no means true. There are numerous specimens subequal in sizes with the smaller individuals of *Mya grewinkki* MAKIYAMA or with the shells of *M. grewinkki* var. *elongata* (= *kusiroensis*) NAGAO et INOUE. Further, the shells of *M. grewinkki* var. *elongata* (= *kusiroensis*) occasionally seem to be somewhat like those of the present species now in consideration, not only in the size but also in their outer configuration; however, these two forms are doubtlessly specifically distinct with each others, because the beaks of "*Mya ezoensis*" are always situated more anteriorly than those of "*elon-*

gata (= *kusiroensis*)" besides the postero-dorsal margin of "*ezoensis*" is long, and slightly convex, compared to the relatively short and rather steeply inclined postero-dorsal margin of "*elongata* (= *kusiroensis*)".

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Thickness	L/H	B.P*) (AL/PL)
8997 (Holotype)	42.0	20.5	13.0	2.05	0.44/0.56
9000 (Paratype)	37.5	18.4	—	2.05	0.44/0.56
" (")	53.6	33.5	19.5	1.60	—
" (")	56.8	29.3	18.4	1.94	0.43/0.57
11290 (Topotype)	35.5	18.3	—	1.94	0.43/0.57
" (")	36.9	19.0	—	1.95	0.38/0.62
" (")	46.8	23.4	12.7	2.00	0.41/0.59
11293 (")	52.0	29.3	14.5	1.77	0.45/0.55
" (")	49.7	25.0	14.6	1.99	0.38/0.62

Repository: U.H. Reg. No. 8997, 9000, 11290-9.

(U.H.=Department of Geology and Mineralogy, Faculty of Science Hokkaido University, Sapporo.)

Localities: This species had not been found until the present day from places other than the type locality which is situated at the Koguchino-sawa, a small tributary of the Panke river, Yubari district, Province Ishikari. However, very recently the same species was also found by S. UOZUMI from the boring cores of the Sumitomo Coal Mining Company, Ltd. at the Sankono-sawa, Akabria City, Sorachi district, Province Ishikari.

Geological horizon: Lowest Wakkanabe formation of the Ishikari series, probably Eocene in age.

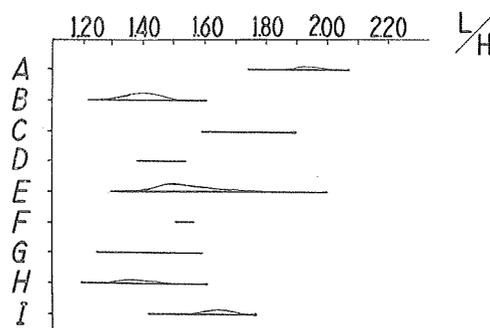


Fig. 1. Showing a ratio of the length and height in several species, genus *Mya*.

- A: *Mya ezoensis* NAGAO et INOUE.
 B: *M. grewingki* MAKIYAMA.
 C: *M. grewingki* MAKIYAMA var. *elongata* NAGAO et INOUE.
 D: *M. grewingki* MAKIYAMA var. *haboroensis* var. nov.
 E: *M. cuneiformis* (BÖHM)
 F: *M. cuneiformis* (BÖHM) var. *takigawensis* var. nov.
 G: *M. truncata* L.
 H: *M. japonica* JAY.
 I: *M. japonica oonogai* MAKIYAMA.

*) This is a ratio that express the position of beak in the total length of the specimen. AL is a ratio gained by dividing the total length by the anterior length and PL is a ratio gained similarly for the posterior one.

2. *Mya grewingki* MAKIYAMA 1934

(Plate 5 Figures 5, 7 and Plate 6 Figures 2, 4a-b)

J. MAKIYAMA: Mem. Coll. Sci., Kyoto Imp. Univ., ser. B, Vol. X, No. 2, pp. 156-8, pl. VII, figs. 50-2, 1934.

T. NAGAO and T. INOUE: Jour. Fac. Sci., Hokkaido Imp. Univ., ser. IV, Vol. 6, no. 273, pp. 147-50, pl. XXXII (I), figs. 7-10, 1941.

This species was first established by J. MAKIYAMA in 1934 based upon the specimens collected from Matchgar in North Saghalin and the Asagai formation of the Joban coal field. Since then the same species has been described by some palaeontologists from the Tertiary deposits in various localities in Hokkaido and Saghalin, while recently K. WATANABE and others (1950, 1956) also illustrated specimens of this species derived from the Akabira formation developing in the Chichibu basin of the Kwanto district, Central Honsyu island.

There are more than seventy specimens at the writer's disposal for study. Of them, forty were collected from Hokkaido, twenty-four from Joban, Honsyu island, while the others are from Saghalin.

The diagnostic feature of this species have already been outlined in much detail by MAKIYAMA and others, however, the writer wishes here to present briefly an account on this species as follows: shell trigonal or shortly sub-oval in outline; most strong convexity lies at a point slightly in front of the middle of the shell, this inflated part being somewhat angular and presenting a ridge-like appearance and this so-called ridge*) is running from the beaks to the antero-ventral margins; the postero-dorsal margin is rather steeply sloping downwards to the posterior end as usual; the subumbonal excavation is not observable; the pallial sinus is rather deep and rectangular-shaped in form.

The chondrophore of the left valve projects vertically to the hinge line, and is sub-circular in form; the anterior and middle portion sometimes slightly oblique anteriorly; the leg somewhat small, sub-trigonal in outline, and only slightly elevated; the anterior ridge narrow, also slightly elevated, and somewhat curved; the inner part of the middle portion is ornamented by numerous concentric striae; the posterior one is thicker and more highly elevated than the anterior one, and sometimes

*) This feature has been customarily called by some palaeontologists under the name of "umbonal keel," but there is not originally such a definite ornamentation in the shells, now in problem; in truth, such feature only appears as the consequence of deformation of shells under rock pressure, and it may be not reasonable to call it either a keel or a ridge.

conspicuously thick at its distal end, where a short but rather deeply impressed fissure is sometimes recognizable; the furrow is long trigonal in outline and rather shallow.

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Thickness	L/H	(AL/PL)
716	59.0	45.0	28.8	1.31	0.47/0.53
8265(a)	62.0	42.5	30.2	1.46	0.51/0.49
" (b)	60.5	44.5	25.5	1.36	0.48/0.52
8269(a)	63.8	47.0	27.0	1.36	0.46/0.54
11335(b)	59.0	48.0	27.2	1.23	0.46/0.54
" (d)	42.4	30.5	19.5	1.39	0.50/0.50
" (f)	33.0	21.4	9.5	1.54	0.48/0.52
8976	56.0	38.5	20.5	1.43	0.47/0.53
8977	60.7	43.3	—	1.40	0.54/0.46
8998	65.0	46.2	—	1.41	0.50/0.50
9003	47.0	33.0	25.4	1.42	0.53/0.47
11353(b)	46.0	31.5	19.0	1.46	0.51/0.49
" (c)	45.0	28.7	17.0	1.57	0.49/0.51

Repository and collections: U.H. Reg. No. 716, 8265 (a, b), 8269 (a), 11355 (b, d, f, h), from the Joban coal field in Honsyu. U.H. Reg. No. 11351, 11353 (b, c), 11354, from the Kushiro coal field; No. 11336, 11342, from the Haboro coal field; No. 8976, from the Rumoe coal field; No. 8977, from the Uryu coal field; No. 8998, from the Tokoro district, Kitami province, in all Hokkaido. U.H. Reg. No. 8972 (a), 8973 (a), 9003, from South Saghalin.

Remarks: This species is distinguishable from *Mya cuneiformis*, *M. truncata* and *M. japonica* in having the chondrophore circular in outline and also the postero-dorsal margin of shells is rapidly sloping down. Furthermore, this species is easily separable from *Mya ezoensis* and *M. japonica oonogai* in general outline of the shell, in some character of the chondrophore and in the shape of the pallial sinus.

In the course of his study for this species described in the foregoing pages, the present writer has noticed the existance of a strong individual variation in form, size and ornamentation of the shells. Especially the form of the shell is remarkably variable in certain specimens, in spite of the rather constant nature of the shape of the pallial sinus and the structure of the chondrophore.

In almost all the specimens, now under consideration, the shells in the early stage of their ontogeny, are quite similar with each other being transversely elongate oval in outline; this outer form may be the basic shell form for the genus *Mya*.

However in the shell form in the mature stage, a considerable variation is recognizable in some specimens as above stated, which may be perhaps divisible into three *formas* and two (geographical) varieties.

1) *Mya grewingki* MAKIYAMA *forma* α . (oblong oval form)

The shell here designated as *forma* α is sub-oblong, ovate in form; beak is situated anteriorly; anterior portion of the shell short, more inflated; postero-dorsal margin very smoothly sloping down, while the ventral margin is slightly convex. (figs. 3a-b in pl. 6)

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Thickness	L/H	(AL/PL)
8265(d)	56.0	38.1	27.0	1.47	0.37/0.63
8269(b)	54.0	41.2	27.0	1.32	0.40/0.60
11335(a)	62.0	44.0	29.0	1.41	0.44/0.56
" (c)	55.4	42.0	—	1.32	0.45/0.55

Repository and collections: U.H. Reg. No. 8265 (d), 8269 (b), 11335 (a, c), from the Jōban coal field in Honsyu.

2) *Mya grewingki* MAKIYAMA *forma* β . (shortly oval or sub-trigonal form)

The shell is almost similar in form to that of the typical form of this species, but the beak is situated posteriorly, the anterior portion is longer, broader and rather more inflated than the posterior, which is much compressed; antero-dorsal margin is somewhat long and straight, postero-dorsal margin is somewhat rapidly sloping down, while the ventral margin is nearly straight. (fig. 6 in pl. 5)

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Thickness	L/H	(AL/PL)
8265(c)	58.5	44.5	28.1	1.32	0.56/0.44
" (e)	54.6	40.5	27.0	1.35	0.60/0.40
" (f)	52.5	35.6	22.7	1.47	0.58/0.42
" (g)	46.7	34.7	23.2	1.35	0.61/0.39
11335(e)	39.3	28.5	15.0	1.38	0.60/0.40
11352	39.0	26.5	—	1.47	0.56/0.44
11358	33.0	22.8	13.0	1.44	0.56/0.44

Repository and collections: U.H. Reg. No. 8265 (c, e, f, g), 11335 (e), from the Jōban coal field in Honsyu. U.H. Reg. No. 11352, 11354, 11356-8, from the Kushiro coal field in Hokkaido. U.H. Reg. No. 8972 (b), 8973 (b), from South Saghalin.

3) *Mya grewingki* MAKIYAMA *forma* γ . (elliptical oval form)

The shell is elliptical in form, the outline of shell is closely similar

to that of *Mya japonica oonogai*, collected from the sea coast at Kesenuma in Northeast Honsyu, but the dorsal- and the ventral-margin of the former are more strongly curved than that of the latter. (figs. 5a-b in pl. 6)

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Thickness	L/H	(AL/PL)
11335(g)	73.0	47.0	30.5	1.56	0.41/0.59

Repository and collection: U.H. Reg. No. 11335 (g), from the Jōban coal field in Honsyu.

3. *Mya grewingki* MAKIYAMA var. *elongata* NAGAO et INOUE 1941
(=*M. grewingki* var. *kusiroensis* NAGAO et INOUE 1941)

(Plate 7 Figures 1-4, 6, 8-12)

T. NAGAO and T. INOUE: Jour. Fac. Sci., Hokkaido Imp. Univ., ser IV, Vol. 6, no. 273, pp. 150-1, pl. XXXIII (II), figs. 1-4, pl. XXXII(I), figs. 2, 4-6, 1941.

NAGAO and INOUE once distinguished such two varieties as "*elongata*" and "*kusiroensis*" from the typical form of the preceding species, both of which are quite allied to the latter in every respect, but these varieties have shells more elongated than the typical form of this species. According to them, of these two varieties, the former is characteristic in having the shells larger and more convex than the latter, however in the writer's opinion they may be rather preferably grouped in one variety. Four reasons for this view are as follows: firstly these two types of varieties are always found in the same bed in association with each other. Secondary, there exists a gradual change in size of the shells between these two forms. In this respect no sharp distinction between them is recognizable, if one treats a considerable number of individuals. Accordingly the variability in size of shells should be assumed probably to represent the growth stage of each individual but must be not regarded to be an essential difference as NAGAO and INOUE once considered. Thirdly NAGAO and INOUE stated that there is observable a slight concavity on the ventral margin in their variety "*elongata*", in contrast to the nearly straight ventral margin in so-called "*kusiroensis*." However this point is also not acceptable, because this concavity is observed to be appearing when the shells reach a mature stage in thought it is only weakly developed in the young forms. Fourthly these two forms are almost impossible to distinguish from each other in respect to the shell form, nature of chon-

drophore, form of pallial sinus, position of the beaks, and the ornamentation of shells.

However, there is an intermediate form between this variety and the typical form of *M. grewingki*, e.g., the specimens designated by NAGAO and INOUE as a paratype of *M. grewingki* var. *kusiroensis* (figs. 2 and 5 in their plate 32) is the form to represent such type; the shells of it are rather short in general, the posterior dorsal margin inclines more steeply, and the posterior ends tend to be more acute and more narrow than the typical form of *M. grewingki* var. *elongata* as well as so-called "*kusiroensis*" and the shells become more nearly akin to the typical form of *M. grewingki* in every respect.

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Thickness	L/H	(AL/PL)
8987 (Holotype)	63.0	35.0	18.0	1.87	0.52/0.48
" (Paratype)	52.0	29.0	—	1.66	0.50/0.50
11353 (a)	45.0	28.7	17.0	1.57	0.49/0.51
11359	31.0	22.0	—	1.41	0.55/0.45

Repository and collections: U.H. Reg. No. 8268(a, b), 11353(a), 11336, 11359-60, in Hokkaido. U.H. Reg. No. 8987, 9001, in South Saghalin. Localities: The outcrop in the vicinity of the Shitakara river at the Yubetsu Coal Mine, Akan district: the outcrop in the lower stream of the Shoro river, Chinomi, Shiranuka Machi, Shiranuka district: these two localities are in the Kushiro coal field. There is one specimen from the Chikubetsu coal field in our collections, which seems probably to belong to this variety.

Remarks: The features of the chondrophore of this variety are perfectly identical with those of *M. grewingki*, both belong to the one circular form (see Fig. 2). In this regard these two forms are quite indistinguishable from each other. Nevertheless, there exists a difference in the shell form, at least with respect to their typical forms. On the other hand, such species as *Mya cuneiformis*, *M. truncata* and *M. japonica* bear the chondrophore, trigonal in form. In this regard, the present variety as well as the typical form of *M. grewingki* are quite distinct from the specimens above enumerated and the former ones (*M. grewingki* and its variety) now under considerations are rather allied to such species as *Mya ezoensis* as well as to *M. japonica oonogai* in the nature of chondrophore, although the former are easily separable from the latter in the different form of shells.

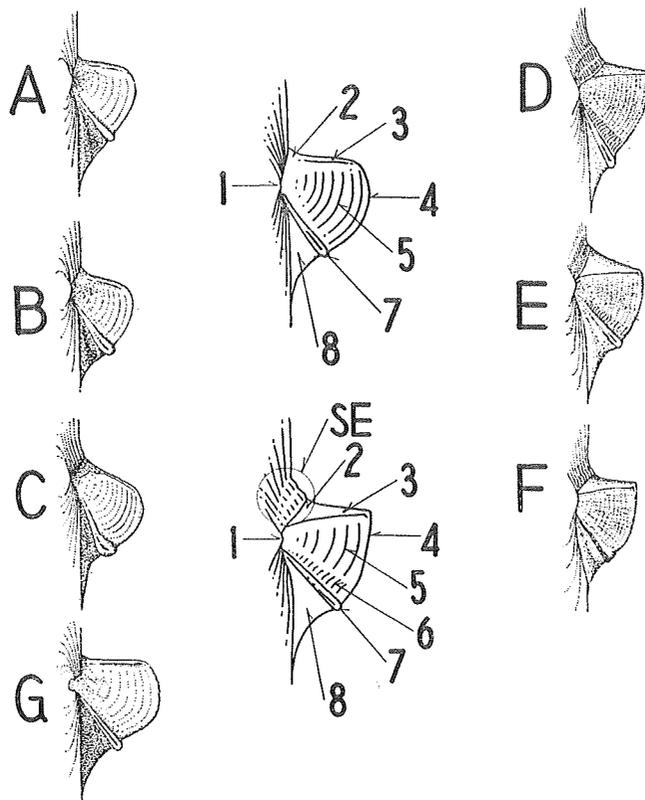


Fig. 2. The modified sketch of the chondrophore of the left valve in each species and varieties of genus *Mya*.

- A: *Mya ezoensis* NAGAO et INOUE.
 B: *M. grewingki* MAKIYAMA and *M. grewingki* var. *elongata* NAGAO et INOUE.
 C: *M. grewingki* MAKIYAMA var. *haboroensis* var. nov.
 D: *M. cuneiformis* (BÖHM) and *M. cuneiformis* var. *takigawensis* var. nov.
 E: *M. truncata* L.
 F: *M. japonica* JAY.
 G: *M. japonica oonogai* MAKIYAMA.

The names of the several parts in the chondrophore.

- | | |
|----------------------------|----------------------|
| SE: subumbonal excavation. | 1: beak |
| 2: leg. | 3: anterior ridge. |
| 4: outer margin. | 5: sculpture. |
| 6: undulated part. | 7: posterior ridge. |
| 8: furrow. | |
| 2-3: anterior portion. | 4-6: middle portion. |
| 7-8: posterior portion. | |

4. *Mya grewingki* MAKIYAMA var. *haboroensis* var. nov.

(Plate 5 Figures 1-4)

The specimens here treated were collected by Messrs SATORU UOZUMI and SABURO YASUDA from the Chikubetsu formation widely developed in the Haboro coal field, Northwest Hokkaido. They show close similarity to *Mya grewingki* MAKIYAMA in respect to the feature of chondrophore, but are distinct from the latter in the outer form and ornamentation of shells. Such peculiar forms have never been recorded hitherto from any regions so far as the present writer is aware.

Description: Shell medium in size, very thick, somewhat equilateral; the outer form of shell is rather deviated from that of *Mya grewingki* MAKIYAMA but akin to the typical form of *M. cuneiformis*, although the latter shows considerable variations in respect to the shell form. Anterior portion is sub-circular and much inflated, while the posterior one is gradually compressed to the posterior end; these two portions seem to be divided by an elevated line, ridge-like in appearance, and there is also recognizable one more fairly distinct ridge-like line near the anterior margin. These two lines are tending to grow from the beaks as far as the antero-ventral margins. The anterior margin very short and slightly convex, while the posterior one only slightly truncated. The antero-dorsal margin short and very slightly convex, while the postero-dorsal one is long nearly straight. The antero-ventral margin somewhat short and very slightly convex, which continues to the anterior margin with somewhat equally convexed curve, however between the antero-ventral and the ventral margins the curve becomes somewhat rapidly convex. The ventral margin long and nearly straight or very slightly convex.

Umbo inclines to the anterior side, is more prominently high than that of *Mya grewingki* or *M. cuneiformis*, beak situated at sub-central position or slightly anteriorly beyond the middle of the shell. The pallial sinus broad, but shallow, the depth of which does not reach the line perpendicular to the ventral margin passing through the beak. The shape of pallial sinus is roundly trapezoidal or nearly semi-arched.

The chondrophore observable only on the left valve, which shows a somewhat close similarity to the one of *Mya grewingki*. But the chondrophore of the present form is oblong in form, and projects vertically to the hinge line: the antero-middle portion bounded by ridge on both sides is somewhat slightly depressed, elliptical in form; the direction of the long axis of the ridge is considerably oblique to the hinge line; the leg is rather small, sub-trigonal in form; the anterior ridge evenly curved,

relatively narrow, and not prominently elevated, while the posterior one is rather long, broad and more strong than the former, especially it becomes wider and somewhat curved at its distal end, where a short but rather broad fissure is recognizable; the posterior portion of chondrophore represents a long trigonal form, and is deeply depressed.

The subumbonal excavation wholly absent and accordingly the leg of the chondrophore makes 90 degrees with the antero-dorsal margin at a point immediately beneath the beak. The posterior opening is broad but short.

The whole surface of the shell is ornamented by distinct growth lines, parallel to the shell margins, besides irregular short lines, oblique to the former, especially developing near the anterior and posterior ends.

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Thickness	L/H	AL/PL
8981 (Paratype)	47.0	33.5	21.5	1.40	0.49/0.51
11340 (")a	50.0	33.5	22.5	1.51	0.46/0.54
" (Holotype)b*)	51.0	35.0	21.3	1.46	0.50/0.50
	43.0	27.8	—	1.55	0.47/0.53
	32.5	21.5	—	1.51	0.46/0.54
	24.0	15.0	—	1.60	0.46/0.54

Repository: U. H. Reg. No. 8981, 11340 (a-e).

Localities: Upper stream of the Haboro river and the Chikubetsu river, Chikubetsu and Haboro, both of Tomamae district, Teshio province.

Geological horizon: Chikubetsu formation, Miocene age.

Remarks: This variety is readily distinguishable from *Mya ezoensis*, *M. truncata*, *M. japonica* and *M. japonica oonogai* in respect to the shell form, ornamentation and the characteristic features of chondrophore. The present form is more nearly akin to *Mya cuneiformis* than to *Mya grewingki* from the outline of the shell form, however the nature of the chondrophore of the present form is perfectly identical with that of *M. grewingki*; furthermore the subumbonal excavation is wholly absent in the present form, now under consideration.

Accordingly the present writer wishes to regard that this form is to be treated as a variety of *Mya grewingki* MAKIYAMA, putting aside for a while whether or not it should be recognized as an independent species.

The geographical distribution of the *forma* enumerated and defined

*) Deals with the dimensions of one individual showing each stage of ontogeny of the shell.

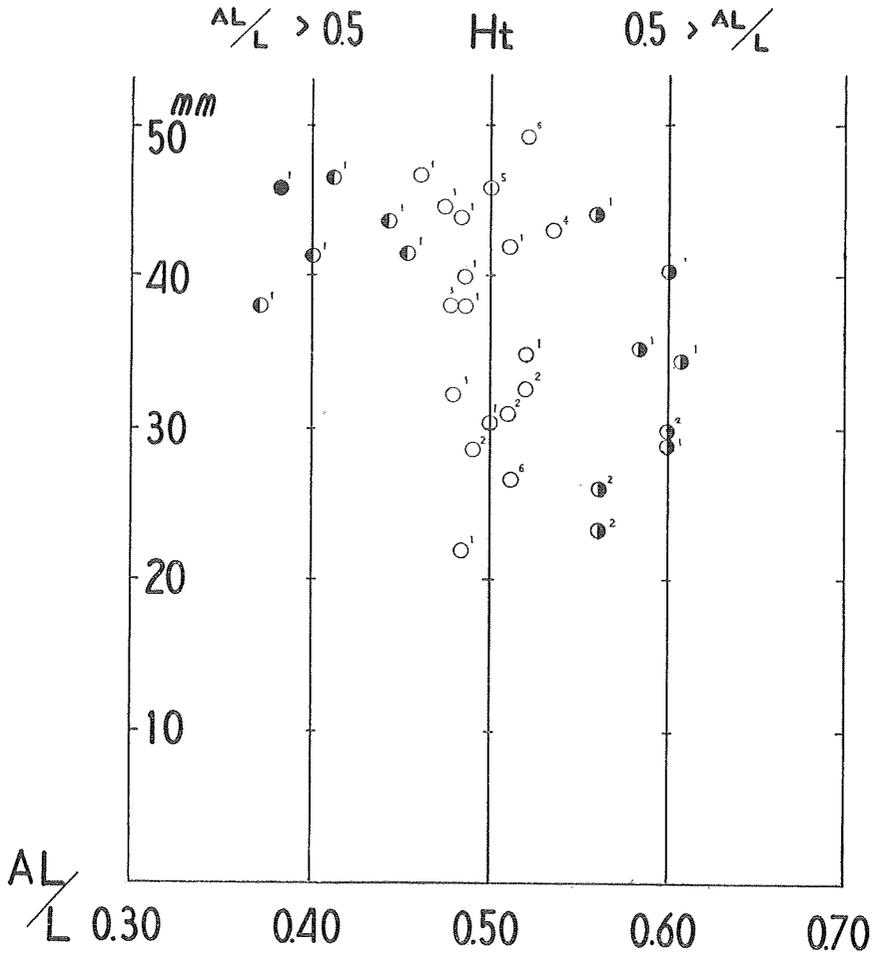


Fig. 3. Shows the variations in connection with the position of the beak observed in shells belonging respectively *formas* α , β , γ and the typical specimens of the species, *Mya grewingki* MAKIYAMA. The *formas* are distinguished from the typical form of *Mya grewingki* mainly in respect to the different outer form of shell; the difference in the shell form seems to be wholly corresponding to the difference in the position of the beak for each form.

- *Mya grewingki* MAKIYAMA (typical form)
- (with dot) *M. grewingki* MAKIYAMA *forma* α
- (with horizontal line) *M. grewingki* MAKIYAMA *forma* β
- (with vertical line) *M. grewingki* MAKIYAMA *forma* γ

above, as well as the typical form of *Mya grewingki* and its varieties can be tabulated as in Table 1. It will be seen that the typical form of *Mya grewingki* and *forma* β show most wide distribution, while *Mya grewingki*

var. *elongata* occurs not only from the Kushiro coal field, but also South Saghalin. Notwithstanding this, it has never been known from the stratigraphical equivalent of the Jōban coal field, Honsyu. Meanwhile *Mya grewingki* var. *haboroensis* is believed at the present moment to have been collected only from the Miocene deposits developing in Chikubetsu and Uryu districts in Hokkaido; it is never known from any palaeogene deposits. It should preferably be treated as a new mutation of *Mya grewingki* MAKIYAMA, as already stated.

TABLE 1.

	Chichibu	Joban	Kushiro	Uryu	Chiku- betsu	Tokoro and Others	Saghalin
<i>Mya grewingki</i> MAK. (typical form)	—	—	—	—	—	—	—
<i>forma</i> α.		—				- ? -	
<i>forma</i> β.		—	—			—	—
<i>forma</i> γ.		—					
<i>Mya grewingki</i> var. <i>elongata</i>			—				—
<i>Mya grewingki</i> var. <i>haboroensis</i>				- ? -	—		

5. *Mya cuneiformis* (BÖHM) 1915

(Plate 3 Figure 5 and Plate 4 Figures 1-6)

J. BÖHM: Jarb. d. königl. preussisch. geol. Landesanst., Vol. XXVI, p. 557, pl. 29, figs. 1a-b, text figs. 1-2, 1915.

T. NAGAO and T. INOUE: Jour. Fac. Sci., Hokkaido Imp. Univ., ser. IV, Vol. 6, no. 273, pp. 151-5, pl. XXXIV (III), figs. 1, 3-6, 1941.

This species has been abundantly found from the Miocene and Pliocene deposits in Hokkaido. The species has been usually regarded to be quite characteristic in the following points: the shell is constantly cuneiform, the umbo is highly elevated and situated at the anterior portion.

From minute observations of quite numerous specimens for this species, however there seems to be a considerable variation in form of the shells and sinus, as will later be described in detail.

Although the chondrophore of this species was already described by NAGAO and INOUE, the present writer wishes to supplement the former description in this regard as follows: the chondrophore of the left valve is trigonal in form, projects vertically to the hinge line, but sometimes

slightly inclines downwards the inner side of shells; the leg is large and highly elevated, and perfectly uniting with the anterior elevated ridge; the anterior ridge is usually thick, broad, and more highly elevated than that of *grewingki* or *japonica oonogai*, and projects straight from the hinge line at an acute angle; the posterior ridge is also thick, broad and more highly elevated than the surface of the chondrophore, and a distinct fissure is recognizable on the top of the posterior ridge; the antero-middle portion more steeply inclines to the anterior side, if it is compared with *grewingki* or *japonica oonogai*; the inner surface of the present species is ornamented by numerous fine concentric striae; the furrow is trigonal in form, and rather long and deep. The subumbonal excavation is usually distinct. The antero-dorsal margin beneath the umbo is much compressed towards the elevated leg, with the undulated sculpture of its growth lines.

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Thickness	L/H	(AL/PL)
8382	54.0	37.0	23.0	1.46	0.42/0.58
	61.0	39.0	22.0	1.56	0.45/0.55
8983	44.6	27.5	—	1.62	0.41/0.59
	28.0	17.2	—	1.63	0.41/0.59
9030	42.0	27.5	23.0	1.53	0.43/0.57
11319	92.0	60.5	33.5	1.52	0.44/0.56
11322	99.0	65.5	49.0	1.50	0.42/0.58
11331	69.0	39.5	27.0	1.75	0.42/0.58
11332	70.5	36.0	28.0	1.97	0.43/0.57
11338	30.5	18.0	—	1.70	0.45/0.55

Repository: U.H. Reg. No. 3320, 3665 (a-c), 4541, 4543 (a-c), 4549, 8270-2, 8274, 8381 (a-b), 8382, 8383 (a), 8980, 8983, 8989, 8999, 9037, 9030-41, 11319 (a), 11320 (a-b), 11321, 11325-6, 11338, 12351. These specimens come from Hokkaido.

Distributions: the Wakkanai and the Koitai formations in the Tenpoku coal field; the Chikubetsu formation in the Haboro coal field; the Tōgeshita formation in the Rumoe coal field; the Takigawa formation in the Kabato and Sorachi districts; the Kawabata formation in the Ishikari coal field; the Honbetsu and the Atsunai formations in the Kushiro coal field, all are in Hokkaido.

Remarks: This species is easily distinguishable from such species as *Mya ezoensis*, *M. grewingki*, its variety, and *M. japonica oonogai* from the feature of the chondrophore in general, and is also easily separable from *Mya truncata* in the shape of the shells and pallial sinus. While

this species is somewhat like the typical form of *Mya japonica*, especially the individuals represented by transversely much elongate form, yet the former is specifically distinguishable from the latter, in having shells more inequilateral; furthermore the posterior elevated ridge of the chondrophore in the former species is observed to be vertical to the plane of the chondrophore, against the inclined ridge of the latter, and also there are recognizable distinct undulations in the inner surface in front of the posterior ridge of the chondrophore possessed by the former species, although such feature is wholly absent in the latter.

Mya cuneiformis (BÖHM) *forma* α . (figs. 5a-b in pl. 3 and figs. 3a-b, 6a-b in pl. 4)

The shell is transversely compressed, sub-trigonal in form, that is to say, the shell is fairly shorter than the typical form *Mya cuneiformis*; beak is highly elevated; anterior portion is larger and more inflated than the posterior one, which is rather small and much compressed; postero-dorsal margin is somewhat straight and rapidly sloping down. Repository: U.H. Reg. No. 4543(d), 6005, 8271(b), 8383(b), 11319(b), 11322(a), 11323(b), 11324, 12351. These specimens come from Hokkaido.

Mya cuneiformis (BÖHM) *forma* β . (figs. 5a-b in pl. 4)

The shell is elongate, elliptical in form, is apparently sub-equally inflated both in the anterior and posterior portion.

Repository: U.H. Reg. No. 3665(d, e), 8381(c), 11320(c), 11322(b), 11331, 11332(b). These specimens come from Hokkaido.

6. *Mya cuneiformis* (BÖHM) var. *takigawensis* var. nov.

(Plate 4 Figures 1a-c)

The three specimens collected from the Takigawa formation seem to be closely resemblant to *Mya cuneiformis* as a whole, but somewhat deviated from the latter in a few points.

Description of these specimens follows: shell rather small in size, somewhat thin, oval in form, inflated and inequilateral, the posterior side longer than the anterior one. Beak is small, slightly elevated, and is situated rather posteriorly. The anterior margin broadly rounded, while the posterior one rather narrowly rounded, with a narrow gaping. The dorsal and the ventral margin sub-equally, slightly convex, and the curvature of the postero-dorsal margin does not show the straight line like *Mya cuneiformis*. Surface of the shell is covered by fine concentric growth lines. Pallial sinus deep and wide, sub-trapezoidal in form. The chon-

drophore of the left valve is quite similar to that of the typical species of *Mya cuneiformis* in every respects.

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Thickness	L/H	(AL/PL)
11309	44.5	29.0	17.5	1.53	0.46/0.54

Locality and geological horizon: The outcrop along the bank of the Sorachi river, near town of Takigawa, Sorachi district, province of Ishikari; the Takigawa formation, Pliocene age.

Rmarks: From the characteristic feature of the chondrophore, the present specimens now under consideration may be preferably assigned into *Mya cuneiformis* rather than into *M. japonica oonogai*, although the outer configuration of the shells possessed by the present specimens seems to be much deviated from the typical form of *Mya cuneiformis* but is rather akin to that of *M. japonica oonogai*. The chondrophore of the present specimens shows trigonal shape and possesses a distinct subumbonal excavation; these features are quite different from those of such species as *Mya ezoensis*, *M. grewingki* and *M. japonica oonogai* in which the chondrophore is circular in shape and bears an indistinct subumbonal excavation. These specimens now at hand are also specifically distinct from *Mya truncata* in having shells not truncate in the posterior end, besides, both the dorsal and ventral margins of the shells are not parallel in the present specimens.

Further the outline of shell of the present specimens is sub-equal to that of *M. japonica*, but the former is specifically distinguishable from the latter in the following points: the shell is rather oval, the postero-dorsal margin is not conspicuously sloping down to the posterior extremity, the ventral margin is not running straightly, while the posterior ridge of the left chondrophore is highly elevated, perpendicular to the plane of the chondrophore, and possesses distinct undulations in front of the posterior ridge.

Taking all these details into consideration, the present writer is of opinion that the present specimen should be classified into *Mya cuneiformis* as above stated from the nature of the chondrophore, although the form of the shells somewhat deviates from that of the typical individuals of that species. A few other specimens closely like the present specimens now being discussed are stored in the Department of Geology and Mineralogy; they were collected from a few other localities listed before, but they are unfortunately in ill state of preservation.

More than 180 fossil specimens for the species, *Mya cuneiformis* (BÖHM) were studied; they were collected from various horizons of the Tertiary deposits in Hokkaido. Among them the writer recognized the following one variety and two formas besides the typical form based on the variation of the shell form, although they should be surely included in one species on the basis of the constant nature in the position of the beaks, and the form of chondrophore.

The geological and geographical distribution of *Mya cuneiformis*, its variety and its formas can be tabulated as in Table 2.

TABLE 2

	Tenpoku	Haboro	Rumoe	Kabato & Sorachi	Ishikari	Kushiro	Miocene	Pliocene
<i>Mya cuneiformis</i> (BÖHM)	—	—	—	—	—	—	—	—
<i>M. cuneiformis</i> forma α .	—		-?-	—	—	—	—	—
<i>M. cuneiformis</i> forma β .		-?-	—		—	—	—	—
<i>M. cuneiformis</i> var. <i>takigawensis</i>				—				—

7. *Mya truncata* LINNAEUS 1758

(Plate 3 Figures 1-4)

LINNAEUS: Syst. Nat., Ed. 10, p. 670.

T. NAGAO and T. INOUE: Jour. Fac. Sci., Hokkaido Imp. Univ., ser. IV Vol. 6, no. 273, pp. 155-6, pl. XXXIII (II), figs. 5, 9-10, 1941.

Mya truncata is a northern element which has been widely known from the Arctic sea and Sub-arctic regions; in Japan this is also known to be an inhabitant in the sea farther north than the sea off Nemuro (Hanasaki) peninsula and Cape Erimo.

In the collections of the Geology and Mineralogy Department, the specimens assignable into this species are surprisingly few whether fossils or living forms.

Mya truncata is quite characteristic in respect to the shells in that the posterior margin of them is nearly straightly truncated, the posterior end gapes widely, the outline of the pallial sinus is half-arched shape, the posterior adductor muscle is very small, and sub-circular in form,

the chondrophore of the left valve is broad trigonal in form. Accordingly this species is easily distinguishable from all other forms of this genus.

However this species becomes very like the recent species of *Mya japonica*, especially those individuals which present an oval-shaped outline, with much rounded posterior ends, although most specimens of *Mya japonica* show generally elongate oval form. Notwithstanding this the former ought to be decidedly distinguished from the latter because of the shape of pallial sinus, nature of chondrophore and size of the posterior adductor muscle.

The chondrophore of the present species seems to be closely similar in general to that of *Mya cuneiformis*, but the former is different in having more well-developed leg at the anterior part; the middle portion of the chondrophore is broad flabelliform in the former species.

Until the present day, the beaks of *Mya truncata* have been generally believed to be constantly situated at about median position, however in the present specimens the beaks are observed to be situated more posteriorly, so far as the present writer has observed.

*Dimensions (in mm):**—

U.H. Reg. No.	Length	Height	Thickness	L/H	(AL/PL)
8384	70.0	51.5	27.0	1.36	0.49/0.51
9002	59.0	38.0	21.5	1.53	0.50/0.50

Repository: U.H. Reg. No. 6342, 8384, 8992, 8994-5, 9002, 9009-10, 11329-30.

Localities and geological horizons: Since NAGAO and INOUE, the following two localities have become known for this species: 1) a cliff in the right side of the lowest part of the Akubetsu river, Akubetsu, Akan district, province of Kushiro; the Honbetsu formation. 2) the upper stream of the Haboro river, Haboro, Tomamae district, province of Teshio; the Chikubetsu formation.

8. *Mya japonica oonogai* MAKIYAMA

9. *Mya japonica* JAY

There seems to have been considerable confusion in the classification of the living species belonging to the subgenus *Arenomya* of the genus

*) The specimens here treated are the same individuals which were once measured by NAGAO and INOUE, but the measurements reported by them should be corrected in this way.

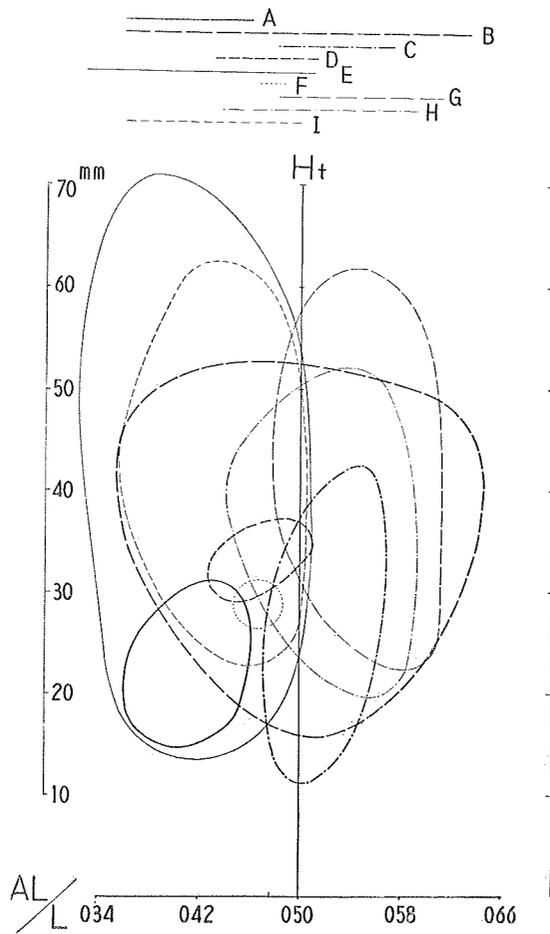


Fig. 4. Graph to show the distributions of beak position in each species, of genus *Mya*.

- A: *Mya ezoensis* NAGAO et INOUE.
- B: *M. grewingki* MAKIYAMA.
- C: *M. grewingki* MAKIYAMA var. *elongata* NAGAO et INOUE.
- D: *M. grewingki* MAKIYAMA var. *haboroensis* var. nov.
- E: *M. cuneiformis* (BÖHM).
- F: *M. cuneiformis* (BÖHM) var. *takigawensis* var. nov.
- G: *M. truncata* L.
- H: *M. japonica* JAY.
- I: *M. japonica oonogai* MAKIYAMA.

Mya, commonly found in the sea around the Japanese islands; they have been customarily treated by Japanese palaeontologists as well as conchologists under the name of *Mya japonica* (JAY) or *M. arenaria japonica* JAY.

The existence of such species has been widely identified in the sea around the Japanese islands, and the name, *Mya arenaria japonica* JAY has been long accepted by Japanese biologists.

The subspecies, *Mya arenaria japonica* has come to be regarded as a species independent from the Atlantic form, *Mya arenaria* and the name, *Mya japonica* (JAY) has become more commonly used in the Japanese literature. Further it came to notice that there may exist two different forms in this species; e.g. MAKIYAMA (1934, 1935) once stated that the northern specimens collected from Hokkaido and Saghalin are quite like *M. japonica* JAY described by JAY in every respect, while the southern specimens collected from Shikoku island etc., are thin in shell structure, much attenuated in the posterior margins and sculptured by finer growth lines. MAKIYAMA (1935) provisionally gave the name of "*oonogai*" to these southern specimens.

Also T. NAGAO and T. INOUE stated independently from MAKIYAMA as follows: "the first form (northern specimens) is a thick-tested, relatively short, and nearly equilateral shell with its posterior extremity more or less well rounded or slightly truncated, while the second one (southern specimens) is characterised by its generally thin, long more or less very inequilateral shell with a narrowly rounded or frequently acuminate posterior extremity. As far as the specimens at hand are concerned, the chondrophore seems to be different in these two forms; the chondrophore in the first is nearly perpendicular to the antero-posterior diameter of the shell, narrower, more deeply excavated and its inner border less convex than in the second. In the second type, subumbonal excavation is not observable."

T. HABA who has long accepted this kind of pelecypod the grouping of a single species as *Mya japonica* JAY, very recently found two forms in association with each other in the collections brought back from Akkeshi bay, southeastern Hokkaido; according to him, one of them is nothing but *Mya japonica* JAY (s.s.), while the other one is coincides with in features with the shells designated once by MAKIYAMA as *Mya oonogai*. Thus Dr. HABA referred to the latter form under the name *Mya japonica oonogai* MAKIYAMA. The present writer wishes to follow him.

Mya japonica oonogai MAKIYAMA

(Plate 2 Figures 1-6)

J. MAKIYAMA : Warera no Kōbutsu, Vol. 4, no. 3, pp. 37-9, text-fig. 0, 1935.

T. HABE : Publ. Akkeshi Marine Biol. Station, No. 4, pp. 22-3, pl. 6, fig. 3, 1955.

This form is widely found in the sea surrounding Kyushu, Shikoku, Honsyu and Hokkaido islands, especially under the influence of the warm current.

Description: shell generally large in size, transversely elongate ovate in shape, inequilateral; the posterior portion is longer than the anterior one; the anterior margin broadly rounded, the posterior one somewhat narrowly rounded; both dorsal and ventral margin long, gently curved with nearly equal convexity; the beaks slightly elevated and situated to the anterior side, the umbonal region in the left valve destroyed by continuous rubbing together with the opposite valve; the sculpture surface of the shell is ornamented by very fine growth lines, and delicate radial lines*) which are running from beak to half way to the ventral margins. The pallial sinus long but narrow, forming a transversely elongate elliptical shape; its length almost twice its width. The anterior adductor muscle long, and lanceolate in outline, its swollen base lies about the middle line of the height of the shells, while the posterior one is sub-quadrangular in form, and more strongly impressed than the former.

The chondrophore of the left valve is circular, spoon-shaped and vertically projecting to the hinge line; the leg is very small, and somewhat flattened trigonal in form; the anterior ridge projecting from the hinge line at an angle of 90-100° is rather thin and slightly recurved posteriorly; the antero-middle portion is nearly flattened or sometimes very slightly inclined towards the anterior side, and the outer margins broadly rounded; the furrow is long and deep, and is long trigonal in form.

Subumbonal excavation wholly absent, the antero-dorsal margin of shell beneath the umbo makes about right angle to the leg of the chondrophore. The right chondrophore is sub-trigonal in form, and deeply concave; the denticle ridge of the anterior portion is very small, slightly elevated, while the posterior one is also small; the lower portion of the chondrophore somewhat acuminate, and elevated; the inner surface of chondrophore is smooth.

*) These radial lines seemed to be more conspicuously impressed on the individuals collected from the southern region than on those from the northern district.

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Width	L/H	(AL/PL)
11349 (R.V.)	98.8	57.5	17.0	1.72	0.41/0.59
	82.7	46.8	—		0.42/0.58
	62.8	35.8	—		0.42/0.58
	45.1	26.5			0.44/0.56
	32.9	19.1			0.43/0.57
	21.4	12.8			0.42/0.58
9019 (R.V.)	75.0	44.4	14.2	1.70	0.40/0.60
	57.8	34.2			0.41/0.59
	41.3	24.5			0.45/0.55
	27.0	15.5			0.44/0.56
9014 (R.V.)	19.5	11.5			0.44/0.56
	86.0	53.4	15.3	1.61	0.41/0.59
	62.5	36.2			0.40/0.60
	45.0	26.0			0.42/0.58
	29.0	17.0			0.38/0.62
1722 (R.V.)	17.5	10.0			0.38/0.62
	81.0	55.4	17.2	1.46	0.44/0.56
	65.2	44.2			0.43/0.57
	49.7	33.0			0.45/0.55
	34.3	22.5			0.47/0.53
12353 (R.V.)	24.5	11.3			0.45/0.55
	74.0	43.6	13.9	1.70	0.45/0.55
	58.6	32.5			0.46/0.54
	40.0	21.2			0.44/0.56
	25.9	14.3			0.45/0.55
	19.3	9.7			0.44/0.56
11346 (L.V.)	61.9	37.2	13.0	1.66	0.49/0.51
	50.8	28.7			0.47/0.53
	39.3	22.1			0.44/0.56
	30.8	16.5			0.43/0.57
	20.0	11.1			0.45/0.55
11347 (R.V.)	92.0	58.5	19.5	1.57	0.47/0.53
	84.7	49.5			0.44/0.56
	70.2	42.2			0.46/0.54
	57.2	32.8			0.45/0.55
	43.8	25.4			0.45/0.55
	32.7	18.4			0.45/0.55
	23.0	12.2			0.45/0.55
	15.7	8.2			0.41/0.59
11305 (R.V.)	88.7	59.5	19.5	1.49	0.44/0.56
	77.0	46.4			0.42/0.58
	65.0	39.0			0.42/0.58
	56.2	32.3			0.43/0.57
	41.1	24.2			0.47/0.53
	30.7	17.3			0.47/0.53

	65.8	42.0	13.8	1.57	0.44/0.56
11306 (R.V.)	50.0	33.2			0.44/0.56
	39.1	24.2			0.41/0.59
	26.3	16.0			0.42/0.58
	(Length)	(Height)	Thickness	(L/H)	(AL/PL)
11334 (a)	87.5	52.0	26.0	1.68	0.45/0.55
" (b)	70.8	43.3	24.0	1.64	0.46/0.54

Repository and localities: U.H. Reg. No. 11349, the sea shore of Nagasaki City, Nagasaki pref.; No. 9019, the sea shore of Hanyu, Toyoura district, Yamaguchi pref.; No. 9014, the sea shore of Fukuyama City, Hiroshima pref.; No. 1722, the sea shore of Kesennnuma, Iwate pref.; No. 12353, the sea shore of Muroran City, Hokkaido; No. 11346, the sea shore of Mōrai, Atsunai district, Ishikari province, Hokkaido; No. 11306, Akkeshi bay, Akkeshi district, East Hokkaido; No. 11305, the sea shore of Kirittapu, Akkeshi district, East Hokkaido; No. 11308, the sea shore of Tokoro, Tokoro district, Northeast Hokkaido; No. 11347, the Alluvial deposits, Abashiri Lake.

Distribution: The collection of these shells extends from Nagasaki-harbor in Kyushu to the shore of Abashiri Lake and the sea neighboring Akkeshi, in Hokkaido.

Locality and geological horizon of the fossil species: The species is abundantly found from the Neogene deposits in Honsyu, however, it seems to be rather rare from any Tertiary formations in Hokkaido, though not wholly lacking. M. MINATO and others once illustrated some specimens collected from the Takinoue formation developing at Takinoue in the Ishikari coal field, under the name of *Mya arenaria* but those specimens are perfectly conspecific with *Mya japonica oonogai* in every respect.

No examples other than these specimens above mentioned are known to date from the Cenozoic deposits in Hokkaido; they are referable to *Mya japonica oonogai* MAKIYAMA with certainty.

Remarks: This species is distinguishable from *Mya cuneiformis* and *M. truncata*, in general outlines of the shell and the left chondrophore. Also they are specifically distinct from *Mya grewingki* and its varieties, in having a rather elliptical-shaped shell and a circular-shaped chondrophore. The present species is easily separable from *Mya japonica*, especially in respect to the different kind of left chondrophore. On the contrary, the present species is rather more akin to *Mya ezoensis*, palaeogene species, than to any other forms, but the former is distinguishable from the

latter in having a larger and the chondrophore rather circular in shape.*)

Lastly, the present writer is of opinion that the present subspecies is closely like or rather almost identical to the typical form of *Mya arenaria* L., which inhabit the North Atlantic, although he cannot but hesitate to express such as a final conclusion, because he does not have available at present any specimens of the Atlantic species, *arenaria*.

Mya japonica JAY 1857

(Plate 1 Figures 1-5)

JAY: U.S. Japan Expedition, Vol. II, p. 292, pl. 1, figs. 7, 10, 1857.

J. MAKIYAMA: Warera no Kōbutsu, Vol. 4, no. 3, pp. 37-9, text-fig. j 1935.

T. HABE: Publ. Akkeshi Marine Biol. Station, No. 4, pp. 22-3, pl. 7, fig. 12, 1955.

Until the present day, the geographical distribution of this species has been little known, but it is probable that it may be distributed mainly in the northern sea around Hokkaido, Saghalin, and Kurile islands. Description: shell medium in size, rather thick, considerably variable in form ranging from very transversely long to very shortly oval; the anterior end usually rather broadly rounded, while the posterior one is narrowly rounded or somewhat roundly truncated. The dorsal margin rather convex, the ventral one usually running nearly straight or often very slightly concave in the median part, the antero-dorsal margin more or less long and nearly straight, while the postero-dorsal margin is sloping down towards the posterior end having a curvature quite similar to that of the typical form of *Mya grewingki*. The beaks in both valves are perfectly preserved; no trace of rubbing between the two beaks is noticeable. The beaks usually situated posteriorly but not seldom positioned anteriorly. Pallial sinus is deep, large, and sub-trapezoidal in form. Both the lanceolate anterior—and the sub-quadrangular posterior—adductor muscles are larger than those of the *Mya japonica oonogai* in size. The chondrophore of the left valve is trigonal in form; it has an elevated leg and two elevated ridges. The subumbonal excavation is distinctly

*) This subspecies shows sometimes a fairly remarkable individual variation in respect to the thickness of the test, its ornamentation and outline of the shell; most of the northern specimens collected from the coast of Kesenuma, Iwate Prefecture, in Honsyu and the sea shore around Hokkaido island seem to be thicker, more distinctly sculptured and more rounded in the posterior margin in comparison with the southern specimens.

present. The chondrophore of this species is strongly like that of *Mya cuneiformis* and *M. truncata*, however, the former differ from the latter two in having the posterior ridge inclined, more elevated, and somewhat rugosed on its upper portion.

The right chondrophore is sub-trigonal in form, and deeply concave, but the denticle ridge is larger and more highly elevated than that of *Mya japonica oonogai*, while the posterior ridge of the present species is slightly elevated; the lower margins of the chondrophore possessed by the present species is strongly rounded.

Dimensions (in mm):—

U.H. Reg. No.	Length	Height	Width	L/H	(AL/PL)
11344 (L.V.)	70.0	44.0	14.8	1.59	0.52/0.48
	61.0	36.3			0.50/0.50
	52.0	29.0			0.50/0.50
	34.6	18.8			0.46/0.54
	19.9	11.7			0.47/0.53
9016 (R.V.)	61.6	44.5	14.8	1.37	0.50/0.50
	45.2	31.7			0.47/0.53
	28.5	18.1			0.48/0.52
	18.6	10.1			0.48/0.52
9007 (R.V.)	51.0	32.0	10.8	1.59	0.47/0.53
	40.0	23.9			0.47/0.53
	32.5	17.4			0.46/0.54
	32.5	12.5			0.45/0.55
	14.0	7.6			0.46/0.54
11307 (R.V.)	69.0	45.1	15.3	1.53	0.50/0.50
	58.2	36.2			0.52/0.48
	42.5	26.4			0.55/0.45
	29.0	17.7			0.52/0.48
9006 (R.V.)	72.0	51.0	14.5	1.41	0.55/0.45
	60.0	36.5			0.49/0.51
	40.0	23.3			0.50/0.50
	33.0	18.5			0.47/0.53
	21.0	11.0			0.48/0.52
9017 (R.V.)	62.3	43.8	15.8	1.42	0.51/0.49
	45.0	31.5			0.51/0.49
	33.8	20.5			0.47/0.53
	26.8	15.4			0.45/0.55
	18.7	9.9			0.43/0.57

Repository and localities: U.H. Reg. No. 11344; the sea shore of Muroran City: No. 11307(a, b); the sea shore of Tokoro: No. 9007, 12355(a, b), 12356(a-d), 12358(a); the sea shore between Shoya and Monshizu in Hidaka province: Hokkaido. U.H. Reg. No. 12357; the sea shore of South

Saghalin. U.H. Reg. No. 9013, 9017; the sea shore of the Kurile Islands. Distribution: The shells of this species have been abundantly found in various localities along the sea coasts of Hokkaido, Saghalin and the Kurile islands. Although the southern limit of the geographical distribution of this species was and still is not ascertained, it may probably inhabit the intermediate area between the distributions of *Mya japonica oonogai* and *M. truncata* L.

Geological horizon: This species is known to occur as in fossil form from the Neogene and Pleistocene deposits in Hokkaido, namely: 1) the Numata formation (Tôgeshita formation) in Uryu, 2) the Setana formation in southwestern Hokkaido, 3) the Ikeda formation in Tokachi province.

Remarks: The specimens now at hand are quite identical with the specimen of T. HABE figured under the name of *Mya japonica* in every respect. The present species differs from *Mya ezoensis*, *M. grewingkii*, its varieties and *M. japonica oonogai*, in the feature of the chondrophore. It is also distinguishable from *Mya truncata*, because the former is distinctly not truncated in the posterior end, the posterior ridge of the chondrophore of the present species is not highly elevated upwards and the part immediately in front of the posterior ridge is not undulated. This species is distinguishable from *Mya cuneiformis*, in the position of beak, the shape of shell and some features of chondrophore, but not in respect to the outer form.

The relation between *Mya japonica* and *M. intermedia* has been already discussed more in detail by many palaeontologists as well as by conchologists. However, it seems to the present writer that the opinion of NAGAO and INOUE may be most worthy of respect. NAGAO and INOUE stated as follows: "the first group with a thick tested shell comprises the following forms: a) those which are nearly equilateral with both extremities somewhat broadly rounded, belonging to *M. japonica* JAY. b) Those which are somewhat truncated posteriorly, may be identical with *M. intermedia* DALL."

Meanwhile, *Mya intermedia* established by DALL in 1898, has been lately considered as usually to be synonymous with *Mya arenaria* L. by many American conchologists. NAGAO and INOUE erroneously placed their so-called "first group" but not *Mya japonica*, in *Mya arenaria* L., because they had understood that *M. japonica* is quite synonymous with *Mya arenaria* L. Therefore they stated that their so-called "first group" might be grouped into not only *Mya arenaria* but also into *Mya intermedia*,

and they were of the opinion that their so-called "second group" might belonged to a new species.

On the other hand the present writer is of opinion, that *Mya intermedia* may be synonymous with *Mya japonica* JAY, which is quite different from *Mya arenaria* L., the Atlantic species, and is also easily separable from *Mya japonica oonogai* as already stated.

Mya japonica JAY *forma* α . (figs. 1, 3a-c in pl. 1)

Mya japonica JAY seems to be rather constant in the nature of the shell, yet there are sometimes recognizable fairly strong individual variations, especially in respect to the shell form, ranging from the typical transversely elongate form to the short rounde oval shape, although these two forms are occasionally found in association with each other.

So, the present writer wishes to separate the short oval form from the typical form as a *forma*.

Repository and collections: U.H. Reg. No. 9016, 12355 (c, d) 12356 (e, f, g), 12356 (b, c); the sea shore between Shoya and Monshizu in Hidaka province: No. 11307 (c), the sea shore of Tokoro, Kitami province; Hokkaido. U.H. Reg. No. 9006, the sea shore of South Saghalin. U.H. Reg. No. 9011, 9012, 9015, 9018, the sea shore of Kurile Islands.

III. Some remarks on the other fossil species of the genus.

Mya, known outside of Hokkaido.

a. *Mya uzenensis* NOMURA et ZIMBO 1937

S. NOMURA and N. ZIMBO: Saito-Hoon-Kai Mus., Res. Bull., no. 13, p. 167, pl. 22, fig. 17, 1937.

Remarks: According to NOMURA and ZIMBO, this species reported to have been found from the Matsuzawa bed developed in Yamagata prefecture, Northern Honsyu, is characteristic in having shell form and posterior sharply truncated margin. They stated that this species is quite different from both *Mya arenaria* L. and *Mya truncata* in the form of shells.

However, it seems to the present writer that the illustrated specimen of this species is unfortunately so much deformed as to give an appearance much compressed in comparison with original form. From the figure illustrated by NOMURA and ZIMBO, the present writer cannot help regarding this species to be not a very peculiar one but perhaps to belong to either *Mya japonica* or *M. japonica oonogai*.

b. *Mya arenaria kitafukuokaensis* subsp. HATAI 1940

K. HATAI: Bull. Biogeogr. Soc., Japan, Vol. 10, No. 9, p. 131, pl. 1, fig. 9, 1940.

Remarks: This subspecies described from the Miocene deposits of Ananushi, Kitafukuoka, Ninohe district, Iwate prefecture in Honsyu, seems to be somewhat broadly truncated in the posterior end. Probably this form may be nothing but *Mya truncata* L.

c. *Mya miyagiensis* NOMURA 1935

S. NOMURA: Saito-Hoon-Kai Mus., Res. Bull., No. 6, p. 222, pl. 16, figs. 13 and 19, 1935.

Remarks: This species is believed to be characteristic in the small, inflated and oblong ovata shell form. Although NOMURA described this form as belonging to the group of *Mya grewingki* MAKIYAMA based only on the similarity of the outer form of the shells, it may be almost impossible to compare this species in detail to any other known species, because nothing of this species has ever been closely described by any one in respect to the ornamentation of the outer surface of the shells, nature of pallial sinus and chondrophore.

d. *Mya dickersoni* CLARK 1915

B. L. CLARK: Univ. Calif. Publ. Geol., Vol. 8, p. 478, pl. 63, figs. 3 and 4, 1915.

Remarks: There are two specimens which were described by CLARK under the name of *Mya dickersoni* from the San Pable groups of Middle California, however each of them seems to the present writer to represent quite different character in form of shells.

The present writer believes that the specimen of this species (CLARK's fig. 3) may be quite like to *Mya cuneiformis*, and that the other specimen (CLARK's fig. 4) does not belong to the same species, *Mya cuneiformis*, but should perhaps be assigned into another species of this genus, rather than into any hitherto known form.

e. *Mya salmonensis* CLARK 1932

B. L. CLARK: Bull. Geol. Sci., America, Vol. 43, p. 822, pl. 17, figs. 3, 4 and 8, 1932.

Remarks: This species is said to have been collected from the Poul and Yakataga formation developing in Southern Alaska, in association with *Mya truncata* L.

According to the description and illustrations given by CLARK, this species is probably much resemblant to *Mya cuneiformis*, in having the shell in which the beak is prominent and situated anteriorly, additionally to the strongly similar outline of the shell.

f. "*Mya crassa* GREWINGK 1850"

GREWINGK: Beitrag zur Kenntniss der N. W. -küste Amerikas, p. 282, pl. 6, figs. 2a-b, 1850.

g. *Mya arenaria* var. *profundior* GRANT et GALE 1931

U. S. GRANT and H. R. GALE: Mem. San Diego Soc. Nat. Hist., Vol. 1, p. 414, 1931.

Remarks: This variety was distinguished by GRANT and GALE in 1931 the typical form of *Mya arenaria* L., in their statement as follows: "this (*M. crassa*) may be but an unusual variation of the form for which Dall in 1904 used the preoccupied name *intermedia*; and if it is decided separated from *japonica* and *dickersoni*, it may be possible to use this name (*M. arenaria* var. *profundior*) for it." Further they stated also: "It is characterized by its extreme depth, having a greater depth than length, as can be seen by the dimensions which are the reverse of those of the other varieties."

Such peculiar form has been never known from the Cenozoic deposits in Japan until the present day, so far as the writer is aware.

IV. Geological distribution of the species belonging to the genus *Mya* in Hokkaido.

Although the geological distribution in Hokkaido of the species belonging to the genus *Mya* has been clarified in detail by many palaeontologists, there may perhaps be need for considerable revisin.

Here the writer wishes to tabulate the information in the following Table 3, based on his best knowledge at the present moment.

TABLE 3.

Formation Species and Variety	Eocene	Oligocene	Miocene	Miocene Pliocene	Pliocene	Pleistocene	Recent
	Wakkanabe Formation	Suitakara F.	Takinoue Kawabata Horoshin and Chikubetsu F.	Togeshita F.	Wakkanai and Oiwake F.	Takigawa and Horibetsu F. Setana F.	
<i>Mya ezoensis</i> NAGAO et INOUE	—						
<i>M. grewingki</i> MAKIYAMA		—	—				
<i>M. grewingki</i> var. <i>elongata</i> NAGAO et INOUE		—	—?				
<i>M. grewingki</i> var. <i>haboroensis</i> var. nov.			—				
<i>M. cuneiformis</i> (BÖHM)			—				
<i>M. cuneiformis</i> var. <i>takigawensis</i> var. nov.			—		—?		
<i>M. truncata</i> LINNAEUS			—		—		
<i>M. japonica</i> JAY				—			
<i>M. japonica oonogai</i> MAKIYA -MA				—			—?

Acknowledgments

Before finishing with the description, the writer wishes to express his sincere thanks to Prof. MASAO MINATO of the Department of Geology and Mineralogy, for his valuable suggestions and kind guidance during this investigation. Further the writer would offer his thanks to Mr. SATORU UOZUMI of the same Department, for his guidance during the preparation of this note. Acknowledgment are also due to Messrs. MASARU MATSUI Assist. Prof. of this Department, Mr. YASUKUNI HURUHATA of the Matsusho High School, and Mr. KATSUTOSHI MITANI of the Geological Survey of Hokkaido, for their kind sharing of information connected with this study. Also thanks are due to Mr. SUMIO KUMANO, who took the photographs accompanying this report.

References to literature

- BÖHM J. (1915): *Über kreideversteinerungen von Sachalin*; Jahrb. d. könig. Preussisch. Geol. Landesanstalt., Vol. 36, teil 1, p. 557, pl. 29, figs. 1a-c, text-figs. 1-2.
 CLARK B. L. (1915): *Fauna of the San Pablo group of Middle California*; Univ. Calif. Publ. Geol., Vol. 8, p. 478, pl. 63, figs. 3-4.

- (1932): *Fauna of the Poul and Yakataga formation of Northern Alaska*; Bull. Geol. Sci. America Vol. 43, p. 822, pl. 17, figs. 3,4 and 8.
- DALL W. H. (1898): *Tertiary Fauna of Florida*; Trans. Wagner Inst. Sci. Phila., Vol. 3, part 4, p. 857-8.
- FOSTER R. W. (1946): *The Genus Mya in the Western Atlantic*; Johnsonia, Vol. 2, no. 20, p. 29-35, pl. 17, pl. 18, figs. 1-4, pl. 19, figs. 1-2, pl. 20, figs. 1-4, pl. 21, figs. 1-2.
- GRANT U. S. and GALE H. R. (1931): *Catalogue of the Marine Pliocene and Pleistocene Mollusca of California*; Mem. San Diego Soc., Nat. Hist., Vol. 1, pp. 410-5, pl. 21, fig. 13.
- HABE T. (1952): *Genera of Japanese Shells, Pelecypoda* No. 3; pp. 236-7, figs. 604-5, 612. (in Japanese)
- (1955): *Fauna of Akkeshi Bay*; Publ. Akkeshi Marine Biol. Stat., No. 4, pp. 22-3, pl. 6, figs. 10-1, pl. 7, fig. 12.
- HATAI K. (1940): *On some Fossils from the Ninohe District, Mutu Province, Northeast Honshu, Japan*; Bull. Biogeogr. Soc. Japan, Vol. 10, no. 9, p. 131, pl. 1, fig. 9.
- HATAI K. and NISHIYAMA S. (1952): *Chek List of Japanese Tertiary Marine Mollusca*; Sci. Rep., Tohoku Univ., ser. 2, special volume no. 3, pp. 89-92.
- MAKIYAMA J. (1934): *The Asagaian Mollusca of Yotukura and Matchgar*; Mem. Coll. Sci., Kyoto Imp. Univ., ser. B, Vol. 10, no. 2, pp. 156-9, pl. 7, figs. 50-2.
- (1935): *The Fossils of genus Mya*; Warera no Kōbutsu, Vol. 4, no. 3, pp. 135-9, 6 text-figs. (in Japanese)
- MINATO M., MATSUI M. and S. UOZUMI (1950); *On the Genus Mya from Hokkaido*; Shinsei Dai no Kenkyu (Study of the Cenozoic), No. 7, pp. 106-9, pl. 10, figs. 75-91.
- NAGAO T. and INOUE T. (1941): *Myarian Fossils from the Cenozoic Deposits of Hokkaido and Karafuto (Saghalin)*; Jour. Fac. Sci., Hokkaido Imp. Univ., ser. 4, Vol. 6, no. 273, pp. 143-58, pl. 32-4.
- NOMURA S. (1935): *Miocene Mollusca from Siogama, Northeast Honshu, Japan*; Saito-Hoon-Kai Mus., Res. Bull., No. 6, p. 222, pl. 16, figs. 13 and 19.
- (1935): *Miocene Mollusca from the Nisi-Tugaru District, Aomori-ken, Northeast Honshu, Japan*; Saito-Hoon-Kai Mus., Res., Bull. No. 6, pp. 68-9.
- NOMURA S. and ZIMBO N. (1937): *On Some Neogene Mollusca from Yamagata Prefecture, Northeast Honshu, Japan*; Saito-Hoon-Kai Mus., Res. Bull., No. 13, p. 167, pl. 22, fig. 17.
- OLDROYD I. S. (1924): *The Marine Shells of the West Coast of North America*; Stanford Univ. Publ. Geol., Vol. 1, p. 197-9, pl. 10, fig. 4, pl. 15, fig. 5, pl. 32, figs. 1a-b.
- WATANABE K., ARAI J. and HAYASHI T. (1950): *Tertiary Geology of the Chichibu Basin*; Bull. Chichibu Mus., Nat. Hist., no. 1, p. 79, pl. 4, figs. 11-12.
- WATANABE K., ARAI J., KANNO S., HIRAYAMA K. and YUGETO H. (1956): *On the Akabira and Asagai stage in the Kwanto Region*; Yūkocho (Foraminifera), No. 5(I), p. 29-34. (in Japanese)

Explanation of
Plate 1

Explanation of Plate 1

(all figures natural size)

Mya japonica JAY forma α

Fig. 1. U. H. Reg. No. 12355(d). Collector: S. UOZUMI. A side view of left valve.

Figs. 3a-c. U. H. Reg. No. 12355(c). Fig. 3a. Side view of left valve. 3b. dorsal view. 3c. inner side view.

These specimens collected from the Shoya coast. Hidaka province.

Mya japonica JAY

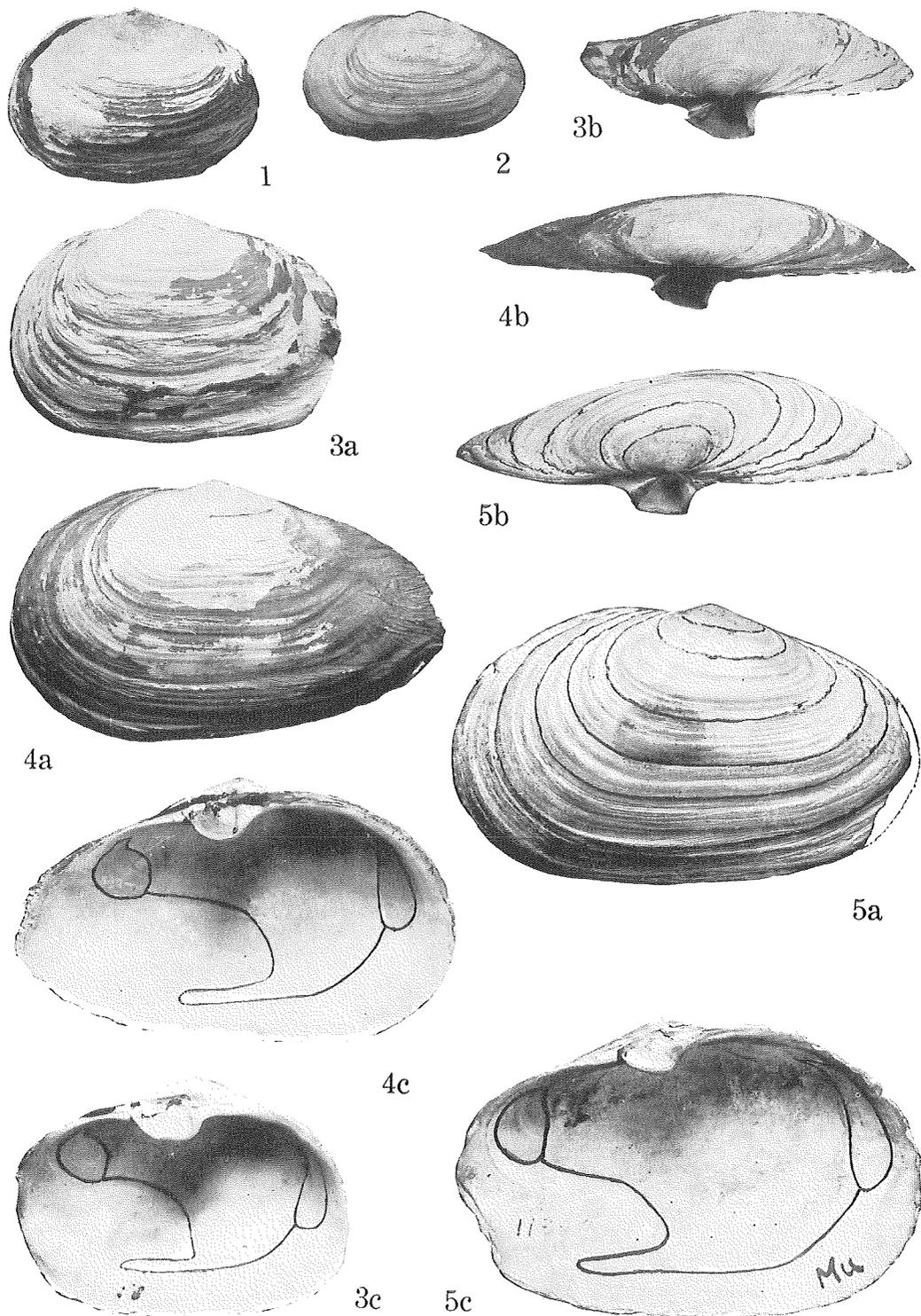
Fig. 2. U. H. Reg. No. 12355(b). Side view of left valve.

Figs. 4a-c. U. H. Reg. No. 12355(a). Fig. 4a. Side view of left valve, 4b. dorsal view, 4c. inner side view.

These specimens collected from the Shoya coast, Hidaka province.

Figs. 5a-c. Specimen collected from the sea shore of Muroran City. U. H. Reg. No. 11344. Collector: A student of Department of Geology and Mineralogy.

Fig. 5a. Side view of left valve, 5b. dorsal view, 5c. inner side view.



FUJIE: *Myarian* pelecypod

KUMANO Photo.

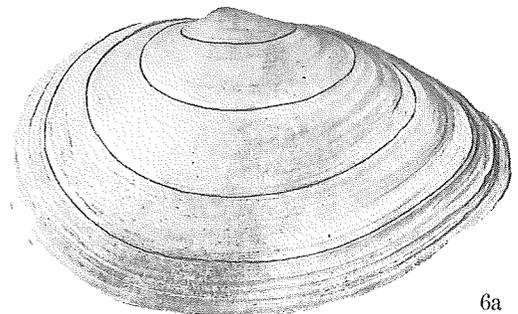
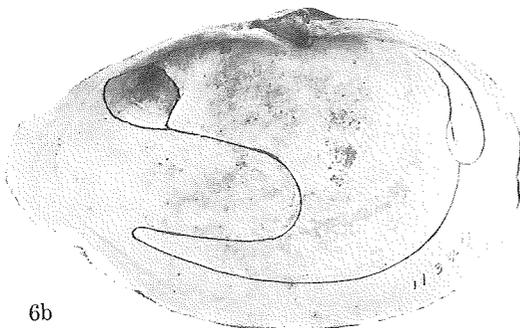
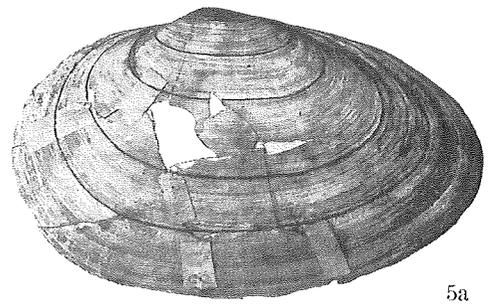
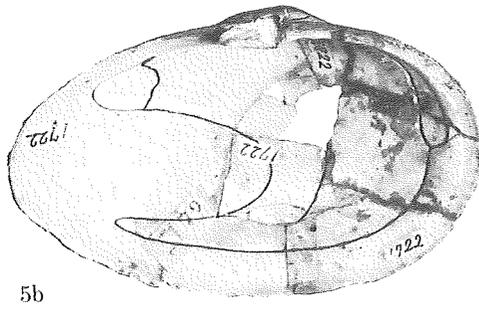
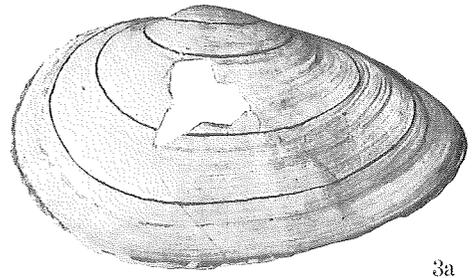
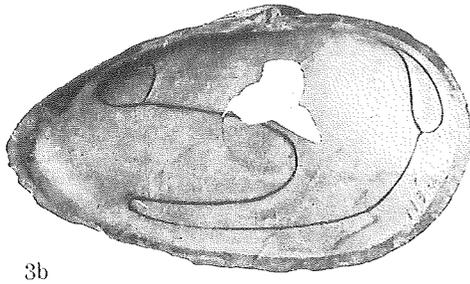
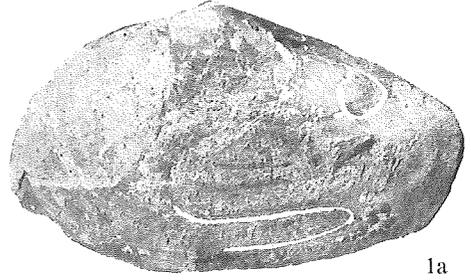
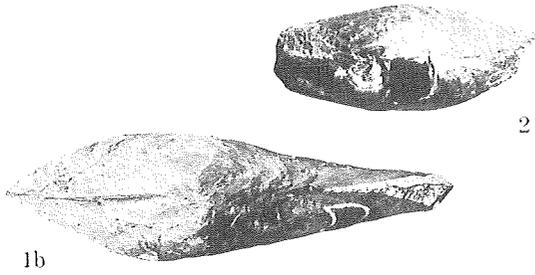
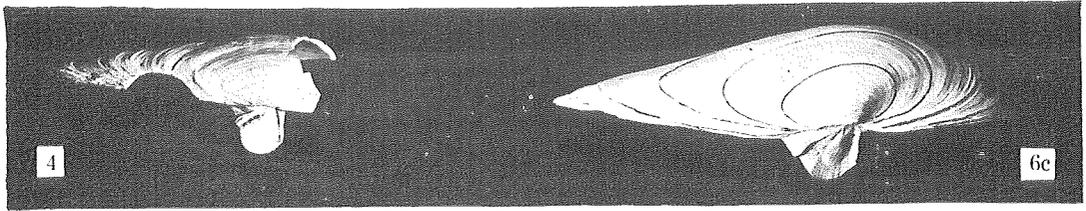
Explanation of
Plate 2

Explanation of Plate 2

(all figures two-thirds natural size)

Mya japonica oonogai MAKIYAMA

- Figs. 1a-b, 2.** Fossil specimens from the Takinoue formation, Takinoue, Sorachi district, Ishikari province. U. H. Reg. No. 11334 (a, b). Collectores: M. MATSUI and S. UOZUMI. Figs. 1a. Side view of left valve, 1b. dorsal view of same specimen, 2. showing the left chondrophore.
- Figs. 3a-b, 4.** Recent specimens collected from the sea shore of Nagasaki City, Nagasaki prefecture, Kyushu. U. H. Reg. No. 11349. Collector: D. MAKI. Fig. 3a. Side view of left valve, 3b. inner side view. Fig. 4. Showing the left chondrophore.
- Figs. 5a-b.** Recent specimen collected from the sea shore of Kesenuma-machi, Iwate prefecture, Honsyu. U. H. Reg. No. 1722. Collectors: T. NAGAO and S. OISHI. Fig. 5a. Side view of left valve, 5b. inner side view.
- Figs. 6a-c.** Specimen collected from the Alluvial deposits, around Lake Abashiri, Kitami province. U. H. Reg. No. 11347. Collector: Y. KITAGAWA. Fig. 6a. Side view of left valve. 6b. inner side view, 6c. dorsal view.



Explanation of
Plate 3

Explanation of Plate 3

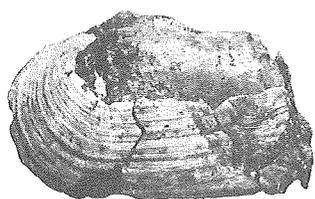
(all figures natural size)

Mya truncata LINNAEUS

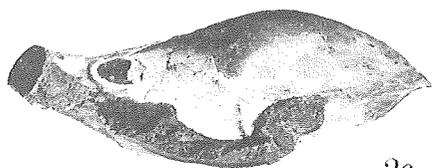
- Fig. 1. Fossil specimen from the Setana formation, the Pirika Mine, Setana district, Shiribeshi province. U. H. Reg. No. 8995. Collector: T. ŌSUGI. A side view of left valve.
- Figs. 2a-c. Fossil specimen from the Oiwake formation, Gabari, Yufutsu district, Iburi province. U. H. Reg. No. 9002. Collector: T. NAGAO. Fig. 2a. Side view of left valve, 2b. anterior view, 2c. dorsal view.
- Fig. 3. Fossil specimen from the Setana formation, outcrop on the Toshibetsu river to the west about 500m from Pirika Station, Setana district, Shiribeshi province. U. H. Reg. No. 8992. Collector: T. ŌSUGI. A dorsal view.
- Fig. 4. Fossil specimen from the Chikubetsu formation, upper stream of the Haboro river, Haboro, Tomamae district, Teshio province. U. H. Reg. No. 11331. Collector: S. UOZUMI. A side view of left valve.

Mya cuneiformis (BÖHM) *forma a*

- Figs. 5a-b. Specimen from the Honbetsu formation, at Okiyokunnai-zawa, a tributary of the Shitakara river, Yubetsu Coal Mine, Akan district, Kushiro province. U. H. Reg. No. 11322 (a). Collector: Y. HURUHATA. Fig. 5a. Side view of left valve, 5b. dorsal view.



1



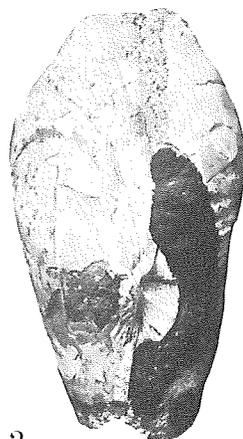
2c



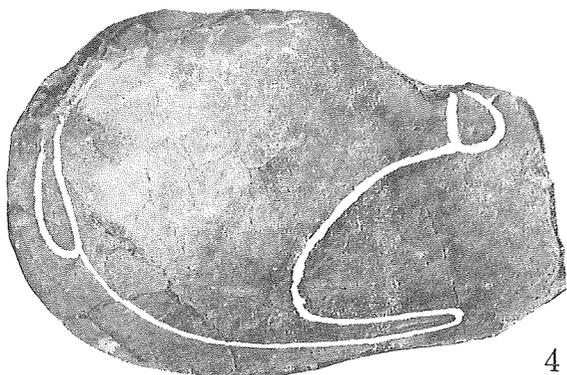
2a



2b



3



4



5a



5b

Explanation of
Plate 4

Explanation of Plate 4

(all figures natural size)

Mya cuneiformis (BÖHM) var. *takigawensis* var. nov.

Figs. 1a-c. Specimen from the Takigawa formation, on the banks of the Sorachi river, Takigawa, Sorachi district, Ishikari province. U. H. Reg. No. 11309. Collector: K. MITANI. Fig. 1a. Side view of left valve, 1b. dorsal view, 1c. anterior view.

Mya cuneiformis (BÖHM)

Fig. 2. Specimen from the Chikubetsu formation, upper stream of the Haboro river, Haboro, Teshio province. U. H. Reg. No. 11338. Collector: Y. HURUHATA. A side view of left valve.

Figs. 4a-b. Specimen from the Kawabata formation, Niwan, Yufutsu district, Iburi province. U. H. Reg. No. 8983. Collector: Unknown. Fig. 4a. Side view of left valve, 4b. dorsal view.

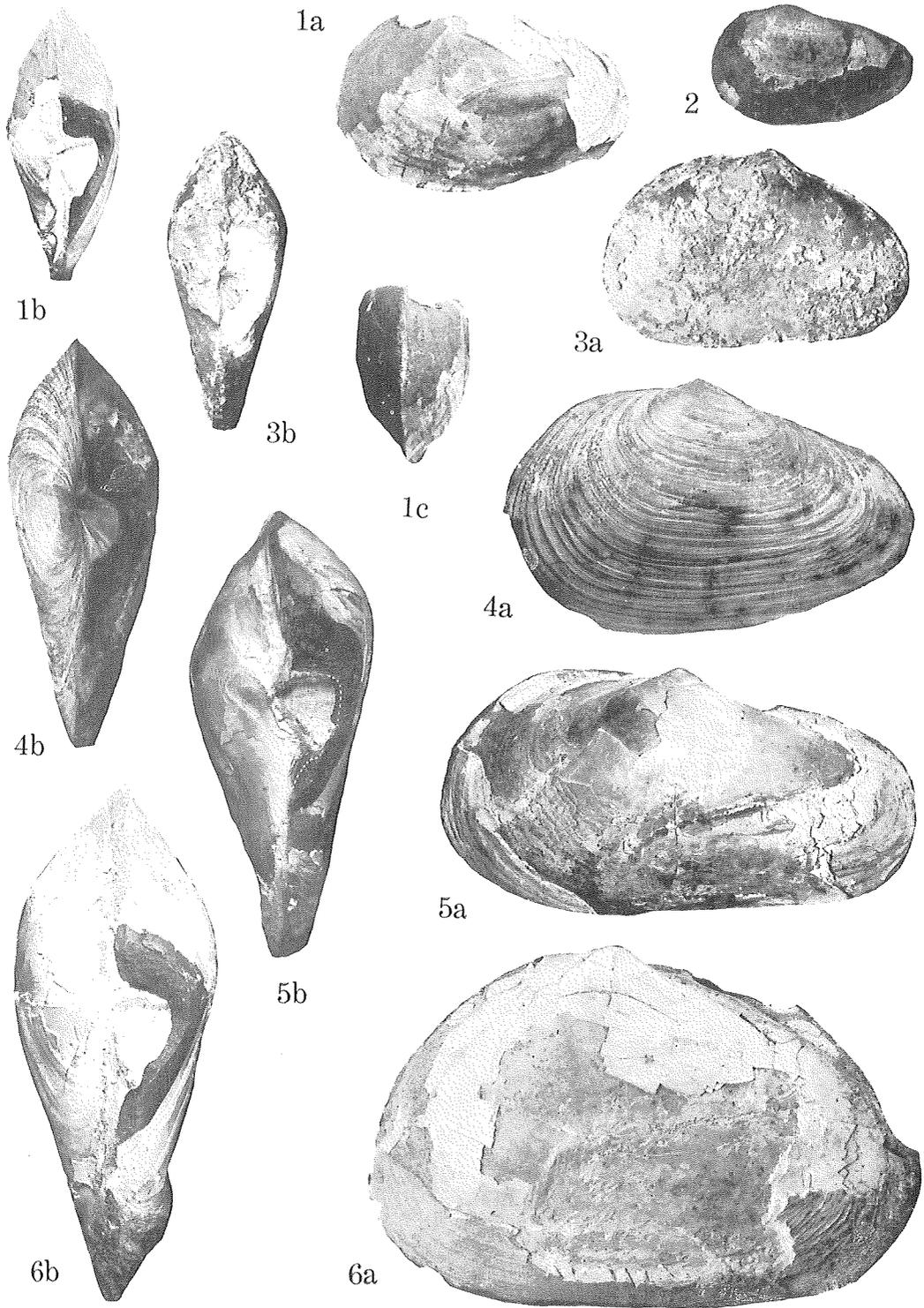
Mya cuneiformis (BÖHM) *forma* α

Figs. 3a-b. Specimen from the Atunai formation, Kamiatsunai, Urahoro district, Tokachi province. U. H. Reg. No. 12351. Collector: J. ISHII. Fig. 3a. Side view of left valve, 3b. dorsal view.

Figs. 6a-b. Specimen from the Oiwake series, Chagama, North side of Shiritoru, South Saghalin. U. H. Reg. No. 6005. Collectors: T. NAGAO and S. OISHI. Fig. 6a. Side view of left valve, 6b. dorsal view.

Mya cuneiformis (BÖHM) *forma* β

Figs. 5a-b. Specimen from the Tōgeshita formation, Ōwada, Rumoe City. U. H. Reg. No. 11331. Collectors: M. MINATO and H. OSANAI. Fig. 5a. Side view of left valve, 5b. dorsal view.



Explanation of
Plate 5

Explanation of Plate 5

(all figures natural size)

Mya grewingki MAKIYAMA var. *haboroensis* var. nov.

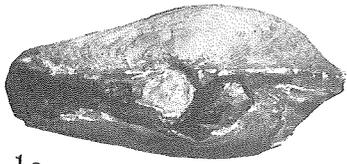
- Figs. 1, 2, 4.** Specimens from the Chikubetsu formation, upper stream of the Haboro river, Haboro, Tomamae district, Teshio province. Collector: S. UOZUMI.
- Figs. 1a-c.** U.H. Reg. No. 11340(a). Fig. 1a. Side view of right valve, 1b. side view of left valve, 1c. dorsal view.
- Fig. 2.** U.H. Reg. No. 11340(b). A dorsal view.
- Fig. 4.** U.H. Reg. No. 11339. A dorsal view.
- Figs. 3a-c.** Specimen from the Chikubetsu formation, Okabeno-sawa, Haboro, Tomamae district, Teshio province. U.H. Reg. No. 8981. Collector: S. YASUDA.
- Fig. 3a. Side view of right valve, 3b. side view of left valve, 3c. dorsal view.

Mya grewingki MAKIYAMA

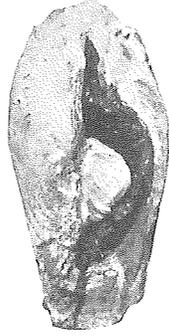
- Fig. 5.** Specimen from the Asagai formation, Yotsukura, Iwaki district, Fukushima prefecture. U.H. Reg. No. 716. Collector: K. UWATOKO. A dorsal view.
- Fig. 7.** Specimen from the Horoshin formation, a small tributary to the west of Horoni Station, Numata, Uryu district, Ishikari province. U.H. Reg. No. 8977. Collector: F. CHIBA. A side view of right valve.

Mya grewingki MAKIYAMA forma β

- Fig. 6.** Specimen from the Shitakara formation, Shoro, a west tributary of the lower part of the Shoro river, Shiranuka district, Kushiro province. U.H. Reg. No. 11351. Collectors: M. MATSUI, Y. HURUHATA and T. FUJIE. A side view of right valve.



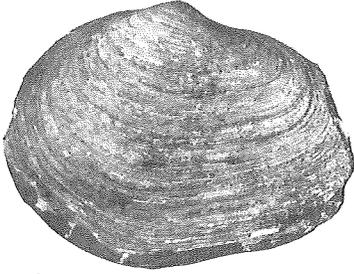
1c



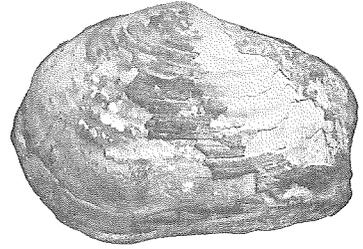
2



3c



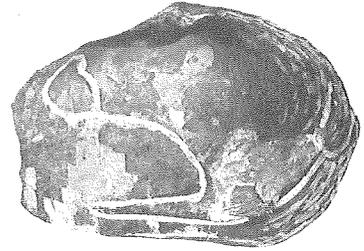
1b



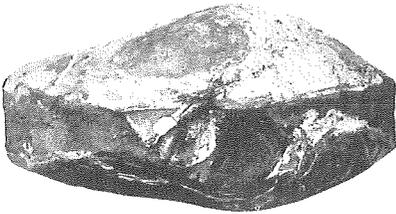
3b



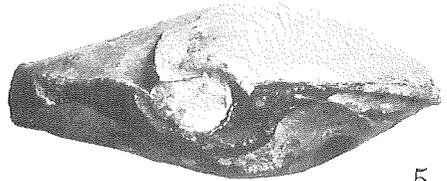
1a



3a



4



5



6



7

Explanation of
Plate 6

Explanation of Plate 6

(all figures natural size)

Mya grewingki MAKIYAMA var. *elongata* NAGAO et INOUE

Figs. 1a-b. Specimen from the Chikubetsu formation, Kiritachi, the upper stream of the Kotanbetsu river, Haboro, Tomamae district, Teshio province. U. H. Reg. No. 11336. Collector: Y. HURUHATA. Fig. 1a. Side view of right valve, 1b. dorsal view.

Mya grewingki MAKIYAMA

Fig. 2. U. H. Reg. No. 11335 (h). Collectors: S. UOZUMI and T. FUJI. Side view of right valve.

Figs. 4a-b. U. H. Reg. No. 8269 (a). Collector: K. HIRANO. Fig. 4a. Side view of right valve, 4b. dorsal view of same specimen.

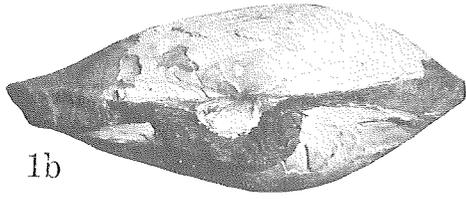
Mya grewingki MAKIYAMA *forma* α

Figs. 3a-b. U. H. Reg. No. 11335 (c). Fig. 3a. Side view of right valve, 3b. dorsal view.

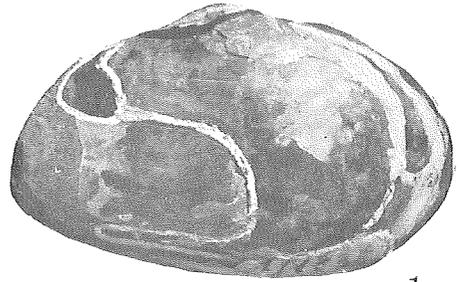
Mya grewingki MAKIYAMA *forma* γ

Figs. 5a-b. U. H. Reg. No. 11335 (g). Fig. 5a. Side view of left valve, 5b. dorsal view.

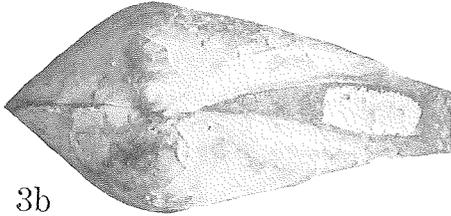
These specimens of No. 8269 (a) and 11335 (c, g, h) are from the Asagai formation, Yotsukura, Iwaki district, Fukushima prefecture.



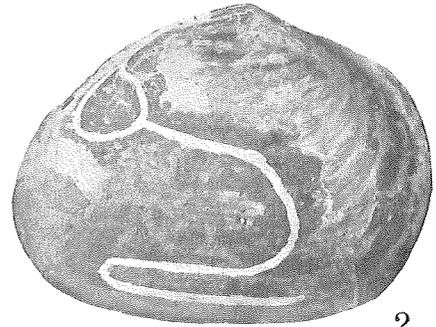
1b



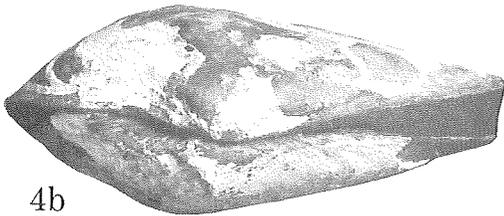
1a



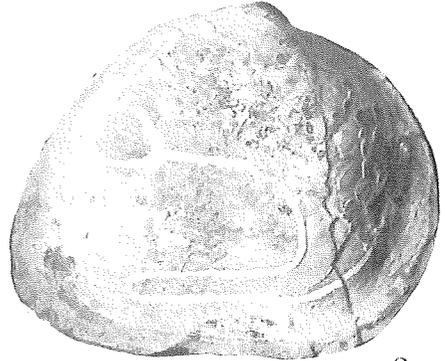
3b



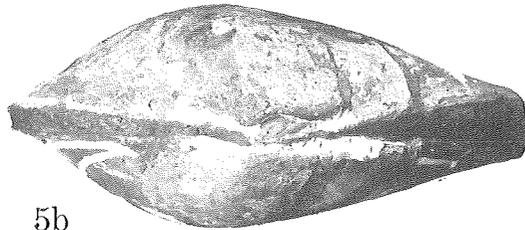
2



4b



3a



5b



4a



5a

Explanation of
Plate 7

Explanation of Plate 7

(all figures natural size)

Mya grewingki MAKIYAMA var. *elongata* NAGAO et INOUE

- Figs. 1-4, 6-8, 10. These specimens from the Shitakara formation, Yubetsu Coal Mine, Akan district, Kushiro province.
- Fig. 1. A side view of left valve. U. H. Reg. No. 11360. Collectors: Y. HURUHATA and T. FUJIE.
- Fig. 2. A side view of left valve. U. H. Reg. No. 11359. Collector: Y. HURUHATA.
- Fig. 3. A side view of right valve. U. H. Reg. No. 8268 (a). Collector: K. HIRANO.
- Fig. 4. A side view of left valve. U. H. Reg. No. 8268 (b).
- Figs. 6a-b. U. H. Reg. No. 11353. Collectors: Y. HURUHATA and T. FUJIE. Fig. 6a. Side view of right valve, 6b. dorsal view of same specimen.
- Figs. 7a-b. U. H. Reg. No. 11357. Collectors: Y. HURUHATA and T. FUJIE. Fig. 7a. Side view of left valve, 7b. dorsal view of same specimen.
- Figs. 8a-b. U. H. Reg. No. 9001. Collector: Unknown. Fig. 8a. Side view of right valve, 8b. dorsal view of same specimen.
- Fig. 10. U. H. Reg. No. 11353 (a). A side view of left valve.

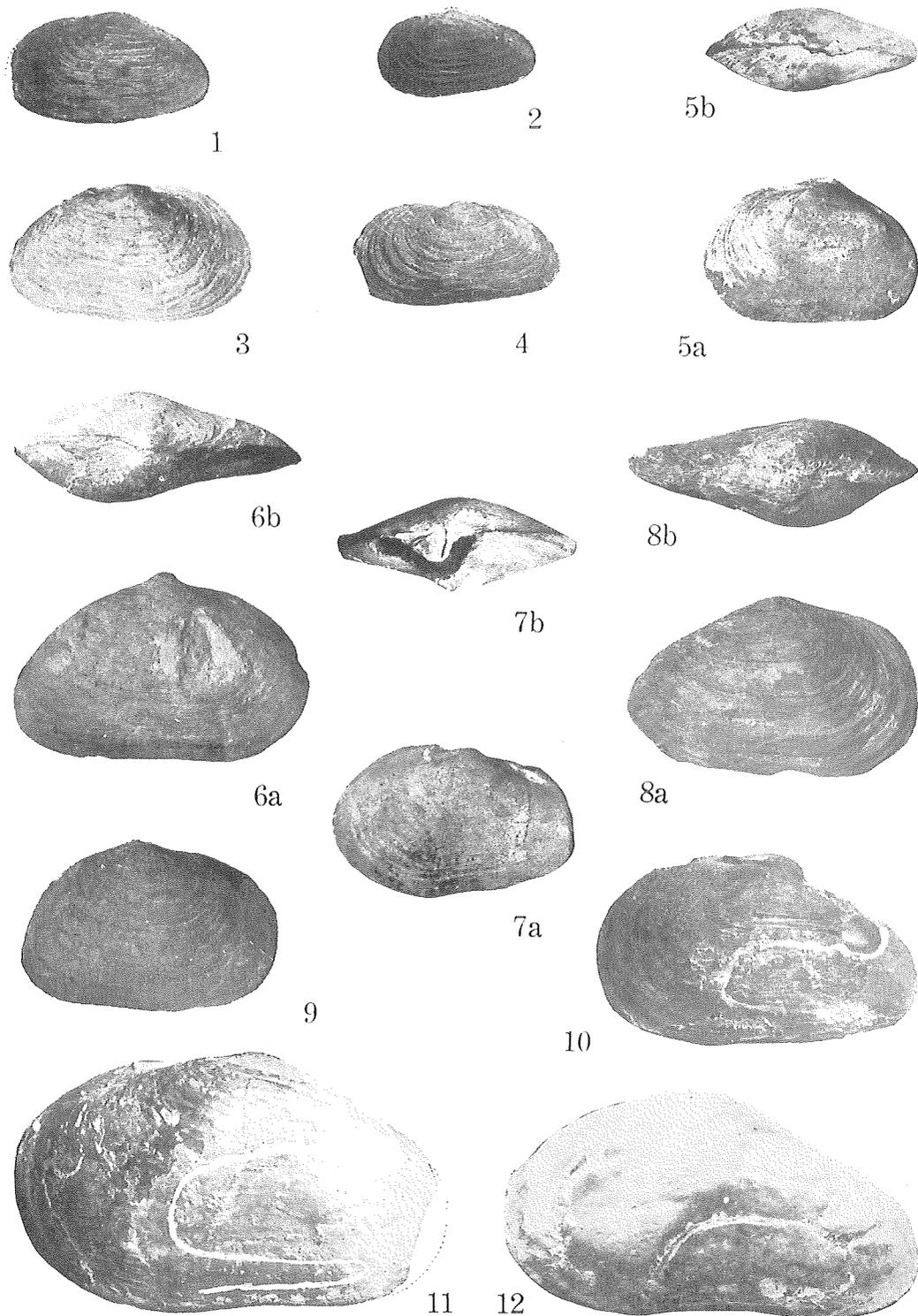
Of them the figures specimens 3, 4, 8 and 9 were once called *Mya grewingki* MAKIYAMA var. *kusiroensis* by NAGAO and INOUE.

- Fig. 11. Specimen from the Shitakara formation, Chinomi, Shoro, Shiranuka district, Kushiro province. U. H. Reg. No. 11355. Collectors: M. MATSUI, Y. HURUHATA and T. FUJIE. A side view of left valve.
- Fig. 12. Specimen from the Nissakutan formation, the Shiinai river, Honto district, South Saghalin. U. H. Reg. No. 8987. Collector: A Karafuto government official in former days. A side view of left valve. This specimen is a Holotype of *Mya grewingki* var. *elongata*.

Mya grewingki MAKIYAMA forma β

- Figs. 5a-b. U. H. Reg. No. 11358. Collectors: M. MATSUI, Y. HURUHATA and T. FUJIE. Fig. 5a. Side view of left valve, 5b, dorsal view of same specimen.
- Fig. 9. U. H. Reg. No. 11352. Collector: Y. HURUHATA. A side view of right valve.

These specimens from the Shitakara formation, banks of the Shitakara river, Yubetsu Coal Mine, Akan district, Kushiro province.



FUJIE: *Myarian* pelecypod

KUMANO photo.

Explanation of
Plate 8

Explanation of Plate 8

(all figures natural size)

Mya ezoensis NAGAO et INOUE

These specimens were collected from the Wakkanabe formation; Koguchino-sawa, a tributary of the Panke river, Yubari district, Ishikari province.

Figs. 1a-b. (Holotype): U. H. Reg. No. 8997. Collector: HIRUKAWA. Fig. 1a. Side view of right valve, 1b. dorsal view of same specimen.

Figs. 2a-b. (Topotype): U. H. Reg. No. 11294. Collectors: M. MINATO, S. UOZUMI and H. OSANAI. Fig. 2a. Side view of right valve, 2b. dorsal view of same specimen.

Figs. 3. ("): U. H. Reg. No. 11292. Collectors: M. MINATO and others. A side view of right valve.

Fig. 4. ("): U. H. Reg. No. 11290. Collectors: M. MINATO and others. A side view of left valve.

Fig. 5. ("): U. H. Reg. No. 11294. Collectors: M. MINATO and others. The chondrophore view of the specimen.

Fig. 6. ("): U. H. Reg. No. 11290. A side view of left valve.

Figs. 7a-b. ("): U. H. Reg. No. 11293. Collectors: M. MINATO and others. Fig. 7a. Side view of right valve, 7b. dorsal view of same specimen.

Figs. 8a-b. (Paratype): U. H. Reg. No. 9000. Collector: A student of I.G.P.S. Fig. 8a. Side view of left valve, 8b. dorsal view of same specimen.

Fig. 9. ("): U. H. Reg. No. 9000. A side view of left valve.

Fig. 10. ("): U. H. Reg. No. 9000. A side view of left valve.

Among these figured specimens, fig. 3 was once treated by MINATO and others as a variety of this species, however, it is quite indistinguishable from typical form of *Mya ezoensis*, in its shell form, as can be easily known from the growth lines (white lines in this figure.)

