

Some acanthoceratid ammonites from the Yubari Mountains, Hokkaido—Part 1

(Studies of Cretaceous ammonites from Hokkaido—LXII)

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北海道夕張山地産のアカントセラス科 アンモナイトのいくつか—その 1

松本達郎*・末包鉄郎**

末包は北海道大学卒業論文の研究以来夕張山地の地質に興味を持っていたが、ここ数年は東海大学付属相模高等学校地学クラブ員への実習訓練を兼ねて白亜系の化石層序に研究の焦点を向けていた。同様の目的の研究は他の人たちによっても実施されているが、その中の1人である松本は化石の同定に協力を求められ、踏査ルート of 重要な露頭も再検討した。末包が得た化石資料の中で、とくに国際対比上も有効とされているアカントセラス科のいくつかのアンモナイトについて研究し、その成果を報告していきたい。この論文では次の種を記述する。

(1) *Sharpeiceras* aff. *S. vohipalense* COLLIGNON: マダガスカル of セノマニアン下部産の上記種に類似するが肋が弱い。大型なことは三笠層下部産の *S. kongo* MATSUMOTO, MURAMOTO et TAKAHASHI なみである。白金沢 loc. S901 の泥岩層産。

(2) *Calycoceras* (*Newboldiceras*) *newboldi* (KOSSMAT): *C. (N.)* の諸種はわが国でもセノマニアン中部によく産するが、亜属模式種の *C. (N.) newboldi* ははじめてである。白金沢新林道 loc. S 208 の泥岩。

(3) *Romaniceras* sp. nov. 半巻き (気房最終と住房) 1個の標本。概して *Romaniceras* の形質を示すが、突起の列は *Yubariceras* なみに数多く、主肋は外面で分岐する点 *Euomphaloceras* 式だが、肩の疣は住房で角状に強化せず弱体化消失するなどの特異性がある。金尾別林道の loc. K240, チューロニアン中部。新種設立には資料なお必要。

(4) *Neomphaloceras pseudomphalum* (MATSUMOTO): 本種の中年～成年期はすでに記述した。今回は未成年殻を記載した。*E. septemseriatum* (CRAGIN) のそれとの類似や側面の疣の増加などが注目される。金尾別林道 loc. K233, チューロニアン中部産。

記載の末包標本は横須賀市自然博物館に寄贈し保管する。なお解良正利氏標本も併せ研究した。

Introduction

Since one of us (T. S.) was a student of Hokkaido University (1972), he has been engaged in the geological field work in the Yubari Mountains. At first he studied the metamorphics and Sorachi Group of the ophiolitic assemblage of rocks, which occupy the core of the mountains. For these several years, however,

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T. S. has done field work in the Cretaceous area together with several students of Sagami High School. The purpose of the work was partly educational, but naturally the teacher and students have turned their interests into the biostratigraphy.

The area of investigation is overlapped with that where HIRANO *et al.* (1977, 1980-'81) have been working, but the SUEKANE team has stressed importance in the inspection of fresh exposures along the forestry road under or immediately after construction. The outcrops along the streams have been also reexamined. T. M. has been invited to help the work of T. S. mainly in the study of the collected ammonites.

Investigation reports have been issued from time to time in a series of papers (in Japanese) published by Tokai University to which the Sagami High School is attached (SUEKANE *et al.*, 1979, 1980, 1981, 1982; SUEKANE, 1985) and a comprehensive description of the stratigraphy is now under preparation by T. S. These papers contain route maps in which fossil localities are indicated. See also Text-fig. 1.

This paper gives a result of our palaeontological study of selected acanthoceratid ammonites among the collection of T. SUEKANE. It would give additions to the two papers by MATSUMOTO and OBATA (1982) and MATSUMOTO *et al.* (1985), in which acanthoceratid ammonites from the Oyubari area have been described. The reason of the frequent issue of short palaeontological papers instead of a monograph has been mentioned by MATSUMOTO *et al.* (1985, p.156) and the geological setting of the Oyubari area (or Oyubari-Hobetsu area) in the Yubari Mountains has been also remarked generally by MATSUMOTO *et al.* (1985, p.169-171).

The described specimens of the T. SUEKANE Collection have been donated to and are to be kept in Yokosuka City Museum (YCM.). We owe much to Dr. Yasumitsu KANIE for his kindness of communicating this paper there as well as helps in various other respects.

Thanks are due to Mr. Masatoshi KERA for his generosity to let us study freely the relevant specimens of his collection. We appreciate the cooperation with T. SUEKANE in the field work by Ms. Taeko YAGI, Ms. Makiko HIRANO, Messrs. Kazuhiro IIZAWA, Masahiro OKI, Michiyo KAWAGUCHI and Michiharu GOTO, when they were students of Sagami High School. For comparison with our material we used a small but valuable specimen kept at the Institute of Geology and Paleontology, Sendai (IGPS) by courtesy of Professor Tamio KOTAKA. Dr. Masayuki NODA kindly helped us in taking photographs of some specimens.

Palaeontological descriptions

Suborder Ammonitina HYATT, 1889

Family Acanthoceratidae DE GROSSOUVRE, 1894

Genus *Sharpeiceras* HYATT, 1903*Type species*: *Ammonites laticlavus* SHARPE, 1855.*Remarks*: For the general account of this genus, see MATSUMOTO *et al.* (1969, p. 258) and KENNEDY (1971, p. 64).*Sharpeiceras* aff. *S. vohipalense* COLLIGNON

Pl. 1, figs. 1-3

Compare:1964. *Sharpeiceras vohipalense* COLLIGNON, p. 104, pl. 354, fig. 1565.*Material*: YCM. 713 collected by T. SUEKANE at loc. S 901.*Description*: A large specimen, 244 mm in diameter (D) at the end of the phragmocone, succeeded by the body-chamber which is preserved for about 150° but devoid of the outer (or ventral) half. It would have a diameter of at least 350 mm in restored outline. Its right side is embedded and partly dissolved in the rock-matrix.The whorl-height (H) is greater than the whorl-breadth (B), showing $B/H=0.78$ at the late stage of phragmocone. The whorl-section is roughly rectangular, with flat venter and subparallel, slightly convex flanks.The expansion ratio of the whorl is moderate in the measurable part, indicating $H/h=1.51$ at the end of the phragmocone (h =whorl-height at a point 180° earlier than H). The umbilicus is of moderate width, about 32% of the entire shell diameter, and surrounded by steep wall.

The ribs on the phragmocone are weak and narrow, numbering 12 in a half whorl, being separated by wide interspaces. They are somewhat prorsiradiate and may be slightly concave forward. They have tubercles in nearly equidistant three rows on the flank; the distinctly bullate umbilical, slightly bullate or weakly pointed mid-lateral and stronger ventrolateral ones; also clavate ventral tubercles on either side of the nearly smooth siphonal zone.

On the body-chamber the ribs and tubercles are much strengthened. The ventrolateral tubercles seem to be more prominent than the ventral ones in the adapical part of the body-chamber. The ribs are rigidly rectiradiate and separated by interspaces which are much wider than those on the phragmocone. There are 6 ribs in about 150° of the body-whorl and probably 7 in a half whorl.

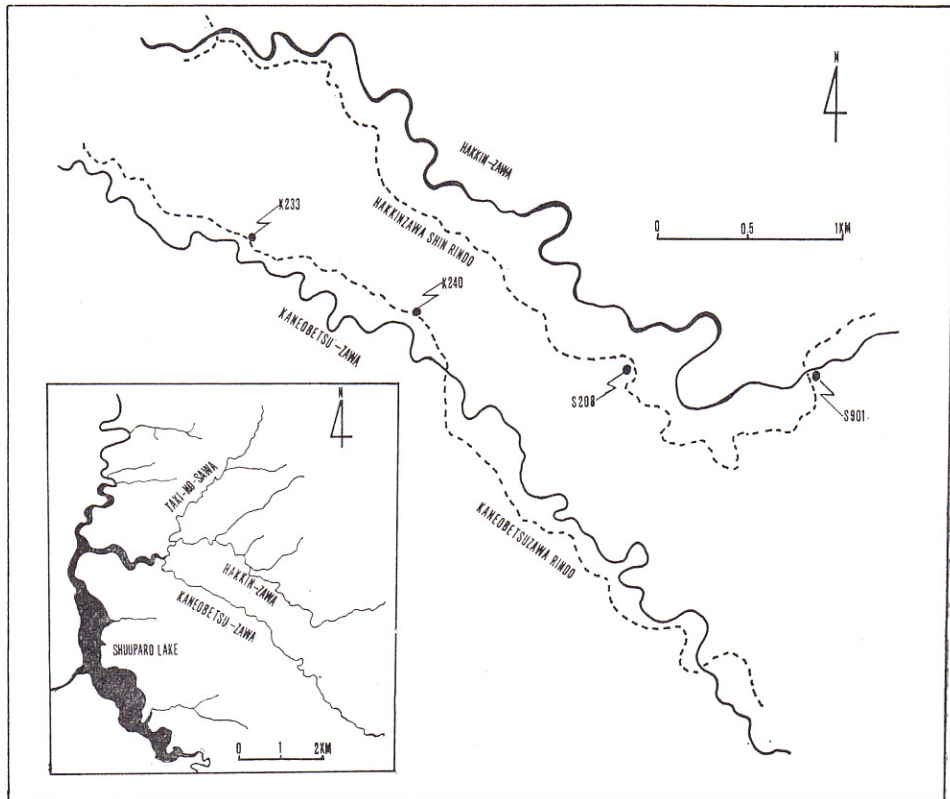
Suture is finely and deeply incised.

Comparison: This ammonite is compatible in size with the holotype of *Sharpeiceras kongo* MATSUMOTO, MURAMOTO, et TAKAHASHI, 1969 (p. 261, pl.

29, fig. 1; pl. 30, fig. 1; text-figs. 3-4), from the Zone of *Mantelliceras japonicum* of the Ikushumbets Valley, but has narrower and weaker ribs and less prominent tubercles. The ventral tubercles on the body-chamber are strongly erected in *Sh. kongo*, but this character is not shown in this specimen. In this respect as well as in other characters, this specimen is closer to the holotype of *Sharpeiceras vohipalense* COLLIGNON, 1964 (p. 104, pl. 354, fig. 1565), from the bed 486 (Lower Cenomanian) of Madagascar with *Mantelliceras cantianum* SPATH, but the ribs and tubercles on the phragmocone of our specimen are still weaker than those of the Madagascar one and the ours is nearly twice as large as the COLLIGNON's.

Sh. laticlavium (SHARPE) (see KENNEDY, 1971, p. 84, pl. 27, fig. 1; pl. 28, fig. 1) has more numerous, broader and rectiradiate ribs which are separated by narrower interspaces as compared with the ribs of our form.

Our specimen may represent a new species, but it is not so well preserved that we call it provisionally *Sharpeiceras* aff. *S. vohipalense* COLLIGNON.



Text-fig. 1. Map showing the localities of ammonites in SUEKANE Collection described in this paper. Inset is the index map of the Rivers Hakin-zawa and Kaneobetsu-zawa with reference to the artificial lake of Shuuparo, dammed up the main course of the River Yubari. Lower left corner of the map is $43^{\circ} 0' N$, $142^{\circ} 6' E$.

(T. S. delin.)

Occurrence: Loc. S 901, mudstone exposed on the left bank of the River Hakkin-zawa (= Shirokin-zawa by some people), slightly upstream from the bridge of the recently constructed forestry road, Oyubari area (see Text-fig. 1).

Genus *Calycoceras* HYATT, 1900

Type species: *Ammonites navicularis* MANTELL, 1822.

Remarks: The generic diagnosis is concisely given by WRIGHT and KENNEDY (1981, p. 33), whose terminology of tubercles may give confusion. We use the umbilical, inner and outer ventrolateral and siphonal tubercles as for those of *Acanthoceras*, although in some cases a tubercle may shift to some extent from its named position.

Various species groups have been recognized (*e. g.* KENNEDY, 1971), which are currently treated as subgenera, although THOMEL (1972) proposed some of them as genera. WRIGHT and KENNEDY (1981, p. 33) have remarked briefly their diagnostic characters and mutual relationships. In the Cenomanian of Japan there are examples of *C. (Calycoceras)*, *C. (Newboldiceras)* and *C. (Gentoniceras)*, of which *C. (Newboldiceras)* occurs most frequently.

Subgenus *C. (Newboldiceras)* THOMEL, 1972

Type species: *Acanthoceras newboldi* KOSSMAT, 1887 (original designation).

Calycoceras (Newboldiceras) newboldi (KOSSMAT)

Pl. 1, fig. 4; Pl. 2, figs. 1-3

1897. *Acanthoceras newboldi* KOSSMAT (typical form), p. 5 (112), pl. 1 (12), figs. 2, 3; pl. 3 (14), fig. 2.
 1951. *Calycoceras newboldi* (KOSSMAT); WRIGHT and WRIGHT, p. 25.
 1964. *Calycoceras newboldi* (KOSSMAT); COLLIGNON, p. 120, pl. 362, fig. 1585.
 1971. *Calycoceras newboldi newboldi* (KOSSMAT); KENNEDY, p. 75, pl. 40, fig. 2; (?) pl. 39, fig. 2.
 1972. *Newboldiceras (Newboldiceras) newboldi* (KOSSMAT); THOMEL, p. 106, pl. 34, figs. 1-3; pl. 38, figs. 1-2; pl. 39, figs. 1-3; pl. 40, figs. 1-3; pl. 41; pl. 42, figs. 3-4 (with full list of synonymy).

Material: YCM. 714 (= A 391) collected by T. SUEKANE from loc. S 208. It is embedded in a nodule on its left side, but its right half is well exposed.

Description: The specimen is fairly large, showing the dimensions recorded in Table 1 (1). Its phragmocone ends at D=135 mm, and followed by the incomplete body-chamber for about 160°.

In the restored outline the whorl is slightly broader than high and subquadrate in section. The ratio of whorl expansion is moderate ($H/h=1.46$); the involution of whorl moderate; the width of umbilicus rather moderate but less than one third of the shell diameter.

The ribs are fairly strong and normally alternately long and short. The long ribs have bullate umbilical tubercles, which are highest at the umbilical shoulder.

Table 1. Dimensions of *C. (N.) newboldi* on selected specimens

Specimen	Diameter	Umbilicus	Height	Breadth	B/H	H/h
(1)	170	52 (.31)	70 (.41)	78 (.46)	1.11	1.46
(2)	113	32 (.28)	49 (.43)	52 (.46)	1.06	1.53
(3)	125	32 (.26)	55 (.44)	63 (.5)	1.14	1.45
(4)	45	12 (.27)	20 (.44)	22 (.49)	1.1	1.54
(5)	109	34 (.31)	50 (.46)	58 (.52)	1.16	1.5

(1): YCM. 714, (2): typical form of KOSSMAT, 1897 (measured on pl. 1, fig. 2), (3): KOSSMAT's medium-sized specimen, (4): KOSSMAT's small specimen, (5): "typical form" from Madagascar (COLLIGNON, 1964, p. 120, pl. 362, fig. 1583)

All the ribs have nodose, inner and somewhat clavate, outer ventrolateral tubercles of moderate intensity. The siphonal tubercles are weakening with growth on the outer whorl. The ribs number 17 or 18 in a half whorl and are separated by the interspaces nearly as narrow as or slightly broader than the ribs themselves.

Comparison and discussion: As MATSUMOTO *et al.* (1954, p. 11-12, footnote) pointed out previously, a question remains as to the specific name (*newboldi* or *subcompressum*), but *C. newboldi* is so much well-known that we follow KOSSMAT (1897) and subsequent authors in describing this species under *C. newboldi* instead of *C. subcompressum* (STOLICZKA, 1865).

KOSSMAT (1897) noted the variability of this species, and called the typical form, var. *planecosta* and var. *spinosa*. They are regarded as subspecies by some authors (e. g. KENNEDY, 1971) or independent species by other authors (e. g. MATSUMOTO *et al.*, 1954; THOMEL, 1972).

Through the study of the material from Hokkaido by MATSUMOTO *et al.* (1954), *C. asiaticum* (JIMBO) and *C. orientale* MATSUMOTO, SAITO *et al.* FUKADA have been added as other examples of the *C. newboldi* group and THOMEL (1972) established the genus *Newboldiceras* for this group, describing more species from France.

To settle these taxonomic problems, further study may be required. We should notice in this paper that the above described specimen is an example of the typical form of *C. (N.) newboldi* as defined by KOSSMAT (1897) and that this is the first record of typical *C. (N.) newboldi* occurring in the Cenomanian of Japan.

Occurrence: The described specimen was obtained solitarily from the mudstone at loc. S 208 of the forestry road (Hakkin Shinrindo) along the Hakkinzawa, middle part of the Cenomanian (Text-fig. 1).

Genus *Romaniceras* SPATH, 1923

Type species: *Ammonites deverianus* D'ORBIGNY, 1841.

Remarks: The concept of *Romaniceras* in this paper is not quite identical

with that defined by KENNEDY *et al.* (1980). *Neomphaloceras* MATSUMOTO et OBATA, 1982 has been established to accommodate the *Euomphaloceras* like ammonites with an additional row of lateral tubercles, altogether nine rows of tubercles as in *Romaniceras* (s. s.), from which the horned ventrolateral tubercles in the adult stage enable us to distinguish *Neomphaloceras*. We expect the genus *Yubariceras* in our sense would be a derivative or branch of *Neomphaloceras* with additional one more rows of tubercles, altogether eleven rows of tubercles. It has strongly tuberculate adult shell, in which ventrolateral horns as those of *Euomphaloceras* (or *Cunningtoniceras* redefined by KIRKLAND and COBBAN, 1986) are diagnostic. Should this be acknowledged, then *Romaniceras* like ammonites with eleven rows of tubercles, which are subdued by prominent ribs on the adult shell, would require a new generic or subgeneric name. As we do not intend to propose that name in this paper, we use provisionally *Romaniceras* for both the group of *R. deverianum* with 9 rows of tubercles and that of *R. deverioide* with 11 rows of tubercles.

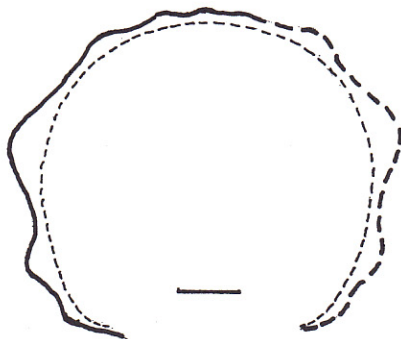
Romaniceras sp. nov.

Pl. 3, figs. 1-3; Text-fig. 2

Material: YCM 715 (= A 16 of T. SUEKANE Collection) from loc. K 240, Kaneobetsu, Oyubari area.

Description: This single specimen is about 180° of the outer whorl, consisting of the last part (about 60°) of the phragmocone and the main part (about 120°) of the body-chamber. Its right half is fairly well preserved, but the left half is dissolved in the rock matrix. A ventral portion of the preserved last part is deficient. Anyhow, it shows somewhat peculiar characters as described below.

The last part of the phragmocone is rounded in intercostal section, with



Text-fig. 2. *Romaniceras* sp. nov.

Diagrammatic whorl-section of YCM. 715 at the last part of phragmocone. Thick line: costal, broken line: restored; dotted line: intercostal. Scale bar =10 mm. (T. M. delin.)

convex flank and broadly arched venter; the whorl-breadth is somewhat larger than the whorl-height, with $B/H=1.24$ in the costal section and 1.17 in the intercostal section (left side restored). The ribs on the phragmocone are fairly thick and alternately long and short. The long rib has a subrounded to bullate umbilical node, prominent inner and outer lateral tubercles; the inner and outer ventrolateral and siphonal tubercles are weak and somewhat clavate. The umbilical and inner lateral tubercles are closely set and the outer lateral tubercle is at about the mid-flank. At the outer lateral tubercle one of the long ribs bifurcates indistinctly into low ribs, of which an adapical one is weaker than the adoral one.

The body-chamber is going to be more compressed with less convex flanks as compared with the phragmocone. The ribs become to be narrow but much raised, separated by broader and concave interspaces, and gently flexuous on the flank, crossing the venter radially (i. e. vertical to the extension of siphonal line). Long ribs predominate but shorter ones are sometimes intercalated. The first long rib have still tubercles which are similar to those on the phragmocone and it bifurcates at the outer lateral tubercle into stronger adoral and weaker adaptal ribs. On the succeeding three ribs angulation remains at the ventrolateral shoulder but the venter has no tubercles. The first short rib behind the first long rib has a weak outer lateral tubercle and a blunt ventrolateral angulation. The fourth long rib seems to have tubercles which are similar to but weaker than those of the first rib and bifurcates like the first, although the feature is not well shown owing to the damaged state. All of other ribs on the body-chamber have no tubercles.

The suture has a massive saddle between E and L; the outer lateral tubercle is roughly on the site of L.

Comparison and discussion: On the basis of a large number of specimens from Loire-et-Cher, Sarthe etc. of France, KENNEDY *et al.* (1980) have concluded that they should be referred to a very variable single species *Ammonites deverioides* DE GROSSOUVRE, 1889, and that this species is a synonym of *Ammonites ornatissimus* STOLICZKA, 1865, as KOSSMAT, 1897 had already pointed out. The result of KENNEDY *et al.* is important, but we have another idea about the genus *Yubariceras* and in this paper we call de GROSSOUVRE's species *Romaniceras deverioides*, pending the indentify and generic assignment of *A. ornatissimus*.

As KENNEDY *et al.* (1980, p. 326) have written adequately, some or all tubercles are lost and subdued by strong ribs in the adult shells of the genus *Romaniceras*. This character is well shown by our specimen described above. The phragmocone of this specimen is somewhat similar to the form which was called *Ammonites deverioides* var. *armata* DE GROSSOUVRE (1889) (see KENNEDY *et al.*, 1980, pl. 50, figs. 3-4) in having a broadly rounded whorl and 11 rows of tubercles, but differs in the disposition of the tubercles. In this specimen the

umbilical and inner lateral tubercles are approximated and the outer lateral tubercle is located at about the mid-flank; the latter occurs even on the intercalated short ribs. Also the weakening of tubercles on the venter occurs much earlier in this specimen than in most of the described specimens of *R. deverioide* (typical form and var. *armata* of DE GROSSOUVRE). In this respect, this specimen may be similar to the lectotype of *Amm. deverioides* var. *inermis* DE GROSSOUVRE (see KENNEDY *et al.*, 1980, pl. 50, figs. 1-2), but the former differs from the latter in having a rather *armata* like phragmocone.

KENNEDY *et al.* (1980, p. 356) suggest that the form represented by *inermis* may be a microconch. In fact the lectotype of *A. deverioides* var. *inermis* is about 160 mm or 165 mm in diameter at the preserved end of the body-chamber. Our specimen is somewhat (but not much) larger ($D=180$ mm) than that size.

One of us (MATSUMOTO, 1959, p. 90, figs. 40-44) has shown whorl-sections of several specimens of *R. deverioide* from the Swede Creek, California in comparison with that of the lectotype (misprinted as holotype) from Bourre, France. They show some extent of variation in the outline and disposition of tubercles, but none of them match with the section of the phragmocone of our specimen. Especially the approximate disposition of the umbilical and inner lateral tubercles is particular to our form.

The approximation of the umbilical and lateral tubercle occurs characteristically in *R. kallesi* (ZÁZVORKA, 1958) (see KENNEDY *et al.*, 1980, p. 143, text-fig. 6; pl. 44, figs. 1-3; pl. 45, figs. 3-4; pl. 46, figs. 1-4; pl. 47, figs. 1-4) and also in *R. pseudodeverianum* (JIMBO, 1894) (see MATSUMOTO *et al.*, 1985, p. 165, pl. 4, fig. 3; pl. 7, fig. 1; pl. 8, figs. 3-4). This character may have been succeeded hereditarily by the species represented by this specimen.

The rows of tubercles are nine in *R. kallesi* and also *R. pseudodeverianum*, whereas they are eleven in this species. Moreover the umbilical and lateral (inner and outer) tubercles in this species are more prominent and rather nodose, instead of weak and bullate ones in *R. kallesi*.

The narrowly raised and sometimes gently flexuous ribs also occur in *R. kallesi* and some individuals of *R. pseudodeverianum* (see MATSUMOTO and UCHIDA, 1985 pl. 1 and text-fig. 1), whereas this kind of ribbing occurs only in the adult body-chamber of this species in which the change of ornamentation from the septate whorl to the body-chamber is rather abrupt. The ribs are less numerous and more widely separated in this species than in *R. kallesi*. In this respect this form is closer to *R. pseudodeverianum*.

To sum up, we should like to regard this specimen as representing probably a new species of *Romaniceras*, which looks similar to a certain form of highly variable *R. deverioide* but is still outside the known extent of variation of that species. It may have derived from *R. pseudodeverianum* with acquisition of one more row of lateral tubercles rather than branched from *R. deverioide*. Anyhow,

more specimens of better preservation are wanted to establish a new species and to settle its systematic position.

Occurrence: Loc. K 240, Kaneobetsu Rindo (forestry road on the right side of the River Kaneobetsu), mudstone characterized by *Inoceramus* aff. *hobetsensis* NAGAO et MATSUMOTO (non-sulcate form), which is stratigraphically higher than the bed with abundant *Mytiloides mytiloides* (MANTELL) and probably referred to the lower part of the Middle Turonian.

Genus *Neomphaloceras* MATSUMOTO et OBATA, 1982

Type species: *Yubariceras pseudomphalum* MATSUMOTO.

Remarks: MATSUMOTO and OBATA (1982, p. 71) described clearly the generic diagnosis and the reason why this genus should be established, giving a description of *N. pseudomphalum* in the subsequent collections. Additional description has been recently given on the same species (MATSUMOTO *et al.*, 1985) and we present some more information in this paper.

Neomphaloceras pseudomphalum (MATSUMOTO)

Pl. 4, figs. 1-2, 4-7, 10-11; Text-fig. 3

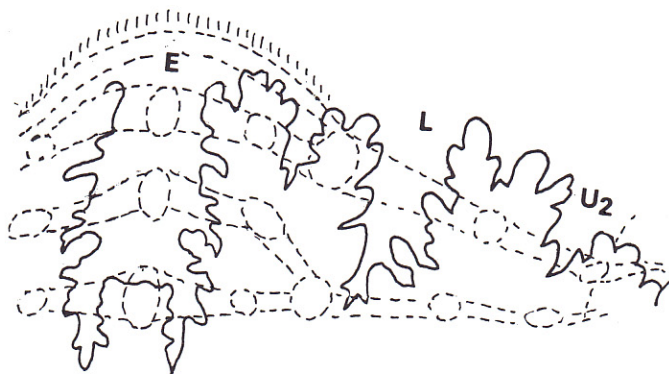
1975. *Yubariceras pseudomphalum* MATSUMOTO, p. 146, pl. 22, fig. 1.

1982. *Neomphaloceras pseudomphalum* (MATSUMOTO); MATSUMOTO and OBATA, p. 73, pl. 2, fig. 1; pl. 5, fig. 1.

1985. *Neomphaloceras pseudomphalum* (MATSUMOTO); MATSUMOTO, OBATA and KAWASHITA, p. 162, pl. 5, fig. 1.

Holotype: MC. 76 of the MURAMOTOS' Collection from the Taki-no-sawa, Oyubari area.

Material: The following four specimens in addition to the previous ones: (1) YCM. 716, very small, immature specimen, collected by T. SUEKANE at loc. K 233; (2a,b) M. KERA's Coll. No. 405 and 458, two other immature specimens



Text-fig. 3. *Neomphaloceras pseudomphalum* (MATSUMOTO).

External suture of YCM. 716 (immature specimen) at diameter=21.6 mm, whorl-height=5.6 mm and whorl-breadth=11.6 mm. (T. M. *delin.*)

from the Kamimaki-zawa (drifts); (3) YCM. 717, medium-sized, deformed specimen (D=106 mm), collected by T. SUEKANE from a boulder of the Panke-moyuparo-gawa (Panke-moyuparo in Ainu).

Descriptive remarks:—We regard the above three specimens (1, 2a, b) as showing the young growth-stages of the indicated species. The third specimen (3) is medium-sized as is the holotype from the Taki-no-sawa (MATSUMOTO, 1975, p. 146, pl. 22, fig. 1). These two specimens represent the middle growth-stage. Still later, adult shell, with horned body-chamber, is represented by YKC. 560920 (see MATSUMOTO *et al.*, 1985, pl. 5, fig. 1), obtained by Y. KAWASHITA from the mudstone exposed in a gully on the right side of the Kamimaki-zawa not far from the locality of the second (2) specimen.

It should be noted that the three small specimens (1) and (2a, b) are fairly similar to, if not identical with, some examples of *Euomphaloceras septemseriatum* (CRAGIN), as figured by MATSUMOTO *et al.* (1969, pl. 37, figs. 1–3) from Japan, COBBAN and SCOTT (1972, pl. 12, figs. 5–27) and WRIGHT and KENNEDY (1981, pl. 12, figs. 1–8) from North America, and COOPER (1978, fig. 18 G–H; fig. 19 G–H) from Angola. The unmistakable distinction is the development of mid-lateral tubercles in *N. pseudomphalum*. In YCM. 716 (specimen 1) the lateral tubercle first appears at about 13 mm in diameter, showing the aspect as if the umbilical bulla is doubled; soon a lateral tubercle of moderate intensity and smaller tubercle at the umbilical shoulder become independent. A similar, if not identical, feature is observable in KERA's 458.

The siphonal tubercles in the three young specimens do not form such a distinct keel-like elevation as is often (but not always) seen in *E. septemseriatum*; also the ribs on the venter of the former do not show so distinct chevrons as normally seen in the latter, although some of the inserted or branched riblets do form chevrons or at least project forward, whereas other ribs form a slightly forward convexity or cross the venter nearly vertically to the siphonal line. The interspaces between some ribs are periodically somewhat deeper than those of others and can be called shallow constrictions, which are, however, not so distinct as in *E. euomphalum* (SHARPE, 1855) (see WRIGHT and KENNEDY, 1981, pl. 11, figs. 1–8). KERA's No. 458 has a weak keel-like elevation in its younger part and the ribs show ventral projection or chevrons more frequently than the other two immature specimens.

In the middle growth-stage the umbilical, lateral and ventrolateral tubercles are nearly equidistant. So far as the shells of the middle to late growth-stages are concerned, *N. pseudomphalum* looks similar to *E. lonsdalei* (ADKINS, 1928) (p. 244, pl. 26, fig. 5; pl. 27, fig. 3) (see also WRIGHT, 1963) and could be derived from the latter with an additional row of lateral tubercles. However, several small immature specimens of *E. lonsdalei* are described by STEPHENSON (1955), which have coarser and less numerous ribs on the venter without any sign of

chevron or constriction as compared with our small specimen (YCM. 716). YCM. 716 has a broad E/L saddle and narrow lobe L, as in *E. cunningtoni*, whereas *E. euomphalum* is said to have a narrow E/L saddle and broad lobe L. We should look for an early Turonian form which could be an immediate ancestor of *N. pseudomphalum*.

Incidentally M. KERA kindly showed us an interesting immature shell (No. 411, Pl. 4, figs. 8-9) from the Kamimaki-zawa, whose early part is similar to our YCM. 716 but the lateral tubercle is doubled at D=23 mm and soon a row of weaker outer lateral tubercles is added. This is probably an immature example of *Yubariceras* sp. It suggests the derivation of *Yubariceras* from *Neomphaloceras*.

Table 2. Dimensions of some specimens mentioned in the text of *Neomphaloceras pseudomphalum*

Specimen	Diameter	Umbilicus	Height	Breadth	B/H	H/h
(1)	22.7	7.3 (.32)	9.8 (.43)	12.1 (.53)	1.23	1.75
(2a)	34.0	11.0 (.32)	14.0 (.41)	17.0 (.50)	1.21	1.55
(2b)	21.0	7.0 (.33)	8.5 (.40)	10.6 (.50)	1.25	1.55
(3)	106.0	—	46.1 (.41)	59.5 (.50)	1.29	—
(4)	93.0	30.0 (.32)	—	—	—	—
"	—	—	33.5	41.0	1.22	—
(5)	212.0	67.0 (.32)	89.0 (.42)	98 (.46)	1.10	—
(6) (c)	29.0	9.0 (.31)	11.7 (.40)	17.0 (.59)	1.45	—
(ic)	29.5	10.1 (.34)	12.1 (.41)	15.6 (.53)	1.29	—

(1): YCM. 716, (2a): M. KERA No. 405, (2b): M. KERA No. 458, (3): YCM. 717, (4): holotype, (5): YKC. 530321, adult shell (cited from MATSUMOTO *et al.*, 1985), (6): M. KERA No. 411 (*Yubariceras* sp. mentioned in the text); c: costal, ic: intercostal, h: whorl-height at 180° early than H.

Occurrence: This species occurs so far characteristically in an unnamed zone with *Inoceramus* aff. *hobetsensis* (non-sulcate form), below the Zone of *I. hobetsensis*, and probably early Middle Turonian in age.

Loc. K 233, cliff of the forestry road (Kaneobetsu Rindo) on the right slope of the V-shaped valley of the River Kaneobetsu. M. KERA's specimens are from drifted nodules which contain *Scaphites* sp. and *Otoscapites* sp., suggesting their derivation from the "Scaphites Beds", *i. e.* Turonian, in the Kamimaki-zawa, Oyubari area.

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Hakkin-zawa (=Hakkin-gawa or Shirokin-zawa) (白金沢 (白金川),
 Hobetsu (=Hobets or Popets) (穂別), Hokkaido (北海道),
 Kaneobetsu (=Kaneobets) (金尾別), Kamimaki-zawa (上巻沢),
 Oyubari (大夕張), Panke-moyuparo-gawa (パンケモユーパー川)
 Shuparo (=Shuparo) (シューパー), Sorachi (空知), Taki-no-sawa
 (滝の沢), Yokosuka (横須賀), Yubari (夕張)

Explanation of plate 1

- Figs. 1–3. *Sharpeiceras* aff. *S. vohipalense* COLLIGNON.
 YCM. 713 collected by T. SUEKANE from loc. S 901, Hakkin-zawa, Oyubari area. Lateral (1) and back (2) views, $\times 4/7$; diagrammatic whorl-section at Q (3), $\times 1/2$. Arrow: position of the last septum.
- Fig. 4. *Calycoceras* (*Newboldiceras*) *newboldi* (KOSSMAT).
 YCM, 714, diagrammatic whorl-section at Q in pl. 2, fig. 1, $\times 1/2$. Photos (pls. 1–2) by T. SUEKANE.

Explanation of plate 2

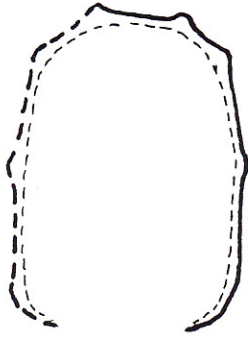
- Figs. 1–3. *Calycoceras* (*Newboldiceras*) *newboldi* (KOSSMAT).
 YCM. 714 collected by T. SUEKANE from loc. S 208, Hakkin-zawa, Oyubari area. Lateral (1), back (2) and frontal (3) views, $\times 4/7$.

Explanation of plate 3

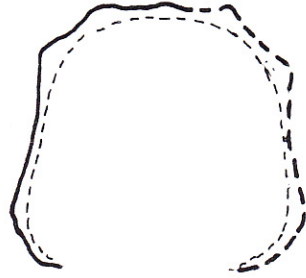
- Figs. 1–3. *Romaniceras* sp. nov.
 YCM. 715 collected by T. SUEKANE from loc. K 240, Kaneobetsu, Oyubari area. Lateral (1) and ventral (2) views $\times 3/4$; ventral view of the last part of phragmocone and the early part of body-chamber (3), $\times 1$.
 Photos (pls. 3–4) by courtesy of Dr. M. NODA.

Explanation of plate 4

- Figs. 1–2. *Neomphaloceras pseudomphalum* (MATSUMOTO).
 YCM. 716 collected by T. SUEKANE from loc. K 233 of the Kaneobetsu, Oyubari area. Lateral (1) and back (2) views of an immature example, $\times 2$.
- Fig. 3. *Euomphaloceras septemseriatum* (CRAGIN).
 IGPS. 57749 from the Ikushumbets area (probably loc. Ik 1038), back view of an immature specimen, $\times 2$.
- Figs. 4–7. *Neomphaloceras pseudomphalum* (MATSUMOTO).
 M. KERA Coll. 405, drift in the Kamimaki-zaaw, Oyubari area. Two lateral (4, 5), back (6) and front (7) views, $\times 2$.
- Figs. 8–9. *Yubariceras* sp.
 M. KERA Coll. 411, drift in the Ohmaki-zawa, Oyubari area. Lateral (8) and back (9) views, with *Scaphites* sp., $\times 2$.
- Figs. 10–11. *Neomphaloceras pseudomphalum* (MATSUMOTO).
 M. KERA Coll. 458, drift in the Kamimaki-zawa, Oyubari area. Lateral (10) and back (11) views of an immature example, $\times 2$.



3

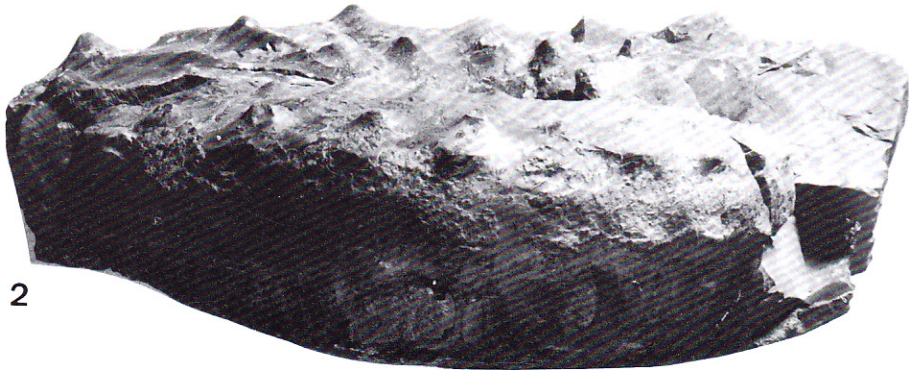


4

Q



1



2





