

## Two Interesting Heteromorph Ammonoids from Hokkaido : Studies of the Cretaceous Ammonites from Hokkaido and Saghalien—XV II

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## Two Interesting Heteromorph Ammonoids from Hokkaido

(Studies of the Cretaceous Ammonites from  
Hokkaido and Saghalien—XVII)

By

Tatsuro MATSUMOTO and Tatsuo MURAMOTO

### Abstract

We describe two new ammonite species of very peculiar coiling, one referable to *Madagascarites* and the other to *Nipponites*, from the Upper Cretaceous of Hokkaido, discussing their relations with other species.

### Introduction

While one of us (MURAMOTO) was engaged in collecting ammonites from the Ikushumbets area, Hokkaido, in cooperation with the other, he found a number of interesting specimens from the zone of *Reesidites minimus*, uppermost Turonian, which have septate whorls of *Nipponites* like coiling but quadrituberculate flared ribs. This new type of heteromorph ammonoid was preliminarily and very briefly mentioned by the other of us (MATSUMOTO, 1959, p. 79), without giving a name nor a full description. We have endeavoured to obtain better specimens.

In the meanwhile General COLLIGNON (1966) has recently illustrated a similarly peculiar ammonoid from the Santonian of Madagascar, under a new generic name, *Madagascarites*. Although his description is brief, we think it certain that our specimens represent another new species of the same genus. In this paper we give a full description.

In our collection there is another species, from the Upper Turonian and Coniacian of the Ikushumbets area, which has whorls of similarly peculiar coiling but simple ribs. It is described in this paper under *Nipponites*, although it has characters of *Bostrychoceras* in some respects.

### Palaeontological Descriptions

Order Ammonoidea

Family Nostoceratidae

Genus *Madagascarites* COLLIGNON, 1966

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Tatsuo MURAMOTO: Leader of the *Mikasa Kaseki Dokokai* [Mikasa Association of Non-professional Palaeontologists].

*Type-species*.—*Madagascarites andimakensis* COLLIGNON, 1966 (by original designation).

*Generic diagnosis*.—Coiling is similar to that of the type-species of *Nipponites*, *N. mirabilis* YABE, 1904, at least in the early growth-stages. The whorls of the late growth stage may or may not embrace the earlier ones but still show U-turns in irregular orientations. The surface is ornamented with numerous fine minor ribs and frequently periodical flared major ones. The flares are provided with four rows of tubercles, which may be spinose. Sutures are of modified lytoceratoid type.

*Remarks*.—The above diagnosis is given so as to include the characters of the type-species and also another new species described below.

*Affinities*.—As can be judged from the characters shown in the two species as well as from their stratigraphic occurrences, *Madagascarites* is probably a specialized offshoot of *Hyphantoceras* HYATT, 1894. *Madagascarites* and *Nipponites* are in a parallel relationship, since the latter is interpreted to be a specialized offshoot of *Eubostrychoceras* MATSUMOTO, 1967.

*Geological range and geographical distribution*.—The two species from Japan and Madagascar show the range of the genus from Upper Turonian to Santonian. In view of the great distance between the two regions, more occurrences from various areas can be expected. Some of the fragmentary specimens of the so-called *Hyphantoceras* have to be reexamined.

*Madagascarites ryu* sp. nov.

Pl. 19, Fig. 3; Pl. 22, Fig. 1; Pl. 23, Figs. 1-4

*Holotype*.—MURAMOTO Collection No. 9100A. from loc. Ik 967, left bank of the Ikushumbets, at the first meandering below the confluence with the Ichi-no-sawa, Hokkaido, zone of *Reesidites minimus*, Uppermost Turonian. (This locality is now under the artificial lake of the Katsurazawa dam.)

*Paratypes*.—MURAMOTO Coll. No. 9100B and GK. H5449 [=MURAMOTO Coll. No. 9100C] from the type-locality; GK. H5450 and GK. H5451, from loc. Ik. 968, adjacent to the type-locality. GK. H5448, a pebble at Omagari of the Ikushumbets, is probably a fragmentary body-whorl of the same species.

*Etymology*.—*Ryu*, a divinity in China and Japan, who is imagined to have a snake like body and spinose horns and worshiped as symbolizing auspicious omen.\*

*Specific diagnosis*.—The whorls show a very peculiar mode of coiling, consisting of several U-turns in various orientations. The whorls in early growth-stages up to a shell dimension of about 25 mm are coiled in the same way as those of young *Nipponites mirabilis* YABE, 1904. They are subcircular in cross section and separated by the interspaces as wide as or somewhat wider than the whorls themselves. In the succeeding growth-stage the whorl is descending down with a loosely spiral twisting and then forms a narrow U-turn on a plane roughly vertical to the axis of the spiral coil. This is followed immediately by another,

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\* *Ryu* may be translated to but is not identical with a dragon.

more opened U-turned whorl, the last part of which obliquely ascends to the proximity of the *Nipponites*-like earlier whorls.

The surface of the whorl is ornamented with quadrituberculated, flared, major ribs, which occur fairly frequently, and dense, fine, minor ribs on the interspaces and on the major ones. The tubercles are spinose on the outer shell layer, septate and nodose on the inner one. Two or three riblets may form loops at the tubercles on the flares.

Sutures are of modified lytoceratoid type, having much narrowed stems of saddles.

*Descriptive remarks.*—The holotype is in part secondarily deformed but represents a full grown shell which shows the above described diagnosis. Its maximum dimension is about 110 mm. The larger arm of the last U-turn is about 75 mm.

Paratypes\* are smaller than the holotype. G. H5450 and GK. H5451 are very small, showing at first a loosely helical coiling and then a few U-turns around the helix, showing thus a mode of coiling similar to that of *Nipponites mirabilis* in earlier growth stages. Each of GK. H5449 and MURAMOTO 9100B has a descending whorl of a loose spiral twisting in addition to the *Nipponites* like younger whorls, but the U-turned last whorl is not preserved.

As the shell of the late growth-stage is represented only by the holotype and another fragmentary specimen, the extent of variation in the detailed features of the two U-turns in the last stage is not precisely known. Because more commonly found immature shells constantly show the *Nipponites* like coiling, the possibility that this peculiar type of coiling might be pathologic is denied. Similarly we do not think that the loosely spiral and then retroversally U-turned whorls of the late growth stage are pathologic. This form may imply an evolutionary feature, namely the affinity with *Hyphantoceras*.

How this peculiar form of coiling is connected with the habitat of the species is an interesting problem about which we do not intend to discuss much at this moment. It is, however, noted that the fossils occur together with fragments of drifted wood. An idea that the whorls in the late growth stages might have crawled around a piece of wood could be considered as a possible interpretation (see *occurrence*).

*Comparison and affinity.*—This species resembles *Madagascarites andimakensis* COLLIGNON (1966, p. 26, pl. 465 figs. 1, 2), from the middle Santonian zone of *Texanites hourcq* of Madagascar, but is distinguished by much finer and denser, minor ribs and more pronounced major ribs. Although COLLIGNON's description is brief, in *M. andimakensis* the U-turned whorls of late growth-stage seem to embrace those of the early stage. In other words that species seem to show *Nipponites mirabilis* like coiling throughout life, although the whorls are more separated one from another than in *N. mirabilis*. As compared with this, *M. ryu* is atypical of *Madagascarites*, being somewhat intermediate between *Hyphantoceras* and the typical species of *Madagascarites*.

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\* There are similarly small specimens in MURAMOTO's collection of private possession.

While *M. andimakensis* is allied to the nearly contemporary *Hyphantoceras ingens* COLLIGNON (1966, p. 24, pl. 464, fig. 1896), our species is allied to Turonian *Hyphantoceras reussianum* (D'ORBIGNY, 1850) in the ornamentation and also in some respects of coiling. The latter species shows a more or less loose spiral coiling in the main part of the septate stages and a hook like retroversal U-turn in the last stage, but is fairly variable in the form of the entire shell. Accordingly *Madagascarites* is almost certainly derived from *Hyphantoceras*, representing a specialized offshoot.

It is interesting to see that the present species is similar in the mode of coiling to a new species of *Nipponites* [*N. bacchus*] to be described below.

*Occurrence.*—Remains of the present species are found not uncommonly in calcareous nodules of the zone of *Reesidites minimus*, the uppermost part of the Gyliakian, probably the uppermost Turonian, in the sequence of the Ikushumbets valley. For some reasons they are mostly immature and the adult specimens occur only occasionally, just as in the case of *Reesidites minimus*. The lithology of the fossiliferous bed is more or less greenish, dark grey, fine-sandy siltstone and is evidently less fine-grained than the main (Urakawan) part of the Upper Yezo Group. See figs. 2 and 4 in MATSUMOTO (1965) for the details of the location and stratigraphic position of the zone.

A few fragmentary specimens probably referable to the present species are found also in the Saku Formation (Turonian) of the Saku-Abeshinai area, Teshio Province, northwest Hokkaido.

#### Genus *Nipponites* YABE, 1904

*Type-species.*—*Nipponites mirabilis* YABE, 1904 (by original designation).

*Remarks.*—The diagnosis was clearly described by YABE, 1904. In the subsequent collections from the Upper Cretaceous of Hokkaido, Saghalien and Kamchatzka there are a number of specimens which can be identified with *Nipponites mirabilis*. The best preserved specimen of them, which is compatible with the holotype, is the one recently obtained from the Saku area and nicely cleaned by Kikuwo MURAMOTO. The stratigraphic range of the species is Upper Turonian and Coniacian.

A new species to be described below is atypical, but is better ascribed to *Nipponites* than to any other genera. To accomodate it, the generic diagnosis may be modified as follows:

A few whorls in the early growth-stage form a loose helical coiling and are followed by whorls of later growth-stages which form several\* U-turns in different orientations around every side of the early helix. In some atypical species the last whorl may descend downward with slight sigmoidal twisting and then form a retroversal U-turn. The whorl is ornamented with numerous, simple ribs. The last whorl typically have flared ribs. The suture is florid and of modified lytoceratid type, with a narrowed stem of saddles.

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\* Six in the holotype of the type-species.

*Nipponites bacchus* sp. nov.

Pl. 23, Fig. 5; Pl. 14, Fig. 1

*Holotype*.—GK. H5444 [MURAMOTO Coll. No. 122], from loc. Ik 2013, right bank of the Pombets, a tributary of the Ikushumbets, zone of *Inoceramus tenuistriatus*–*Inoceramus teshioensis*, Upper Turonian, Hokkaido.

*Paratypes*.—Unnumbered specimen in the private collection of Takemi TAKAHASHI, from Ik 2014, Pombets, a tributary of the Ikushumbets. Another, GK. H5584, from loc. Ik 963b.

*Etymology*.—*Bacchus*, the god of wine. In TITIAN's famous painting an attendant of *Bacchus* wears a snake crawling around him, which remind us of the coiling of this species.

*Specific diagnosis*.—The septate whorls form a peculiar coiling of *Nipponites mirabilis* type, but their U-turns are more opened than in that species. The body whorl at first descends down from the septate whorls with a sigmoidal twisting and then makes another, gentle U-turn, forming a hook like shape for the entire shell.

The whorl is ornamented with numerous, simple ribs, which are rather narrow, sharp-headed, and separated by wider interspaces on the outer side of the whorl. Periodically some of the ribs seem to be slightly more elevated than others, but a pronounced flare is very rare. Near the apertural margin the ribs become denser.

The suture is nearly of the same pattern as that of *Nipponites mirabilis*.

*Descriptive remarks*.—The septate whorls are subcircular in cross section. The body whorl is secondarily compressed in the holotype. The dimensions of the *N. mirabilis* like septate shell are about 10×10 cm. The maximum dimension of the entire shell, including the hook like body whorl, is about 19 cm.

The specimen of TAKAHASHI's collection is slightly smaller than and similar in coiling and ribbing to the holotype. Another, from Ik-963b, is incomplete.

*Comparison*.—This species is allied to *Nipponites mirabilis* but differs in more opened U-turns of the septate whorls and the hook like shape of the body whorl. The hook is fairly similar to that of *Didymoceras* (*Bostrychoceras*) *polyplocum*, and we do not consider the peculiar coiling of the present species as pathologic. The ribs in the present species seem somewhat more distant than in *N. mirabilis* and the strong flares do not occur so frequently as on the body whorl of *N. mirabilis*.

In the mode of coiling *Nipponites bacchus* is somewhat similar to *Madagascariites ryu* (described above), but in the former the last whorl shows U-turn only once, instead of twice, and the *Nipponites mirabilis* like septate whorls are larger (i.e. of longer duration) than in the latter. The two species greatly differ in ornamentation.

*Occurrence*.—The species is found very rarely in the upper part of Upper Gyliakian (i.e. approximately Upper Turonian), zone of *Inoceramus tenuistriatus*–*I. teshioensis*, and also in the lower part of Lower Urakawan, (i.e. Coniacian), zone of *Inoceramus uwajimensis*, in the area of the Ikushumbets valley, central

Hokkaido. This lower part of the Upper Yezo Group is fine-sandy siltstone containing scaphitids and baculitids among others. It is considered to be of a comparatively shallower and less off-shore facies than the clayey, main part of the Group.

### Concluding Remarks

On the basis of the above description the following remarks can be led as a conclusion.

(1) *Madagascarites ryu* sp. nov., from the Uppermost Turonian of Hokkaido, has a close affinity with *Hyphantoceras reussianum* D'ORBIGNY. *M. andimakensis* COLLIGNON, from the Santonian of Madagascar, is said to be somewhat allied to *Hyphantoceras ingens* COLLIGNON.

(2) It is almost certain that *Madagascarites* were derived from *Hyphantoceras*, although the lineage is not shown by a series of gradually transitional forms.

(3) *Nipponites bacchus* sp. nov., from the Upper Turonian and Coniacian of Hokkaido, is closely allied to nearly contemporary type-species, *N. mirabilis* YABE, but is similar to the species of *Didymoceras* (*Bostrychoceras*) in that the last whorl shows a retroversal hook.

(4) *N. mirabilis* and *N. bacchus* may have a common origin in a certain species of *Eubostrychoceras*, although the lineages are not shown by series of gradually transitional forms.

(5) *Nipponites* and *Madagascarites* are distinct genera, probably specialized offshoots, in the family Nostoceratidae. Their peculiar mode of coiling is not pathologic.

Finally we thank Professor Emeritus Hisakatsu YABE for his generous encouragement to our study. We are indebted to the main staff and geologists of the Sumitomo Coal Mining Company for the facilities which they provided for our field and laboratory works. Dr. Itaru HAYAMI and Miss Yuko WADA have assisted us in preparing the illustration and manuscript.

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Two Interesting Heteromorph Ammonoids  
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Plates 22 ~ 24

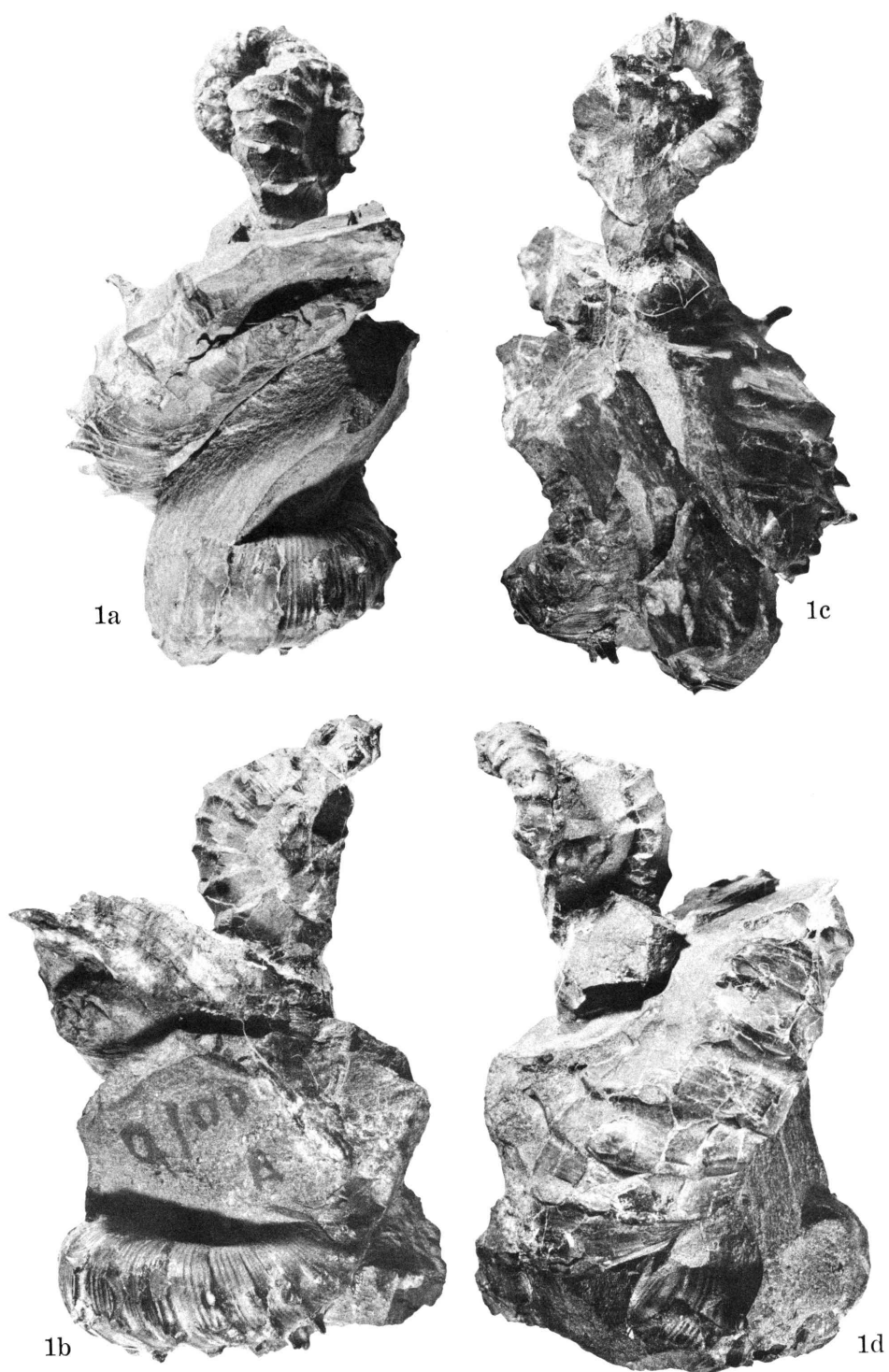


## Plate 22

## Explanation of Plate 22

Fig. 1. *Madagascarites ryu* sp. nov. ....Page 362  
Holotype, MURAMOTO Coll. No. 9100A, from loc. Ik.967, zone of *Reesidites minimus*, main stream of the Ikushumbets, central Hokkaido. Four views, rotated at each right angle around the axis of the largest dimension,  $\times 5/6$ . Two fragments of drifted wood are attached to the specimen.

Kyushu Univ. Photos, without whitening.

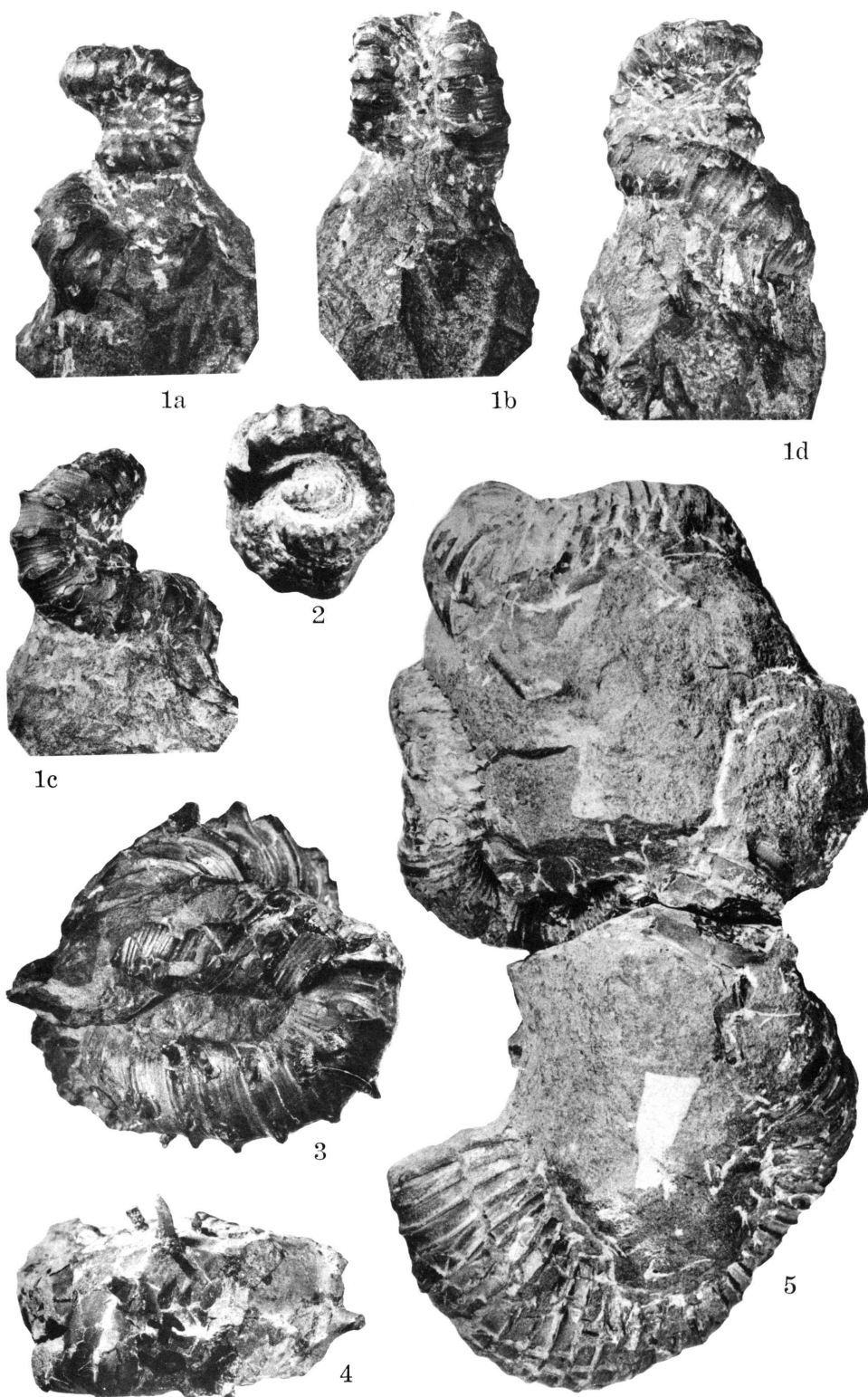


## Plate 23

## Explanation of Plate 23

- Figs. 1-4. *Madagascarites ryu* sp. nov. ....Page 362
1. Paratype, MURAMOTO Coll. No. 9100B, from loc. Ik.967, zone of *Reesidites minimus*, main stream of the Ikushumbets central Hokkaido. Four views (a, b, c, d) rotated at every right angle around the axis of the largest dimension,  $\times 1$ . The body-whorl which should be connected with the loosely spiral part is missing.
  2. Paratype, GK. H5451, from loc. Ik.968, zone of *Reesidites minimus*, main stream of the Ikushumbets. Young shell, showing the three, loose, helical whorls of the initial stage, and the succeeding U-turned whorl which runs around the early helix,  $\times 2$ .
  3. Holotype, MURAMOTO Coll. No. 9100A, from loc. Ik.967. Bottom view, referring to the lateral views on Pl. 22,  $\times 5/6$ . The twice U-turned body whorl is shown.
  4. GK. H5448, a fragmentary specimen probably referable to a part of the body-whorl of *M. ryu*, from loc. Ik.968,  $\times 1$ . Four spines on a major rib are shown.
- Fig. 5. *Nipponites bacchus* sp. nov. ....Page 365
- Holotype. GK. H5444 [=MURAMOTO Coll. No. 122], from loc. Ik.2013, Pombets, a tributary of the Ikushumbets,  $\times 7/10$ . (see the next plate for another view.)

Kyushu University Photos, without whitening.



## Plate 24

## Explanation of Plate 24

Fig. 1. *Nipponites bacchus* sp. nov. ....Page 365  
Holotype, GK. H5444 [=MURAMOTO Coll. No. 122], from loc. Ik.2013, Pombets,  
a tributary of the Ikushumbets, zone of *Inoceramus tenuistriatus*. A lateral  
view, in natural size, opposite to that of Pl. 23, Fig. 5.

Kyushu University Photo, without whitening.



