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Some Doubtful Cretaceous Ammonite Genera from Japan and Saghalien

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Introduction

A considerable number of ± ammonite genera have been proposed in Japan for Cretaceous forms, which for various reasons are of doubtful nomenclatorial validity. One of us (T. M.) hopes eventually to monograph the Cretaceous Ammonites of Hokkaido and Saghalien and is at present engaged in a series of studies of certain ammonite families. He has however joined the other author in the present paper in order that properly established names may meanwhile be available for both stratigraphic and palaeontological purposes.

We endeavour to clear up the nomenclatorial problems raised by these doubtful names but in the process have been compelled to discuss a number of taxonomic questions.

Relevant Clauses of the Rules of Zoological Nomenclature

Pending the issue of a revised set of the Rules in accordance with the decision of the 1948 and 1953 International Congresses of Zoology, the following Articles 25 is effective:—

"The valid name of a genus or species can only be that name under which it was first designated on the condition:

(a) that (prior to January 1, 1931) this name was published and accompanied by an indication, or a definition, or a description; and

(b) that the author has applied the principles of binary nomenclature.

(c) But no generic name nor specific name, published after December 31, 1930, shall have any status of availability (hence also of validity) under the Rules, unless and until it is published either

(1) with a summary of characters (*seu* diagnosis; *seu* definition; *seu* condensed description) which differentiate or distinguish the genus or the species from other genera or species;

(2) or with a definite bibliographic reference to such summary of characters (*seu* diagnosis; *seu* definition; *seu* condensed description; and further

(3) in the case of a generic name, with the definite unambiguous designation of the type species (*seu* genotype; *seu* autogenotype; *seu* orthotype).

Alphabetical List of Nomenclatorially Doubtful Nominal Genera and Subgenera of Japanese Cretaceous Ammonites

Family Phylloceratidae ZITTEL

SHIMIZU has proposed two genera for late Upper Cretaceous Phylloceratidae, *Neophylloceras* in 1934 (p. 61, in SHIMIZU & OBATA) and *Paraphylloceras* (1935b, p. 180). In 1934 he stated that "*Neophylloceras* gen. nov. must be separated from *Phylloceras* SUESS em. SPATH on account of the considerable difference in suture-line" (translation from Japanese). He designated *P. ramosum* (MEEK) as the type species and set out in a table (table 11, p. 61) the difference between *Neophylloceras* and *Phylloceras*, as follows:

" *Phylloceras*	*Neophylloceras*
Incision of suture line simple	Incision of suture line complicated
External and two lateral saddles are shallowly bipartite; the subdivisions of the saddles are rounded and phylloid	External and two lateral saddles are deeply bipartite and the subdivisions are again bipartite
Lobes are broad, tripartite and a little asymmetric	Lobes are narrow, tripartite and much more asymmetric than in *Phylloceras*; the outer branch being much better developed than the inner"

Thus *Neophylloceras* is valid from 1934. However, the publication was in Japanese in a book which had a small circulation and it has been largely ignored.

SHIMIZU added at that time that "The so-called *Phylloceras ramosum* in Japan must be called *Neophylloceras subramosum* sp. nov. because of the considerable difference from the type of *N. ramosum* (MEEK)." Unfortunately this new species was left undescribed although a good illustration was given (fig. 34 A, B, C, p. 62). Curiously SHIMIZU in 1935 appeared to ignore his *Neophylloceras*, including only as apparent misprints in lists "*Neophylloceras* aff. *velledae*" (p. 193) and "*Phylloceras subramosum* gen. et sp. nov." (p. 171); on p. 177 he remarked that *Phylloceras velledae* of YOKOYAMA (1890) seemed to be identical with his *P. subramosum*.

SPATH (1939) pointed out the confusion in SHIMIZU's 1935 paper and, after examining a specimen in the British Museum labelled "*Neophylloceras subramosum* SHIMIZU" by SHIMIZU himself, accepted the taxonomic necessity of the genus and designated as type species *N. subramosum* SHIMIZU. He gave a definition of this species and, although he suggested that despite the absence of a description by SHIMIZU the 1935 reference to a good figure by YABE (1927) might serve to validate the species, we feel that the species can only validly date from SPATH's 1939 description.

As indicated above however and despite SPATH's recent statement to the contrary (1953, p. 6) *Neophylloceras* SHIMIZU, 1934 is valid and its type species is *Ammonites (Scaphites?) ramosus* MEEK, 1857.

Paraphylloceras was not mentioned by SHIMIZU in 1934 but was proposed in 1935b (p. 180) as follows:—"*Paraphylloceras* gen. nov. is proposed for the group of *Phylloceras surya* FORBES and selected *P. costatum* sp. nov. as its genotype. The ornamentation of *Paraphylloceras* is of a special type. *Phylloceras radiatum* MARSHALL may belong to this stock. This also includes *Paraphy. marshalli* nom. nov. (=*Phylloc. nera* MARSHALL (non FORBES))." As SPATH (1939) pointed out *P. costatum* is a *nomen nudum* and *surya* would have to be the type of the genus.

However *Paraphylloceras* SHIMIZU, 1935 is a stillborn homonym of *Paraphylloceras* SALFELD, 1919. SPATH (1953, p. 4) argues that since *Paraphylloceras* SALFELD is an objective synonym of *Parapsiloceras* HYATT, 1900 it was stillborn and does not in-

validate *Paraphylloceras* SHIMIZU. However this situation would only arise if *Paraphylloceras* SALFELD were a homonym, which it is not. Thus not only is *Paraphylloceras* SHIMIZU invalid but the name could only be used for the group for which *Parapsiloceras* HYATT is in fact the correct name.

The question remains whether the group of *Phylloceras surya* (FORBES) needs to be separated from *Neophylloceras*. MATSUMOTO (1942e, p. 675) suggested that "the more remarkably costate forms like "*Phylloceras surya* (FORBES) may be treated as a subgenus" of *Neophylloceras*. SPATH also (1953) maintains the genus. On the other hand in those genera of Phylloceratidae characterised by strong ornament, the ribs vary much in strength and in stage at which they occur, both within and between species, as indeed is well shown in certain species of the *surya* group. Our present view is that separation of the *surya* group is not taxonomically necessary.

Family Tetragonitidae SPATH

SHIMIZU (1935b) set up three new genera, *Eoepigoniceras*, *Neoepigoniceras* and *Saghalinites*, in this family, all of which are invalid for want of differentiation or description. Moreover one of them, *Neoepigoniceras*, had a type species which was invalid for the same reason. Only one of the three names, *Saghalinites* is, we believe, taxonomically required.

Epigoniceras SPATH, 1925

Type species: Tetragonites epigonum KOSSMAT, 1895.

Differs from its ancestor *Tetragonites*, which it otherwise closely resembles, in having a distinctly recurved suspensive lobe.

E. (Epigoniceras) (includes *Eoepigoniceras*, *Neoepigoniceras* SHIMIZU, 1935 *nomina nuda*)

Moderately involute. Combines *Epigoniceras* type of suture with oval, subquadrate or trapezoidal whorl section, as in *Tetragonites*. Ranges from Turonian to Maestrichtian.

The designated type species of *Eoepigoniceras*, *Tetragonites kingianus* KOSSMAT, only differs from contemporary and later members of the subgenus it its oval whorl section, an unimportant feature. *Neoepigoniceras* was based on *N. schmidti*, a *nomen nudum*, being founded without description on figures in SCHMIDT, 1873, which in fact reveal no differences sufficient to justify even subgeneric separation of the form.

E. (*Saghalinites*), subgen. nov.

(ex SHIMIZU, 1935b, p. 181)

Type species: Ammonites cala FORBES, 1846.

Very evolute and widely umbilicate, the whorl height increasing slowly.

Whorl section rounded or octagonal.

SHIMIZU designated as type species of his genus *Saghalinites* "*S. saghalinensis* nov." which he differentiated from *A. cala* FORBES sufficiently to validate the specific name, but since *saghalinensis* has never been figured and no holotype was mentioned, we prefer, in validating the genus, to choose as type the well known species of FORBES. SPATH (1953, p. 8) used *Saghalinites* as a genus but did not validate it.

The genus ranges from Campanian* to Maestrichtian.

Family Gaudryceratidae SPATH

SHIMIZU (in SHIMIZU & OBATA, 1934 and SHIMIZU 1935a, b) set up a number of genera or subgenera in this family of doubtful validity; there were moreover differences in treatment between the 1934 and 1935 papers. SPATH (1953) has recently reviewed some of these genera.

Hypogaudryceras SHIMIZU, 1934 was established with "*H. compressum* SHIMIZU" as designated type species. This species however was neither described nor illustrated, either in 1929 when it was first mentioned or in 1934 or 1935, and the genus was not defined. In 1934 SHIMIZU merely remarked that "*Hypogaudryceras* and *Varunaites*** resemble each other and are grouped into the subfamily Hypogaudryceratinae SHIMIZU. The diagnosis of the subfamily is in its compressed, smooth whorls" (translation from Japanese). He listed *Hypogaudryceras kawanoi* (JIMBO) as another member of the genus. In 1935b (p. 179) he remarked that "*Hypogaudryceras* subgen. nov." was created by himself "for the group of *Lytoceras (Gaudryceras) dozei* FALLOT and *G. (H.) compressum* SHIMIZU from the Upper Albian of South Saghalien taken as its genotype." On the same page SHIMIZU referred *Desmoceras kawanoi* JIMBO to *Zelandites* MARSHALL (misprinted *Zealandites*) with a query and suggested that *Lytoceras (Gaudryceras) odiense* KOSSMAT from the Utatur Group of South India might belong to *Hypogaudryceras*. *H. compressum* remained a *nomen nudum* and the difference between *Hypogaudryceras* and *Zelandites* ("*Varunaites*") were not stated.

Hypogaudryceras might be validated by selecting *Ammonites dozei* FALLOT as type. This species has been described by JACOB (1907) and PERVINQUIÈRE (1910). MATSUMOTO (1938b) has referred it doubtfully to *Zelandites*, with the remark that it is not typical as it has a moderately wide umbilicus, rounded umbilical edge and almost symmetrical first lateral lobe. However most immature *Zelandites* are less involute than adult specimens. Supposedly adult *G. dozei* figured by PERVINQUIÈRE

* *S.* cf. *cala* (FORBES) was once recorded from the Japanese Neourakawan (T. M. 1942d, p. 673). As a result of the recent knowledge of the correlation between Hokkaido and Kii (Wakayama Prefecture) the age must be changed to the Paleohetonaian, i. e. Campanian.

** *Varunaites* SHIMIZU, 1926 (type species *Am. varuna* FORBES) is a synonym (see MATSUMOTO, 1938) of *Zelandites* MARSHALL, 1926, as apparently recognized by SHIMIZU in 1935.

has an umbilicus 34% of the diameter, as in adult *G. flicki* PERVINQUIÈRE, compared with 30.3% in *Zelandites mihoensis* MATSUMOTO. Such differences are not more than specific.

In our opinion all the species mentioned can be safely referred at present to *Zelandites*, the genus comprising small, compressed, involute gaudryceratids, with fairly narrow umbilicus and a first lateral lobe of varying degrees of asymmetry. Although its range, Albian to Maestrichtian, is rather long, as in the case of *Anagaudryceras* mentioned below, we hesitate to establish divisions until more convincing evidence is obtained. Similarly we regard as unnecessary the subgenus *Anazelandites* MATSUMOTO, 1938b suggested provisionally for *G. flicki* PERVINQUIÈRE.

Anagaudryceras was proposed by SHIMIZU in 1934 (in SHIMIZU & OBATA, p. 67) and *Ammonites sacya* FORBES was designated as type species. SHIMIZU gave no generic diagnosis but said that the genus corresponded to what YABE (1903, p. 17) called the group of *Gaudryceras sacya* (FORBES). This may be regarded as satisfying Article 25 (c) (2) and the genus is thus valid.

Similarly the following genera proposed by SHIMIZU in 1934 might be regarded as nomenclatorially valid on the basis of their correspondance to YABE's groups:—

SHIMIZU's *proposals*	YABE's *corresponding groups*
Neogaudryceras SHIMIZU type species *N. tenuiliratum* (YABE)	Group of *G. tenuiliratum* YABE
Epigaudryceras SHIMIZU type species *E. striatum* (JIMBO)	„ „ *G. crassicostatum* (JIMBO)
Paragaudryceras SHIMIZU type species *P. limatum* (YABE)	„ „ *G. limatum* YABE
Hemigaudryceras SHIMIZU type species *H. denmanense* (WHITEAVES)	„ „ *G. denmanense* (WHITEAVES)

In the same work SHIMIZU set up *Pseudogaudryceras*, without description, with type species *P. infrequens* (YABE) (=*Gaudryceras tenuiliratum* var. *infrequens* YABE, 1903).

In a work (1935a) slightly earlier than his main paper of that year SHIMIZU referred to *Anagaudryceras* as "subgen. nov." and designated another species as type, *G.* (*A.*) *utaturense* sp. nov. (=*Ammonites sacya* STOLICZKA, 1865 *non* FORBES, 1846). Later in 1935b SHIMIZU abandoned *Epigaudryceras* as a synonym of *Neogaudryceras* and treated the remainder of his 1934 genera as subgenera of *Gaudryceras*.

SPATH in 1953 referred only to SHIMIZU's illegitimate 1935 designation of STOLICZKA's "*Am. sacya*" (non FORBES) as type species of *Anagaudryceras*, adopted *Neogaudryceras* and commented on the other subgenera, without settling their validity or otherwise.

Now YABE's subdivision of *Gaudryceras* was based primarily on the characters, especially the often coarse ribbing, of the last whorl. This ribbing however is very variable within and between species both as regards its form and the stage of growth at which it appears; it forms no reliable basis for generic classification. MATSUMOTO (1942c) has shown that two well defined groups can be distinguished, *Gaudryceras sensu stricto*, characterised by fine but strong, very sigmoidal riblets with a forward projection on the periphery, and *Anagaudryceras* with still finer and much weaker ornament, sometimes so fine as to be imperceptible to the naked eye, which though oblique on the umbilical wall is not markedly sinuous on the sides or shoulders.*

The only obvious character of *G. tenuiliratum* YABE, the type of *Neogaudryceras* SHIMIZU, that is not mentioned above is the branching of the riblets, as in the later *Vertebrites*, during mid growth, but this feature occurs to a variable extent in both *Gaudryceras* and *Anagaudryceras*. Indeed YABE placed *G. mite* (designated as type species of *Gaudryceras* by BOULE, LEMOINE & THÉVENIN in 1906) in his group of *G. tenuiliratum*.

G. limatum YABE belongs to *Anagaudryceras* and *Paragaudryceras* is therefore a synonym of that genus. *G. denmanense*, the type of *Hemigaudryceras* and *G. intermedium*, the type of *Pseudogaudryceras*, are typical members of *Gaudryceras sensu stricto*.

Thus we have the following synonymies:—

Anagaudryceras SHIMIZU, 1934
=*Paragaudryceras* SHIMIZU, 1934

Gaudryceras DE GROSSOUVRE, 1894
=*Epigaudryceras*, *Hemigaudryceras*, *Neogaudryceras*, *Pseudogaudryceras* SHIMIZU, 1934

Zelandites MARSHALL, 1926
=*Varunaites* SHIMIZU, 1926; *Hypogaudryceras* SHIMIZU, 1934; *Anazelandites* MATSUMOTO, 1938.

Family Turrilitidae MEEK

SHIMIZU (1935b, p. 195) proposed without any description the nominal genus *Hypoturrilites* "for *Turrilites komatai* (YABE)" (recte *komotai* YABE) and stated that "*Turrilites gravesianus* d'ORBIGNY and *T. tuberculatus* BOSC in d'ORBIGNY may belong to this genus".

The fact that this genus, though never defined, has been used several times in

* Although the holotype of *A. sacya* (FORBES) (BM. 10486) is a poorly preserved immature specimen, it does show the typical characters given above. The generic definition is not affected whatever is the answer to the question whether or not *Am. buddha* FORBES is a fragment of an adult of the same species.

the literature suggests that it is taxonomically necessary and it has now been validated by DUBOURDIEU (1953), with *Turrilites gravesianus* d'ORBIGNY as type species.

Family Nostoceratidae HYATT

A number of new generic names that are invalid or doubtful have been set up for some of the rich fauna of heteromorphs from the Cretaceous of Japan and Saghalien. However there is difficulty in stabilising the nomenclature in the absence of a secure taxonomic arrangement of the post-Cenomanian uncoiled forms. Their classification must therefore be discussed here.

HYATT (1900) set up *Hyphantoceras* for the European Turonian species *reussianum* d'ORBIGNY, previously referred to *Heteroceras*, a Barremian genus. *H. reussianum* is characterised by irregular helical coiling, typically with retroversal U-shaped body chamber, round whorl section, weak to moderately strong annular ribs and periodic thin tuberculate flares and an ornate lytoceratoid suture; the earlier whorls are sometimes but by no means always rather regularly in contact but the later ones form a very open and variable spiral. There are usually also referred to *Hyphantoceras* a number of Turonian to Santonian turreted forms whose whorls are in contact until the latest stage when there is an uncoiled or even U-shaped body chamber. Some of these species have marked constrictions sometimes with a projecting rib behind, while others have none. They are all more properly to be referred to *Bostrychoceras* HYATT.

Amongst the variable forms of these genera can be seen the probable origins of nearly all the Turonian and later heteromorphs of both the Nostoceratidae and the Diplomoceratidae. SPATH (1953, p. 16, 17) has suggested six subfamilies for the Nostoceratidae. While some subdivision of the family may prove necessary, there is too little knowledge at present to justify it, certainly on such a scale.

Against this background we can review the genera now in question.

Orientoceras was set up by SHIMIZU (1935b, p. 198) for *Heteroceras orientale* YABE, 1904. No description was given; it was merely suggested that *H. oshimai* YABE (pars, pl. iii, fig. 6, non fig. 5) might be the young stage of *H. orientale.* In fact both *orientale* and *oshimai,* with irregular helicoid coiling and fine simple ribs with periodical elevated tuberculated ones, fall within *Hyphantoceras* as defined above.

Euhyphantoceras was set up by SHIMIZU (1935b, p. 181) as follows:—"for *E. maestrichtiense* nom. nov. (=*Helicoceras venustum* YABE, loc. cit., (1904), Pl. V, figs. 1, 2 non Pl. III, fig. 4) as its genotype. The holotype of this genus coils loosely and is provided with alternately tuberculate and plain costation; tuberculate ribs disappear at about the middle of the flanks from where usually 2 or 3 plain ribs originate.

This genus differs from *Hyphantoceras* not only in its crioceratid coiling but more significantly in the ornamentation."

The specimen referred to by SHIMIZU has been examined by one of us (T. M.). As indeed the figure suggests, its ornament is not as described by SHIMIZU. Moreover its age is Santonian and not Maestrichtian. More complete specimens of this species show open but distinctly helicoid whorls in the early stages and the species is clearly a *Hyphantoceras*, close indeed to the type species *H. reussianum*. The only difference, a minor one, is that the Santonian form has widely open, low helical coiling at a relatively early stage and constantly fine subcostae between the quadituberculate flared ribs. Forms occur in the Turonian of the Japanese province, and YABE's other figured specimen of *Helicoceras* (?) *venustum* is one of them, which appears to belong to a bituberculate species of *Hyphantoceras;* in view of SHIMIZU's establishment of the species *maestrichtiense*, the original of YABE's Pl. III, fig. 4 becomes the holotype of *venustum*.

The Santonian species has in addition to SHIMIZU's name *maestrichtiense* received the name *serpentinum* MATSUMOTO (1938a, 1942b p. 161 and elsewhere) (*sub Bostrychoceras*) but no description was given and the name is invalid. Although SHIMIZU's name is inappropriate for a Santonian form it cannot under the Rules be rejected on that account. On the other hand his statement about the character of the species is so much at variance with the figure and specimen as to indicate that a mistake has been made.

Neoturrilites was set up by SHIMIZU (1935b, p. 180) as follows:—"with *N. karafutoense* sp. nov. as its genotype. The holotype of this species is characterised in having oblique ribs provided with three rows of weak tubercles." Not only is there no generic diagnosis but the description of the type species is quite insufficient for recognition. Both species and genus must be ignored.

Family Diplomoceratidae SPATH

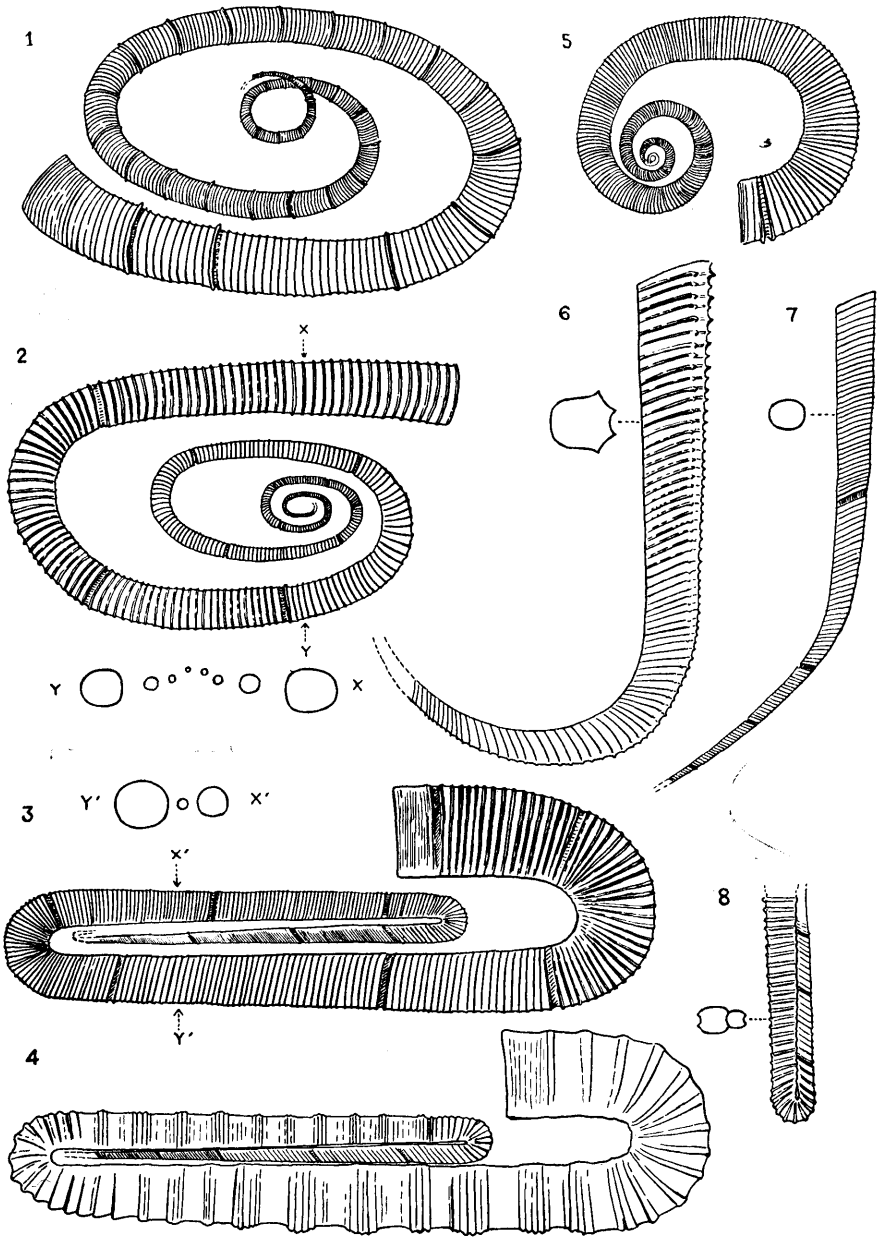
For a series of Turonian and Coniacian forms of the Japanese province similar in some respects to *Hyphantoceras* but with rather different ornament and coiling MATSUMOTO has used the generic name *Scalarites nom. nud.* (1938a, p. 193 and *passim*). These forms are of importance as linking Nostoceratidae to Diplomoceratidae and we validate the genus here.

Scalarites, gen. nov.

(ex MATSUMOTO, 1938 MS. *nom. nud.*)

Type species: Helicoceras scalare YABE, 1904.

Diagnosis:—A very shallow, open helicoid spire in the early stages is sooner or later followed by loose elliptical coiling in nearly one plane. The whorls enlarge



T. M. del.

Figs. 1–8. Diagrammatic figures of some Diplomoceratidae.

1. *Scalarites scalaris* (YABE) (×½) Turonian. 2. *S. mihoensis* sp. nov. (×½) Upper Turonian-Coniacian. 3. *Polyptychoceras obstrictum* (JIMBO) (×½) Coniacian-Santonian. 4. *Subptychoceras yubarense* (YABE) (×½) Santonian. 5. *Glyptoxoceras* sp., based on BM. 10500, *G. rugatum* (FORBES) in KOSSMAT, 1895 (×⅔) Upper Senonian. 6. *Pseudoxybeloceras quadrinodosum* (JIMBO) (×⅔) Santonian-Campanian. 7. *Ryugasella ryugasensis* sp. nov. (×⅔) Upper Santonian-Campanian. 8. *Solenoceras texanum* STEPHENSON (×1) Campanian.

very slowly and are more or less circular in section. Ribs simple and annular. Typically there are periodic untuberculated flared ribs or infrequent constrictions. Suture of IULE pattern, all elements bifid except for trifid internal lobe.

Remarks:—As the text figures and plate show the genus differs from *Hyphantoceras* and *Bostrychoceras* principally in having shallower and still more open coiling, which tends to be elliptical, and in the absence of a retroversal body chamber. It is a relatively small step on the one hand to the Santonian and perhaps Coniacian *Polyptychoceras obstrictum* (JIMBO)* (text fig. 3) and thence to *Subptychoceras yubarense* (YABE) (text-fig. 4) and on the other to *Glyptoxoceras*, including such Indopacific species as *G. rugatum* (FORBES) (text fig. 5) or *G. tenuisulcatum* (FORBES). Indeed fragments from the English Coniacian of what are probably a species of *Scalarites* have been reported as *Glyptoxoceras* (WRIGHT & WRIGHT, 1942) and are indistinguishable, so far as they are preserved, from Campanian forms of that genus. Both *Glyptoxoceras* and *Diplomoceras* retain the helical coiling of the early whorls and it is therefore reasonable that *Scalarites* should be associated with them in the family Diplomoceratidae.

Scalarites scalaris (YABE)

Pl. 7, fig. 3; Text fig. 1

1894. *Hamites* sp., JIMBO, p. 40, pl. ix, fig. 1; pl. vii, fig. 7, 7a.

1904. *Helicoceras scalare* YABE, p. 9, pl. iii, figs. 2, 3a-c.

Types: YABE's syntypes are Nos. GT.I-233** and GT.I-234a, b from the "*Scaphites* beds" of the Opirashibets, Teshio Province, Hokkaido. JIMBO's specimens from the Opirashibets are also referable to the present species. In subsequent collections there are number of specimens, though more or less fragmentary: e.g. GT.I-2930a, b-GT.I-2937 from the zone Mh2 of the Miho group in the Naibuchi Valley, South Saghalien; GT. I-3350 and GT. I-3361 from the Saku formation in the Saku-Abeshinai area, Teshio Province, Hokkaido; GK.H1441-GK. H1443 from the Saku formation in the Shiyubari Valley, Ishikari Province, Hokkaido (all coll. by T. M.).

Diagnosis: Very low, rather variable helical coils in the early stages, followed by later whorls of loose and broadly elliptical coiling with nearly U-shaped bends. Section subcircular in earlier whorls and elliptical and compressed with rather flattened flanks in later whorls. Prominent annular periodic ribs, frequent and

* This species has been erroneously referred to *Diplomoceras*. JIMBO's type species, as well as others, has a straight first arm between but not in contact with the second and the third ones. It has not yet been found in the Maestrichtian in the Japanese province but is characteristic to the Urakawan, i.e. Santonian *plus* Coniacian.

** The following symbols are used in the register numbers of Japanese specimens. GT. Geological Institute, University of Tokyo and GK. Department of Geology, Kyushu University, Fukuoka.

fairly regular in most whorls but infrequent in the late part, with numerous annular ribs of moderate strength between them.

Remarks: YABE's original specimens are fragments of early and middle-aged whorls. The better one (GT.I-233) shows a nearly spiral coil with the curvature slightly different at places and is not strictly in one plane. In subsequent collections there are several specimens which correspond in age with YABE's. They show more distinctly the variable curvature and the irregularly helicoid coiling. The fragments of larger whorls with heights from 10 mm to 25 mm indicate a very gently arcuate long arm and strongly curved almost U-shapped short part. The largest fragment, a little over 25 mm. in whorl-height, is moderately curved and shows densely crowded striae. The reconstructed shell-form is shown diagrammatically in text fig. 1, although no perfect specimen has yet been collected. The ornament was correctly described by YABE but the periodic strong ribs become infrequent and rather irregular in spacing on the last whorl.

Occurrence: Neogyliakian, approximately Turonian, in Hokkaido and South Saghalien, especially common in its lower part.

Scalarites mihoensis, sp. nov.

Pl. 7, figs. 1, 2; Text fig. 2

Holotype: GT. I-2951a (immature) from loc. N27a, zone Mh4 of the Miho group in the Naibuchi Valley, South Saghalien (coll. T. M.).

Paratypes: GT. I-2951b, I-2949, I-2950, I-2953—I-2956 from the zones Mh3 and Mh4 in the Naibuchi Valley; GT. I-3352, I-3354, I-3357, I-3362, I-3363, I-3373, I-3375, I-3382, I-3383 from beds IId and IIIa in the Abeshinai Valley, Teshio Province, Hokkaido; GK. H1451 and GK. H1454 from beds IIs and IIIa in the Shiyubari Valley, Ishikari Province, Hokkaido. Comparable specimens have been found at corresponding horizons in other areas of Hokkaido.

Diagnosis: Coiling elliptical and loose in early stages and elongated elliptical with nearly straight arms and moderately curved parts in later stages; whorls separated but only slightly so in the straightened part of the later whorls. Section subcircular in early whorls and somewhat flattened dorsally in the last whorl, height and breadth much the same. Very infrequent periodic strong ribs and occasional constrictions. Numerous, narrow, annular ribs of considerable elevation, separated by broader interspaces.

Remarks: This species is interesting in that its coiling is more elliptical than that of the preceding species. The flared ribs become more infrequent, while constrictions are occasionally found. All these features seem to indicate a progression from the typical *Scalarites scalaris* to *Polyptychoceras*, but the species must still be referred to *Scalarites*.

Besides the illustrated specimens there are a number among which some are fairly large with a nearly straight arm of 20 cm. in length and whorl-height of about 30 mm.

Occurrence: Upper part of the Neogyliakian and Paleourakawan in South Saghalien and Hokkaido, approximately Upper Turonian and Coniacian.

Besides the above two species we have recognized at least two other species referable to *Scalarites*. One has a similar mode of coiling to that of *S. scalaris* and very frequent periodic flared ribs with intervening faint striae or weak subcostae. It seems to be confined to the lower part of the Neogyliakian. The other has straighter arms than *S. mihoensis* and dense ribs of moderate strength. It is closely allied to *Polyptychoceras obstrictum* (JIMBO) and occurs in the Paleourakawan and the uppermost part of the Neogyliakian.

As explained above *Scalarites* may be derived from *Hyphantoceras*, or from some common ancestor of *Hyphantoceras* and *Bostrychoceras*, and in turns leads to the group of the Upper Cretaceous forms, *Polyptychoceras* YABE, 1927 and *Subptychoceras* SHIMIZU, 1935c, for which, and also for *Scalarites* itself, the family Polyptychoceratidae MATSUMOTO (1938a, p. 193) was established. The North American group of *Solenoceras* (and *Oxybeloceras* if distinct) may be bituberculate derivatives of *Polyptychoceras* or possibly independent offshoots of some later Nostoceratid of *Emperoceras* type. The family includes also a few forms whose names require to be stabilized.

Pseudoxybeloceras, gen. nov.

(ex MATSUMOTO, 1938, MS. *nom. nud.*)

Type species: Hamites quadrinodosus JIMBO, 1894.

Diagnosis: Shell in one plane, arcuate at first, then moderately curved, finally straight, thus forming a J. Whorl section more or less compressed. Simple, fine, rather prorsiradiate ribs with upper or upper and lower ventro-lateral spines. Suture IULE, with all elements bifid and more or less equal except for I which is small and trifid.

Remarks: In its ornament *Pseudoxybeloceras* resembles some species of *Solenoceras* (cf. STEPHENSON, 1941) but this genus is distinguished by its tight ptychoceratid coiling. It might be suggested that the affinities of the present genus lie with the Turonian and possibly Coniacian *Allocrioceras* SPATH, which already has a pair of ventral tubercles. On the other hand, just as *Solenoceras* may be a tuberculate descendant of *Polyptychoceras*, so *Pseudoxybeloceras* is taken to be a tuberculate and straightening offshoot of *Scalarites*.

The J-shaped coiling of the preserved fragments and the four rows of tubercles recall the group of '*Ancyloceras*' *pseudoarmatum* SCHLÜTER (1871–6, pp. 99 and 164, pl. xxxi, figs. 1-3; pl. xliii, figs. 5-9). That species however and the

closely allied '*Ancyloceras*' *kossmati* SIMIONESCU (1899, p. 21, pl. 1, figs. 6, 7, 8a, b) are characterised by more or less inflated, instead of flattened, whorl section and periodic strong tuberculate ribs with weaker intermediate ones which may or may not have tubercles; moreover the ribs are often doubled, as in *Anisoceras*, between the tubercles. SPATH (1921, p. 52) stated the '*Ancyloceras*' *pseudoarmatum* SCHLÜTER probably represented an adult whorl fragment of a species of his new genus *Neocrioceras*, of which only the helically coiled early whorls were then known. The largest specimen certainly attributed to *Neocrioceras* (an example of *N. spinigerum* figured by SHIMIZU, 1933, pl. ii, figs. 4-9) tends to support SPATH's view. '*Oxybeloceras*' *sanushibense* YABE MS. is described and figures below for purpose of comparison with *Pseudoxybeloceras*.

Range: *Pseudoxybeloceras* is not uncommon in the Upper Santonian and Campanian of Japanese province; it occurs in Pondoland* and possibly in New Zealand**.

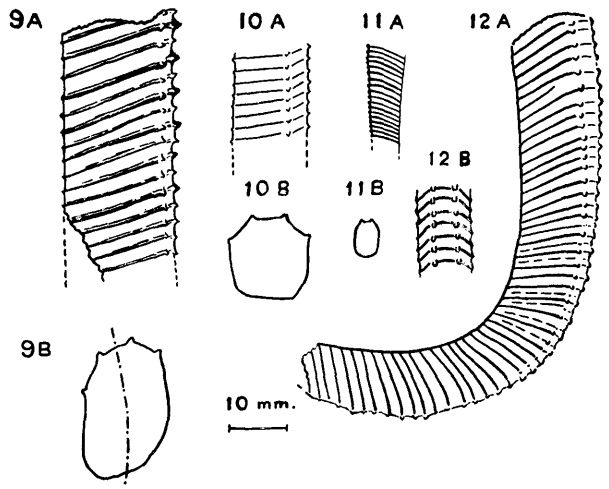
Pseudoxybeloceras quadrinodosum (JIMBO)

Pl. 7, fig. 6a, b; Text figs. 6, 9—12

1894. *Hamites quadrinodosus* JIMBO, p. 39, pl. vii, figs. 3, 4.

1927. *Oxybeloceras quadrinodosum* (JIMBO) YABE, p. 44 (18).

The early arcuate part is succeeded by a moderately curved and then by a straight part, but it is not yet certain whether the moderate curvature appears



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Figs. 9-12. *Pseudoxybeloceras quadrinodosum* (JIMBO)

9 A,B. Lectotype. GT.I-125, lateral view and cross section (deformed). 10 A,B. Syntype. GT.I-126a, lateral view and cross section (secondarily depressed). 11 A, B. Syntype. GT.I-126b, lateral view and cross section. 12 A,B. YABE's specimen. GT.I-341, lateral and part of ventral views.

* *Oxybeloceras* (?) cf. *quadrinodosum* (JIMBO) SPATH, 1921, p. 50, pl. vii, fig. 2a, b; *Hamites amapondensis* van HOEPEN, 1921, p. 15, pl. iii, figs. 5, 6, text fig. 9.

** *Oxybeloceras* sp., MARSHALL, 1926, p. 156, pl. 33.

once or twice. The section is fairly compressed at first but only slightly so at a later stage. The siphonal area is somewhat flattened and the shoulders subangular or rounded. The ribs are simple, dense, sharp and narrow and are separated by rather broader interspaces; in the early part they are prorsiradiate and distinctly concave on the dorsum but cross the venter transversely; later are less prorsiradiate. Each rib has small spinose tubercles on the shoulders and on either side of the flattened siphonal area. The lower tubercle is at first very indistinct or absent. The tubercles are usually equal until the last part on which strong and weak ones alternate. Occasionally a fine untuberculate rib is intercalated.

JIMBO, who based the species on straight fragments alone, regarded it as *Hamites*. YABE and SPATH referred it to *Oxybeloceras*, which has however an arcuate or straight shaft followed by a sharply bent over hook, besides having different ornament (fig. 8).

Occurrence: Besides JIMBO's original material from Chiptanshibets on the Tumbets River, Kitami Province (GT.I-125 & 126a, b) specimens have subsequently been found from the *Anapachydiscus* beds in the valley of the Ikushumbets (GT.I-341, coll. YABE), from bed Ur5 in the Urakawa area, Hokkaido (GK. H3543) and from zones Mh6 and Ray_1 in South Saghalien (GT. I-2859 and 2860, coll. T. M.). All these occurrences are in the Santonian and Campanian.

Neocrioceras (?) sanushibense, sp. nov.
(ex YABE, 1901 MS. *nom. nud.*)
Pl. 7, fig. 5a, b; Text fig. 22.

1909. *Hamites sanushibensis* YABE, p. 440, listed.
1927. *Oxybeloceras sanushibense* YABE, p. 44 (18), listed.

The holotype is YABE's original specimen (GT.I-340) from the "*Pachydiscus*" (*Anapachydiscus*) Bed at locality "B" on the Saushisanushibe, Iburi Province, Hokkaido. The paratype is GK. H3542 (T. M. coll.) from bed Ur5β at locality U238, Urakawa area, Hokkaido.

The fragmentary holotype is more or less J-shaped but the paratype shows again a curved part at a still later growth-stage. The whorl section is subcircular and as high as broad. The numerous annular ribs are only slightly oblique on the straight limb. Every fourth or fifth rib is stronger in the outer part and likewise has stronger ventrolateral and ventral tubercles than the other, narrow and sharp ribs. Sometimes two or three of the minor ribs are united at one of the strong ventrolateral tubercles.

This species is obviously allied to '*Ancyloceras*' *pseudoarmatum* SCHLÜTER and '*A.*' *kossmati* SIMIONESCU. It is distinguished from both these species by its

subangulate ventrolateral shoulders and the ventrolateral, instead of mediolateral, position of the lower tubercles.

This species is somewhat allied to but readily distinguished, together with the above two species, from *Pseudoxybeloceras* by their subcircular or oval whorl section, radial ribs, periodic strong ribs which have strong tubercles and a tendency to double or treble the ribs between the tubercles, while they are similar to the type species of *Neocrioceras* in most of these characters except for the depressed whorl section of that species.

Occurrence: The species has been found in the upper part of the Urakawan and the lower part of the Hetonaian, that is in the Upper Santonian and Campanian.

Ryugasella, gen. nov.

(ex MATSUMOTO, 1942 MS. *nom. nud.*, as subgenus of *Pseudoxybeloceras*)

Type species: *Ryugasella ryugasensis*, sp. nov.

Diagnosis: In one plane, broadly curved at an early stage then sooner or later becoming quite straight, the resulting shape being that of the Japanese long sword "*naginata*". The form of the earliest growth stage is still uncertain. Section oval to circular. The ribs are dense, annular, prorsiradiate and untuberculate. There are occasional constrictions. Suture IULE, with all the elements bifid except for trifid I.

Remarks: The genus is similar in general aspect to *Pseudoxybeloceras* but differs in coiling, circular section and in the absence of tubercles. It may well be another offshoot of late *Scalarites*.

Range: The occurrence is almost the same as that of *Pseudoxybeloceras*, namely Campanian and perhaps late Santonian of the Japanese province and perhaps the Campanian of Graham Land*.

Ryugasella ryugasensis, sp. nov.

(ex MATSUMOTO, 1938 MS. *nom. nud.*)

Pl. 7, fig. 4a—d; Text figs. 7, 13A—E

? 1890. *Anisoceras* cfr. *rugatum* (FORBES) YOKOYAMA, p. 183, pl. xx, fig. 8.

? 1894. *Hamites* sp. JIMBO, p. 39, pl. vii, figs. 5, 5a.

1938. *Glyptoxoceras* (?) *ryugasense* MATSUMOTO, p. 193, listed.

1942. *Pseudoxybeloceras* (*Ryugasella*) *ryugasense* MATSUMOTO, p. 167 and elsewhere, listed.

The holotype is GT. I-2862 from loc. N18f, horizon Ray1 in the Naibuchi Valley, South Saghalien (Coll. T. M.).

* *Polyptychoceras* sp. from Graham Land (SPATH 1953, p. 18, pl. vii, figs. 5a, b, c=BM.C41390 and C41486) is another fragmentary example of this genus, being quite similar to the type species.

The shell form given in the generic diagnosis is the most probable reconstruction from a number of straight or gently curved fragments. The ribs are sharp and narrow, separated by broader interspaces, and of uniform strength. They are prorsiradiate on the sides but cross the venter transversely. Constrictions are sometimes present especially on the early stages.

Besides the holotype the following material is known:—

GT. I-2861, 2863, 2865 from the Naibuchi Valley, South Saghalien.

GT. I-3587—3589 from the Abeshinai Valley, Teshio Province, Hokkaido.

? GT. I-127 from Opirashibets, Teshio Province (the original of JIMBO, 1894, pl. vii, fig. 5).

GK. H3547—3551 from localities in the Urakawa Area, Hokkaido.

These specimens are mostly from the Paleohetonaian, that is Campanian, and a few from the Upper Neourakawan, perhaps the top of the Santonian.

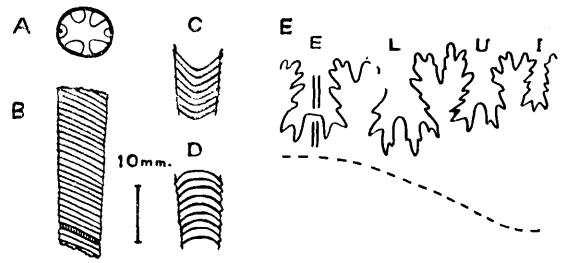

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Fig. 13. *Ryugasella ryugasensis* sp. nov.
A. Section. B. Lateral view. C. Dorsal view. D. Ventral view.
E. Suture at a whorl-height of 8 mm.

Family Desmoceratidae ZITTEL

Kotoceras appears without diagnosis in a work of YABE's published in 1927, as follows:—

on p. 36 '"*Desmoceras*" (*Kotoceras*, YABE, MS.) *damesi* JIMBO
„ („) *laeve* YABE (MS. *nom.*)'

on p. 44 '*Desmoceras* (*Kotôceras**) *damesi* JIMBO
„ („) *laeve* YABE*
„ („) *semicostatum* YABE' (* MS. *nom.*)

on explanation of plate VII, fig. 9a, b
'*Kotôceras* (gen. nov.) *damesi*'

In view of the date of publication (before 31 December 1930) *Kotoceras* is not necessarily invalid because of lack of description. One valid species, *damesi* JIMBO, is mentioned and that becomes type species by monotypy.

Kotoceras KOBAYASHI, 1934 is therefore a homonym of *Kotoceras* YABE, 1927 but

the latter has already been replaced by *Damesites* MATSUMOTO, 1942a (p. 24) on the grounds that KOBAYASHI's name is valid.

It would appear that greater confusion is likely to be caused by maintaining *Kotoceras* YABE and consequently an application will be made to the International Commission on Zoological Nomenclature to reject *Kotoceras* YABE and uphold *Kotoceras* KOBAYASHI and *Damesites* MATSUMOTO.

Family Puzosiidae SPATH

(We are are not decided whether this group should be accorded family status or be regarded as a subfamily of Desmoceratidae. The question is not discussed here.)

The following genera or subgenera proposed in this family are invalid for want of description:—

Anapuzosia MATSUMOTO, 1938
Jimboiceras SHIMIZU, 1935
Mesopuzosia MATSUMOTO, 1938
Neopuzosia MATSUMOTO, 1954

These are being dealt with in a forthcoming paper by one of us (T. M.) on the Puzosiidae of Hokkaido and Saghalien and are therefore not treated here.

Family Pachydiscidae SPATH

SHIMIZU (1935b, p. 181) set up a genus *Rotalinites* in the following terms: "*Menuites rotalinoides* (YABE) is quite different from the earlier *Ammonites rotalinus* STOLICZKA, which has a row of tubercles on the venter; this makes it necessary to separate as a new genus *Rotalinites* gen. nov. (genotype *Am. rotalinus* STOLICZKA)."

This statement does indicate, though not very clearly, the character of *Rotalinites* and the genus could be accepted as valid.

The tuberculation of *Ammonites rotalinus* however is similar to that of *Pseudojacobites* SPATH, 1926, based on a species of which only one very badly preserved specimen is known. Both *Amm. rotalinus* and *Pseudojacobites farmeryi* (CRICK) may be derived from *Lewesiceras*, species of which often exhibit strengthening of the ribs on the shoulders and the midline of the venter, where *Pseudojacobites* has its characteristic tubercles. Although the ribbing of *Am. rotalinus* differs considerably from that of *P. farmeryi*, we believe that it should, provisionally at any rate, be included in *Pseudojacobites*, of which *Rotalinites* SHIMIZU thus becomes a synonym.

As recently pointed out by MATSUMOTO & SAITO (1954) *Neodesmoceras* was validly described with a valid type species, *N. japonicum*, by MATSUMOTO in 1947. However the description was in Japanese. In 1951 (p. 24) MATSUMOTO gave a résumé in English of his 1947 paper but referred to *Neodesmoceras* as "subgen. nov." (of

Pachydiscus) and to its type species as "*P.* (*N.*) *japonicus* SAITO MS," although both subgeneric and specific names had been validly established by himself.

Unfortunately it was only the second paper (1951) that was noticed in other countries and COLLIGNON, for example, (1952) tried unnecessarily to validate *Neodesmoceras* by designating as its type species *Pachydiscus catharinae* ANDERSON & HANNA, 1938, which had been referred to *Neodesmoceras* with some doubt by MATSUMOTO.

Epipachydiscus was proposed as a subgenus of *Parapachydiscus* HYATT by YABE & SHIMIZU, 1926 (p. 173), who gave a concise subgeneric diagnosis as follows. "Shell like *Parapachydiscus* s.s., HYATT, in form and sculpture. Suture-lines: external part as in *Pseudopachydiscus*,* but with $l_1 l_2 l_3$ (i.e. three pairs of internal lobes on both sides of the antisiphonal lobe) erect." However the designated type species, *Parapachydiscus mamiyai* YABE & SHIMIZU, and another species doubtfully referred to the subgenus, *P. abeshinaiensis* YABE, have never been described and are therefore invalid. Thus the subgeneric name also is a *nomen nudum*. MATSUMOTO (1947, 1951) recognized no essential criterion in the character of internal lobes when he treated the Japanese Pachydiscids and failed to find a form which could validate *Epipachydiscus* with the diagnosis above cited.

Family Kossmaticeratidae SPATH

This family was established for a group of Senonian derivatives of Puzosiidae, characterized by dense ribbing, tuberculation, constrictions that are oblique to and truncate the ribs and a suture that somewhat resembles that of Puzosiidae. There are however a number of earlier forms mostly from the Indo-Pacific area, ranging from the Upper Albian to the Cenomanian, mainly undescribed, which are morphologically similar to the typical Kossmaticeratidae and are also clearly derived from Puzosiidae. It is by no means clear whether the two groups represent two or more parallel offshoots of different Puzosiidae. The point is not discussed in detail here and the early forms are provisionally included in Kossmaticeratidae.

Two nominal genera have been listed but not fully described; they are validated below. Three other listed genera, *Eomadrasites*, *Jacobitoides* and *Marshallites* MATSUMOTO, 1954, will be described fully in a forthcoming paper by one of us (T. M.) on the Kossmaticeratidae from Hokkaido and Saghalien and are therefore not dealt with here.

Eogunnarites, gen. nov.

(ex MATSUMOTO, 1942 MS. *nom. nud.*)

Type species: *Olcostephanus unicus* YABE, 1904.

Diagnosis: Whorl section inflated and depressed. Umbilicus rather narrow or

* Now a synonym of *Canadoceras* (see MATSUMOTO, 1947; 1951).

of moderate width and rather deep. Umbilical wall steep with subangular umbilical shoulder, ornamented with tubercles. Fine, sharp ribs, slightly convex forwards, rise in bundles from the umbilical tubercles or are intercalated. Regular well marked constrictions each truncate two or three ribs. Suture apparently similar to that of *Kossmaticeras* (s. s.), comprising the following lobes I, U1, U3 (=S), U4, U2, L, E. L is subsymmetrically trifid. The auxiliaries form a descending series.

Remarks: The holotype of *E. unicus* is rather poorly preserved but subsequent collecting (by T. M.) has furnished several good specimens which confirm the necessity of establishing a new genus. *Eogunnarites* is distinguished from other members of the family by its whorl section or by its ornamentation. From *Fagesia*, of Vascoceratidae, which it somewhat resembles in whorl section, it is distinguished by its finer ribs with regular constrictions and especially by its suture, which has the complication characteristic of most Kossmaticeratidae instead of the comparative simplicity of a degenerative acanthoceratid type.

Range: The type species is known from the upper half of the Neomiyakoan and the Paleogyliakian, that is the Upper Albian and Cenomanian.

Eogunnarites unicus (YABE)

Pl. 8, figs. 2a—c; 3a, b; 4a—c; 5a, b; Text figs. 14—20

1904. *Olcostephanus unicus* YABE, p. 28, pl. vi, figs. 5a, b.

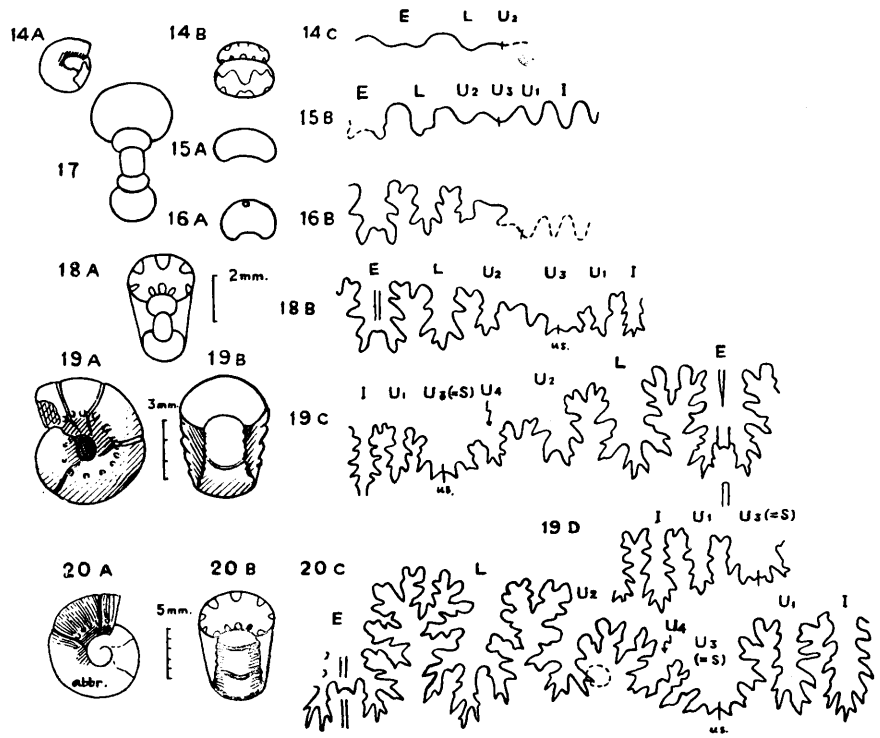
1925. *Fagesia unica* (YABE) DIENER, Foss. Catal., Ammonoidea Neocretacea, p. 182.

In the earliest stages the whorl section is depressed and lunate. It increases gradually in height and becomes round. The fourth whorl is still smooth, merely with weak constrictions. From a diameter of about 5 mm. the whorl becomes much depressed with broadly arched venter and angular umbilical shoulder. The umbilicus is fairly narrow and very deep. This stage is characterised by umbilical tubercles and geniculate constrictions. At a diameter of about 10 mm. many weak radial subcostae appear near the umbilical tubercles; they are absent on the venter where the constriction curves gently forward.

In the middle growth stages numerous regular sharp subcostae spring in bundles of three or four from each umbilical tubercle. The adult whorl has a more rounded shoulders but is still broader than high. Here two or three additional ribs are intercalated between each bundle. The ribs are nearly straight and radial while the constrictions cut two or three of them.

The suture is in the early stages of development similar to that of young *Desmoceras*. In the adult it is finely and deeply incised with gradually descending auxiliaries. The formula is I, U1, U3(=S), U4, U2, L, E. L is subsymmetric-

ally trifid and as deep as E. The saddles are bifid. That between U2 and U4 is brord and situated at the umbilical shoulder.



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Figs. 14-20. *Eogunnarites unicus* (YABE), immature, showing the ontogenetic development. GT. I-3246 from locality T591d, horizon lowest IIb, Middle Yezo Group in the Abeshinai Valley, Teshio Province, Hokkaido. Paleogyliakian (Cenomanian).

14 A,B. The first whorl with the protoconch and the first suture. 15 A,B. Section and suture of the second whorl. 16 A,B. Section and suture of the early part of the third whorl. 17. Sections up to the late third whorl. 18 A,B. Section at a diameter of 4.3 mm. and the suture at a diameter of 2.5 mm. 19 A, B, C, D. Lateral and apertural views at a diameter of 6.6 mm. and sutures. 20 A, B, C. Lateral and apertural views at a diameter of 11 mm. and the suture.

Measurements:

Specimen	*Diameter*	*Height*	*Breadth*	*Umbilicus*
GT. I-3246	4.3	1.7	2.7	1.0 (23%)
	6.6	3.4	4.8	1.5 (23%)
	10.5	4.4	7.5	3.2 (30%)
GT. I-3245a	31.5	12.3	16.8	9.4 (29.5%)
GK. H 1556		40.3	44.0	

Material: YABE's original specimen, the holotype (GT. I-255), came from near Poronai, Ishikari Province, Hokkaido, probably from the Mikasa ("*Trigonia*") Sandstone. In addition there are:—

GT. I-3245a and b bed IIb, Abeshinai Valley, Teshio Province.

GK. H1556-1557 bed IId. Middle Yezo Group, Shiyubari Valley, Ishikari Province.

GT. I-3714 horizon Ky (or possibly Kx), Imano-sawa River, Naibuchi Valley, South Saghalien (T. M. coll.).

In S. NAGAO & A. OSANAI Coll. (Sapporo), locality 58, Oyubari area, Ishikari Province.

Fagesia siskiyouensis ANDERSON (1931, p. 125, pl. 17, figs. 2, 3) from the Middle Chico Group, Turonian (? Upper), of California, resembles the adult of the present species at least superficially. It differs in the absence ~~or~~ of well marked constrictions and in having rather prorsiradiate ribs. Unfortunately its suture has not been figured.

SHIMIZU (1935b, p. 198) proposed a genus *Yokoyamaoceras* "for *Holcodiscus kotoi* JIMBO (genotype *Holcodiscus kotoi* JIMBO)." No description was given and the name is therefore a *nomen nudum*. However the group of *H. kotoi* is of some taxonomic importance and we therefore validate the name here.

Yokoyamaoceras, gen. nov.

(ex SHIMIZU, 1935 *nom. nud.*)

Type species: *Holcodiscus kotoi* JIMBO, 1894, p. 33, pl. v (xxi), figs. 2, 2a, 2b.

Diagnosis: Rather small, evolute with compressed whorls. Constrictions frequent, well marked, prorsiradiate on the sides and showing a conspicuous peripheral projection. Ribs numerous, flexuous on the sides and nearly obsolete, in middle growth, on the venter, with or without elevation on the venter in the adult. Ventrolateral tubercles develop in middle age, but typically there are no umbilical tubercles, apart from an occasional slight elevation just behind a constriction. Apertural margin with moderately projected lappets and rostrum. Suture similar to that of other kossmaticeratids, with trifid L narrower than E.

Remarks: *Yokoyamaoceras* resembles the rather earlier *Holcodiscoides* SPATH, 1922 but is distinguished by the general absence of umbilical tubercles. It also resembles the inner whorls of certain contemporary puzosiids ("*Kitchinites*" *japonicus* SPATH and "*Desmoceras*" *ishikawai* JIMBO) but these do not develop such a flattened venter or such distinct ventrolateral tubercles.

Occurrence: Urakawan, that is Coniacian and Santonian, of the Japanese province and Coniacian or perhaps Turonian of Southern India.

Family Acanthoceratidae DE GROSSOUVRE

Kossmatia YABE, 1927 (p. 42) *non* UHLIG, 1907 was set up without any description in a list. The only species included were *pseudodeverianum* JIMBO and two *nomina*

* See also pl. 8, fig. 1a—c of this paper.

nuda. Fortunately the species *pseudodeverianum* belongs to *Romaniceras* SPATH, 1923, in the synonymy of which *Kossmatia* YABE falls.

Family Collignoniceratidae (HYATT) WRIGHT & WRIGHT

SHIMIZU (1932, p. 2) set up a genus *Subprionocyclus* with type species *Prionocyclus hitchinensis* BILLINGHURST. He stated that his genus differed from *Prionocyclus* in ribbing and evolution, but did not specify in what respects, and added that "the siphonal lobe was shorter than the first lateral and the internal suture had a deeply divided external saddle" whereas in *Prionocyclus* there were two distinct saddles in the internal suture.

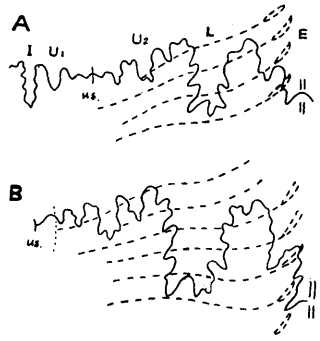
The group to which *P. hitchinensis* belongs certainly requires generic separation but SHIMIZU's description is inadequate.

Subprionocyclus SHIMIZU, 1932

Type species: Prionocyclus hitchinensis BILLINGHURST, 1928.

Diagnosis: Compressed to quadrate whorled, involute or only moderately evolute. Prominent keel, finely or coarsely serrate. Ribs very fine to rather coarse, sharp at first but may be flattened on later whorls, springing in pairs from faint umbilical bullae or intercalated, usually slightly prorsiradiate and flexuous. Double ventrolateral clavi on all ribs but lower one may be weak on the outer whorls. The ribs always remain regular throughout and never unite at the ventrolateral tubercles.

Remarks: The siphonal lobe is, as SHIMIZU states, shorter than the first lateral, but so it is in some species at least of true *Prionocyclus*. His statement about the internal suture is not correct and we find no essential difference in this feature between the two genera (see text fig. 21).



T. M. del.

Fig. 21. *Subprionocyclus hitchinensis* (BILLINGHURST). Holotype, BM. C32292 from Hitch Wood Pit, 2 miles W. S. W. of Stevenage Station, Hertfordshire, England; "Chalk Rock", Upper Turonian.

A. Suture at a whorl-height of about 5 mm. B. External suture at a whorl-height of 7.3 mm. Broken lines show the position of ribs and tubercles.

Subprionocyclus includes, besides the type species, the well known *Ammonites neptuni* GEINITZ, the coarsely ribbed *Prionotropis cristatus* BILLINGHURST, *Schloenbachia knighteni* ANDERSON (1902, p. 119, pl. i, figs. 1–4; pl. ii, figs. 39–40) and possibly also *Schloenbachia siskiyouense* ANDERSON (1902, p. 119, pl i, figs. 19–20),

as well as some undescribed species, including one from Japan. This group is distinguished from *Prionocyclus* itself by usually greater involution, by the regularity of the ribs, which persists on the outer whorls, and the more clavate ventrolateral tubercles, at which ribs do not unite in pairs. The two genera probably represent parallel and perhaps contemporary offshoots of *Collignoniceras*.
Occurrence: Upper Turonian of Western Europe and the Japanese province and also its presumable equivalent of California.

Subsequently SHIMIZU (1935b, p. 197) set up a nominal genus as follows:—"*Spathinella* gen. nov. is proposed with *S. takaoi* sp. nov. as its genotype; it differs from *Prionocyclus* in having wider umbilicus and different ornamentation." This description conveys nothing but in any case the proposed type species is a *nomen nudum* and the nominal genus *Spathinella* has no validity.

A species listed, but not described, by YABE (1925, p. 125) as *Barroisiceras minimum* from the "*Scaphites* Beds" of Hokkaido, Japan was listed by MATSUMOTO (1942b, p. 197 and elsewhere) as *Reesidites* but the genus is a *nomen nudum*. The species is not a *Barroisiceras* but is apparently one of the Collignoniceratidae that often resemble *Barroisiceras*. Although its general form with fastigate and coarsely serrate venter recalls *Barroisiceras sensu stricto* the sharp forward bend of the ribs, especially on the inner whorls, as they approach the ventrolateral shoulder indicates the connexion with *Subprionocyclus*. Indeed the ornament of the adult is not unlike that of the outer whorl of *Subprionocyclus neptuni* (GEINITZ), on which the lower ventrolateral tubercle is weak. There are however sufficient differences to justify the validification of *Reesidites*.

Reesidites, gen. nov.

(ex MATSUMOTO, 1942 MS. *nom. nud.*)

Type species: *Barroisiceras minimum* HAYASAKA & FUKADA, 1951 (ex. YABE, 1925 MS *nom. nud.*).

Diagnosis: Involute, compresed, flat sided with fastigate venter. Sinuous ribs branch in twos or threes from distinct but small umbilical bullae, giving rise to ventrolateral clavi and forming chevrons on the venter; there is a sharp forward bend just below the ventrolateral tubercle. The ribs become increasingly broad and flat with age.

Remarks: The type species, which was fully described by HAYASAKA & FUKADA (1951), is the only one so far known. The absence of a lower ventrolateral tubercle at any stage and the strength of the flat ribs on the venter distinguish it from *Subprionocyclus*. A nearly contemporary genus from South America, *Subprionotropis* BASSE, 1950, which somewhat resembles *Reesidites*, differs in being less involute and in having sharper and more distant ribs with subsidiary ventral

tubercles between the ventrolateral tubercles and the keel. The distinction from *Barroisiceras* has already been mentioned. The genus is evidently a direct descendant of *Subprionocyclus* of the *neptuni* group. A species from the Pacific side of North America, "*Schloenbachia*" *siskiyouense* ANDERSON, which has been referred to *Barroisiceras*, seems to represent an intermediate form between the two genera, although it can still be included in *Subprionocyclus*.

Range: The uppermost part of the Neogyliakian, probably Uppermost Turonian but possibly lowest Coniacian, in Hokkaido, Japan.

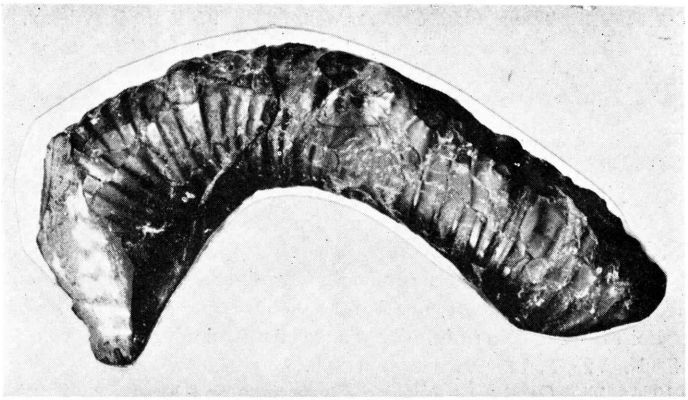


Fig. 22. *Neocrioceras* (?) *sanushibense*, sp. nov. Lateral view of a paratype (GK. H3542, T. M. coll.) from locality U238 (Nishihorobets), bed. Ur5^3, Urakawa area, Hidaka Province, Hokkaido. Natural size (T.M. photo.).

Acknowledgements

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C. W. WRIGHT and T. MATSUMOTO

Some Doubtful Cretaceous Ammonite Genera
from Japan and Saghalien

Explanation of Plates

Plate 7

Fig. 1. *Scalarites mihoensis*, sp. nov. Upper view of immature holotype (GT. I-2951a, T. M. Coll.) from locality N27a, zone Mh4 in the Naibuchi Valley, South Saghalien.

Fig. 2. *Scalarites mihoensis*, sp. nov. A paratype (GT. I-3352, T. M. Coll.), a part of middle aged whorls from locality T848p, bed IId ( ), Abeshinai-Saku area, Teshio Province, Hokkaido.

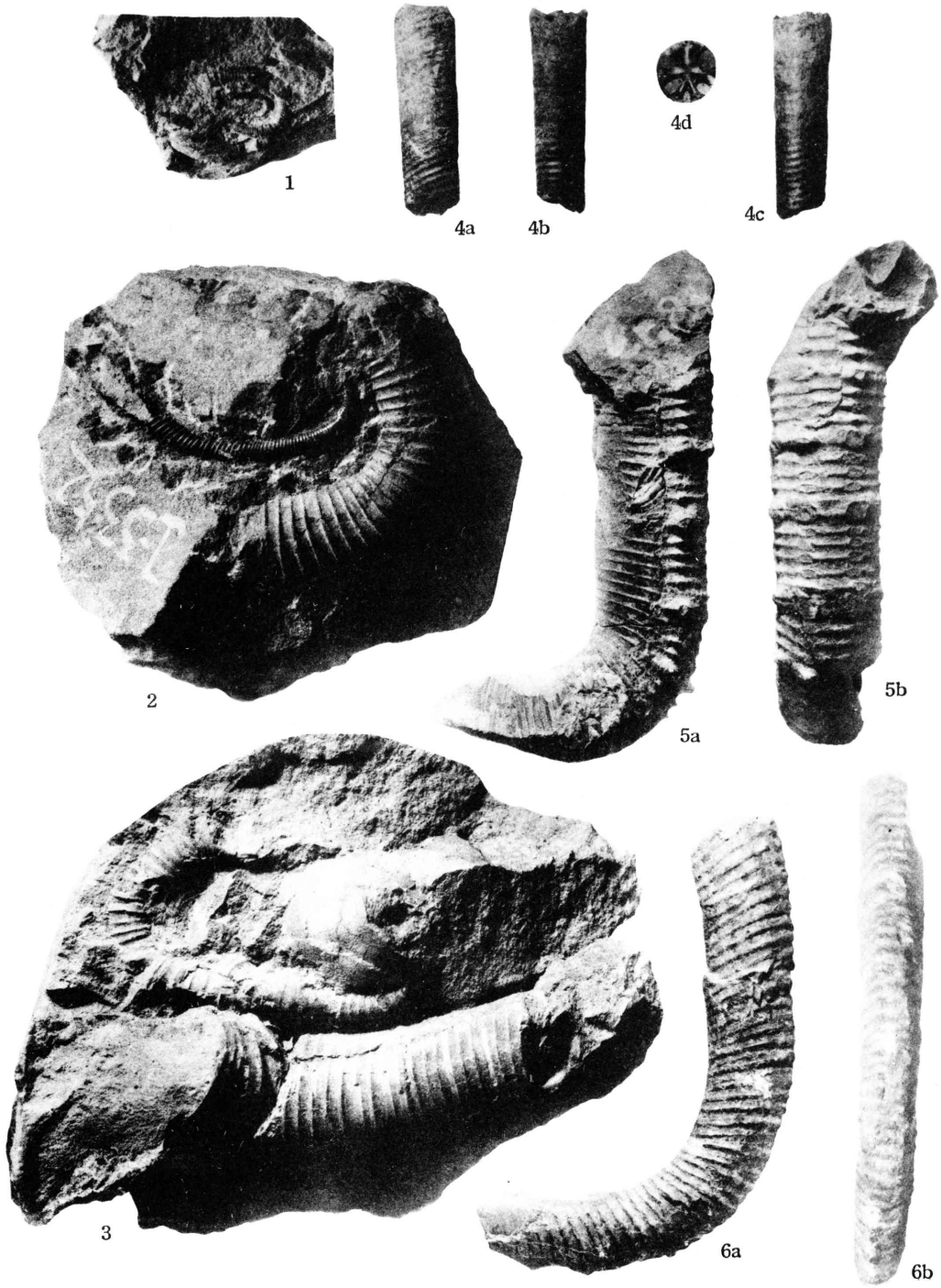
Fig. 3. *Scalarites scalaris* (YABE). An example (GT. I-2931, T. M. Coll.) from locality N125dl, zone Mh2 in the Naibuchi Valley, South Saghalien, showing elliptical coiling in later whorls. x 2/3.

Fig. 4. *Ryugasella ryugasensis*, sp. nov. Lateral(a), ventral (b) and dorso-lateral (c) views and cross section (d) of holotype (GT. I-2862, T. M. Coll.) from locality N18f, zone Ray1 in the Naibuchi Valley, South Saghalien.

Fig. 5. *Neocrioceras* (?) *sanushibensis*, sp. nov. Lateral (a) and ventral (b) views of holotype (GT. I-342, H. YABE's Coll.) from locality 'B' of the Saushisanushibe, '*Pachydiscus* Beds' (= *Anapachydiscus* zone) in the Iburi Province, Hokkaido.

Fig. 6. *Pseudoxybeloceras quadrinodosum* (JIMBO). Lateral (a) and ventral (b) views of a relatively well preserved example (GT. I-341, H. YABE's Coll.) from the Ikushumbets, upper course above the mouth of the Yoshiashi-zawa, '*Pachydiscus* Beds' (= *Anapachydiscus* zone) in the Ishikari Province, Hokkaido.

All the figures are of natural size, unless otherwise stated. Photos by C. UEKI.


1
4a
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6b

Plate 8

Fig. 1. *Yokoyamaoceras kotoi* (JIMBO). Apertural (a), lateral (b) and ventral (c) views of holotype (GT. I-107, illustrated by JIMBO, 1894, pl. v. fig. 2, 2a, 2b) from the Obirashibets Valley, about 60km. from its mouth in Teshio Province, Hokkaido.

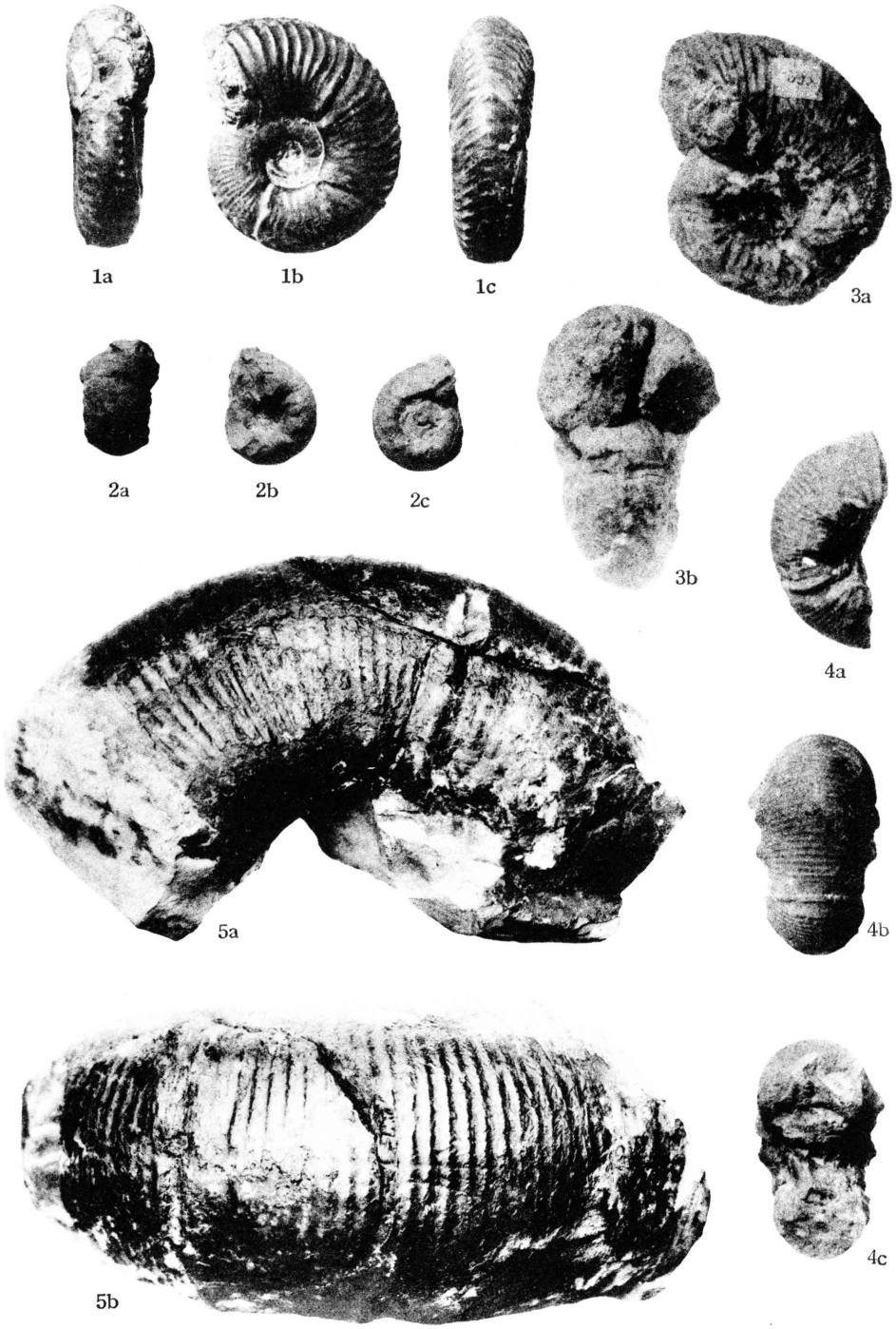
Fig. 2. *Eogunnarites unicus* (YABE). Ventral (a) and two lateral (b, c) views of a young example (GT. I-3245b, T. M. Coll.) from locality T608, bed IIb' in the Saku, a tributary of the Teshio, Teshio Province, Hokkaido.

Fig. 3. *Eogunnarites unicus* (YABE). Lateral (a) and frontal (b) views of a middle aged example, holotype (GT. I-255, illustrated by YABE, 1904, pl. vi, fig. 5a. b) from Kamitakambe, a right branch of the Ikushumbets near Poronai, Ishikari Province, Hokkaido.

Fig. 4. *Eogunnarites unicus* (YABE). Lateral (a) and ventral (b) views and cross-section (c) of another middle aged example (GT. I-3245a, T. M. Coll.) from locality T608, bed IIb in the Saku, a tributary of the Teshio, Teshio Province, Hokkaido.

Fig. 5. *Eogunnarites unicus* (YABE). Lateral (a) and ventral (b) views of a fragment of the last whorl (GK. H1556, T. M. Coll.) from locality Y259, bed IId in the Shiyubari Valley, Ishikari Province, Hokkaido.

All the figures are of natural size. Photos by C. UEKI (1-4) and T. MASTUMOTO (5).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