Molluscan Fauna from "the Chikubetsu Formation", Hokkaido, Japan

Saburo KANNO* and Kyuya MATSUNO**

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Introduction

The junior writer has been studying the geology of the area lying north of the Obirashibe River in south to the Shosanbetsu River in north, where late Cretaceous and Tertiary deposits are well developed. Because of economical reasons, this area has been worked out in detail compared with other regions in Hokkaido. However, there still remains problems on both the stratigraphy and paleontology.

The present paper is a brief account of the stratigraphy and the molluscan fauna of each of the formations of the Tertiary terrain.

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Previous Works

Early in 1913, WATANABE (pp. 1—43) reported on the geology of the Haboro and Enbetsu area. He divided the Tertiary deposits into two parts, namely, the upper and the lower. This is the first article in which the stratigraphic sequence of the mentioned area has been published. With regard to the molluscan fauna he mentioned only the generic names.

Many years later, UEMURA (1924, pp. 10—11) reported on the geology of the Haboro coal-field, concentrating his work to the distribution of the coal seams and not to the subdivision of the Tertiary rocks.

Subsequently, he (UEMURA, 1925, pp. 1—40) described the stratigraphic sequence of the Tertiary strata developed in the Haboro coal-field, and recognized three formations, namely, the Haboro, the Chikubetsu, and the Kotanbetsu formations (in ascending order). He also listed, without mention of their geological age, the molluscan fossils occurring from each formation; from the fossiliferous sandstone of the Haboro formation; *Leda* sp., *Yoldia* sp., *Ostrea* sp., *Cardium* sp., *Cyrena* sp., *Venus* sp., *Cytherea* sp., *Aralia* sp.; from the lower sandstone of the Chikubetsu formation; *Yoldia* sp., *Nucula* sp., *Mytilus* sp., *Ostrea* sp., *Cyrena* sp., *Venus* sp., *Mactra* sp., *Mya* sp., *Tellina* sp., *Lutraria* sp., *Natica* sp., *Turritella* sp., *Terebra* sp., *Cancellaria* sp., *Siphonalia* sp.; and from the upper sandstone of the Chikubetsu formation; *Nucula* sp., *Yoldia* sp., *Cyrena* sp., *Tapes* sp., *Dentalium* sp.

* Tokyo University of Education.

** Geological Survey of Japan.

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In another paper, UEMURA (1928, pp. 413—414) briefly mentioned the geological ages of the Tertiary strata of the oil-bearing formations developed in the southern part of the Teshio oil-field; namely, he assigned the Haboro formation to the Miocene, and the Chikubetsu, the Kotanbetsu, the Shosanbetsu, and the Enbetsu formations to the Pliocene. Moreover, he stated that the Kotanbetsu was a correlative of the Kawabata, the Masuporo and the Epekoropetsu formations.

In 1930, UEMURA reported on the geology of the oil-bearing Tertiary strata developed in the northern part of Teshio Province, Hokkaido, and presented details concerning his previous conclusion of 1928 (op. cit.).

In the same year, ISHIDA (1930, 680—706) reported on the geology of the Kitami and Teshio oil-fields of Hokkaido, in this article he treats in detail the Tertiary Masuporo, which he considers an equivalent of the Kotanbetsu and younger formations.

In 1949, the stratigraphic sequence of the Tertiary deposits in the Tomamae coal-field was published by the Sapporo sub-committee of the Committee of Cenozoic Correlation of the Geological Association of Japan. In this paper the Marine Haranosawa formation was newly proposed for the lower half of the Haboro (UEMURA, 1925) based upon the results of HATTORI (1948, MS).

AOYAGI and HITOSUGI (1951, pp. 23—29) reported on the Tertiary geology of the area occupying the upper courses of the Haboro and the Kotanbetsu Rivers, where the Haranosawa, the Haboro, the Chikubetsu, and the Kotanbetsu formations are well developed (in ascending order). The molluscan fossils from the Chikubetsu formation listed by them are; from the fossiliferous sandstone, the lowest part of the Chikubetsu; *Ostrea* sp., *Dosinia* sp., *Callista* sp., *Cardium* sp., *Macra* sp., *Spisula* sp., *Crepidula* sp.; from the lower sandstone, succeeding the abovementioned; *Yoldia* sp., *Cardium* sp., *Periploma* sp.; from the upper sandstone member; *Yoldia* sp., *Acila* sp., *Nucula* sp., *Cardium* sp., *Venericardia* sp., *Crepidula* sp.,

Although the geological ages of these formations were not discussed, they considered them to be Miocene in age.

In 1956, UOZUMI and FUJIE (pp. 351—369) wrote on the boring shells derived from the base of the upper part (Cb₃) of the Chikubetsu formation, and also listed the molluscan fossils from that formation. They applied the name of "Chikubetsu fauna" for it and stated that it included; *Solemya tokunagai*, *Yoldia* (*Cnestrium*) *notabilis*, *Portlandia* (*Portlandella*) *watasei*, *Acila gottschei*, *Mytilus grayanus*, *Venericardia magaribuchiensis* (MS), *V. akagii*, *Thyasira bisecta*, *Fulvia mutica*, *Serripes fujinensis*, *S. groenlandica*, *Spisula onnechiuria*, *Macoma optiva*, *Peronidea t-matsumotoi*, *Panope japonica*, *Mya cuneiformis*, *M. truncata*, *Pholadidea* (*P.*) *kamakurensis*, *Phalium onishibetsuensis*, *Neptunea* sp., *Buccinum* sp., *Psephaea antiquior*, and *Trophonopsis felix*. This fauna is considered to have been associated with *Desmostylus*, though the exact locality and geological horizon of it still remains unknown. They concluded that the Chikubetsu formation may be contemporaneous with the Kawabata formation in the Ishikari coal-field, Hokkaido, and the Kadonosawa formation of Iwate Prefecture, and that its geological age is middle Miocene.

Geology of the Tomamae District

During the past several years, the junior writer with S. YAMAGUCHI and Y.

FORMATION	COLUMN	THICK (M)	ROCKS
KOTANBETSU FORMATION			
CHIKUBETSU FORMATION	C ₂	0 95	DARK GRAY MUDSTONE INTERCALATED WITH GRAY TUFF
	C ₁	0 350	GREENISH GRAY MUDDY FINE-GRAINED SANDSTONE, CROSS-BEDDED BASAL CONGLOMERATE
SANKEBETSU FORMATION	S ₂	0 600	ALT. OF HARD SHALE & TUFFACEOUS SANDSTONE, INTERCALATED WITH GRAYISH WHITE TUFF
	S ₁	0 270	GREENISH GRAY SANDSTONE
HABORO FORMATION		0 600	COAL-BEARING SANDSTONE & SILTSTONE
HARANGAWA FORMATION		0 350	WHITE TUFF WHITE BLUISH GRAY FINE-COARSE- GRAINED SANDSTONE
CRETACEOUS ROCKS			

Fig. 1 Ideal columnar section of the Tertiary formation of the Tomamae district.

KINO of the Geological Survey of Japan, studied the geology of the Tomamae district, northwestern Hokkaido. According to their results, the stratigraphic sequence of the Tertiary rocks is as given in Fig. 1.

The Chikubetsu formation of UEMURA (1925), and AOYAGI and HITOSUGI (1951) was subdivided into two formations of the Sankebetsu and the Chikubetsu (strict sense); both are unconformable with one another. Further, these two formations are characterized respectively by a different molluscan fauna.

The so-called Chikubetsu Fauna

The molluscan fossils called previously the "Chikubetsu fauna" may be subdivided into two groups based upon the recent geological and the paleontological evidences, namely, the lower one is the Sankebetsu fauna and the upper is the Chikubetsu fauna (revised). These two names are newly proposed.

1. Sankebetsu fauna

The present fauna comprises abundant molluscan fossils among which the following are dominant; *Acila* (s. s.) *vigilia elongata*, *Yoldia* (s. s.) *biremis*, *Lithophaga chikubetsuensis*, n. sp., *Conchocele disjuncta*, *Nemocardium yokoyamai*, *Papyridea harrimanni*, *Dosinia yamaguchie*, n. sp., *Macoma optiva*, *Periploma besshoensis*, *Mya cuneiformis*, and *Natica* (*Tectonatica*) *severa*.

Of the present fauna, *Lithophaga* and *Dosinia* are rather characteristic member in the sub-tropical to temperate zone, especially, the former is distributed from the Equator to N. lat. 35° along the Pacific coast of Japan (KURODA and HABE, 1952), and the latter which has more extensive distribution is characteristic in its large, thick, heavy shells, which are features also common in warm water genera. Most of the other molluscs are those which usually occur in Central to Northeastern Honshu (the main Island of Japan) ranging from the upper Oligocene to the Miocene. They generally occur from deposits composed of sandy to silty sediments. Moreover, these genera are common shallow water habitants.

The upper part of the Sankebetsu formation consists mainly of silty or muddy rocks and yields the following molluscs; *Portlandia* (*Partlandella*) *tokunagai*, *P. (P.) tokunagai hayasakai*, *P. (P.) cf. watasei*, *Nuculana* sp., *Malletia* (s. s.) *cf. poronaica*. All of the above listed are characteristic in the muddy rocks in the late Oligocene to early Miocene in Honshu and southern Hokkaido.

Table 1. Molluscan Fossils from the Sankebetsu and the Chikubetsu Formations.

Species	Formation	Sankebetsu		Chikubetsu	
		S ₁	S ₂	C ₁	C ₂
1. <i>Ennucula haboroensis</i> KANNO & MATSUNO, n. sp.		R			
2. <i>Acila</i> (s. s.) <i>vigilia elongata</i> N. & H.		F			
3. <i>A.</i> sp.		R			
4. <i>Yoldia</i> (s. s.) <i>biremis</i> UOZUMI		A			
5. <i>Y.</i> (s. s.) cf. <i>akanensis</i> UOZUMI		F			
6. <i>Y.</i> (<i>Cnesterium</i>) <i>notabilis</i> YOKOYAMA		R		F	
7. <i>Portlandia</i> (<i>Portlandella</i>) <i>tokunagai</i> var. <i>hayasakai</i> UOZUMI			R		
8. <i>P.</i> (<i>P.</i>) <i>tokunagai</i> (YOKOYAMA)			F		
9. <i>P.</i> (<i>P.</i>) cf. <i>watasei</i> (KANEHARA)			F		
10. <i>Y.</i> sp.			R		
11. <i>Nuculana</i> sp.			F		
12. <i>Malletia</i> cf. <i>poronaica</i> (YOKOYAMA)			F		
13. <i>Anadara</i> sp.				F	
14. <i>Mytilus</i> sp.		R			
15. <i>Lithophaga chikubetsuensis</i> KANNO & MATSUNO, n. sp.		C			
16. <i>L. otukai</i> NOMURA and HATAI		F			
17. <i>Fortipecten</i> ? sp.				F	
18. <i>Venericardia</i> cf. <i>abesinaiensis</i> OTUKA		R			
19. <i>V.</i> sp. 1		F			
20. <i>V.</i> sp. 2		R			
21. <i>Lucinoma</i> aff. <i>hannibali</i> (CLARK)				R	
22. <i>Conchocele disjuncta</i> GABB		A			
23. <i>Nemocardium yokoaymai</i> TAKEDA		A		R	
24. <i>Papyridea harrimanni</i> (DALL)		A			
25. <i>Serripes groenlandica</i> (BRUGUIÈRE)				A	
26. <i>S. fujinensis</i> (YOKOYAMA)				R	
27. <i>Dosinia yamaguchie</i> KANNO & MATSUNO, n. sp.		A			
28. <i>Mercenaria chitaniana</i> (YOKOYAMA)				A	
29. <i>M. y-iizukai</i> (KANEHARA)				C	
30. <i>Spisula onnechiuria</i> (OTUKA)		R ?		A	
31. <i>S.</i> ? sp.		R			
32. <i>Platyodon nipponica</i> UOZUMI				A	
33. <i>Peronidea t-matsumotoi</i> OTUKA		R		F	
34. <i>Macoma optiva</i> (YOKOYAMA)		F		C	
35. <i>M.</i> cf. <i>tokyoensis</i> MAKIYAMA		F			
36. <i>M.</i> cf. <i>praetexta</i> (v. MARTENS)				F	
37. <i>M. calcarea</i> (GMELIN)				R	
38. <i>M.</i> sp.		R		R	
39. <i>Periploma besshoensis</i> (YOKOYAMA)		A			
40. <i>Mya cuneiformis</i> (BÖHM)		C		A	
41. <i>M. cuneiformis</i> (BÖHM) var.				R	
42. <i>M. truncata</i> LINNÉ				R	
43. <i>Panomya</i> ? sp.				R	
44. <i>Pholadidea kotakae</i> KANNO & MATSUNO, n. sp.		R		A	
45. <i>Crepidula</i> sp.		R			
46. <i>Polinices didymoides</i> KANNO & MATSUNO, n. sp.		R			
47. <i>Natica</i> (<i>Tectonatica</i>) <i>severa</i> (GOULD)		C			
48. <i>N.</i> (<i>T.</i>) <i>ezoana</i> KANNO & MATSUNO, n. sp.		F		A	
49. <i>Trophonopsis felix</i> (YOKOYAMA)		R		R	
50. <i>Ancistrolepis</i> sp.		R		F	
51. <i>Melongena</i> ? sp.		R		R	
52. <i>Buccinum</i> cf. <i>chishimanum</i> PILSBRY				R	
53. <i>B.</i> sp.		F			
54. <i>Neptunea oomurai</i> OTUKA		C		R	
55. <i>N.</i> ? sp.		R			
56. <i>Beringius</i> sp.				R	
57. <i>Fulgoraria</i> sp.		R		R	

R.....Rare (less than 2 specimens), F.....Few (several specimens), C.....Common (more than five specimens), A.....Abundant (more than 15 specimens)

Fig. 2. Geological map of the Tomamae district showing the fossil localities. 1. Kotanbetsu formation, 2. Chikubetsu formation, 3. Sankebetsu formation, 4. Haboro, Hara-nosawa formation and Cretaceous rocks, 5. Fossil localities

From the above facts, the writers are inclined to conclude that the Sankebetsu fauna may have lived under rather warm to temperate thermal conditions.

2. Chikubetsu fauna

The newly proposed Chikubetsu fauna is diffined as the fauna occurring from and characterizing the Chikubetsu formation (strict sense). This fauna comprises abundant molluscs, especially, the following are dominant; *Yoldia* (*Cnesterium*) *notabilis*, *Anadara* sp., *Serripes groenlandica*, *Mercenaria chitaniana*, *M. y-iizukai*, *Spisula onnechiuria*, *Platyodon nipponica*, *Peronidea t-matumotoi*, *Macoma optiva*, *Mya cuneiformis*, *Pholadidea kotakae*, n. sp., and *Natica ezoana*, n. sp.

These molluscs are chiefly distributed in the temperate to sub-boreal region, namely, *Yoldia* (*Cnesterium*) *notabilis* ranges from N. lat. 32° to 45°, *Serripes groenlandica* from N. lat. 35° to 51° (along the Japan Sea coast). The genus *Platyodon* may be restricted in its fossil and Recent distribution to the northern Pacific Ocean (UOZUMI and FUJIE, 1956). Such genera as *Peronidea* and *Mya* are dominant in rather boreal waters. *Mercenaria y-iizukai* and *Spisula onnechiuria* are characteristic in this region, especially, the latter is a horizon marker of the lower part of the Chikubetsu formation in the revised sense. The other molluscs besides those mentioned above are dominant in Northern Honshu and Hokkaido.

The upper member of the Chikubetsu formation chiefly consists of muddy rocks, and fossils hardly occur.

From the above given reasons the writers conclude that the Chikubetsu fauna lived under temperate to sub-boreal thermal conditions, that is to say, the present fauna may be boreal.

Correlation and Geologic Age

The Tertiary formations developed in the Tomamae district have been referred by previous workers to various geological ages. Although the Tertiary formations are of Miocene age according to present day workers, to what part of the Miocene the Sankebetsu and the Chikubetsu fauna belong is to be discussed.

The Chikubetsu formation overlies the Sankebetsu with unconformity, and the latter covers with unconformity the Haboro, Haranoswa and Cretaceous rocks. The former two are overlain unconformably by the Kotanbetsu. But in the southern part of this area, the Miocene Neiraku formation, the upper half of which is characterized by *Siratoria siratoriensis* (an index fossil of the middle Miocene Kadonosawa fauna), is overlain with unconformity by the Kotanbetsu formation.

Although the Kotanbetsu is rather poor in fossil yield, it is conformably overlain with the Onishika shell-bearing formation of TSUSHIMA, MATSUNO, and YAMAGUCHI (1951, p. 4), which is an equivalent of the upper Miocene Tôgeshita (HASHIMOTO, 1950).

As already mentioned in earlier pages the characteristic species of the Sankebetsu fauna are *Yoldia biremis*, *Acila* (s. s.) *vigilia elongata*, *Yoldia* (*Cnesterium*) *notabilis*, *Conchocele disjuncta*, *Nemocardium yokoyamai*, *Pepyridea harrimanni*, *Macoma optiva*, *Periploma besshoensis*, and *Mya cuneiformis*. These molluscs are usually dominant in the rocks ranging from the Poronai stage (Oligocene) to the Kawabata stage (Miocene, 1949, CCC Sapporo sub-committee of the Geological Society of Japan).

On the other hand, the abovementioned Sankebetsu molluscan fauna more or less resembles that of the Miocene Kadonosawa and Takinoue with respect to its thermal characters and faunal elements.

However the Chikubetsu fauna in question is rather different, namely, it comprises inhabitants of rather sub-boreal nature, while the underlying Sankebetsu is subtropical to temperate.

From the above discussion, it is considered that the Chikubetsu fauna may be younger than the middle Miocene, and older than the upper Miocene Tôgeshita formation. However, if the above discussion is to be accepted, the Chikubetsu fauna which possesses the characters different from the Sankebetsu is to be referred to an age between middle and upper Miocene. The faunal elements of the Chikubetsu are rather restricted in the northern part of Central Hokkaido. If the Neiraku fauna is an equivalent of the Chikubetsu of TSUSHIMA, TANAKA, and YAMAGUCHI (1958, pp. 42—47), the characters of these two are undoubtedly different. However, detail discussions concerning these fauna are retained until paleontological studies on them have been completed.

Systematic Description

Genus *Ennucula* IREDALE, 1931

Ennucula haboroensis KANNO and MATSUNO, n. sp.

Pl. 4, figs. 1a—b.

Shell small, rather swollen, ovate-subtrigonal in outline, very inequilateral, equivalve, longer than high. Beak small, pointed, opisthogyrous, situated extremely posteriorly; postero-dorsal border obliquely arched, ventral margin broadly rounded, postero-ventral corner somewhat produced, antero-dorsal margin short, slightly arched and merges into ventral one with more or less broad angle; escutcheon hardly observed. Surface rather smooth except for weakly developed concentric growth lines. Taxodont teeth well developed, about 10 distinct anteriorly, posterior ones less distinct than anterior. Length, 18.8 mm.; height 7.2 mm.; thickness, ca. 6.0 mm. (intact valves, holotype). Length, 11.5 mm.; height, 8.0 mm.; thickness, ca. 3.0 mm. (paratype; left valve).

Remarks: This species occurred from the fine-grained sandy rocks of the upper member of the Sankebetsu formation. The occurrence of the genus *Ennucula* in Japan is rather rare except for the *E. akitana* (OTUKA, 1943) from the Kurosawa Miocene of Akita Prefecture.

This new species more or less resembles the Recent species *E. tenuis* (MONTAGU) (OLDROYD, 1924, p. 13, pl. 5, fig. 12; pl. 37, fig. 4) in the subcordate and smooth shell. However, the posteriorly situated beak, produced postero-ventral corner, and lower shell of the present species serves to distinguish in therefrom.

Locality and geological formation: Loc. 37, upper member of the Sankebetsu formation. Reg. Nos. 5504 (holotype), 5505 (paratype).

Genus *Lithophaga* RÖDING, 1798

Lithophaga chikubetsuensis KANNO and MATSUNO, n. sp.

Pl. 4, fig. 5

Shell elongate, subcylindrical, very heavy in central part of disc, and thinner towards margin. Beak low, pointed, somewhat produced; sides nearly parallel with each other, tapering anteriorly and posteriorly, more abruptly toward anterior margin, while produced, subtruncate towards posterior margin. Surface with rough concentric growth lines. Height, ca. 80 mm.; width, 25 mm.; thickness, 12 mm. (left valve, holotype).

Remarks: The occurrence of the genus *Lithophaga* in the Japanese Miocene is hardly known except for the record from the Siratori Miocene of Iwate Prefecture from where *L. otukai* NOMURA and HATAI (1936, p. 211, text-figs. 1—3) was reported. The molluscs of the

present genus usually bore into rocks or often shells, and are distributed in the sub-tropical to temperate zone.

This species is distinguishable from *L. curta* (LISCHE), (LISCHE, 1874, p. 111, pl. 9, figs. 14—17), a common Recent species in Japan distributing from N. lat. 26° to N. lat. 35°, by possessing a markedly more produced posterior margin, less arched dorsal border, more prominent beaks, and heavy shell. *L. otukai* NOMURA and HATAI (op. cit.) is more or less akin to the present species, but the shorter and more inflated shell serves to distinguish it therefrom.

Localities and geological formation: Locs. 080104, 080105, lower member of the Sankebetsu formation. Reg. Nos. 5506 (left valve, holotype), 5507 (right valve, paratype).

Genus *Dosinia* SCOPOLI, 1777

Dosinia yamaguchie KANNO and MATSUNO, n. sp.

Pl. 5, figs. 1, 2, 6

Shell large in size, ovate-trigonal in outline, much longer than high, inequilateral; test heavy. Beaks prominent, turned-in, not touching, prosogyrous; postero-dorsal and ventral borders broadly rounded and forming rather sharply round angle with their extremities; antero-dorsal margin slightly concave, but merge into roundly antero-ventral corner. Lunule rather deep, elongate cordate in outline, bounded behind by distinct ridge, longitudinally and fine striations within; escutcheon rather narrow. Surface almost smooth except for very fine incremental lines of growth. Pallial sinus rather shallow, obliquely ascending, broad, bluntly pointed at end. Hinge-plate broad, with a flat area in each valve behind the teeth; cardinal and anterior lateral teeth well developed. Muscular impressions strong. Length, 82 mm.; height, 71 mm.; thickness, about 20 mm. (left valve, holotype). Length, 75 mm.; height, 59 mm.; thickness, about 20 mm. (left valve, paratype).

Remarks: The heavy and large test, almost smooth surface are the characteristics of this species. Although the general features of the present species closely resembles the well known Japanese Miocene *Dosinia kaneharai* YOKOYAMA, the surface ornamentation is quite different. The outline of the shell considerably varies as in *D. kaneharai*, above all, the variation in the shell height is the most characteristic. Accordingly, the extreme of different variants appear as if different species. *D. margaritana projecta* LOEL and COREY (1932, p. 217, pl. 39, figs. 2—4) from the lower Miocene Vaqueros formation of California is another allied one in the respect of the postero-ventral angulation, but the smooth surface of the present species serves to distinguish it therefrom.

Localities and geological formation: Loc. 732, the upper stream of the Chepotsunai River, a tributary of the Kotanbetsu River. Locs. 430, 431, and 1300, the upper stream of the Haboro River; All belong to the lower member of the Sankebetsu. Reg. Nos. 5508 (holotype), 5509 (paratype).

Genus *Pholadidea* TURTON, 1819

Pholadidea kotakae KANNO and MATSUNO, n. sp.

Pl. 4, figs. 10 a—b.

1956 *Pholadidea kamakurensis* (YOKOYAMA), UOZUMI and FUJIE, Jour. Fac. Sci., Hokkaido Univ., ser. 4, vol. 9, no. 3, pp. 363—364, pl. 5, figs. 1—3.

Shell elongate, contracted submedially and grooved; anterior side inflated, with concentric, lamellar, crowded, undulated lines, crossed by numerous radiating striae; posterior side cuneiform, postero-dorsal margin sloping, and more or less truncated at extremity. Hinge inaccessible. Length, 68 mm.; height 35 mm.; thickness of intact valves, 39 mm. (holotype); length, ca. 53 mm.; height, 32 mm.; thickness of intact valves, 26 mm. (paratype).

Remarks: The present new species is closely related to *Ph. chishimana* HABE, and *Ph. kamakurensis* (YOKOYAMA), now living along the Pacific coast of Northern Honshu and Hokkaido, but has a distinctly narrower and slender posterior area which separates the anterior by a radial groove.

The present species usually occurs from the lowest part of the Chikubetsu formation in the holes bored into underlying muddy rocks of the Sankebetsu formation and of Cretaceous ones associated with *Platyodon nipponica* as previously pointed out by UOZUMI and FUJIE (1956, pp. 351—369).

Localities and geological formation: Loc. 31, and other localities of the lowest part of the Chikubetsu formation. Reg. Nos. 5513 (holotype), 5514 (paratype).

Genus *Natica* SCOPOLI, 1777

Natica (Tectonatica) ezoana KANNO and MATSUNO, n. sp.

Pl. 4, figs. 12, 13

Shell globose, spire moderately elevated; whorls five, convex, more or less shouldered; suture linear, abutting, Aperture sub-oval or semicircular in outline, acute behind, broadly rounded anteriorly; outer lip broadly arched, inner lip rather straight, with crescent shaped funicle which generally does not entirely invade umbilicus. Surface marked with only fine growth lines. Maximum diameter, 27 mm.; height, 36mm.; width of aperture, 24 mm.; height of aperture, 13 mm. (holotype).

Remarks: The present species rather resembles *Natica janthostomoides* KURODA and HABE, a Recent species along the Pacific coast of northern Japan, but the more elongate conical shell, more shouldered whorls, and smaller funicle serve to distinguish it therefrom.

Localities and geological formation: Locs. 082301, 080104, the side of the Chikubetsu River; loc. 945, the side of the Kotanbetsu River; all of the lower member of the Sankebetsu formation. Loc. 21, the side of the Haboro River; loc. 1081, the side of the Shosanbetsu River; loc. 651, the upper stream of the Sankebetsu River, a tributary of the Haboro River. All belong to the lower member of the Chikubetsu formation. Reg. Nos. 5511 (holotype), 5512 (paratype).

Genus *Polinices* MONTFORT, 1810

Polinices didymoides KANNO and MATSUNO, n. sp.

Pl. 5, figs. 7a—b

Shell solid, conical, spire moderately low, with five whorls. Aperture suboval or semicircular, acute behind, broadly rounded in anterior; outer lip broadly rounded; inner lip nearly straight, with moderately heavy callus, a portion of which is fairly well developed on parietal wall. Suture more or less appressed. Umbilicus open, somewhat deeply perforated. Surface marked only by growth lines. Maximum diameter, 48 mm.; height, 50 mm.; width of aperture, 25 mm.; height of aperture, 42 mm. (monotype).

Remarks: Although this new species is represented by only a single specimen, interesting problems are found in its character. Namely, the conical shell outline and appressed sutures indicate that it belongs to the subgenus *Neverita* RISSO, 1826. While the possession of the perforated umbilicus and wanting of any funicle does not permit such subgeneric assignment, it may be better referred to the subgenus *Euspira* AGASSIZ in SOWERBY, 1838. Thus, strictly speaking, a new subgenus may be proposed based upon the present new species, but the lack of specimens does not permit such a procedure.

The general feature of the present species are closely related to *P. (Neverita) didyma* (RÖDING), a Recent species along the Pacific coast of Japan, but the former is easily distinguished from the latter in having a large funicle almost filling the umbilicus.

Locality and geological formation: Loc. 732, the upper stream of the Chipotsunai River, a tributary of the Kotanbetsu River; the lower member of the Sankebetsu formation. Reg. No. 5510 (monotype).

いわゆる築別動物群について

菅野三郎・松野久也

(摘要)

北海道苫前地方に発達する第三系は下位より原の沢・羽幌・築別・古丹別^{コタンベツ}の各層に区分されていたが、最近の調査の結果、築別層とされていた地層は上下2つの地層に分けられ、それらは互に不整合をもつて境することが明かになった。それで今まで築別層とされていた地層の中の上半部を新しく築別層と再定義し、下半部を三毛別層^{サンケベツ}と命名する。今まで築別動物群と呼ばれていたものには著しく性格を異にする内容を含んでいたが、新しい層序区分に従ってそれらの含有する動物群を検討した結果、非常に性格の異なる2つの動物群の存在が明かとなった。

下位の三毛別層は上下2つの部層に分けられ、下位の部層は緑灰色の粗粒～中粒の砂岩よりなり、海棲動物化石を多産する。その特徴的なものは *Acila viglia elongata*, *Yoldia biremis*, *Lithophaga chikubetsuensis*, n. sp., *Conchocele disjuncta*, *Nemocardium yokoyamai*, *Papyridea harriamanni*, *Dosinia yamaguchie*, n. sp., *Macoma optica*, *Periploma besshoensis*, *Mya cuneiformis*, *Natica severa* などである。これらの動物群は概観すれば稍温暖な浅海の生物群を示すものである。三毛別層の上部々層は泥質岩からなり、*Portlandia tokunagai*, *P. tokunagai hayasakai*, *P. cf. watasei*, *Nuculana* sp., *Malletia cf. poronaica* などを含み、稍温暖な泥相の生物群を示している。

狭義の築別層も上下2つの部層に分けられ、下位の部層は主として中～細粒の砂岩からなるが、上位の部層は泥質岩からなり化石を殆んど含まない。下位の砂岩部層からは *Yoldia notabilis*, *Anadara* sp., *Serripes groenlandica*, *Mercenaria chitaniana*, *M. y-iizukai*, *Spisula onnechiuria*, *Platyodon nipponica*, *Peronidea t-matsumotoi*, *Mya cuneiformis*, *Pholadidea kotakae*, n. sp., *Natica ezoana*, n. sp.などを多産する。これらの動物群は本州北部並びに北海道沿岸の浅海に現生するものや北海道北部の第三系に特有なものである。この動物群は一言にしていえば稍寒冷な北方型を示すものである。

三毛別動物群は北海道の滝ノ上動物群、東北地方の門ノ沢動物群に対比され、築別動物群は峠下動物群と滝ノ上動物群の間に位置するものである。

Explanation of Plate 4 (All figures in natural size unless otherwise stated)

- Figs. 1a-b. *Ennucula haboroensis* KANNO and MATSUNO, n. sp., holotype, ×3; fig. 1a, apical view of fig. 1b.
 Fig. 2. *Yoldia* (s. s.) *biremis* UOZUMI
 Fig. 3. *Yoldia* (*Cnesterium*) *notabilis* YOKOYAMA
 Fig. 4. *Periploma besshoensis* (YOKOYAMA)
 Fig. 5. *Lithophaga chikubetsuensis* KANNO and MATSUNO, n. sp., holotype.
 Fig. 6. *Serripes fujinensis* (YOKOYAMA)
 Fig. 7. *Spisula onnechiuria* (OTUKA)
 Figs. 8a-b. *Lucinoma* aff. *hannibali* (CLARK)
 Fig. 9. *Nemocardium yokoyamai* TAKEDA
 Figs. 10a-b. *Pholadidea kotakae* KANNO and MATSUNO, n. sp., holotype; fig. 10b, showing the apical view of fig. 10a.
 Fig. 11. *Malletia* cf. *poronaica* (YOKOYAMA)
 Figs. 12, 13. *Natica* (*Tectonatica*) *ezoana* KANNO and MATSUNO, n. sp.; fig. 12, holotype, showing funicle and umbilicus; fig. 13, paratype.
 Fig. 14. *Platyodon nipponica* UOZUMI and FUJIE, right valve.

Explanation of Plate 5 (All figures in natural size)

- Figs. 1~2, 6. *Dosinia yamaguchie* KANNO and MATSUNO, n. sp.; fig. 1, holotype, showing pallial sinus; fig. 2, paratype, showing cardinal teeth; fig. 6, apical view, showing lunule.
 Fig. 3. *Serripes groenlandica* (BRUGUIÈRE)
 Fig. 4. *Conchocele disjuncta* GABB
 Fig. 5. *Mercenaria y-iizukai* (KANEHARA)
 Figs. 7a-b. *Polinices didymoides* KANNO and MATSUNO, n. sp., monotype; fig. 7a, lateral view; fig. 7b, basal view, showing aperture and umbilicus.
 Fig. 8. *Neptunea oomurai* OTUKA
 Fig. 9. *Natica* (*Tectonatica*) *severa* (GOULD)
 Fig. 10. *Melongena*? sp.

S. Aoki Photo.

S. AOKI Photo.

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