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Some selected ammonites from the Aptian and Albian Miyako Group, Japan

(Lower Cretaceous ammonites from the Miyako Group, Part 8)

By

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Abstract Four douvilleiceratoid and three lytoceratoid species from the Lower Cretaceous Miyako Group were studied. Among them one new genus, *Oshimaceras*, and three new species, *Hypacanthoplites kawakamii*, *Oshimaceras kanazawai* and *Eotetragonites aketoensis* are proposed.

Introduction

The gently inclined Miyako Group exposes in the Pacific coast area, which is so prolific of various ammonites and is regarded as one of the most important formations of the Lower Cretaceous standard in the Japanese islands (YABE and YEHARA, 1913; SHIMIZU, 1931; OBATA, 1967a, b, 1969, 1973, 1975; HANAI *et al.*, 1968; MATSUMOTO, 1978; OBATA and MATSUKAWA, 1980; OBATA and FUTAKAMI, 1991).

Numerous specimens were collected from the Tanohata Village or Sakiyama Village, Shimohei County, and are preserved or temporarily loaned out for study at the Iwate Prefectural Museum, Morioka City (KAWAKAMI *et al.*, 1983, 1984, 1986). Mr. T. KAWAKAMI, a former stuff of the museum, requested us to examine the ammonite specimens. Among them we selected several specimens for the study. As a result we recognized three genera and four species belonging to Hoplitaceae, two genera and two species belonging to Lytocerataceae, and one genus and one species belonging to Turrilitaceae.

We thank Mr. T. KAWAKAMI who has helped us in various ways. Thanks are also extended to Ms. S. FUNAKI of the National Science Museum, Tokyo who typed the manuscript.

Systematic Description

Superfamily Hoplitaceae DOUVILLE, 1890

Family Douvilleiceratidae PARONA & BONARELLI, 1897

Subfamily Acanthoplitinae STOYANOW, 1949

Genus ***Hypacanthoplites*** SPATH, 1923

Hypacanthoplites has some similarity with *Parahoplites* and *Nolaniceras* in the morphological features, and was included into Acanthoplitidae with the latters. According to CASEY (1961, 1965), *Parahoplites* has generally a narrow umbilicus, and a broadly arched venter, and is characterized by no tuberculation. *Nolaniceras* has rounded venter, wide umbilicus, and no tuberculation on the umbilical marign in any growth-stage. Thus, *Hypacanthoplites* is distinguished from *Parahoplites* and *Nolaniceras*.

Hypacanthoplites kawakamii OBATA & FUTAKAMI sp. nov.

Pls. 1–3; Figs. 1–3

Holotype: IPMM 8697, a middle-aged specimen from a block at about 150 m west of Shimanokoshi coast (Collected by F. SASAKI).

Paratype: IPMM 8696, an adult shell of gerontic stage, from Shimanokoshi coast (Collected by A. SHIMONOSONO).

Both specimens were yielded from the Hiraiga Formation, Tanohata Village, Shimohei County, Iwate Prefecture.

Measurements: (estimation in mm, because of secondary deformation)

	Diameter	Height	Breadth	B/H	Umbilicus	U/D
Holotype						
IPMM 8697	183.8	79.6	46.0	0.58	56.8	0.31
Paratype						
IPMM 8696	339.7	136.8	—	—	107.4	0.32

Specific diagnosis: Shell is very large, showing moderate involution. The diameter of umbilicus is moderate in size, being 31 to 32% of the total shell diameter. The whorl is distinctly compressed and subrectangular in cross section, although that is slightly deformed secondarily. The umbilical wall is low and perpendicular. Ornaments of the shell surface are composed of flexous primary and secondary ribs. There are one to three secondary ribs between each primary rib by insertion or forking of the latter.

The inserted ribs start from the mid-flank, while the forked ribs start at a third part from the umbilical shoulder. The primary ribs are strong and rursiradiate on the umbilical wall, usually forming a tubercle-like elevation on the umbilical shoulder. They are somewhat decreased in strength on the flank and more or less biconcave, showing a convex curvature on the mid-flank. The ribs are comparatively strong on the venter. In the middle growth-stage they are almost rectiradiate on the venter, while they are slightly projected forward on the body chamber of the full-grown shell in the gerontic stage. There are fine lirae near the apertural margin. Tubercles are well developed in the young and middle growth-stages: the bullae on the umbilical and the ventrolateral margin and the nodes on the lateral flank. They are rather strong especially on the inner whorl.

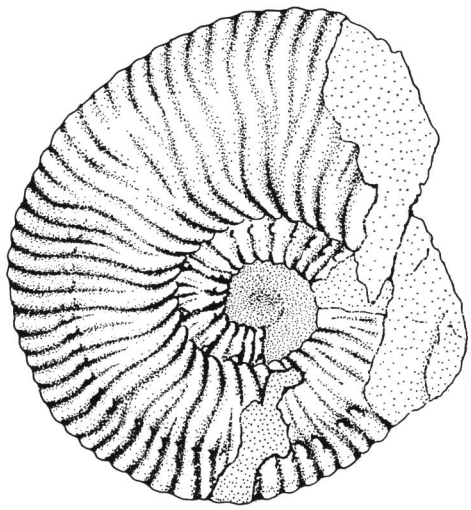

Fig. 1. *Hypacanthoplites kawakamii* OBATA & FUTAKAMI, sp. nov. (IPMM 8697, holotype, ×0.37)

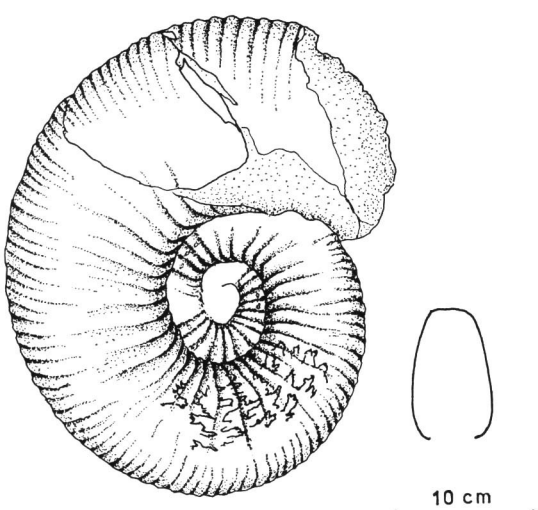

Fig. 2. *Hypacanthoplites kawakamii* OBATA & FUTAKAMI, sp. nov. (IPMM 8696, paratype, ×0.19)

According to WIEDMANN (1966) suture-lines of *Hypacanthoplites* are represented by a formula of $ELUv_1$, Uv_2Uv_3: U_dI. Those of this species are not so complicated, but are not clearly known in details.

Ontogeny: As generally known in *Hypacanthoplites* (CASEY, 1965, p. 422), the mor-

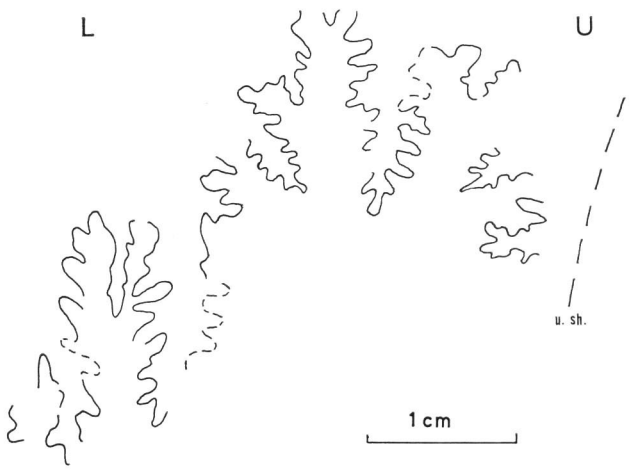

Fig. 3. Suture of *Hypacanthoplites kawakamii* OBATA & FUTAKAMI, sp. nov. (IPMM 8696, paratype)

phologic feature changes by growth-stages. In the young and the middle stages the tubercles and the primary ribs are strong.

In the earlier shells the primary ribs are coarse, and the secondary ribs are weakly formed. The distance between two primary ribs is usually wide: the distance and the strongness of these ribs are generally irregular. Occasionally the umbilical bullae differentiate to the outer and the inner ones. The whorl-section is quadrangular, being lower than that of the adult shell in height.

In the adult shells the tubercles and the ribs gradually decrease in strength. Thus, the ventrolateral and the umbilical bullae change into only a slight elevation, and the lateral nodes disappear at about 163 mm in shell diameter. On the living chamber of the gerontic stage the ribs almost disappear on the lateral flank.

Remarks: The present species has slender whorls, somewhat angular ventrolateral and umbilical shoulders. The lateral nodes persist at about 160 mm in diameter.

Comparison: The present species resembles in the morphological characters to *Hypacanthoplites spathi* (DUTERTRE) from the Upper Aptian of England (CASEY, 1965, 442–443, text-fig. 164a-b). The latter species has, however, small shell (*ca* 60 mm in diameter), and is characterized by the existence of the lateral tubercles up to about 30 mm in diameter, having rather regularly arranged ribs. Therefore, *Hypacanthoplites spathi* (DUTERTRE) is distinguished from the present species in the above morphological characters.

Hypacanthoplites subcornuerianus, a late Aptian species from Japan (SHIMIZU, 1931, 32–33, pl. 1, figs. 8, 9) is generally small in shell size (*ca.* 50 mm) and has less slenderer, subquadrate whorl-section than *H. kawakamii*.

Occurrence: This species occurs from the Hiraiga Formation of the Miyako Group. The formation is assigned to the upper Upper Aptian.

Hypacanthoplites subcornuerianus (SHIMIZU)

Pl. 4, fig. 1; Figs. 4, 5

1931 *Acanthoplites subcornuerianus* SHIMIZU, p. 32–33, pl. 1, figs. 8, 9.
1968 *Hypacanthoplites subcornuerianus* (SHIMIZU); HANAI *et al.*, pl. 2, fig. 6.
1980 *Hypacanthoplites subcornuerianus* (SHIMIZU); OBATA and MATSUKAWA, p. 189, pls. 23, 24.

Material: IPMM 8725 from Hiraiga, Tanohata Village, Shimohei County, Iwate Prefecture (Collected by Study Group of Iwate Natural History). The specimen is very beautifully preserved.
Measurements: (in mm)

	Diameter	Height	Breadth	B/H	Umbilicus	U/D
IPMM 8725	40.6	16.9	14.8	0.88	13.7	0.34

Description: The shell is small and has moderate width of the umbilicus, U/D being 34%. The whorl-section is subquadrate: the whorl-height is slightly larger than the breadth. The umbilical wall is low and perpendicular to the flank, but the umbilical shoulder is rather rounded. The ornaments of the shell surface consist of ribs and tubercles. There are sinuous primary ribs and secondary ones which start near the mid-flank. One to three secondary ribs are intercalated between two primary ribs.

Tubercles are on the primary ribs: they are bullae on the umbilical shoulder and nodes on the lateral flank and the ventrolateral part. The ribs and the tubercles vary eminently by growth in one and the same specimen. At 21.0 to 27.4 mm in diameter ribs are coarse and strong, while the tubercles are sharp and enlarged.

On the body chamber at above 27.4 mm in diameter the ribs are weakened but are increased in number. They are flexuous on the flank and somewhat projected

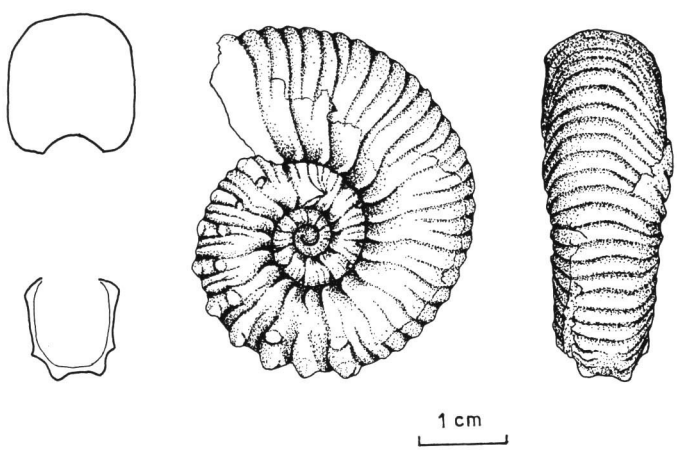

Fig. 4. *Hypacanthoplites subcornuerianus* (SHIMIZU). (IPMM 8725)

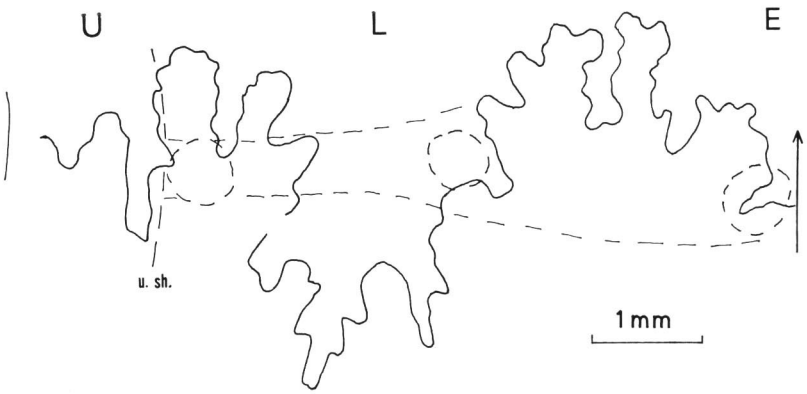

Fig. 5. Suture of *Hypacanthoplites subcornuerianus* (SHIMIZU). (IPMM 8725)

forward. At 29.2 mm in diameter the lateral and the ventrolateral tubercles disappear.

Suture-lines are simple: the ventro-lateral saddle is large, and the lateral lobe is subsymmetrically trifid (Fig. 5).

Occurrence: Sandstone along the coast of Raga, Tanohata Village, Shimohei County, Iwate Prefecture. The lower part of the Hiraiga Formation, which is assigned to the upper Upper Aptian.

Nolaniceras yaegashii (SHIMIZU)

1931 *Parahoplites yaegashii* SHIMIZU, p. 30–32, pl. 2, figs. 1–3.

Material: IGPS 36509. The specimen is the holotype of the present species. The shell is incomplete, because a half of the shell is missing and the preserved inner whorl is deformed secondarily.

Measurements: (in mm)

	Diameter	Height	Breadth	B/H	Umbilicus	U/D
Holotype	—	78.7	52.3	0.66	62.8	—

Description: The shell is rather large, being more than 200 mm in diameter. The width of umbilicus is moderate. The whorl section is rather oval and the whorl height is larger than the breadth. The whorl has the rounded venter and somewhat inflated on the flanks, but is suddenly arched on the umbilical shoulder, then perpendicular on the umbilical wall to its surface, showing the largest breadth near the umbilical margin.

The ornaments of the shell surface consist of the flexuous primary ribs and secondary ones. A few secondary ribs are usually intercalated between two primary ribs on the outer half of the flank, frequently diverging on the mid-flank from the primaries. The ribs are radial on the venter, instead of forward projection.

Simple suture-lines are well preserved on the shell. There are broad first lateral saddle and lobe. The former is symmetrically divided, and the latter trifid.

Remarks: The present species was assigned to *Parahoplites* by SHIMIZU (1931). The species, however, has a large umbilicus, flexuous and fine ribbing, rounded venter and the suture-lines resembling to those of *Nolaniceras*. From all along the line of morphologic evidences above mentioned, the present species may be better placed as *Nolaniceras yaegashii* (SHIMIZU).

Comparison: *Nolaniceras* was proposed by CASEY (1961, p. 598) using *Hoplites nolani* (SEUNES, 1887, p. 564, pl. 13, figs, 4a, b) from France as the type species. The present species, however, has more numerous ribs, slenderer whorl-section than the type species, and has no regular insertion of the secondary ribs.

The present species much resembles *Acanthoplites uhligi* ANTHULA described by SINZOW (1907, p. 498, pl. 7, figs. 9, 9a). The latter species is distinguished from the former one in having a ventrolateral angulation and a narrower umbilicus.

Occurrence: Sandstone of the lower part of Hiraiga Formation, Sakiyama Village, Shimohei County, Iwate Prefecture. The locality is included in the zone of *Hypacanthoplites subcornuerianus* of the upper Upper Aptian.

Family Douvilleiceratidae PARONA & BONARELLI, 1987

Subfamily Parahoplitinae SPATH, 1922

Genus ***Oshimaceras*** nov.

Diagnosis: The upper Upper Aptian *Oshimaceras* is closely allied with the middle Upper Aptian *Parahoplites* in the morphological characters, but has slenderer whorls and more complicated sutures than *Parahoplites*.

Type species: *Oshimaceras kanazawai* OBATA & FUTAKAMI, below described.

Oshimaceras kanazawai OBATA & FUTAKAMI sp. nov.

Pl. 5; Figs. 6, 7

Material: A well preserved specimen from Loc. Ks 4004, the east coast of the Oshima islet, off the southeastern coast of Moshi, Iwaizumi-town, Shimohei County, Iwate Prefecture. It is told that the specimen was discovered in about 1925, and has been kept at Kakuzo KANAZAWA's home. The replica is registered as IPMM 8698 and is preserved at the Iwate Prefectural Museum, Morioka.

Measurements: (in mm)

	Diameter	Height	Breadth	B/H	Umbilicus	U/D
IPMM 8698	195.0	86.4	60.8	0.70	55.4	0.28

Description: The specimen is fairly large. The width of umbilicus is somewhat narrow, being 28% to the total diameter. The whorl-section is oval, having a rounded venter: the whorl-height is larger than the whorl-breadth. The umbilical margin is less angular, but is sharply curved, showing a perpendicular wall. The umbilicus is

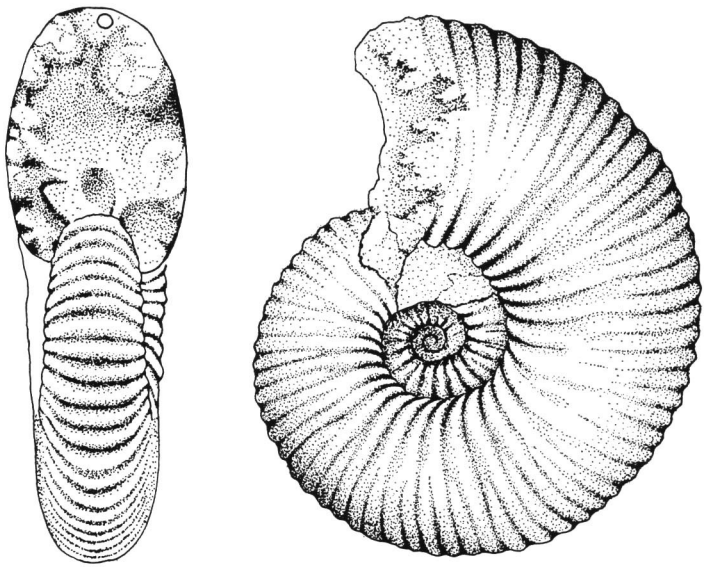

Fig. 6. *Oshimaceras kanazawai* OBATA & FUTAKAMI, sp. nov. (IPMM 8698, holotype, ×0.37)

shallow. The whorl-breadth is the widest at about one third on the flank from the umbilical margin. The body chamber is not preserved.

The ornament of the shell surface consists of the primary and the secondary radial ribs. Between two primary ribs a few secondary ribs are inserted, being sometimes forked from the primary at the mid-flank. The ribs are strong on the umbilical margin, forming somewhat bullae-like elevations. They cross on the venter almost radially. The ribs are, however, slightly projected forward on the late stage. The ribbing is comparatively coarse and strong in the inner whorls than in the outer whorls. There is no tubercle at any growth-stages except the bullae-like elevations on the umbilical margin.

Suture-lines are well preserved, being rather complicated. The external lobe is narrow and deeply bipartite by the median foliole. The first lateral saddle is high, subsymmetrically and deeply bipartite. The first lateral lobe is large and subsymmetrically trifid. The median lobule is extremely large and deep. The second lateral saddle is lower than the first and asymmetrically divided.

Comparison: The present specimen has some similarity with those of *Parahoplites nutfieldensis* (SOWERBY) in the shell ornament and the narrow umbilicus. The former has, however, slenderer whorls and more complicated sutures than the latter.

Parahoplites cunningtoni CASEY also resembles the present species, but has regularly inserted secondary between the primary ribs, narrower umbilicus and slightly higher whorl-section than the present species (CASEY, 1965, p. 411).

As to the whorl-section, the present specimen fairly resembles that of *Parahoplites*

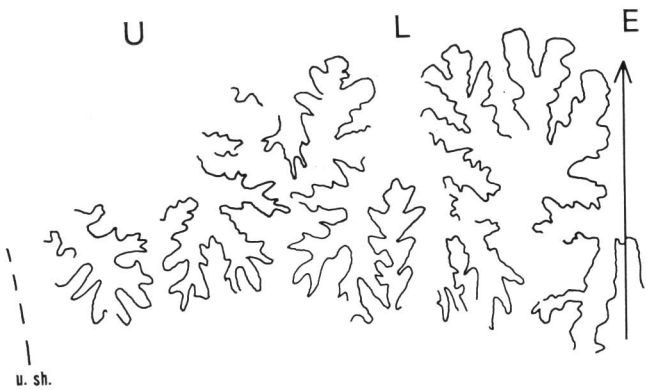

Fig. 7. Suture of *Oshimaceras kanazawai* OBATA & FUTAKAMI, sp. nov. (IPMM 8698, holotype)

vectensis CASEY (1965, p. 413), but differs in having slenderer shell, and the secondary ribs of the latter species start near the umbilical margin.

Nolaniceras yaegashii (SHIMIZU) from the Miyako Group is clearly distinguished from the present species in having wider umbilicus and more flexuous ribs.

Occurrence: The fossil site is interpreted as a calcareous sandstone bed of the upper Hiraiga Formation of the Miyako Group. The bed is assigned to the zone of *Diadochoceras nodosocostatiforme*, the uppermost Aptian.

Superfamily Lytocerataceae NEUMAYR, 1875

Family Tetragonitidae HYATT, 1900

Subfamily Gaudryceratinae SPATH, 1927

Genus ***Eotetragonites*** BREISTROFFER, 1947

Eotetragonites aketoensis OBATA & FUTAKAMI sp. nov.

Pl. 6, Figs. 8, 9

Material: IPMM 8743 from Hiraname coast, Tanohata Village, Shimohei County, Iwate Prefecture. The specimen is collected by Study Group of Iwate Natural History. It is well preserved, although secondary deformation is observed.

Measurements: (estimation in mm, because of secondary deformation)

Diameter	Height	Breadth	B/H	Umbilicus	U/D
85.0	35.0	43.0	1.2	27.0	0.32

Description: The total diameter of the shell is about 85 mm. The width of umbilicus is moderate, being 32% of the total diameter. The outer whorls have nearly flattened parallel flanks, while the inner whorls have rather inflated curvature of the flanks. The umbilical shoulder of the whrol is subangular and the umbilical wall is perpendicular and fairly deep in the adult stage, but is subrounded in the young. The venter

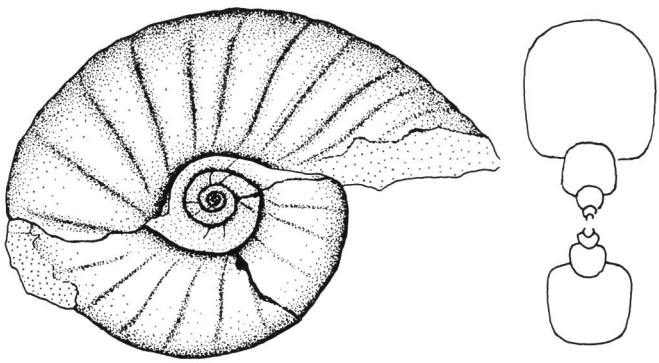

Fig. 8. *Eotetragonites aketoensis* OBATA & FUTAKAMI, sp. nov. (IPMM 8743, holotype)

is widely arched and the ventro-lateral shoulder is somewhat rounded. The cross section of the adult whorl is nearly square, but that of the young is reniform as the whorl-height is smaller than breadth.

The shell surface is almost smooth except numerous striae which show a gentle forward curvature on the flank and widely arched on the venter. There are twenty prorsiradiate constrictions which start from the umbilical seam. They are fairly distinct on the flank and cross on the venter, being widely convex. The constrictions are also discernible on the inner whorls, being about fifteen in number.

The saddles of suture-lines are irregularly and widely divided, representing the pattern of *Eotetragonites* species. The body chamber occupies about two thirds of the outermost whorl.

Remarks: The present species resembles *Eotetragonites raspaili* BREISTROFFER, type species of this genus (BREISTROFFER, 1947; KENNEDY & KLINGER, 1979) in the morphologic features. *Eotetragonites aketoensis*, however, has subangular umbilical shoulder, subrectangular whorl-section and twenty constrictions on the outer whorl, while *Eotetragonites raspaili* has rounded umbilical shoulder and whorl-section, and several constrictions.

The whorl-section of *Eotetragonites aketoensis* has some similarity with that of *E. kossmatelliformis* (FALLOT, 1920, pl. 2, fig. 9). However, the constrictions of the latter species are strong and less numerous, *e.g.* eight in MURPHY, 1967, p. 24. Thus, both the species are clearly distinguished. In this respect the lower Albian *Eotetragonites gainesi* (ANDERSON) from northern California has numerous constrictions on the outer whorl (MURPHY, 1967, pl. 4, figs. 1–5). This species shows convergent flanks and slenderer whorl section than *Eotetragonites aketoensis* which has rather divergent flanks.

Occurrence: The locality is Hiraname coast, Tanohata Village, Shimohei County, Iwate Prefecture. The bed is the lower part of the Aketo Formation of the Miyako Group and is assigned to the upper Lower Albian.

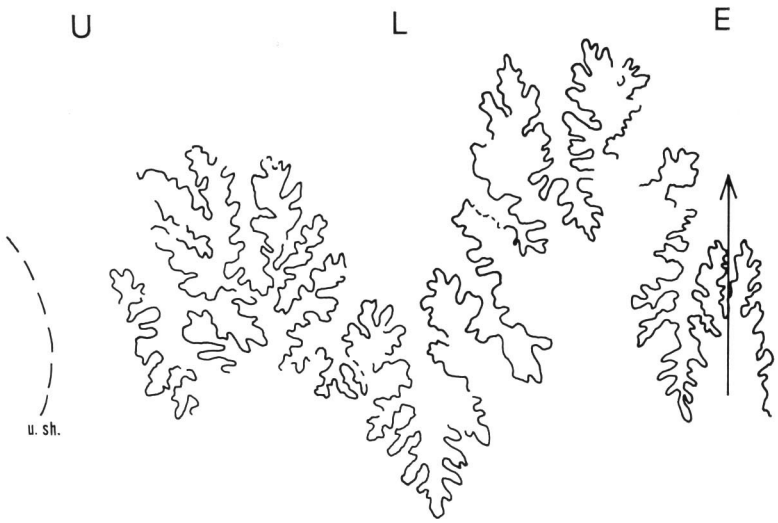

Fig. 9. Suture of *Eotetragonites aketoensis* OBATA & FUTAKAMI, sp. nov. (IPMM 8743, holotype)

Superfamily Lytoceratacеae NEUMAYR, 1875

Family Lytoceratidae NEUMAYR, 1875

Genus ***Ammonoceratites*** BOWDICH, 1822

Subgenus *Ammonoceratites* BOWDICH, 1822

Ammonoceratites (Ammonoceratites) crenocostatus (WHITEAVES)

Pl. 4, fig. 2; Fig. 10

1876 *Ammonites crenocostatus* WHITEAVES, p. 45–47, pl. 9, figs. 2, 2a.

1972 *Ammonoceratites crenocostatus* (WHITEAVES). MCLEARN, p. 22, pl. 1, fig. 5; pl. 2, figs. 1–3.

?1978 *Ammonoceratites (Ammonoceratites) mahadeva* (STOLICZKA). KENNEDY & KLINGER, p. 301, figs. 24, 25, 32, 33.

Material: IPMM 20804, an adult shell, from the Aketo Formation of Hiraname Coast, Tanohata Village, Shimohei County, Iwate Prefecture. The specimen was collected by Mr. Renji KOKUBU.

Measurements: (in mm)

Diameter	Height	Breadth	B/H	Umbilicus	U/D
70.8	24.5	(21.7)	(0.89)	31.3	0.44

Description: The whorl is very evolute and the umbilicus is rather wide. The whorl section is nearly circular and the whorl-breadth is the largest at the mid-flank.

The ornament of the shell surface is very weak. Irregularly flared ribs are nearly

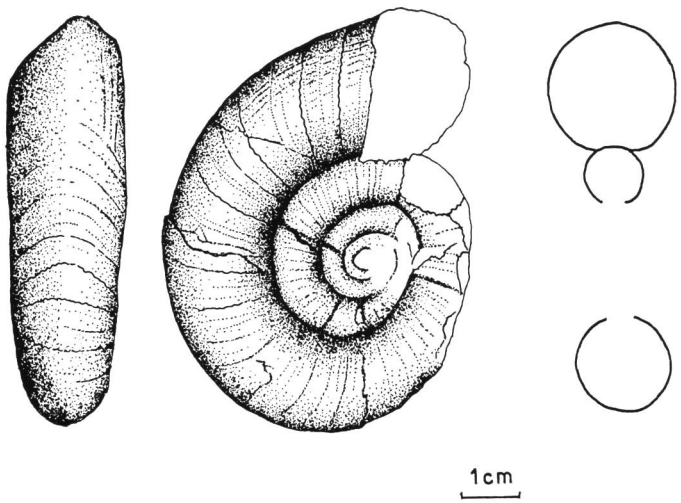

Fig. 10. *Ammonoceratites* (*Ammonoceratites*) *crenocostatus* (WHITEAVES). (IPMM 20804, ×0.78)

radially projected on the flank, and then forwardly on the venter of the outer whorl, showing a convex curvature. Between the ribs there are numerous fine striae. Very week spiral ribs are also observed on the body chamber.

Prorsiradiate growth-lines and well-marked constrictions develop on the inner whorl. The latters are four to five in number, and rather irregularly developed. The suture is not well-marked.

Remarks: *Ammonocreas ezoense* (YABE) was described from the Upper Albian of the main part of the Middle Yezo Group (SHIMIZU, 1931, pl. 4, fig. 1). This species is distinguished from *Ammonoceratites* (*A.*) *crenocostatus* in showing rapid growth of the whorls and no constrictions.

Ammonites mahadeva STOLICZKA (1865, pl. 30, fig. 1) from the southern India shows slightly forward projection of the crossing ribs on the venter, and very weak or no constrictions. In these morphologic characters the Indian species is clearly distinguished from *Ammonoceratites* (*A.*) *crenocostatus*.

The Japanese specimen has the same distinct characteristics as the Canadian specimen of *Ammonites crenocostatus* WHITEAVES (1876, pl. 9, fig. 2) from the Albian of British Columbia in that the constrictions are comparatively strong on the inner whorl and the ribs are convex on the venter. Thus we are inclined to recognize the present species, although KENNEDY and KLINGER (1978) concluded that *Ammonoceratites* (*A.*) *crenocostatus* is a synonym of *A.* (*A.*) *mahadeva* because the Zululand material (KENNEDY & KLINGER 1978, figs. 24, 25) shows the intermediate features of the both species.

Occurrence: The silty sandstone of the Aketo Formation, Miyako Group. The

locality is a cliff of Hiraname coast, Tanohata Village, Shimohei County, Iwate Prefecture. The horizon is assigned to the upper Lower Albian.

Superfamily Turrilitaceae MEEK, 1876

Family Hamitidae HYATT, 1900

Genus ***Hamites*** PARKINSON, 1811

Hamites sp.

Pl. 4, fig. 3

Material: IPMM 20090 from Hiraname coast, Tanohata Village, Shimohei County, Iwate Prefecture. The specimen is collected by Renji KOKUBU from the lower Aketo Formation of the Miyako Group.

Measurements: (in mm)

	Length	Height	Breadth	B/H
IPMM 20090	12.0	21.1	19.6	0.93
		29.4	21.9	0.74

Description: The specimen is incomplete: the preserved part is only the body chamber. The preserved shell is a straight shaft and then curved last part, showing J-shape curvature in outline. The whorl-height is slightly larger than the whorl-breadth. The cross section is nearly elliptical, but the outline of the dorsal part is rather flat. The whorl-height is larger on the curved part than on the straight part.

The ribs are simple, strong and nearly straight, showing slight forward inclination on the straight shaft and weak flexuosity on the curved last part. The ribs are weakened on the dorsum, and a few secondary ribs are inserted between the primaries. The suture-line is uncertain.

Occurrence: IPMM 20090 was obtained from the lower Aketo Formation, which is assigned to the upper Lower Albian.

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Explanation of Plates

Plate 1.

Fig. 1. *Hypacanthoplites kawakamii* OBATA & FUTAKAMI, sp. nov. IPMM 8697, holotype, ×0.54.

Plates, 2, 3

Fig. 1. *Hypacanthoplites kawakamii* OBATA & FUTAKAMI, sp. nov. IPMM 8696, paratype, ×0.38 (Plate 2); ×0.45 (Plate 3), showing a part of outer whorl of IPMM 8696.

Plate 4.

Fig. 1. *Hypacanthoplites subcornuerianus* (SHIMIZU) IPMM 8725, ×0.72.

Fig. 2. *Ammonoceratites* (*Ammonoceratites*) *crenocostatus* (WHITEAVES) IPMM 8725, ×0.72.

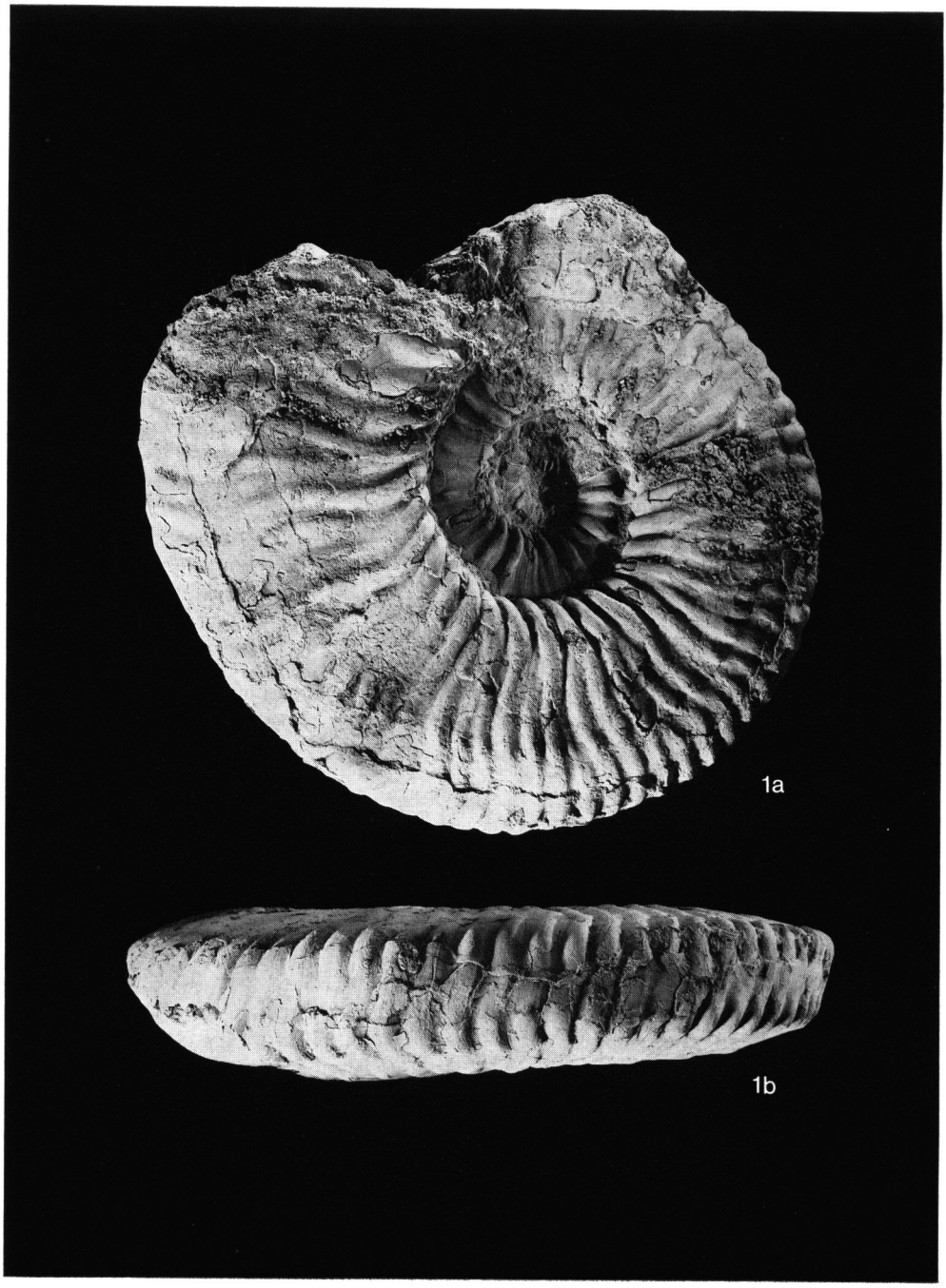
Fig. 3. *Hamites* sp. IPMM 20090, ×0.72.

Plate 5.

Fig. 1. *Oshimaceras kanazawai* OBATA & FUTAKAMI, sp. nov. IPMM 8698, holotype, ×0.50.

Plate 6.

Fig. 1. *Eotetragonites aketoensis* OBATA & FUTAKAMI, sp. nov. IPMM 8743, holotype, ×0.72.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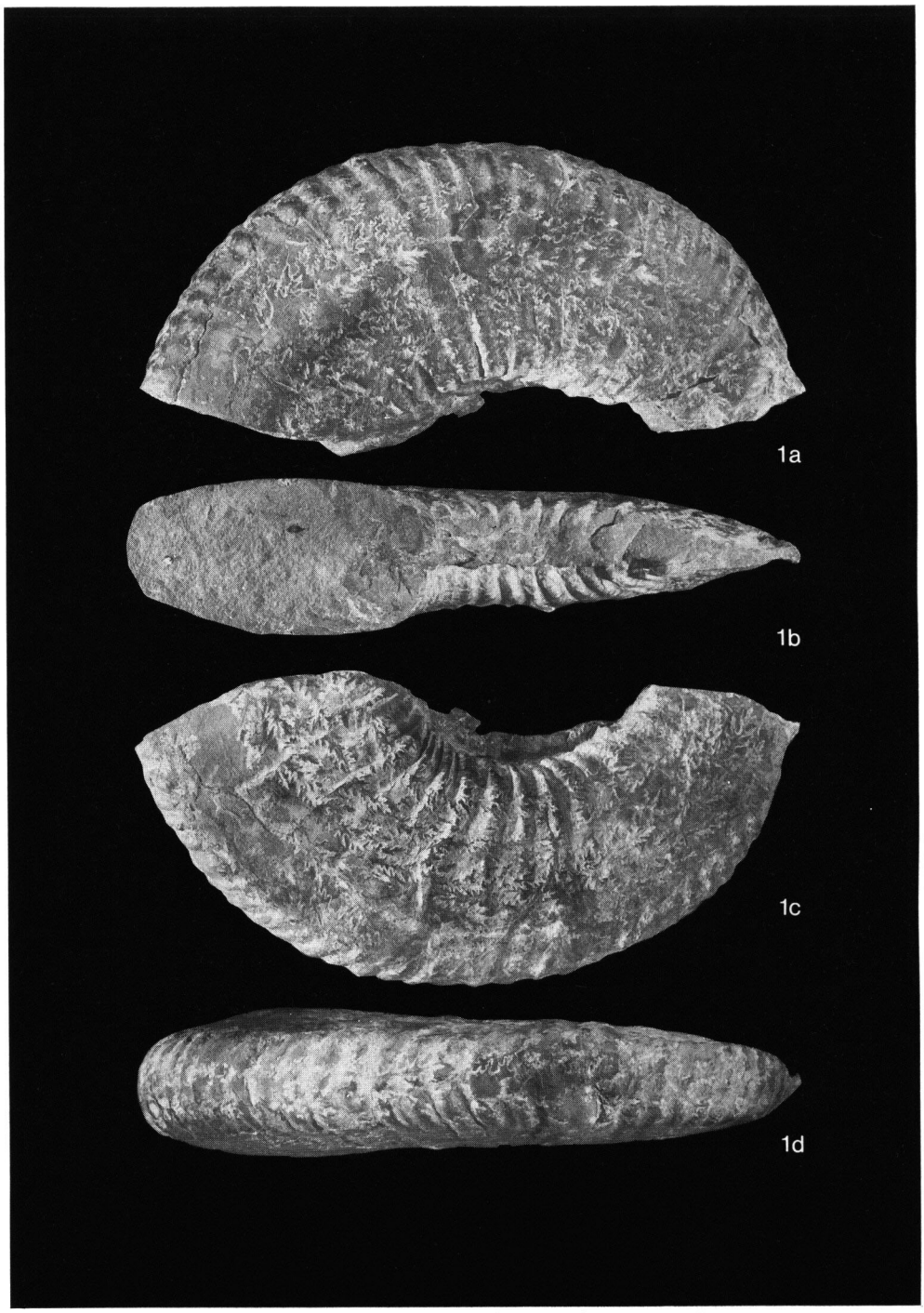
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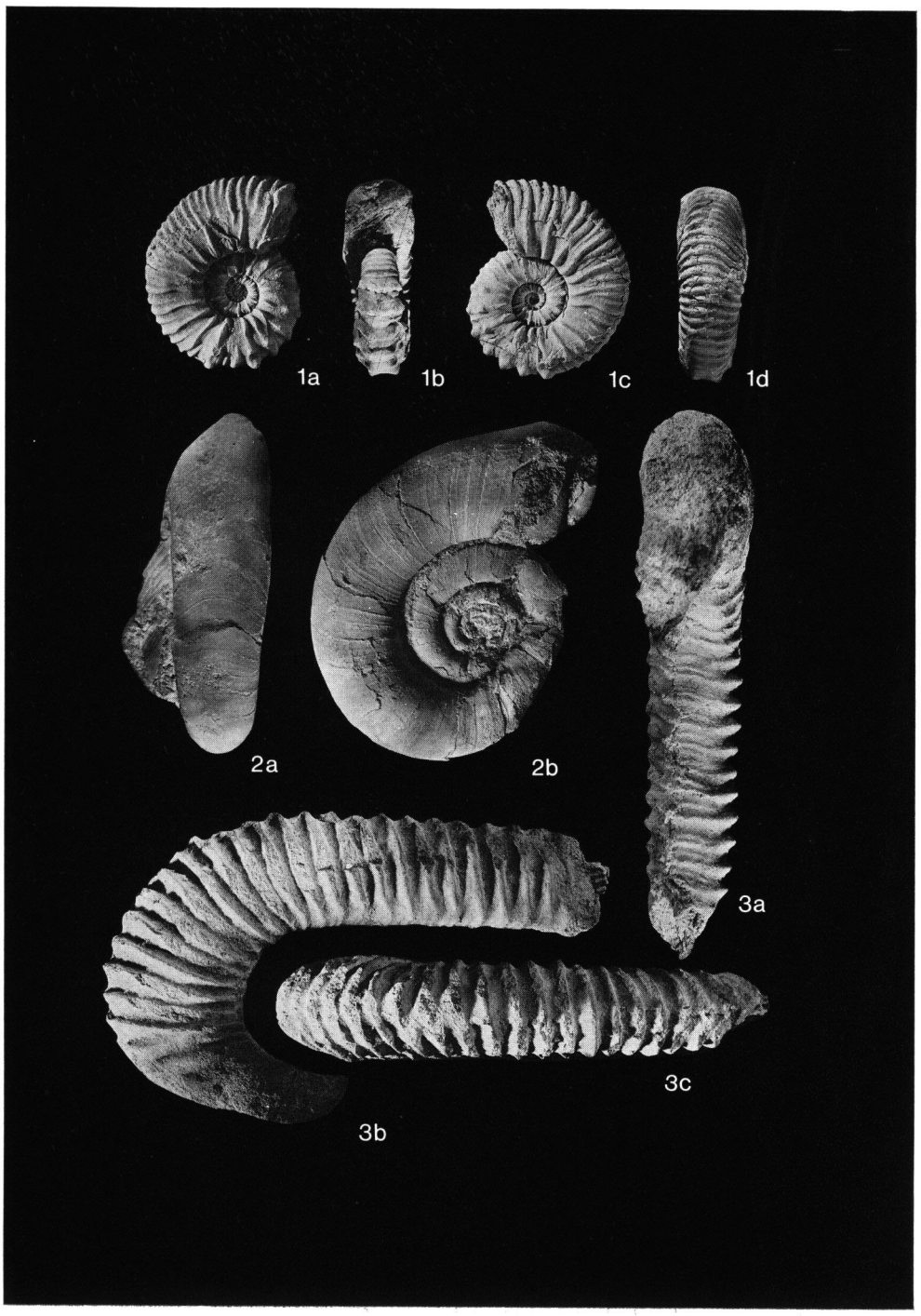
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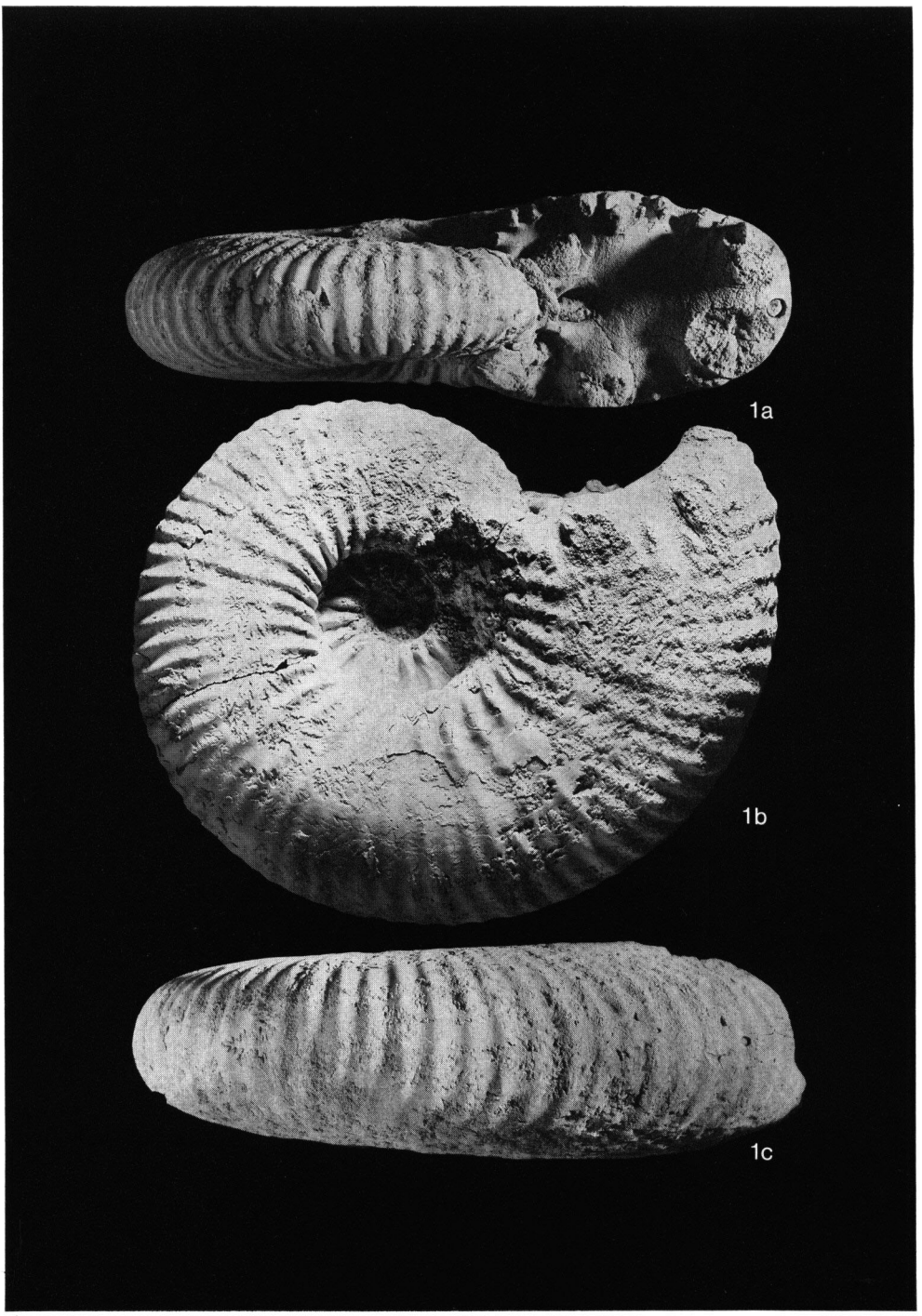
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