

Some Interesting Acanthocerataceans from Hokkaido  
(Studies of Cretaceous Ammonites from  
Hokkaido—XLII)

By

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Among ammonite specimens sent for identification, eight of them belonging to the Acanthocerataceae are here described with brief comments to present some problems needing further consideration. Also, a new genus is established for the third species.

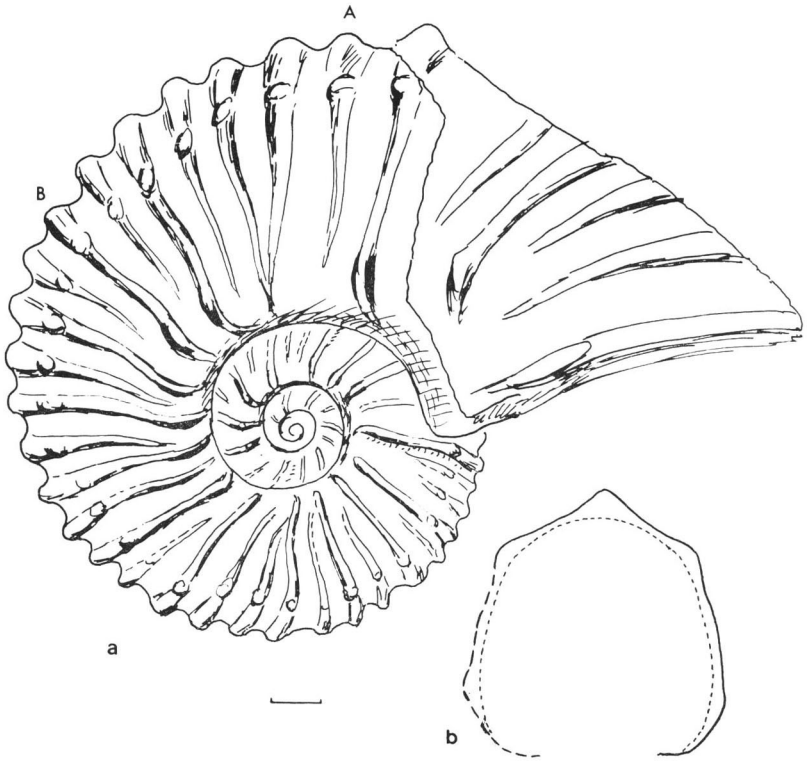
1. *Calycoceras asiaticum* (JIMBO) (Malform?)

Pl. 1, fig. 1a, b; Text-fig. 1

*Material:* A single specimen, numbered 48-4-28 in the Collection of Yoshitaro KAWASHITA, Mikasa. Its phragmocone is well-preserved but its body-chamber is badly squashed.

*Description:* The phragmocone is 126 mm in diameter, and the succeeding body-chamber occupies at least a half whorl. The whorl increases with a moderate rate and is moderately involute. The umbilicus is fairly narrow. In the late part of the phragmocone, the whorl is slightly broader than high or nearly as high as broad and subrounded in the intercostal section, with the maximum breadth at a point somewhat below the middle of the flank.

Ribs are moderately strong, consisting of longer and shorter ones, which are usually, but not always, alternating. They are moderately dense, being separated by interspaces nearly as wide as the ribs on the ventral part. There are 37 ribs on the measurable outer whorl. The long ribs are provided with clavate tubercles slightly outside the umbilical shoulder. The umbilical tubercles are mostly strong, but a few of them are weak. The long ribs are gently flexuous, since they are rursi-radiate on the umbilical wall, curved at the umbilical shoulder, prorsiradiate on the inner part of the flank, forming a gently convex curve on the main part of the flank and curved broadly forward on the venter. Shorter ribs start at variable distance from the umbilical shoulder and run in parallel to the longer ones. Every rib has a



Text-fig. 1. *Calyoceras asiaticum* (JIMBO) (Malform?).

Diagrammatic sketch of Y. KAWASHITA's specimen (48-4-28). a: lateral view (A and B measured points); b: whorl-section at B. Bar 10 mm. (T. MATSUMOTO *delin.*)

distinct tubercle at the ventrolateral shoulder and another on the siphonal line. The same pattern of tuberculation seems to continue to the body-chamber, without weakening of the siphonal tubercles.

Partly exposed suture is similar to that of *C. newboldi* (KOSSMAT) (1897, pl. 3 [14], fig. 2).

*Measurements* (in mm):

Point	Diameter	Umbilicus	Height	Breadth
A	126.0	32.0 (0.25)	62	—
B	110.0	28.0 (0.25)	53	55

A: At the end of the phragmocone (A in Text-fig. 1); B:  $-60^\circ$  (B in Text-fig. 1).

*Occurrence*: The specimen was obtained by Y. KAWASHITA from a calcareous nodule in silty fine-grained sandstone of the Mikasa Formation on the western wing of the Ikushumbetsu anticline, in the upper reaches of the Poronai-Honzawa (main stream of the Poronai), a tributary to the River Ikushumbetsu (see Geological Map

of Iwamizawa by MATSUNO *et al.*, 1964). According to KAWASHITA, undoubted specimens of *C. asiaticum* occur commonly at the same locality.

*Remarks:* At first sight we thought that this ammonite might be a malform of *Calycoceras asiaticum* (JIMBO) (1894, see MATSUMOTO *et al.*, 1957, p. 11, pl. 1, fig. 1; pl. 2, fig. 1), because of its close similarity in lateral view and because of the co-occurrence. However, on account of distinct siphonal tubercles the venter is somewhat acute and the ventrolateral tubercles are in one row (on one side) instead of two. Moreover, there is no sign of abnormal configuration of the ribs and tubercles which should occur in a malform. Mr. KAWASHITA, who has a long experience in collecting ammonites from Hokkaido, expected that it may represent a new form of ammonite.

Should we deny the malform interpretation, then this ammonite would fall in the Lyelliceratidae from its observed characters. It could be a species related to such species as *Stoliczkaia (Faraudiella) roemeri* (LASSWITZ, 1904) (see YOUNG, 1979, p. 52, pl. 5, figs. 1–3, 6–7, 11, 12, 14, 16; pl. 6, figs. 1, 2, 27–30; text-figs. 11 q–s, bb). Although *S. (F.) roemeri* is a comparatively less compressed than other species of the same subgenus, the present ammonite has more rounded whorls. It is much larger and stouter in aspect. Hitherto known species of *S. (Faraudiella)* are known from the Upper Albian and the Lower Cenomanian, but the present ammonite came from the Middle Cenomanian. Therefore, this ammonite might represent the last survival of the Lyelliceratidae and require a new generic and specific name.

We have no definite evidence to select one of the two alternative interpretations. If the second example were obtained and especially if the characters of the young stage were made clear, we would be able to decide. We should be careful to establish a new taxon. One of us (T.M.) sent a letter, including a copy of Text-fig. 1, to Dr. C. W. WRIGHT, who kindly answered that it may be a malform of *Calycoceras* (of *newboldi* group). Dr. W. J. KENNEDY also supported the malform interpretation. There was no reasoning enough to satisfy us, but that was from their deep experience. To indicate this ammonite, we temporarily follow their opinion, which also conforms with our first impression. We do not, however, withdraw completely the second interpretation.

## 2. *Euomphaloceras* sp. aff. *E. cunningtoni* (SHARPE)

Pl. 1, fig. 2a, b

*Material:* A single specimen, numbered 770 in the Collection of Tsutomu SATO, Yubari. The right half is fairly well preserved, but the left half is embedded and resolved in a nodule of calcareous mudstone.

*Description:* The shell shows the body-chamber up to its apertural margin. Its diameter is about 150 mm, umbilcus is 41 mm, about 27 per cent of the shell diameter. The whorl is somewhat, but not much, broader than high. In the septate part and in the last portion of the body-chamber where the tubercles are not very strong the whorl-section is subquadrate, with flat flanks and nearly vertical and high umbilical walls.

The ribs are moderately numerous and not much distant, being separated by the interspaces slightly broader than the ribs or nearly as narrow as the ribs on the flank. On the main part of the body-chamber, the ribs are coarse but not much distant, numbering 7 within a half whorl, the umbilical tubercles are prominent, with their highest point shifted outward near the middle of the flank, and the ventrolateral tubercles are enlarged to horns. Five ribs on the middle part of the body-chamber are rursiradiate and the ventrolateral horns are projected sideward and backward. On other parts the ribs are nearly rectiradiate.

On the last portion, about 30°, of the body-chamber, the ribs and tubercles are rapidly weakened and the last four ribs are narrow and low, the ventrolateral tubercles are much weakened and reduced in size, and the umbilical tubercles are obsolete. The apertural margin is simple in lateral view, with only a shallow ocular sinus. The ventral rostrum is not clearly shown but seems to exist.

Owing to the poor preservation, the multituberculation on the ventral part is not clearly shown, but observable at least partly.

*Occurrence:* T. SATO obtained this specimen, on September 2nd, 1979, from an exposure of mudstone at a point about 3 km upstream in the right (southern) branch from its confluence, which is at about 7 km from the mouth of the Agemaki-zawa, a tributary to the River Shiyubari. This point is referable to the lower part of Unit My 7 in the geological map of Oyubari (NAGAO *et al.*, 1954). It is probably middle part of the Cenomanian.

*Remarks:* This ammonite is certainly referable to the genus *Euomphaloceras* SPATH, 1923, but deviates considerably from the holotypes and other typical specimens of the hitherto described species of the genus. In its strong tuberculation on the body-chamber, it could be referred to *E. cunningtoni* (SHARPE, 1855) (see KENNEDY, 1971, p. 92, pl. 60, fig. 1a, b; pl. 61, fig. 2a, b), but it is much smaller and has less distant ribs than typical examples of that species. In its denser ribbing and less depressed whorl, it is similar to *E. inerme* (PERVINQUIÈRE, 1907) (see KENNEDY, 1971, p. 94, pl. 59, fig. 6a, b; pl. 61, fig. 1a, b; pl. 62, fig. 1a, b; pl. 64, fig. 1), but it has much stronger horn-like tubercles and a narrower umbilicus.

KENNEDY (1971) considers a fairly wide extent of variation in a species of *Euomphaloceras*, although this was not led from the examination of population samples. He mentioned some transitional specimens between *E. inerme* and *E. cunningtoni*. An example figured by KENNEDY (1971, pl. 63, fig. 1) has horn-like ventrolateral tubercles for more than a full outer whorl, but the specimen under consideration has the horn-like tubercles only on the main part of the body-chamber. The rursiradiate ribbing in the middle part of the body-chamber is another peculiar feature in the latter.

The present specimen might represent a new species or subspecies which is allied to "the transitional form" between *E. inerme* and *E. cunningtoni*, but it is solitary and has some deficiency in preservation. Its stratigraphic position in reference to the typical forms of *E. inerme* and *E. cunningtoni* is not known either, although *E. inerme*



was reported once from another area of Hokkaido (MATSUMOTO *et al.*, 1957, p. 33, pl. 14, fig. 2a, b under *Acanthoceras* aff. *A. evolutum* SPATH).

Incidentally, KENNEDY (1971, p. 96) regarded a specimen figured under “*E. euomphalum*” by MATSUMOTO *et al.* (1957, text-fig. 13) as another example of the transitional form, but that figure, although restored, is based on BM. 88704, the holotype of *E. cunningtoni* itself.

Despite its adult stage, the present specimen is much smaller than most of the illustrated specimens of *E. cunningtoni* and *E. inerme*. It may represent a microconch, although the dimorphism of this genus has not been reported. The short persistency of a horned stage may be another dimorphic difference.

Anyhow, this ammonite specimen is interesting, but we need more material to lead a final conclusion.

#### Genus *Neomphaloceras* nov.

*Type species:* *Yubariceras pseudomphalum* MATSUMOTO.

*Diagnosis:* Very similar to *Euomphaloceras* in the shell-form, ornamentation and suture, but is distinguished in having an additional row of lateral tubercles.

*Remarks:* In addition to the type species, *Yubariceras fujishimai* MATSUMOTO, 1975 is assigned to this genus. *Y. japonicum* MATSUMOTO, SAITO et FUKADA and *Y. aff. Y. japonicum* of MATSUMOTO, 1975 may also be included in this genus.

*Discussion:* KENNEDY *et al.* (1980) have shown an interesting idea that *Romaniceras* of the Middle Turonian was derived from *Kamerunoceras* of the Lower Turonian and that *Yubariceras* with eleven rows of tubercles should be treated as a subgenus of *Romaniceras*, whereas the subgenus *R.* (*Romaniceras*) has nine rows of tubercles. This is based on an admirable result of KENNEDY and WRIGHT (1979) that *Kamerunoceras* descended from *Euomphaloceras* (s.s.) by way of *E. (Kanabiceras)*, showing a train of clavi on a low siphonal ridge. We think it rather peculiar, if not impossible, that once acquired character of the keel like train of the siphonal tubercles was lost in *Romaniceras* in which the siphonal tubercles are again separated as in *Acanthoceras*. KENNEDY and WRIGHT (1979), however, mentioned that there is a form of *R. kallesi* ZAZVORKA which is morphologically intermediate between *Kamerunoceras* and *Romaniceras*, although the details were not explained. Therefore, we would not deny a possible line of descent *Euomphaloceras* (s.s.)—*E. (Kanabiceras)*—*Kamerunoceras*—*Romaniceras*.

In parallel to this line of descent there was, in our opinion, another direct line of descent *Euomphaloceras*—*Neomphaloceras*. Whether *Yubariceras* in a correct sense should be attached to the first line or to the second is yet unsettled. There are problems in both morphological and biostratigraphical aspects.

Based on numerous specimens from the Middle Turonian of France, KENNEDY *et al.* (1980) recognized a wide range of variation in a species of *Romaniceras*. They regarded *Y. yubarensis* as conspecific with *Ammonites ornatissimus* STOLICZKA, 1965, with which *A. deverioide* (DE GROSSOUVRE, 1889) is also a synonym. They call the

species *Romaniceras* (*Yubariceras*) *ornatissimum* (STOLICZKA). In the Japanese province, the specimens occur separately from several localities but the number of the available specimens from each locality is rather few. Therefore, it is difficult to examine the true extent of variation. We would acknowledge the above view of KENNEDY *et al.* as a possible interpretation, but there could be possibly another alternative interpretation. The holotype of *Yubariceras yubarensis* MATSUMOTO, SAITO *et al.* (MATSUMOTO *et al.*, 1957, pl. 8, fig. 1a, b; KENNEDY *et al.*, 1980, pl. 40, figs. 3–5), from the Oyubari area, Hokkaido (not Kyushu as misprinted in the paper of KENNEDY *et al.*), is closely similar to the phragmocone of *N. pseudomphalum* to be described below, but has one more row of weak tubercles in the upper lateral part. It is wholly septate and probably immature. One of the paratype of *Y. yubarensis*, Hokkaido University Collection No. 12005, can be regarded as representing the adult shell. Its whorl is depressed and subquadrate in section and its inner ventrolateral tubercles are very prominent and horn-like, if not very long. All of these and other characters suggest that *Y. yubarensis*, represented by the holotype and this paratype, could possibly be interpreted as being most closely allied to *N. pseudomphalum* and that its similarity to *R. ornatissimum* might be a homoeomorphy within the same subfamily. The specimen from Madagascar illustrated by COLLIGNON (1965, p. 24, pl. 385, fig. 1657) is probably another adult example of *Y. yubarensis* in the present sense. We would not, however, deny that there are several specimens from Hokkaido which can be referred to *Romaniceras ornatissimum*.

Turning to the biostratigraphic aspects, *Euomphaloceras* occurs in the Middle and Upper Cenomanian. In our view, the genus seems to range up to the Lower Turonian, because *Acanthoceras calvertense* POWELL (1963, p. 315, pl. 33, figs. 8, 9; pl. 34, figs. 6, 9; text-fig. 2c) is probably an example of *Euomphaloceras* from the Lower Turonian of Chihuahua (Mexico). In fact, "*Yubariceras*" aff. "*Y.*" *japonicum* described by MATSUMOTO (1975), a probable example of *Neomphaloceras*, is similar to this POWELL's species but has a row of lateral tubercles.

The range of *N. pseudomphalum* is not precisely known, but is probably upper Lower Turonian to lower Middle Turonian, as is described below. An example (GK. H5686) of "*Y.*" aff. "*Y.*" *japonicum* is recorded to have come somewhere from the lower half of Turonian (MATSUMOTO, 1975, p. 143).

*Yubariceras yubarensis* was cited by KENNEDY *et al.* (1980) as occurring in the Zone of *Inoceramus hobetsensis*, but the actual situation is as follows. Its holotype was in a floated calcareous nodule on the river floor of the Pankemoyuparo, near the mouth of the Kaneobetsu, Oyubari area (Hokkaido). This point is generally within the Turonian, but from what part of the Turonian the holotype-bearing nodule came is uncertain. The paratype mentioned in this paper was from the Uesugi-zawa, a small branch stream of the River Hobetsu in the Hobetsu area, adjacent to the south of the Oyubari area. According to the record of the late Dr. K. OTATUME, who collected it, it came from a zone which is below the distinctive Zone of *Inoceramus hobetsensis*. NODA and one of us (T. M.) reinvestigated this locality and noticed that

the inoceramid species is not typical *I. hobetsensis* NAGAO et MATSUMOTO but probably an uncentral form which should be provisionally called *I. aff. I. hobetsensis*. Whether this zone is the lower part of the Middle Turonian or the upper part of the Lower Turonian is yet unsettled.

The illustrated specimen of *Y. yubarensis* from Madagascar was recorded by COLLIGNON (1965, p. 24) as occurring in "Gisement 673, Antsarona (Belo sur Tsiribihina)", which he ascribed to the Lower Turonian Zone of *Fagesia superstes*. We hardly understand the statement of KENNEDY *et al.* (1980, p. 360) that it is associated with "Typical mid Turonian ammonites." From the nearby locality (Gisement 674) of Antsarona, COLLIGNON (1965) recorded *Fagesia rudra* (STOLICZKA), *F. superstes spheroidalis* PERVINQUIÈRE (misprinted 474) [= *F. spheroidalis* in our sense] and *Kamerunoceras salmuriense* (COURTILLIER). These species, together with *Y. yubarensis*, were listed by BESAIRIE and COLLIGNON (1972, p. 281) as constituting a fauna of Lower Turonian in which *Mytiloides labiatus* var. *antsaronensis* SORNAY is also included. We agree with BESAIRIE and COLLIGNON in the age assignment of this fauna, although it may be the upper part of the Lower Turonian.

Incidentally, that COLLIGNON's specimen resembles the holotype of *Euomphaloceras inerme* (PERVINQUIÈRE) (see KENNEDY, 1971, pl. 64, fig. 1) but for its two rows of lateral tubercles.

To sum up, there seems to be little or almost no gap between the range of *Euomphaloceras* and that of *Neomphaloceras* or *Yubariceras*, although it may be still required to improve the actually available records.

### 3. *Neomphaloceras pseudomphalum* (MATSUMOTO)

Pl. 2, fig. 1a, b; Pl. 5, fig. 1

*Material*: A specimen, numbered MN''-9 in the Collection of Masami Nihongi, Sapporo. It has both the phragmocone and the body-chamber, although the ventral part of the outer whorl is eroded away and the body-chamber is partly broken.

*Description*: The whorl is rather evolute, overlapping only the ventral part of the inner whorl. As it grows moderately rapidly, the umbilicus is of moderate width, about 29 per cent of the diameter. It is depressed and subquadrate in section, broadest at the mid-flank, with parallel and gently inflated flanks and a broadly arched venter. The umbilical wall is high and nearly vertical. The umbilical and ventrolateral shoulders are angular in the costal section and subrounded in the intercostal section. The siphonal zone between the paired ventral tubercles is nearly flat.

The ribs are nearly rectiradiate; some of them are gently flexuous or arcuate (concave) on the flank; they show a gently forward curve on the venter. They are of unequal strength and length. The tubercles are of nine rows and multiple on the ventral part in accordance with the intercalation of shorter ribs. There are about 8 or 9 major ribs on the last septate whorl. They are long and strong (elevated and broad), having prominent tubercles at the umbilical shoulder, at about the middle of

the flank or slightly inside the mid-flank and at the ventrolateral shoulder. There are long but weaker ribs which has less prominent or no umbilical tubercles, slightly or much weaker lateral tubercles and the ventrolateral tubercles of moderate intensity. In addition to them there are shorter ribs which has a weak or no lateral tubercle and a ventrolateral tubercles of moderate or weak intensity. The ventral three rows of tubercles are smaller and weaker than the ventrolateral ones even on the long ribs and still weaker on the intercalated shorter ribs. A constriction like depression is discernible along some of the ribs on the venter.

On the body-chamber the ribs are very distant and coarse. Each of them has a weak node at the umbilical shoulder, a fairly prominent lateral tubercle and a ventrolateral horn, while the ventral tubercles are weakened. A few shorter ribs occur with wide interspaces at least on the posterior part of the body-chamber.

The external suture is of *Acanthoceras* type, showing massive, bipartite saddle between E and L, deep L which has a stem of moderate breadth but ends at narrow lobules, and narrower saddle between L and U2.

*Measurements* (in mm): (on a septate stage)

Diameter	Umbilicus	Height	Breadth	B/H
68.0	19.8 (0.29)	31.0	40.0	1.29

*Occurrence*: The described specimen was obtained by Masami NIHONGI in August 1981 as a floated nodule at a point in a small branch called the Naka-porokozawa, of the Poroko-Ashibetsu, a tributary to the River Ashibetsu, central Hokkaido. According to the published geological map (SHIMIZU *et al.*, 1953), this stream runs in the lower part (Turonian) of the Upper Yezo Group which overlies the Cenomanian Mikasa Sandstone of the mountain-range to the west. The nodule containing the described ammonite is fine-sandy siltstone, while other marly nodules in the same stream yield *Damesites ainuanus* MATSUMOTO (MN''-11) and *Anagaudryceras limatum* (YABE) (MN''-12). It can be presumed that the former may have been derived from a comparatively lower part of the Turonian and the latter two from the upper part of the Turonian. Further field work is needed to determine precisely the stratigraphic position of this ammonite.

The holotype of the present species (MATSUMOTO, 1975, p. 146, pl. 22, fig. 1) is recorded to have been obtained in the Takino-sawa of the Oyubari area (Hokkaido). Along the route of that stream the Lower Turonian to Cenomanian sequences are well exposed (see HIRANO *et al.*, 1977, text-figs. 4, 5) and *Mytiloides labiatus* (SCHLOTHEIM) (s.l.) (MATSUMOTO and NODA, 1975), *Fagesia spheroidal* PERVINQUIÈRE (MATSUMOTO and MURAMOTO, 1978) and *Mammites* aff. *nodosoides* (SCHLOTHEIM) (MATSUMOTO, 1981) from the same route indicate the Lower Turonian. Therefore, the holotype of *N. pseudomphalum* may have been from the same part, although its locality was not pin-pointed on the sequence. The locality of the paratype is the Sato-nosawa of the Obira area (Hokkaido). This suggests either the lower portion of the Middle Turonian or the upper portion of the Lower Turonian, because of the com-

mon occurrence of *Inoceramus* aff. *I. hobetsensis* and the rare find of “*Kamerinoceras (Ampakabites)*” sp. (see postscript in MATSUMOTO, 1977a, p. 365).

*Remarks:* The present specimen is undoubtedly identified with *Yubariceras pseudomphalum* MATSUMOTO, 1975. This species was established on two specimens (not a single specimen as erroneously cited by KENNEDY *et al.*, 1980, p. 342). The holotype (MATSUMOTO, 1975, pl. 22, fig. 1a, b) has only a portion of the body-chamber, whereas this third specimen shows more clearly the horned and depressed body-chamber of the adult stage as well as the diagnostic phragmocone.

As a whole, this species is closely allied to *Euomphaloceras lonsdalei* (ADKINS) (1928, p. 244, pl. 26, fig. 5; pl. 27, fig. 3), from the Eagle Ford Flag Member of Texas. The difference is the presence or absence of a row of lateral tubercles. KENNEDY *et al.* (1980, p. 342) have correctly stated that “this *Euomphaloceras*-like form is quite distinctive”. The distinctness has become still clearer by this additional material of the third specimen and we have established a new genus for it.

#### 4. *Pseudaspidoceras (Ampakabites) kawashitai* sp. nov.

Pl. 3, fig. 1a, b; Text-fig. 2

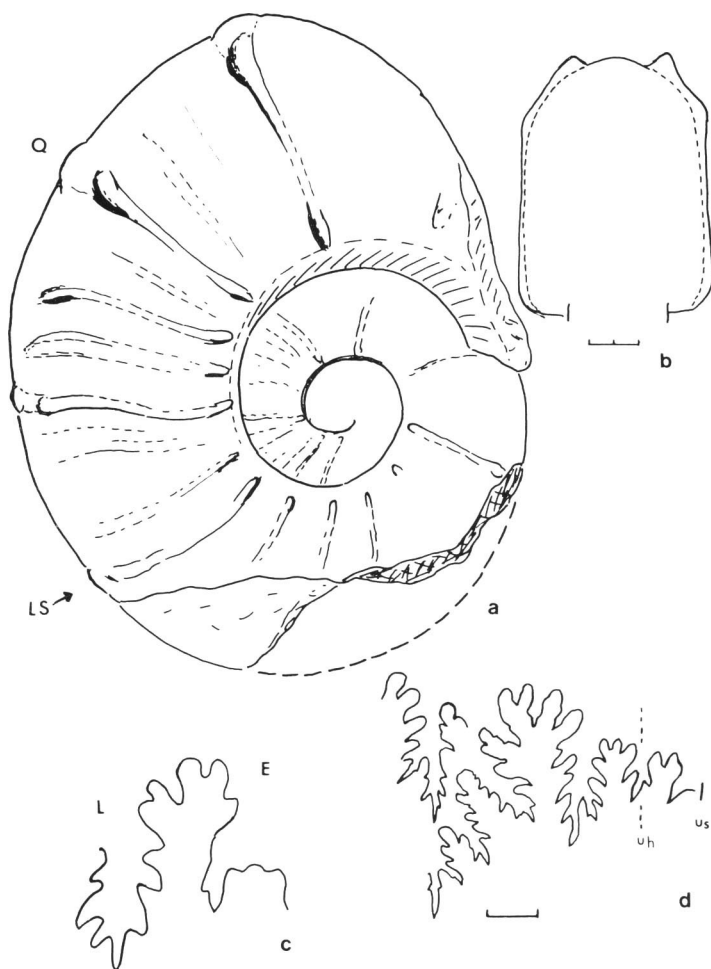
*Material:* Holotype, a specimen collected on 1978–5–30 by Yoshitaro KAWASHITA, Mikasa, showing the characters of phragmocone and the body-chamber both.

*Description:* The specimen is fairly large. It would be about 28 cm in diameter, if the eroded part is restored. The whorl enlarges with a moderate rate; its height increases from 50 mm to 95 mm in a half volution at a diameter of about 210 mm. Therefore, despite the evolute state the umbilicus is not so wide, slightly less than 30 per cent of the entire shell diameter.

The whorl is higher than broad, with  $B/H=0.76$  in the body-chamber, subrectangular in section, with flattened and parallel flanks and nearly vertical umbilical walls. The venter is evenly arched rather than flattened.

The whorl is ornamented with long ribs each of which starts from the umbilical bulla. Ten long ribs are counted within a half whorl which extends from the last part of the phragmocone to the posterior part of the body-chamber. On the later part of the body-chamber the ribs become more distant and also on the inner whorls the long ribs are rather distant. Some of the long ribs are provided with the inner and the outer ventrolateral tubercles, but some others only with the inner one or without both. Therefore, the major ribs with the three kinds of tubercles appear at wide intervals. The outer ventrolateral tubercles are somewhat clavate on the body-chamber. The ribs are much weakened or almost obsolete on the venter between the rows of outer ventrolateral tubercles. On the interspaces of the long ribs weak riblets, lirae or striae may be discernible. Some of the ribs and these minor ornaments show a gentle flexuosity, forming occasionally a loop; others are nearly straight. The ribs and tubercles are very weak on the inner whorl.

The external sutures of both adult and immature stages are exposed, which show



Text-fig. 2. *Pseudaspidoceras (Ampakabites) kawashitai* sp. nov.

Diagrammatic sketch of holotype (Y. KAWASHITA'S 1978-5-30). a: lateral view (LS: last suture); b: whorl-section at Q. Bar 20 mm (for a and b). c: part of much eroded suture, showing the narrow and tall first lateral saddle; d: part of suture near LS, showing the inner side of L and the auxiliaries. Bar 10 mm (for c and d). (T. MATSUMOTO *delin.*)

E, L, U2 and other auxiliaries. The folioles and the lobules of the elements are narrow, long or deep and fairly finely incised even on the inner whorl.

*Measurements* (in mm):

At about 90° behind the preserved last part.

Diameter	Umbilicus	Height	Breadth	B/H
204.0	60.0 (0.29)	93.5	71.5	0.76

*Occurrence:* Upper reaches of the Kamimaki-zawa, in a right branch 1 km upstream from the branching point, Oyubari area, Hokkaido. *Mytiloides labiatus subhercynicus* SEITZ (KAWASHITA's Coll.) was obtained at the nearby locality, which suggests Lower Turonian.

*Remarks:* With respect to the shell-form and the ornamentation, the present specimen is seemingly similar to the illustrated holotype and paratype of *Pseudaspidoceras flexuosum* POWELL (1963, p. 318, pl. 32, figs. 1, 9, 10; text-fig. 2a-c, f, g), from the Lower Turonian of Trans-Pecos Texas and northeastern Chihuahua (Mexico). A minor difference in the degree of flexuosity of the ribs and the proportion of whorl-breadth to height could be counted as individual variations. The venter is arched in our specimen but is flattened in the specimens of POWELL and also PETRASCHECK (1902, pl. 9, fig. 1a, b, from Saxony [Sachsen]). A fragmentary outer whorl from the Obira area (Hokkaido), which was reported as *Mammites* sp. by YABE (1909) and described provisionally under *Ampakabites* (?) sp. by MATSUMOTO *et al.* (1978, p. 14, pl. 6, fig. 2a, b; text-fig. 6), has a rather flat venter and a larger proportion of B/H. Otherwise it is similar to the outer whorl of the present specimen. The important distinction of our form is in the suture. The present specimen and also that Obira specimen show deeply and intricately subdivided sutures, whereas POWELL (1963) described simpler and more shallowly subdivided sutures similar to that of *P. footeanum* (STOLICZKA) (1864, pl. 52, fig. 1c), the type species of *Pseudaspidoceras*. As we do not regard this clear difference in the suture as intraspecific variation, we refrain from concluding the identity of this specimen (and also the Obira specimen) with *P. flexuosum* POWELL. The suture of our form resembles closely that of *Kamerunoceras (Ampakabites) auriculatus* COLLIGNON (1965, p. 29, pl. 388, fig. 1662; pl. 389, fig. 1664), the type-species of *Ampakabites* and also that of *Ampakabites regina* MATSUMOTO *et al.* (1978 text-fig. 5).

*Discussion:* KENNEDY and WRIGHT (1979) have recently made clear the genus *Kamerunoceras* REYMENT, 1954. In that paper they briefly mentioned that *K. (Ampakabites) auriculatus* is believed to be a synonym of *Pseudaspidoceras flexuosum* on the abundant topotype material of the latter. They also regarded *Ampakabites collignoni* COBBAN and SCOTT (1972, p. 81, pl. 20, figs. 1-3, text-figs. 39, 40) as a species of *Pseudaspidoceras*.

As there is no trains of siphonal tubercles, COLLIGNON's species is not related to *Kamerunoceras*. *Ampakabites* and *Pseudaspidoceras* are essentially similar to each other in the shell-form and the ornamentation. As far as their difference in suture is constant, *Ampakabites* can be used as a subgenus of *Pseudaspidoceras*. We recall here similar cases in the Peroniceratinae in which, for example, *Cobbanoceras* can be distinguished from *Peroniceras* and *Sornayceras* from *Gauthiericeras* on account of a distinct difference in the sutures (see MATSUMOTO, 1965b). Furthermore, *Ampakabites regina* MATSUMOTO, FUJISHIMA *et* MIYAUCHI (1978, p. 11, pl. 3, fig. 1; pl. 4, fig. 1; pl. 5, fig. 2; text-figs. 4, 5) is considerably different from the known species of *Pseudaspidoceras*. We use *Ampakabites* provisionally as a subgenus.

5. *Neptychites cephalotus* (COURTILLER)

Pl. 4, fig. 1a-d

*Material:* A specimen numbered 331 in the Collection of Masatoshi KERA, Mikasa, which is septate for the most part and has a portion of somewhat deformed body-chamber.

*Description:* The shell is small, although it has a portion of the body-chamber. It is involute and has a deep and narrow umbilicus, U being 7 per cent of D. The whorl is higher than broad, with B/H ranging from 0.82 to 0.85 in the measurable, undeformed part, and broadest in the lower part, with gently convex and convergent flanks and a narrowly arched venter.

There are numerous ribs of unequal length. They are gently concave, very weak near the umbilical margin and somewhat broadened and becoming more distinct towards the venter. On the body-chamber they are broadened but lowered. On the phragmocone there are at least three, shallow constrictions.

The diagnostic external sutures are well exposed, which are pseudoceratitic, being similar to those illustrated by PERVINQUIÈRE (1907, p. 396, text-fig. 152). They are fairly approximated in the last part of the phragmocone.

*Measurements* (in mm):

	Diameter	Umbilicus	Height	Breadth	B/H
At the end of phragmocone	55.3	3.9 (0.07)	32.5	27.8	0.85
-120°	—	—	25.3	20.7	0.82

*Occurrence:* The specimen was obtained by M. KERA on 30th August 1975 in one of floated nodules in the Ohmaki-zawa, at about 2 km from the confluence with the Shiyubari, Oyubari area.

*Remarks:* This specimen is undoubtedly identified with *Neptychites cephalotus* (COURTILLER) (see PERVINQUIÈRE, 1907, p. 393, pl. 27, figs. 1-4; text-fig. 152), from the Lower Turonian of various regions. An example of the same species from the Obira area (Hokkaido) was described by MATSUMOTO (1977b, p. 197, pl. 1, fig. 1; text-fig. 1), in which a list of synonymy and the distribution on the reconstructed world map are shown. That Obira specimen is a fairly large shell with the full body-chamber. The present specimen is much smaller and might be immature. As it has a portion of the body-chamber and its sutures are approximated in the last part of the phragmocone, we suggest that it may represent a microconch of the dimorphic pair which has not been recognized in this species. Unfortunately the apertural margin is not preserved in this specimen.

On the previous occasion one of us (T. M., 1977b) mentioned that an example from Colorado described by COBBAN and SCOTT (1972) is atypical, but Dr. COBBAN has kindly informed (in a letter dated March 26, 1981, to T. M., with photographs of fine specimens) the occurrence of the typical form of this species in western New



Mexico together with *Mammites nodosoides* (SCHLOTHEIM), *M. depressus* POWELL, *Fagesia superstes* (KOSSMAT) and *Kamerunoceras turoniense* (D'ORBIGNY).

#### 6. *Hourcquia ingens* COLLIGNON

Pl. 4, fig. 2a-c

*Material:* A specimen numbered 50-7-10 in the Collection of Y. KAWASHITA, which consists of a well preserved phragmocone and a portion of the badly squashed body-chamber.

*Description:* The shell is about 65 mm in diameter at the end of the phragmocone. It would exceed 100 mm at the restored full-grown stage. It is involute and the whorl enlarges with a considerable rate, showing the whorl-height ratio of about 1.5 for a half revolution. It is, narrowly and deeply umbilicate ( $U/D=0.19$ ). The whorl is subtrigonal in section, nearly as high as broad or slightly higher than broad, broadest at the umbilical shoulder, with generally convergent flanks which have a shallow depressed zone at the middle, shouldered at the ventrolateral part and keeled on the siphonal line. The keel is moderately broad and high.

There are about ten, rather thick tubercles on the umbilical shoulder, from each of which ribs arise in pair. There are shorter ribs without umbilical tubercles; usually one but occasionally two intercalated. All the ribs are gently flexuous and regularly tuberculated at the ventrolateral shoulder, from where the ribs are curved forward but soon disappear and do not cross the keel. The ribs are altogether 25 or 26 per whorl.

The suture at about 18 mm in whorl-height shows deep E, moderately deep and rather narrow L and much shorter U2 and other auxiliaries. The head of the saddles are asymmetrically subdivided.

#### *Measurements:*

	Diameter	Umbilicus	Height	Breadth	B/H
A	64.5	12.5 (0.19)	32.0 (0.49)	32.0 (0.49)	1.0
B	—	—	28.5	26.0	0.9

A: At the end of phragmocone; B. 90° earlier; intercostal.

*Occurrence:* In a marly nodule floated on the river bed of the Obirashibetsu, somewhat upstream of Kawakami, Obira area, Rumoi district, Hokkaido. The original derivation is uncertain, but Coniacian and Turonian strata are exposed along the main stream of the Obirashibetsu for a considerable distance upstream from Kawakami, while the neighbourhood of Kawakami itself is Santonian.

*Remarks:* On the ground of the described characters, this specimen is most probably identified with *Hourcquia ingens* COLLIGNON (1965, p. 80, pl. 412, figs. 1704-1706; pl. 413, figs. 1707, 1708, 1710), from the Zone of *Coilopoceras requieni-Romaniceras deverianum* (Turonian) of Madagascar. It is closely similar to one of the paratype (*Ditto*, pl. 412, fig. 1706) in shell-form and another (*Ditto*, pl. 412, fig. 1705)

in ornamentation, but is more involute and has a narrower umbilicus. One of COLLIGNON's specimen illustrated under *H. ingens* var. *antsakozatensis* COLLIGNON (*Ditto*, pl. 413, fig. 1710) has an umbilicus as narrow as that of the present specimen, although it has a more compressed whorl and more numerous ribs. As *H. ingens* shows a considerable extent of variation, the present specimen falls within the variation of that species.

The monotypic holotype of *H. pacifica* MATSUMOTO (1970, p. 311, pl. 49, fig. 2; text-fig. 4) has a broader whorl, clearer zone of depression on the flank and more distant, coarser ribs than any examples of *H. ingens*. It is, however, required to know the true extent of variation in *H. pacifica* so that its relationships with *H. ingens* and *H. mirabilis* may become clearer. *H. hataii* HASHIMOTO (1973, p. 316, pl. 35, figs. 1, 2; text-fig. 2), which is again monotypic, is a peculiar form which is compressed and has numerous ribs in the immature stage but is depressed and has very coarse tubercles and ribs in the adult outer whorl. The stratigraphic positions of these two species are uncertain as is that of the present specimen, although HASHIMOTO suggested the Coniacian age of his species.

Lastly it should be noted that there remain on the shell of the present specimen faint colour patterns which run spirally around the umbilicus and on the ventrolateral part.

#### 7. *Reesidites minimus* (HAYASAKA et FUKADA)

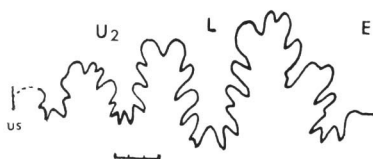
Pl. 5, fig. 2a, b; Pl. 6, fig. 1a, b; Text-fig. 3

*Material:* Takemi TAKAHASHI Collection, TTC. 520731, from his loc. 250 p, Manji area, central Hokkaido.

*Descriptive remarks:* This particular specimen is atypical as compared with the hitherto understood species concept of *Reesidites minimus* (HAYASAKA et FUKADA) (1951; OBATA, 1965; MATSUMOTO, 1965a). It is about 90 mm in diameter and nearly wholly septate, with only a portion of the body-chamber preserved at its end. Therefore the shell, if completely preserved, would be unusually large for *R. minimus*, about 140 mm or more in a restored diameter, seeing that the holotype, probably adult shell, is about 100 mm in diameter.

This specimen is less involute than the holotype; about three fifths (in whorl-height) of the inner whorl being overlapped by the outer whorl. The umbilicus is much broader than in the holotype, nearly or slightly less than 30 per cent of the shell diameter. The whorl-section is similar to that of the holotype, but has a somewhat larger B/H, i.e., 0.52 as compared with 0.44 in the holotype and a topotype (GK. H4090).

It is similar to the holotype and other adult examples of *R. minimus* in the mode of ribbing, such as the flexuosity, bifurcation, intercalation and interspacing, but the ribs are somewhat coarser and less numerous than in the holotype. Its tuberculation, without inner ventrolateral tubercle, is the same as that of normal examples of *R.*



Text-fig. 3. External suture of *Reesidites minimus* (HAYASAKA et FUKADA) at whorl-height=20 mm in T. TAKAHASHI's specimen (520731). Bar 3 mm. (T. MATSUMOTO *delin.*)

*minimus*. On the observable outer whorl, there are 13 umbilical tubercles and 30 ventral ones. The proportion in number between the two kinds of tubercles is somewhat, but not much, different from that (12: 37) of the holotype and another example (12: 36 in GK. H4090) of similar size.

The sutural pattern is generally the same as that of normal examples of *R. minimus*.

*Measurements* (in mm):

	Diameter	Umbilicus	Height	Breadth	B/H
End of phragmocone	89.0	25.4 (0.28)	39.4	20.6	0.52
-120°	69.4	20.3 (0.29)	29.6	15.7	0.53

*Occurrence*: A floated nodule at loc. 250 p (of T. TAKAHASHI), Ponnebetsu [=Suido-no-sawa], a tributary of the Horomui, Manji area, central Hokkaido. The specimen was in green calcareous silty fine-grained sandstone, together with smaller specimens of *Reesidites minimus*. The rock is quite similar to that of the Zone of *Reesidites minimus* exposed at loc. RN 8001 of OBATA and FUTAKAMI (1975, text-fig. 4), which is close to the present locality.

*Discussion*: The Zone of *Reesidites minimum* in the Ikushumbetsu and the Manji areas is characterized by the abundant occurrence of the named species. For some reasons, however, the hitherto obtained specimens are mostly immature and the adult specimens are very few. One of us (OBATA, 1965) has shown in his study of the allometry that there is a considerable variation at each of the six growth-stages (except for the first stage, i.e. the protoconch) with respect to every character. For the last stage, i.e. the seventh stage in his subdivision, the extent of variation was apparently narrow, but this may have come from the small number of the available sample.

Now the present specimen has at least eight whorls and accordingly represents the seventh stage. Should we plot the numerical data obtained by the measurements of the present specimen to OBATA's (1965) diagram of text-fig. 1, the range of variation at the 8th stage would be enlarged to a reasonable extent so that it would not deviate from the trend of the ontogenetic development. Therefore, we could regard the atypical characters of the present specimen as being within the variation of the same species at the adult stage.

Another point to be discussed is the unusually large size of the present specimen

in a restored state. This may suggest the dimorphism; the holotype might represent the microconch and the present specimen the macroconch. Since no specimen shows the apertural margin, we hesitate to give a conclusion.

*Discussion:* MATSUMOTO (1965a) ascribed *Reesidites* to the subfamily Collignoniceratinae because of its intimate relationship with *Subprionocyclus*. If we take account of the absence of the inner ventrolateral tubercles and the similarity between the type species of the two genera, *R. minimus* and *Barroisicerias haberfellneri* (HAUER), there could be another way of taxonomy to ascribe *Reesidites* to the subfamily Barroisiceratinae. In the latter case Barroisiceratinae would have proved to appear in the latest Turonian. Whether *Reesidites* is a direct ancestor of *Barroisicerias* or *Barroisicerias* was directly derived from a certain form of *Subprionocyclus* is yet uncertain.

#### 8. *Reesidites latus* sp. nov.

Pl. 6, fig. 2a, b

*Material:* Holotype, Yoshitaro KAWASHITA Collection No. 54-10-20, from the Zone of *Reesidites minimus*, Suido-no-sawa, Manji area, central Hokkaido.

*Description:* The shell is of moderate size, about 100 mm in diameter of the holotype which has the body-chamber. The whorl enlarges with rather a slow rate; for example the whorl-height increases from 25.5 mm to 33.0 mm in a half outer volution. The umbilicus is wide, about 40 per cent of the entire shell diameter. About one third (in whorl-height) of the inner whorl is overlapped by the outer one. The whorl is higher than broad, B/H being 0.66 to 0.67. It is very gently convex on flanks, seemingly nearly parallel sided in the inner half of the whorl. The umbilicus is surrounded by a low wall and a subrounded shoulder. In the outer half the flanks are gently convergent towards the distinct ventrolateral shoulders. The venter is narrow and has a serrated keel.

The whorl is ornamented with gently flexuous ribs. The ribs start in pair from the umbilical tubercle or a short rib is intercalated between the long ones. The ribs are numerous, separated by narrower interspaces, moderately broad and high. Every rib has a clavate tubercle at the ventrolateral shoulder and on the keel. The chevrons of the ribs on the venter are not acute. Fine lirae may be partly discernible on the ribs and the interspaces.

The suture is unknown, unless the shell layer is taken away.

*Measurements* (in mm):

Specimen	Diameter	Umbilicus	Height	Breadth	B/H
Holotype	97.0 (1)	39.0 (0.40)	32.0	21.5	0.67
" (-200°)	73.4 (1)	29.4 (0.40)	27.8	18.5	0.66

*Occurrence:* According to the information kindly given by KAWASHITA and FUTAKAMI the described specimens were obtained at loc. 163 from the Zone of *Ree-*

*sidites minimus* in the Ponnebetsu [=“Suido-no-sawa”], Manji area, central Hokkaido.

*Remarks:* The present species has common characters with *Reesidites minimus* (HAYASAKA et FUKADA) (see MATSUMOTO, 1965a, p. 63, pl. 14, fig. 1; pl. 15, figs. 1–3; text-figs. 34–39) in the compressed, flat-sided whorl with a serrated keel, the mode of ribbing and tuberculation. Therefore, it is referable to the genus *Reesidites*. It is, however, distinct from that species in its more evolute whorl, much wider umbilicus and a larger proportion of B/H. Although there is some variation in *R. minimus*, as described in the preceding pages, the characters shown by the present specimens are beyond that variation.

The present species is somewhat similar to a comparatively less involute form of *Subprionocyclus*, such as *S. bravaisianus* (D'ORBIGNY) (see MATSUMOTO and NODA, 1966; MATSUMOTO, 1971), which can be regarded as a subspecies or a mere variety of *S. neptuni* (GEINITZ) (see OBATA *et al.*, 1979), but is still more widely umbilicate and there is no inner ventrolateral tubercle. The ribs are simply curved at the points where inner ventrolateral tubercles should occur.

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 Lateral view of the body-chamber,  $\times 1$ . Masami NIHONGI's specimen (MN'' 9): a part of the same individual as Pl. 2, Fig. 1.
- Fig. 2. *Reesidites minimus* (HAYASAKA et FUKADA) .....80  
 Frontal (a) and lateral (b) views,  $\times 1$ . T. TAKAHASHI's specimen (520731) from the Ponnebetsu, Manji area.

#### Plate 6

- Fig. 1. *Reesidites minimus* (HAYASAKA et FUKADA) .....80  
 Ventral (a) and lateral (b) views,  $\times 1$ . T. TAKAHASHI's specimen (520731): the same individual as Pl. 5, Fig. 2.
- Fig. 2. *Reesidites latus* sp. nov. ....82  
 Lateral (a) and frontal (b) views,  $\times 1$ . Y. KAWASHITA's specimen (54-10-20) from the Ponnebetsu, Manji area.

Photos by K. TANABE (Pls. 1, 3) and M. NODA (Pls. 2, 4-6).

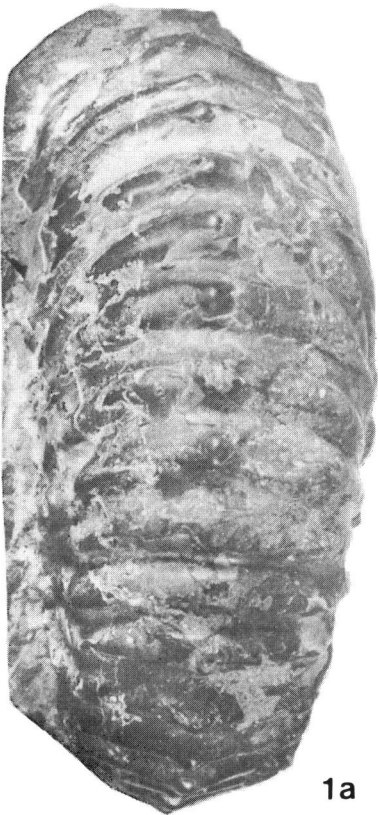




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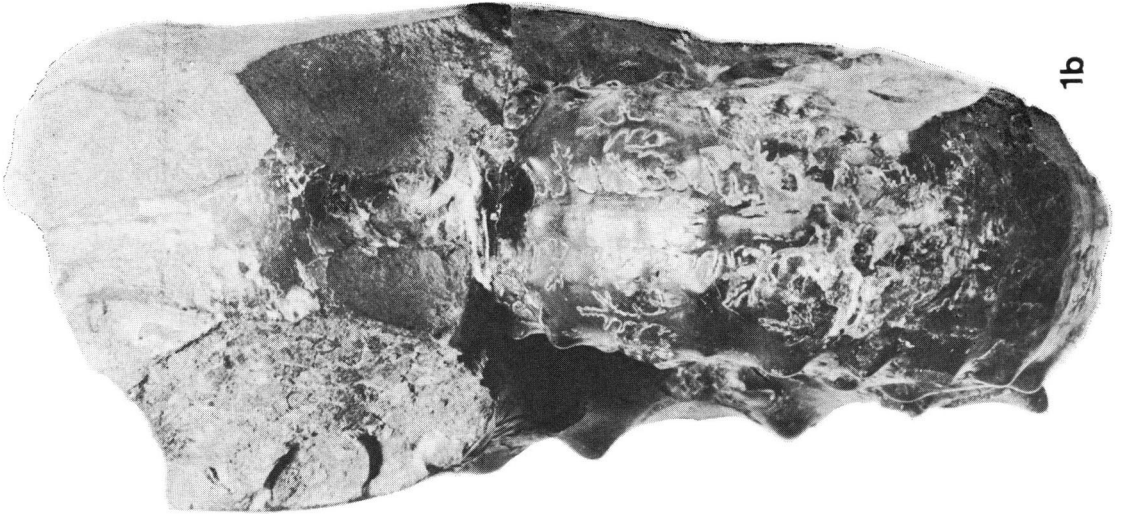
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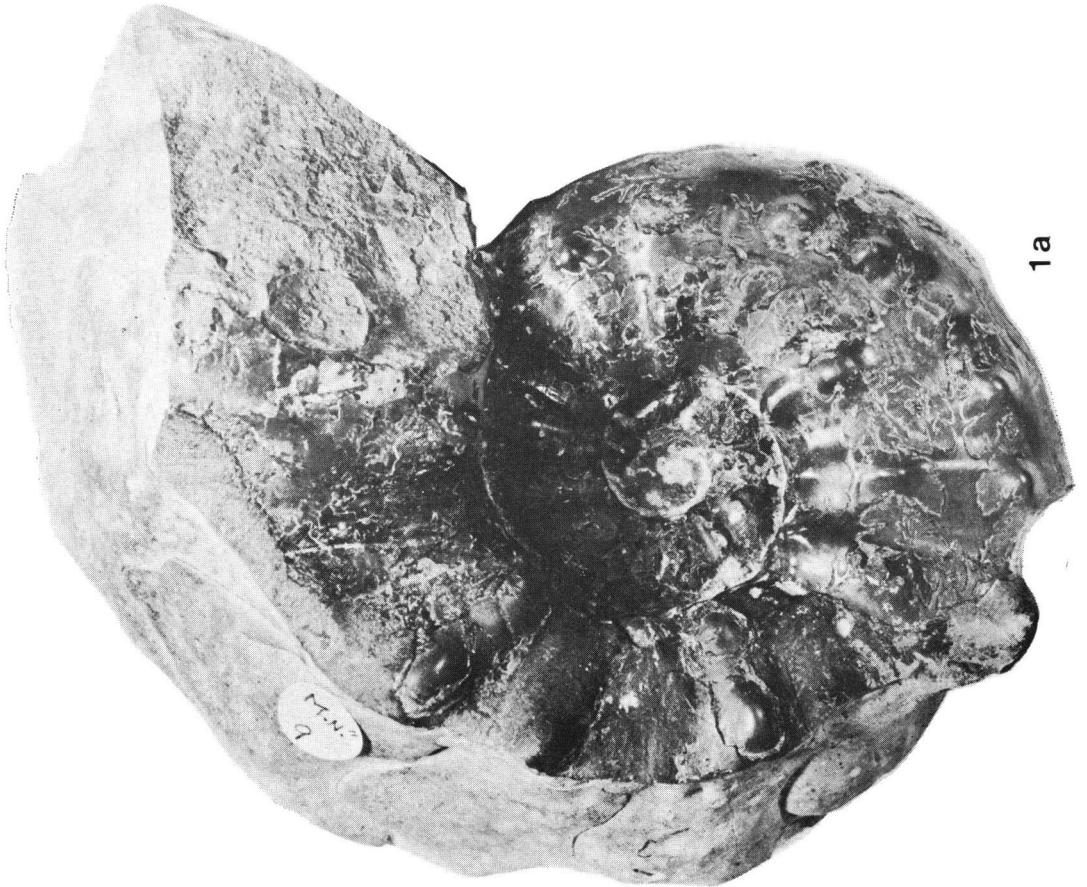
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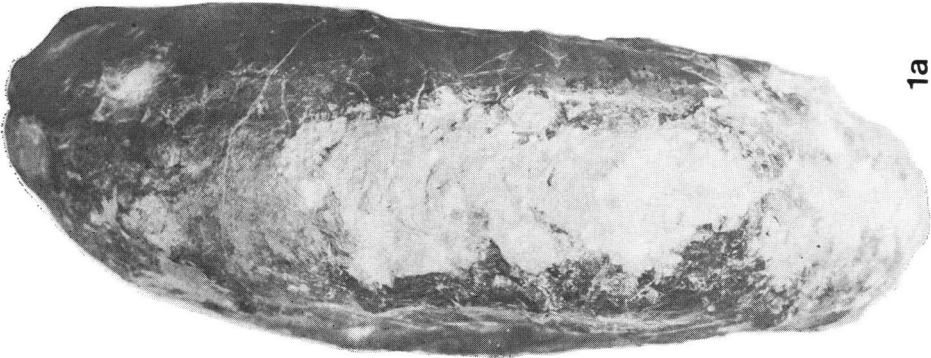
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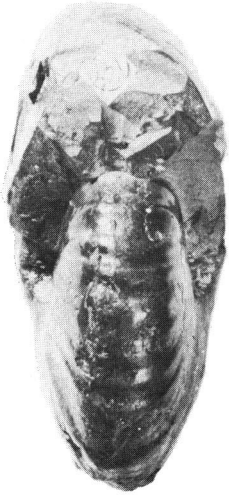
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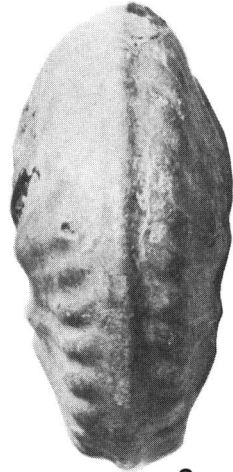
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1d



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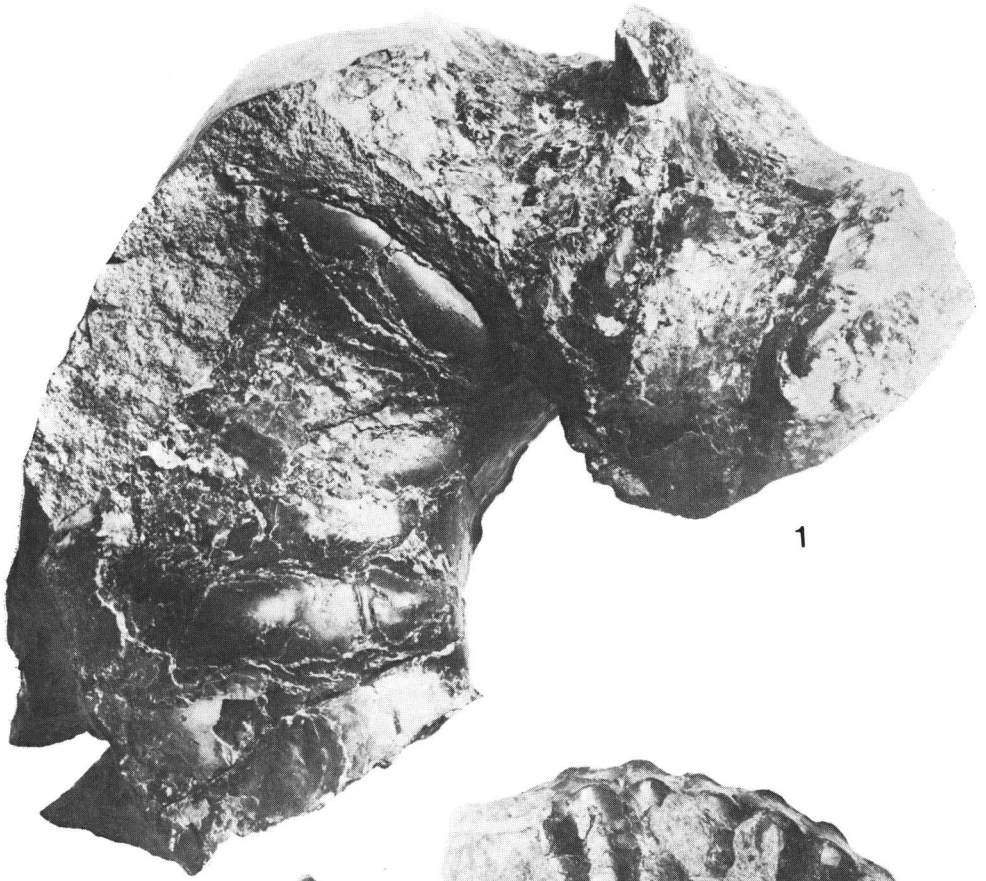


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2b





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2a



2b



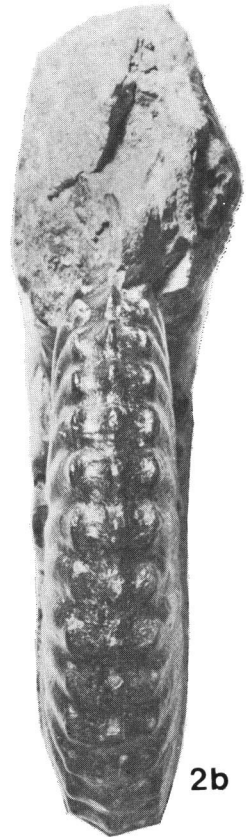
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2a



2b