A Monograph of the Collignoniceratidae from Hokkaido Part V : Studies of the Cretaceous Ammonites from Hokkaido and Saghalien－XXIII

Matsumoto, Tatsuro
Faculty of Science, Kyushu University

https://doi.org/10.5109/1544090

出版情報：九州大學理學部紀要 : Series D, Geology. 21 (1), pp.129-162, 1971-10-25. Faculty of Science, Kyushu University
バージョン：

Mem. Fac. Sci., Kyushu Univ., Ser. D, Geology, Vol. XXI, No. 1,
pp. 129–162, text-figs. 1–11, plates 21–24, October 25, 1971

A Monograph of the Collignoniceratidae from Hokkaido Part V

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

By

Tatsuro MATSUMOTO

Abstract

Part V contains the description of eleven species of the family as a supplement of Parts I–IV. Some of them have already been described but additional descriptions are given here on the basis of subsequently obtained material. Others are new to Hokkaido, including three new species.

As a summary of results concise remarks are given on the Collignoniceratidae with respects to classification, distribution and correlation.

In Parts I–V not only the species from Hokkaido are described but also numerous species from various parts of the world are discussed. The genera and subgenera of the family have been comprehensively treated. Therefore *Index* is added at the end of Part V for the convenience of readers.

Contents

Systematic Descriptions (continued) 129
Family Collignoniceratidae 130
Subfamily Collignoniceratinae 130
Genus *Collignoniceras* BREISTROFFER, 1947 130
Collignoniceras woollgari (MANTELL) 130
Genus *Prionocyclus* MEEK, 1876 132
Prionocyclus wyomingensis MEEK 132
Prionocyclus aberrans MATSUMOTO 133
Genus *Prionocycloceras* SPATH, 1926 134
Prionocycloceras wrighti sp. nov. 134
Genus *Subprionocyclus* SHIMIZU, 1932 136
Subprionocyclus neptuni (GEINITZ) 136
Subprionocyclus bravaisianus (D' ORBIGNY) 137
Genus *Reesidites* WRIGHT and MATSUMOTO, 1954 138
Reesidites elegans MATSUMOTO and INOMA sp. nov. 139
Subfamily Peroniceratinae 142
Genus *Sornayceras* MATSUMOTO 142
Sornayceras wadae sp. nov. 142
Subfamily Barroisiceratinae 144
Genus *Yabeiceras* TOKUNAGA and SHIMIZU, 1926 144
Yabeiceras manasoaense COLLIGNON 144
Subfamily Texanitinae 146

Manuscript received May 28, 1971

Genus *Protexanites* MATSUMOTO, 1955 146
Protexanites (Protexanites) bontanti shimizui MATSUMOTO 146
Genus *Texanites* SPATH, 1932 148
Texanites (Plesiotexanites) pacificus MATSUMOTO 148
Concluding Remarks 149
References Cited 156
Index of Genera and Species 158

Systematic Descriptions (Continued)

Family Collignoniceratidae
Subfamily Collignoniceratinae
Genus *Collignoniceras* BREISTROFFER, 1947

Type-species.—*Ammonites woollgari* MANTELL, 1822.

Collignoniceras woollgari (MANTELL)

Pl. 21 [52], Fig. 4; Text-Fig. 1 [102]

Synonymy.—See MATSUMOTO, 1965, p. 11.

Material.—MURAMOTO Museum Collection, 68. 10. 14.

Descriptive remarks.—In Part I of this Monograph (MATSUMOTO, 1965, p. 11–17) I described at length the specific characters and also a considerable extent of variation, suggesting that the various forms in the immature stage seem to foreshadow several species of the succeeding age. On the same occasion I grouped the specimens from Oregon, California and Hokkaido under the subspecies *Collignoniceras woollgari bakeri* (ANDERSON).

The present specimen, which was obtained after my previous description, shows the features which can be regarded as intermediate between typical *C. woollgari woollgari* and *C. woollgari bakeri*. In its early stage with diameters from 3.5 mm. to about 12 mm. the ribs are dense and numerous, about 30 per whorl, and the whorl enlarges rather slowly. In these respects it has some affinity with *C. woollgari bakeri* defined by MATSUMOTO, 1965 (p. 16). Later than the above stage the whorl grows moderately and the ribs gradually become stronger and more distant. Thus, the specimen is not quite identical with the typical specimens of *C. woollgari bakeri* in its less persistency of the dense ribbing, less slow but moderate growth of whorls and less wide but moderate umbilicus. In other words it is fairly similar to typical examples of *C. woollgari* as represented by those described under subgroup B in my previous paper (MATSUMOTO, 1965, p. 14) and probably by the British specimen illustrated by SHARPE (1855, p. 27, pl. 11, fig. 2). Its suture (Fig. 1) is also similar to those illustrated by HAAS, 1946, under the name *forma typica*. Yet, its ribs are not so remarkably prorsiradiate as those in the typical specimens of *C. woollgari*. It could be still included within the variants of *C. woollgari bakeri*, if *bakeri* be maintained as a geographical subspecies in the northern Pacific region.

As another possibility *C. woollgari bakeri* can be regarded as a subspecies

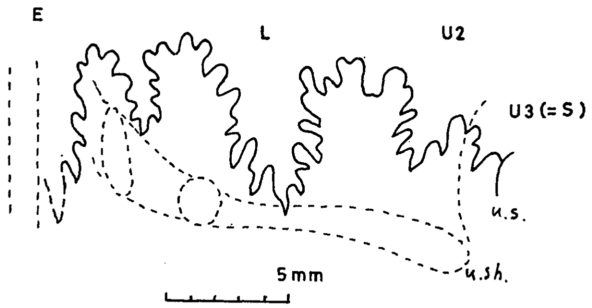


Fig. 1 [102]. *Collignoniceras woollgari* (MANTELL). External suture of a specimen from Hakkin-zawa, Oyubari (MURAMOTO Coll.), at whorl-height=14 mm. Dotted lines indicate the disposition of ribs, tubercles and a keel. (T. M. *delin.*)

which may have given rise to such a species as *Subprionocyclus bravaisianus* (D'ORBIGNY) (see MATSUMOTO and NODA, 1966). In this case *C. woollgari bakeri* is not necessarily a geographical subspecies and the present specimen may represent an intermediate form between *C. woollgari woollgari* and *C. woollgari bakeri.*

Anyhow, the present specimen not only represents a Japanese example which is fairly close to the typical form of *C. woollgari* but also throws a problem which should be settled in the future.

Incidentally the specimen, from the *Brongniarti*-Pläner from Germany, which was described under *Ammonites carolinus* D'ORBIGNY by SCHLÜTER (1872, p. 27, pl. 9, fig. 6) (GIB. No. 38 which I looked at in the University of Bonn) is fairly similar to the present specimen, although it is secondarily compressed. It is probably one of typical examples of *Collignoniceras woollgari.*

Although I missed to examine the illustrated type specimen of *Ammonites carolinus* D'ORBIGNY (1841, p. 310, pl. 91, figs. 5–6) from France, its description and figures seem to suggest that it is possibly an immature example of *C. woollgari,* in which, however, distant, strong ribs are somewhat delayed to occur. In this respect it can be regarded as showing an apparently intermediate feature between *C. woollgari woollgari* and *C. woollgari bakeri.* Anyhow, it would be desirable to get more numerous specimens from Europe to settle the possible identity of *"Ammonite carolinus"* with *C. woollgari.*

The small holotype of *Ammonites serrato-carinatus* STOLICZKA, 1865, GSI. 144, is indistinguishable from the densely ribbed young shell of *Collignoniceras woollgari.* Whether it is assignable to *C. woollgari bakeri* or *C. woollgari woollgari* or otherwise should be determined by collecting more specimens from the Trichinopoly Group at Garudamungalum, southern India.

Occurrence.—The described specimen was found by K. MURAMOTO and T. TAKAHASHI from loc. Y. 5206, Hakkin-zawa, a branch of the Penkemoyuparo, a tibutary of the Shuyubari, Oyubari area, Ishikari province, Hokkaido. The strata exposed at loc. Y. 5206 and adjacent cliffs are assigned to the zone of *Inoceramus hobetsensis,* middle part of the Turonian and *Tragodesmoceroides subcostatus* occurs in the same calcareous nodule.

Genus *Prionocyclus* MEEK, 1876

Type-species.—*Prionocyclus wyomingensis* MEEK, 1876.

Remarks.—See MATSUMOTO, 1965 (this Monograph Part I, p. 17) for the generic diagnosis and comparison with allied genera.

Prionocyclus wyomingensis MEEK

Pl. 21 [52], Fig. 2; Pl. 22 [53], Fig. 1; Text-fig. 2 [103]

Synonymy.—See HAAS, 1946, p. 200.

Types.—HAAS (1946, p. 200) indicated the original syntypes (USNM. 7729) as lectosyntypes. I designated one of them as the lectotype (MATSUMOTO, 1965, p. 18, pl. 16, fig. 1), although other syntypes (paralectotypes) are also good examples of this species.

Material.—GK. H5552, from loc. Ik 2012, found by Takemi TAKAHASHI in a field work conducted by me.

Descriptive remarks.—The present specimen from Hokkaido agrees well with the original and also other typical specimens of *P. wyomingensis* from the Western Interior province of North America in the moderately compressed whorls, finely crenulated and distinct ventral keel, fairly dense, generally prorsiradiate, sometimes gently flexuous ribs of unequal length and intensity, umbilical tubercles or bullae at the end of longer ribs, somewhat clavate ventrolateral tubercles, from which the ribs are projected and run away as they approach the keel. Faint outer tubercles may be discernible on some of the projected ventral ribs, as in the case of the original types.

The specimen, about 75mm. in diameter, is wholly septate and its next inner whorl is rather weakly costate, as in the typical specimens. The suture (Fig. 2) is essentially similar to the previously illustrated ones (e.g. HAAS, 1946, figs. 93–108), but is somewhat more deeply incised and has narrower saddles. The minor difference in the suture can be regarded as being within the extent of variation.

W. A. COBBAN, who is most familiar with the Cretaceous ammonites of the Western Interior province, has agreed with me in identifying the present speci-

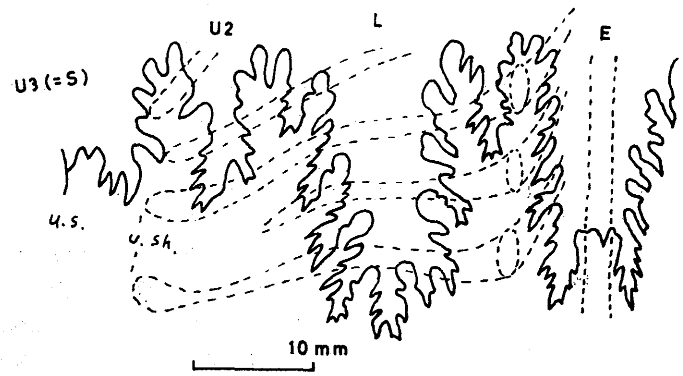


Fig. 2 [103]. *Prionocyclus wyomingensis* MEEK. External suture at whorl-height=27 mm. of GK. H5552. (T. M. *delin.*)

men with *Prionocyclus wyomingensis* on the basis of the plaster cast which I sent to Denver.

As has been described in detail by HAAS (1946, p. 200–215), there is a considerable extent of variation in every character. The present specimen is certainly within that extent.

Measurements.—

Specimen	Diameter	Umbilicus	Height	Breadth	B./H.
GK. H5552	73.0(1)	25.2(.34)	30.0(.41)	22.4(.30)	.75
Lectotype	—	—	44.0	30.5	.69
Paralectotype	62.6(1)	16.5(.26)	27.3(.43)	19.8(.31)	.72
(another)	111.0(1)	41.0(.37)	40.5(.36)	33.0(.30)	.81

Occurrence.—Loc. Ik 2012c, about 20 m. below the base of the green sandstone in the lower part of the Upper Yezo Group, the Pombets [Ponbetsu], a tributary of the Ikushumbets. It is slightly lower than the bed with *P. cobbani* and *P. aberrans*, but they are all in the upper part of the zone of *Inoceramus tenuistriatus*, Upper Turonian.

The rare occurrence of *P. wyomingensis* in Hokkaido is rather surprising, but the immigration of an element of the North American Western Interior ammonite fauna into Japan may have taken place through some seaway in the southern part of North America. *Ammonites novi-mexicani* MARCOU, 1858, (p. 35, pl. 1, fig. 2, holotype BM. C49764, the plaster cast of which is in Kyushu University, GK. H9165), which is possibly identical with *Prionocyclus wyomingensis*, occurs in New Mexico and seems to support the above interpretation.

Prionocyclus aberrans MATSUMOTO
Pl. 21 [52], Fig. 1; Text-fig. 3 [104]

1965. *Prionocyclus aberrans* MATSUMOTO, *Mem. Fac. Sci., Kyushu Univ.*, D, Vol. 16, no. 1, p. 25, pl. 5, fig. 1; pl. 6, fig. 3; text-figs. 8, 9.

Material.—GK. H5553, from loc. Ik2012, found by T. TAKAHASHI in a field work conducted by me.

Descriptive remarks.—The species was established on the basis of two specimens of probably adult stage. The present specimen is added here as an example of immature shell.

The first two whorls, succeeding to the protoconch, are smooth. At about the diameter of 3.5 mm. in the third whorl radial ribs begin to appear. They are rather weak, prorsiradiate and separated by somewhat wider interspaces. Ventrolateral tubercles begin to appear soon after the ribbing began.

In the late part of the third whorl, with diameters over 8 mm., the ribs become to be stronger and provided with distinct, bullate, umbilical tubercles and spinose, strong, ventrolateral tubercles. The characters in this and later growth-stages are essentially the same as those described as specific diagnosis in my previous paper (MATSUMOTO, 1965, p. 25). The double ventrolateral tubercles, consisting of an inner, spinose, stronger one, with rounded nodose

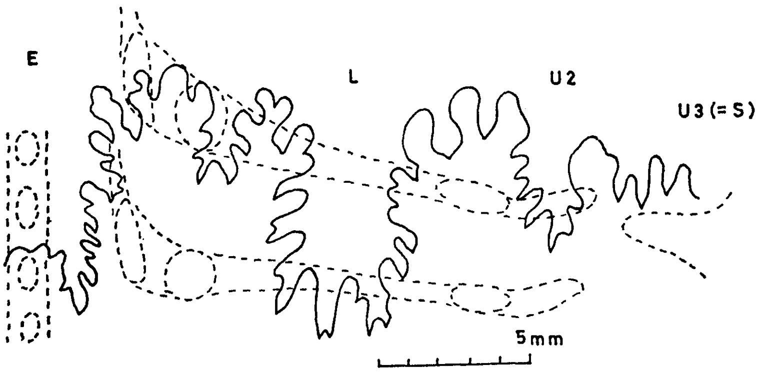


Fig. 3 [104]. *Prionocyclus aberrans* MATSUMOTO. External suture at whorl-height=13.5 mm. of an immature specimen, GK. H5553. (T. M. *delin.*)

base, and an outer, clavate, weaker one is one of the diagnostic characters observed even in this small, immature specimen. The pattern of the suture (Fig. 3) is also essentially similar to that seen on a more grown whorl.

As I mentioned in Part I (MATSUMOTO, 1965, p. 29), the persistency and distinctness of the outer ventrolateral tubercles are a diagnostic feature of *P. aberrans* which might deserve subgeneric separation. *Ammonites germari* REUSS, as understood from the description of FRITSCH and SCHLOENBACH (1872, p. 29, pl. 14, figs. 1–2; pl. 16, fig. 7), from the Turonian of Bohemia (Czechoslovakia), is allied to *P. aberrans* in the presence of the two tubercles on the projected ribs of the ventral part as well as the finely serrate keel, but its ribs are finer. This species was designated as the type-species of *Germariceras* BREISTROFFER, 1947. The outer ventrolateral tubercles are variably discernible in other species of *Prionocyclus*, although they are generally weak and may be reduced in some cases. Therefore *Germariceras* could be included in *Prionocyclus* as a subgenus. I would reserve the final conclusion until I could examine more numerous and better preserved specimens of *Ammonites germari* REUSS.

The specific distinction of *P. aberrans* from nearly contemporary *P. cobbani* MATSUMOTO, 1965, may be still questionable, but so far as the available specimens are concerned they are distinguishable as I previously remarked (MATSUMOTO, 1965, p. 28).

Occurrence.—Loc. Ik 2012, Pombets, a tributary of the Ikushumbets, upper part of the zone of *Inoceramus tenuistriatus.* Relative stratigraphic position of *P. aberrans* with *P. cobbani* is not precisely known, although they occur within the 20 m. thick siltstone exposed at loc. Ik 2012.

Genus *Prionocycloceras* SPATH, 1926

Type-species.—*Prionocyclus guayabanus* STEINMANN, 1897.

Prionocycloceras wrighti sp. nov.

Pl. 22 [53], Fig. 2; Text-fig. 4 [105]

1965. *Prionocycloceras* sp. aff. *P. guayabanum*, MATSUMOTO, *Mem. Fac. Sci., Kyushu Univ.*, ser. D, vol. 16, no. 1, p. 43, pl. 11, fig. 4; text-figs. 19, 20.

Material.—Holotype, GK. H5556, from the Kami-ichino-sawa, a tributary of the Ikushumbets, found and donated to Kyushu University by Takemi TAKAHASHI. Two other specimens, GK. H5436 and GK. H5488, which I described under *Prionocycloceras* sp. aff. *P. guayabanum* (STEINMANN) (see above synonymy) are paratypes.

Specific diagnosis.—The whorl is rather evolute and enlarges moderately, encircling an umbilicus of moderate width. It is subquadrate in section and is somewhat higher than broad.

The young nuclear shell is nearly smooth in lateral view. Faint subcostae are discernible at about the diameters of several mm. to 10 mm. At this stage a narrow keel and a tiny ventrolateral tubercle begin to appear. In the succeeding stages ribs are moderately strong and provided with prominent ventrolateral tubercles and bullate umbilical tubercles. The ventrolateral tubercle is doubled, consisting of prominent inner one, which has septate spines, and a weak node like small elevation somewhat ahead of the main tubercle. The keel is not much elevated and finely serrate, crossed by the projected but weakened ribs. The ribs are gently convex on the flank. They are distant on the immature whorl, about 15 on the holotype. They are less widely separated and more numerous on the whorl of later growth-stage.

The suture (Fig. 4) is fundamentally of *Collignoniceras* type, but there is some peculiarity. The first lateral saddle is massive, roughly subquadrate, and asymmetrically divided, with a broader outer branch. The first lateral lobe (L) is shallower and narrower than the external lobe (E) and its rough outline is intermediate between U and V. The second lateral lobe (U2) takes an oblique disposition from fairly early growth-stage. The suture of the middle growth-stage, about 25–30 mm. in diameter, is considerably incised, the stem of the

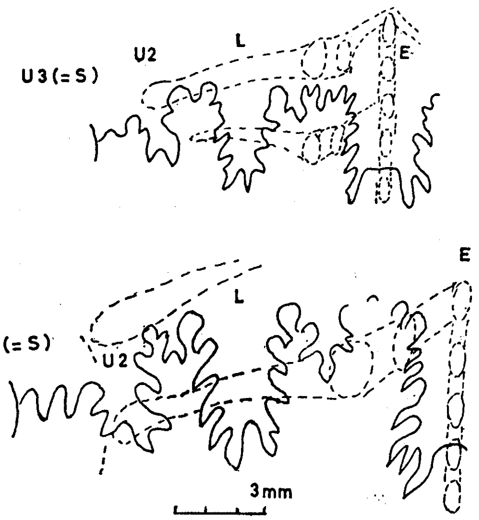


Fig. 4 [105]. *Prionocycloceras wrighti* sp. nov. External suture of the holotype, GK. H5556, at whorl-height of 7 mm. (above) and that of 13 mm. (below). (T. M. *delin.*)

second lateral lobe is narrowed by the oblique incision of U2 and the folioles of the subdivided saddles show somewhat phylloid aspect.

The size of the adult shell is not precisely known. It may be moderate (at least 60 mm. in diameter), if the incompletely preserved paratype, GK. H5436, is assumed to represent an adult shell.

Remarks.—The specific name is dedicated to Mr. C. W. WRIGHT, who has contributed much to the palaeontology of Cretaceous ammonoidea and kindly helped me in the study.

Measurements.—

Specimen	Diameter	Umbilicus	Height	Breadth	B./H.
GK. H5556	28.5(1)	8.0(.28)	13.8(.48)	11.6(.40)	.83

Comparison.—The present species is similar to *Prionocycloceras guayabanus* (STEINMANN *in* GERHARDT, 1897), but is distinguished by the presence of small and weak, but distinctly discernible outer ventrolateral tubercles and the peculiarity in the suture. *P. guayabanum* has less deeply incised, simpler, more typically collignoniceratoid sutures. The obliqueness of U2, narrowed stem of the second lateral saddle and deeper incisions of the present species seem to foreshadow that of *Sornayceras proteus,* although the character may not be so remarkably manifested as in the latter.

Occurrence.—The holotype was found in the Kami-ichino-sawa, a right tributary of the Ikushumbets. It came probably from bed IIIb (Coniacian) as did the two paratypes (see MATSUMOTO, 1965, p. 45).

Genus *Subprionocyclus* SHIMIZU, 1932

Type-species.—*Prionotropis hitchinensis* BILLINGHURST, 1927.

Remarks.—Relationships between variously named species of *Subprionocyclus,* such as *S. hitchinensis* (BILLINGHURST, 1927), *S. bravaisianus* (D'ORBIGNY, 1841), *S. neptuni* (GEINITZ, 1849), *S. branneri* (ANDERSON, 1902) [=*S. cristatus* (BILLINGHURST, 1927)] [=*S. teshioensis* (YABE and SHIMIZU, 1925)], *S. normalis* (ANDERSON, 1958), *S. massoni,* (BASSE, 1962) and *S. casterasi* COLLIGNON, 1965, remain to be restudied from the viewpoint of population palaeontology. Their affinities with ancestral species of *Collignoniceras* and also with descendants likewise need further researches.

In the collections subsequent to those described by MATSUMOTO, 1965, the material is yet insufficient to meet with the above requirements. They contain, however, examples which can supplement the previously described knowledge.

Subprionocyclus neptuni (GEINITZ)
Pl. 22 [53], Fig. 3

Synonymy.—See MATSUMOTO, 1959, p. 112; 1965, p. 52; COLLIGNON, 1965, p. 67.

Material.—GK. H5551, from loc. Ik 2014, collected and donated to Kyushu University by T. TAKAHASHI.

Descriptive remarks.—The illustrated specimen is somewhat crushed but represents a probably adult shell which is slightly larger than an example from the Upper Turonian of Madagascar (COLLIGNON, 1965, p. 67, pl. 406, fig. 1692) and somewhat smaller than an example from California (MATSUMOTO, 1959, p. 112, pl. 30, fig. 2).

As far as the observable part is concerned, the specimen exhibits the diagnostic features of *S. neptuni* described in my previous paper (MATSUMOTO 1959, p. 112). On the probably adult body-whorl the lower ventrolateral tubercles are weakened as in other examples. The paired flexuous ribbing is more distinct on the inner whorls. They are fairly coarse even in the young stage, although the nuclear part less than 12mm. in diameter is not well preserved.

Occurrence.—The specimen was obtained at loc. Ik 2014, Pombetsu, a tributary of the Ikushumbets. From the same cliff a smaller example of *Subprionocyclus normalis* (ANDERSON) was obtained (MATSUMOTO, 1965, p. 55, pl. 13, fig. 3), but that specimen is rather atypical of *S. normalis*, resembling to some extent *S. neptuni*. Fine sandy siltstone of about 40 m. are exposed on the cliff of loc. Ik 2014, but the collecting record is not precise enough to indicate the very horizons of the two specimens in question in the sequence of Ik 2014. The present specimen was obtained from rather a lower part and the previous one (*S. normalis*) came from a block fallen from the cliff.

Subprionocyclus bravaisianus (D'ORBIGNY)
Pl. 21 [52], Fig. 3

1841. *Ammonites bravaisianus* D'ORBIGNY, *Paléontologie Française, Terrains Crétacé*, vol. 1, p. 308, pl. 91, fig. 3–4.
1892. *Ammonites bravaisianus*, FRITSCH and SCHLOENBACH, *Cephalopoden der böhmischen Kreideformation*, p. 29, pl. 8, fig. 5; pl. 16 fig. 4.
1897. *Schloenbachia bravaisiana*, LEONHARDT, *Plalaeontographica*, vol. 49, p. 58, pl. 5, fig. 4.
1913. *Prionotropis bravaisianus*, ROMAN and MAZERAN, *Arch. Musée Hist. Nat. Lyon*, vol. 12, p. 22, pl. 1, figs. 13–17.
1966. *Subprionocyclus bravaisianus*, MATSUMOTO and NODA, *Trans. Proc. Palaeont. Soc. Japan*, N. S., no. 64, p. 359, pl. 40, figs. 1–8.
1969. *Subprionocyclus bravaisianus*, THOMEL, *Ann. Paléont.* (Invertébrés), vol. 55 p. 117, pl. F, figs. 4–6.

Material.—Four more or less incompletely preserved specimens of different size from one and the same nodule, Ob. 001p, MURAMOTO Museum Collection.

Descriptive remarks.—MATSUMOTO and NODA (1965) designated the lectotype and attempted to describe specific characters and some variation of the present species. On that occasion *S. bravaisianus* was distinguished from the closely allied *S. neptuni* (GEINITZ). Because the hitherto described specimens of *S. bravaisianus* are mostly small and because *S. neptuni* is fairly variable, whether their specific distinction is clear or not may be still questionable.

The smaller specimens in the present collection closely resemble those of D'ORBIGNY's syntypes. The larger specimen is about 45 mm. in diameter, although it is incompletely preserved. At this stage the ribs are still dense, rather fine, numerous (26 per a half whorl), somewhat prorsiradiate and gently sigmoidal. They are of unequal length, although the shorter ribs normally arise from a point slightly above and somewhat ahead of the longer ribs which have umbilical bullae. The shell is fairly compressed and the keel is continuous, with serrations corresponding to the ribs. Thus the shell of this size still keeps the characters of younger *S. bravaisianus* and is well distinguishable from typical examples of *S. neptuni* of similar size by its denser and more numerous ribs and wider umbilicus. The specimen from the Alpes-Maritimes illustrated by THOMEL (1969, pl. F, fig. 4) and the one from eastern Kyushu (MATSUMOTO and NODA, 1966, pl. 40, fig. 7) show similar features.

To sum up I treat at least for the time being *S. bravaisianus* as distinct from *S. neptuni*. As the available specimens are not sufficiently numerous, the problem should be settled in the future.

Some resemblance between *S. bravaisianus* and a young shell of *Collignoniceras woollgari bakeri* cannot be overlooked. As a possibility *S. bravaisianus* could be regarded as representing an intermediate position on the line of descent from *C. woollgari* to *S. neptuni*.

Measurements.—

Specimen	Diameter	Umbilicus	Height	Breadth	B./H.
Larger	45.4(1)	17.6(.39)	17.0(.37)	ca. 13.5(.29)	.79
Moderate	25.0(1)	9.6(.38)	8.8(.35)	7.5(.30)	.71
Smaller	12.5(1)	4.7(.37)	4.3(.34)	—	—

Occurrence.—Kamikinebetsu, at the confluence with the Hifumi-zawa, Obirashibetsu [Tappu] area, Hokkaido. *Mesopuzosia* sp. is contained in the same calcareous nodule, which may be derived from a certain horizon of what TANAKA (1958) called the uppermost part of the Middle Yezo Group, zone of *Inoceramus hobetsensis*. In eastern Kyushu the same species occurs in the zone of *Inoceramus hobetsensis*.

Genus *Reesidites* WRIGHT and MATSUMOTO, 1954

Type-species.—*Barroisiceras minimum* (YABE MS) HAYASAKA and FUKUDA, 1951.

Remarks.—See MATSUMOTO, 1965, p. 61, for the generic diagnosis and comparison with allied genera.

In addition to *Reesidites minimus* (HAYASAKA and FUKADA, 1951) (see MATSUMOTO, 1965, p. 63, pl. 14, fig. 1; pl. 15, figs. 1–3; text-figs. 34–39), *Reesidites subtuberculatus* (GERHARDT, 1897) (see REYMENT, 1958a, p. 10, pl. 1, figs. 4–5; pl. 2, figs. 1–2; text-figs. 4a) and *Reesidites* aff. *subtuberculatus* (GERHARDT, 1897) (REYMENT, 1958a, p. 11, pl. 2, fig. 3; text-fig. 3b), there is one more species from Hokkaido which is distinguished from them.

Subprionocyclus casterasi COLLIGNON (1965, p. 68, pl. 406, figs. 1693–1695), from the Turonian of Madagascar, might be another species of *Reesidites*, because it has only one row of ventrolateral tubercles in all the visible stages. It looks, however, very close to *Subprionocyclus normalis* (ANDERSON), from California, Oregon and Japan. In the latter species the double ventrolateral tubercles appear in a limited part of the middle growth-stage, presenting, thus, an intermediate feature. Such a character might exist in a concealed part of the inner whorl of that Madagascar species. I would not give a definite conclusion without examining the original specimens.

Reesidites elegans MATSUMOTO and INOMA, sp. nov.*

Pl. 23 [54], Figs. 1–3; Text-figs. 5–7 [106–108]

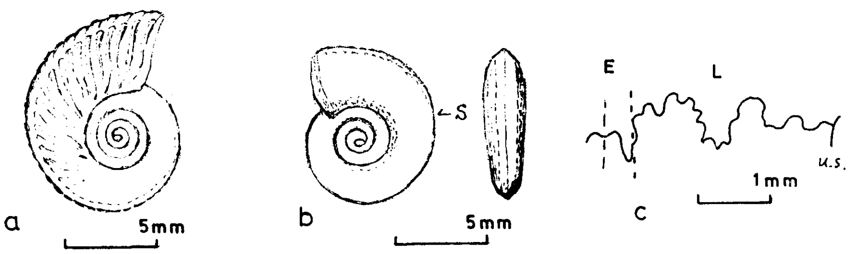


Fig. 5 [106]. *Reesidites elegans* MATSUMOTO and INOMA, sp. nov. Sketch of infant shells. a. TKU. 30376-(10), in which fine ribbing begins to appear at diameter of about 6.5 mm. b. TKU. 30376-(11), lateral and ventral views of the smoothish stage. c. External suture of TKU. 30376-(11) at S.

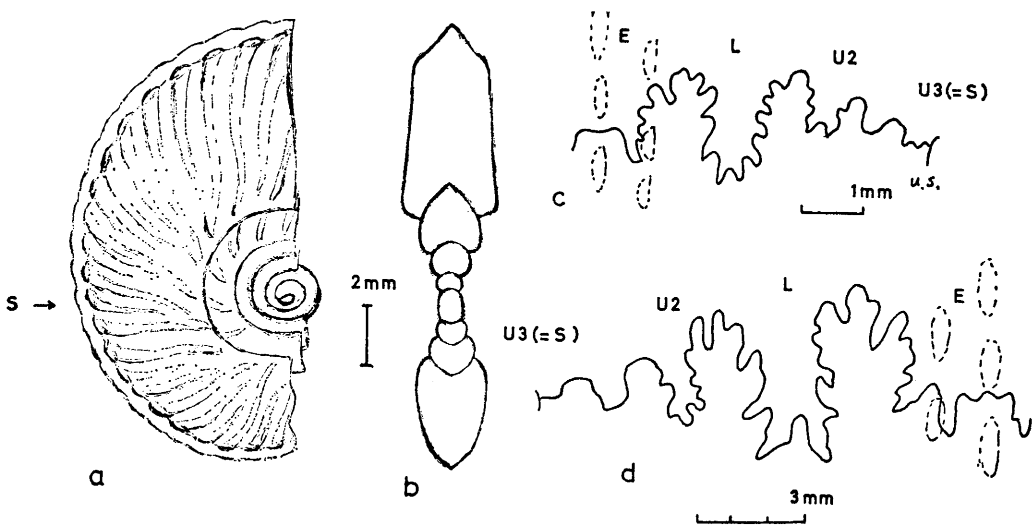


Fig. 6 [107]. *Reesidites elegans* MATSUMOTO and INOMA, sp. nov.
a-c. Sketch of an immature shell, TKU. 30375-(2): lateral view (a), natural cross-section (b) and external suture (c) at S (whorl-height=5.0 mm.). d. Last suture of a probably mature shell, TKU. 30375-(1). (T. M. *delin.*)

* Akitoshi INOMA joins with T. MATSUMOTO in the description of this new species, since he preliminarily studied the specimens at the suggestion of Professor W. HASHIMOTO.

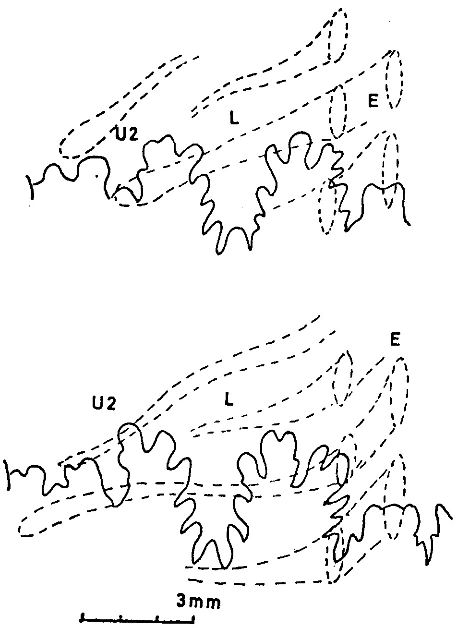


Fig. 7 [108]. *Reesidites elegans* MATSUMOTO and INOMA, sp. nov. External suture of the holotype, TKU. 30376-(1), at whorl-height=7.5 mm. (above) and that of a paratype, TKU. 30376-(3), at whorl-height=8.0 mm. (below). (T. M. *delin.*)

Material.—TKU. 30376·(1)-(15), including immature shells, of which TKU. 30376·(1) is designated here as the holotype. TKU. 30375·(1)-(12), TKU. 30377·(1)-(3) and TKU. 30378·(1)-(4).

Specific characters.—The shell is small. In several specimens before us, including the holotype, the body-whorl, slightly more than a half volution is preserved, on which the ribbing is stronger than on the septate whorls. The sutures are approximated in the last part of the septate whorls. Therefore, we regard these specimens as probably adult. They are about or slightly less than 30 mm. in diameter.

The whorl is involute, encircling a narrow umbilicus. It is much compressed in later growth-stages but less so in the earlier growth-stages. In later stages the venter is keeled, narrow, and shouldered; the flanks are flattened; the umbilical wall is low but nearly vertical or even overhanging.

Up to the shell diameter of several millimeters the shell is nearly smooth. On the succeeding part of the septate whorls there are numerous, fine, weak ribs. On the body-whorl the ribs acquire moderate intensity. The ribs often spring in pairs from the umbilical bullae and in addition to them shorter ribs are sometimes inserted on the flank. The ribs are gently flexuous on the flank and considerably projected on the ventral part, forming chevrons on crossing the serrate keel. The longer ribs have umbilical bullae. Every rib has a distinct but narrow, clavate tubercle at the ventrolateral shoulder. No inner ventrolateral tubercle is found at any stage, although the ribs are bent there. The clavate serration on the ventral keel corresponds with the outer ventrolateral tubercle behind it. The ribs are generally weaker on the inner part of the flank, except near the umbilical bullae. On the well preserved specimens very fine lirae are discernible which run nearly parallel to the ribs.

The suture is fairly similar to that of *Subprionocyclus normalis* (ANDERSON) (see MATSUMOTO, 1965, text-figs. 28–33), but the first lateral saddle between E and L is generally less deeply incised and the oblique disposition of its outer branch is not so remarkable, although there is some extent of variation in these respects (Text-figs. 5–7).

Measurements.—

Specimen	Diameter	Umbilicus	Height	Breadth	B./H.	Turbercles Umb./Vent.
TKU. 30376·(1)	28.5(1)	6.6(.22)	14.0(.49)	6.2(.21)	.44	17/45
TKU. 30376·(2)	27.0(1)	5.0(.19)	13.2(.49)	5.8(.21)	.44	16/40
TKU. 30376·(3)	26.2(1)	6.0(.23)	13.6(.51)	5.5(.21)	.40	16/38
TKU. 30376·(4)	27.0(1)	—	—	—	—	?19/49
(−1/2 vol.)	18.5(1)	4.7(.25)	8.0(.43)	3.4(.18)	.42	11/25(half vol.)
TKU. 30376·(10)	10.3(1)	3.3(.32)	4.4(.42)	2.8(.27)	.63	7/20(half vol.)
TKU. 30376·(11)	8.5(1)	3.0(.35)	3.5(.41)	2.4(.28)	.68	—
TKU. 30375·(1)	28.5(1)	4.5(.15)	15.4(.53)	5.2(.18)	.33	14/43

Comparison.—This species is closely allied to *Reesidites minimus* (HAYASAKA and FUKUDA, 1951) (see MATSUMOTO, 1965, p. 63, pl. 14, fig. 1; pl. 15, figs. 1–3; text-figs. 34–39). OBATA (1965) presented in detail the extent of variation and its ontogenetic change of that species on the grounds of sufficient number of specimens. Although the available specimens of the present species show some extent of variation and, accordingly, a few examples may approach to *R. minimus* in some characters, we still consider that the two species should be distinguished.

R. elegans is evidently smaller than *R. minimus,* inasmuch as the holotype and several paratypes of similar size are regarded as representing an adult shell (see description).

On the average *R. elegans* has much finer and more numerous ribs, weaker or more delicate, umbilical and ventrolateral tubercles. The suture of *R. elegans* is generally similar to that of *R. minimus,* but the outer branch of the first lateral saddle (between E and L) is not so remarkably oblique in the former as in the latter. We recognize, however, certain extent of variation even with respect to the suture as can be understood from the text-figures.

The two species under consideration may have been derived from a common ancestor (e.g. such a species as *Subprionocyclus normalis*), deviating from each other, or *R. elegans* may have evolved from another unnamed species of *Subprionocyclus.* In the boulders of the same area (upper reaches of the Haboro and adjacent parts) HASHIMOTO collected fragmentary specimens (TKU. 30371–30373) of *Subprionocyclus* sp., which is allied to *S. normalis* but has more numerous and finer ribs. This is not yet well defined but suggests a possibly ancestral form of *R. elegans.* On the other hand *S. normalis* itself has faintly ribbed and finely carinate infant stage. Anyhow, how the two allied species, *R. elegans* and *R. minimus,* were differentiated from what species of *Subpriono-*

cyclus is a problem to be worked out in the future by successive collecting more specimens under the idea of population palaeontology.

The suture (especially the first lateral saddle) of *Reesidites* is modified in such a way as could lead to that of Lenticeratinae, as has already been noted by MATSUMOTO (1965, p. 63). This is more remarkably manifested by *R. minimus* than by *R. elegans.* On the other hand, with respect to the rib density and weakness and also the fineness of the keel, the young shell of *R. elegans* is fairly similar to that of such species as *Paralenticeras spath* REYMENT, 1958, a compressed member of the Lenticeratinae.

Occurrence.—TKU. 30376, including the holotype, was obtained by W. HASHIMOTO from boulder 15, loc. 71705, upper reaches of the Haboro (Shirochiune-zawa, a branch of Naka-futamata-gawa), southern part of the Teshio Mountains, northwest Hokkaido. TKU. 30375 was in boulder 14, TKU. 30377 in boulder 3, TKU. 30378 in boulder 5 of the same stream. The source beds are interpreted as upper part of unit Uy2 in the geological map "Soeushinai" (HASHIMOTO et al., 1965). As the overlying Uy3 is Coniacian on account of prolific *Inoceramus uwajimensis,* upper Uy2 is probably referred to Upper Turonian.

Subfamily Peroniceratinae

Genus *Sornayceras* MATSUMOTO, 1965

Type-species.—*Sornayceras proteus* MATSUMOTO, 1965

Remarks.—*Sornayceras* was introduced to accommodate the species which resemble *Gauthiericeras* in shell-form and ornament but have characteristic sutures of *Peroniceras* type.

The species which are referred to *Sornayceras* are as follows:

S. proteus MATSUMOTO, 1965 (Coniacian of Japan)

S. bajuvaricum (REDTENBACHER, 1873) (Gosau beds of the Alps)

S. isamberti (FALLOT, 1885) (Coniacian of France)

S. omorii MATSUMOTO, 1965 (Coniacian of Japan)

S. propoetidum (REDTENBACHER, 1873) (Gosau beds of the Alps and probably also Coniacian of Japan)

S. undulatocarinatum (VAN HOEPEN, 1955) (Coniacian of South Africa)

In addition to them here is another new species, which is apparently very similar to *Gauthiericeras margae* but should be assigned to *Sornayceras* because of its characteristic sutures.

Sornayceras wadae sp. nov.

Pl. 24 [55], Fig. 1; Text-fig. 8 [109]

Material.—Holotype, GK. H5647 from loc. Ik 1527, collected by Tatsuo MURAMOTO.

Specific characters.—The whorl enlarges moderately and is fairly evolute, about one third of the inner whorl being overlapped by the outer one. The umbilicus is of moderate width, occupying about 34 percent of the shell diameter in the holotype. The umbilical wall is low but steep and somewhat overhanging.

The whorl is higher than broad, with nearly flat to gently inflated flanks.

The venter is narrow and subconvex. The keel on the top of the venter is of moderate intensity and nearly smooth or faintly crenulated. It is bordered on either side by a shallow concave zone and the other edge of the concave zone is slightly elevated.

Radial ribs are of moderate intensity and breadth, consisting as a rule of alternating longer and shorter ones. Occasionally the shorter ribs are omitted. There are 13 longer ribs on the outer whorl of the holotype. They have bullate umbilical tubercles. Every rib has a rounded to somewhat clavate ventrolateral tubercle, from which the weakened rib extends for a short distance up to the edge of the ventral concave zone.

The ribs on the flank are nearly rectiradiate, but sometimes slightly convex or rursiradiate, running slightly obliquely with the growth-lirae. The longer rib may look faintly bulged at about the middle of the flank but not so strongly elevated as to form tubercles.

The suture (Fig. 8) is of *Peroniceras-Sornayceras* pattern, resembling that of *S.* aff. *isamberti* (FALLOT) [=*Gauthiericeras bajuvaricum* of GROSSOUVRE, 1894, text-fig. 35, which is too sketchy and actually more deeply incised as I observed in Paris]. The first lateral saddle is subquadrate in general outline and fairly deeply bipartite. The first lateral lobe (L) tends to be narrowed at about the middle of its height and somewhat expanded and moderately deeply indented. The second lateral saddle is higher than the first and is much narrowed at the bottom of its stem. The second lateral lobe (U2) is much smaller than the first, extremely oblique, narrowed in its adoral part and somewhat expanded adaptically, incising into the stem of the second lateral saddle. Auxiliaries are also oblique.

Remarks.—The holotype is almost wholly septate and the most part of the body-whorl is missing. The ribs tend to become more distant on the preserved last part, which is the posterior portion of the body-whorl.

The specific name is dedicated to Miss Yuko WADA who has faithfully assisted the scientific works of my colleagues and myself in the Department of Geology.

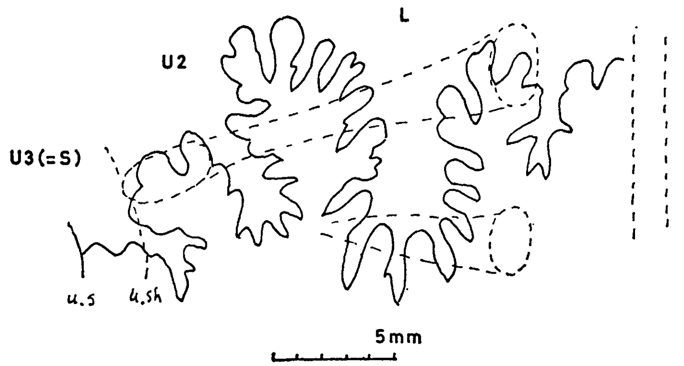


Fig. 8 [109]. *Sornayceras wadae* sp. nov. External suture at whorl-height=18 mm. of the holotype, GK. H5647. (T. M. *delin.*)

Measurements.—

Specimen	Diameter	Umbilicus	Height	Breadth	B./H.
GK. H5647	70.0(1)	23.8(.34)	27.4(.39)	17.4*	.63

* secondarily compressed

Comparison.—At first sight the present specimen from Hokkaido resembles hitherto described specimens of *Gauthiericeras margae* (SCHLÜTER, 1867) (see COLLIGNON, 1967, p. 49 for references), from the Coniacian of Germany, Austria, France, Spain, Morocco, Congo, South Africa, Madagascar and Peru, especially somewhat secondarily compressed examples such as those from Germany. The suture of the present specimen (Fig. 8) differs from that of *G. margae* in its deeper indentions and its much narrower basal stem of the second lateral saddle which is incised by the extremely oblique second lateral lobe. In other words the present specimen represents a new species of *Sornayceras* which is apparently similar to *Gauthiericeras margae.*

The umbilical wall is overhanging in the present species but is not so in *G. margae.*

Sornayceras wadae is distinguished from *S. proteus* MATSUMOTO, 1965, by its narrower umbilicus, weaker and more numerous ribs, with more frequently intercalated shorter ones, generally weaker tubercles and less deeply incised sutures. It is fairly similar to *S.* aff. *isamberti* (FALLOT, 1885) [*Gauthiericeras bajuvaricum* of GROSSOUVRE 1894, p. 88, text-fig. 35, pl. 12, figs. 2, 3; non REDTENBACHER, 1873] in the pattern of suture. The French species is distinguished by its more evolute and more widely umbilicate shell and distinctly finer and more numerous ribs.

At present *S. wadae* is represented by only a single specimen, although it has distinctive characters. It would be desirable to obtain more specimens to make clear the affinities with other species as well as the extent of variation.

Occurrence.—Loc. Ik 1527, in the upper reaches of the Ikushumbets, cliff between the Red Bridge and the confluence with the Kumaoi-zawa, where the lower part of the Upper Yezo Group is exposed and *Kossmaticeras theobaldianum* (KOSSMAT) was obtained. Therefore the age of this part of the Upper Yezo Group is referable to Coniacian.

Subfamily Barroisiceratinae

Genus *Yabeiceras* TOKUNAGA and SHIMIZU, 1926

Type-species.—*Yabeiceras orientale* TOKUNAGA and SHIMIZU, 1926.

Remarks.—See MATSUMOTO, 1969 (this Monograph Part III) for diagnosis and affinity.

Yabeiceras manasoaense COLLIGNON

Pl. 24 [55], Fig. 2; Text-fig. 9 [110]

1965. *Yabeiceras manasoaense* COLLIGNON, *Atlas de fossiles caractéristiques de Madagascar* (Ammonites), fasc. 13, p. 84, pl. 452, fig. 1839.

Material.—A single specimen from the Obirashibetsu area, T. MURAMOTO coll. Ob-S-6-pl.

Description.—The specimen is fairly large, about 150 mm. in diameter and polygyral, consisting of slowly enlarging, rather evolute whorls. The umbilicus is accordingly wide, occupying about 48 percent at a measured diameter. Inner whorls are rather coronate and broader than high, but the height of the whorl increases more rapidly than the breadth with growth. The outer, probably adult body-whorl is somewhat higher than broad and rather ovoid in cross section, with gently inflated flanks and bluntly pointed top of the venter, which may be a remnant of the blunt keel on the inner whorl. The living chamber occupies more than a full whorl. The umbilical wall steeply slopes inward and not forms a vertical or overhanging state.

There is only one row of tubercles, which are situated at about the middle of the flank on the inner whorls but gradually displaced inward to about the umbilical shoulder on the outer whorl. The tubercles are rounded, strong and coarse on the inner whorls, but weakened on the outer whorl and finally disappear on the last part of the body-whorl. They are separated by wider interspaces, especially so on the outer whorls. There are 15 tubercles per whorl at the diameter of about 55 mm. and 18 in the succeeding whorl at about 100 mm. in diameter.

So far as the visible part is concerned faint ribs run forward from some of the tubercles and on the untuberculated last whorl prorsiradiate blunt ribs are sparsely distributed and similarly prorsiradiate lirae are discernible.

Sutures are partly exposed on the whorl of the middle growth-stage. They show a considerably incised pattern, which is similar to that of the type-species, *Yabeiceras orientale* TOKUNAGA and SHIMIZU (1926) (see MATSUMOTO et al., 1964, fig. 2e; MATSUMOTO, 1969, fig. 13).

Measurements.—

Specimen	Diameter	Umbilicus	Height	Breadth	B./H.
Hokkaido	149.0(1)	72.4(.48)	43.2(.29)	38.6(.26)	0.9
Holotype	105 (1)	51 (.49)	24 (.23)	37 (.35)	1.5

Remarks.—The described specimen up to the diameter of about 100 mm. resembles the holotype of *Yabeiceras manasoaense* COLLIGNON, from the middle Coniacian of Madagascar, in the evolute whorls, a rather coronate section and a row of rounded tubercles. Its tubercles seem to be slightly stronger and its whorl is more depressed in the Madagascar specimen, although such differences can be within the range of variation in one and the same species. The hardly perceptible lateral keels which COLLIGNON mentioned on the holotype are still more hardly perceptible in the Hokkaido specimen, but the blunt ventrolateral shoulders on the inner whorls of ours may correspond with them.

The untuberculate, very weakly ribbed or nearly smoothish, last whorl with ovate section is well preserved in the Hokkaido specimen, which is considerably larger than the Madagascar one. I presume that at least the last half of the body-whorl is lacking in the Madagascar holotype, which otherwise would be as large as ours.

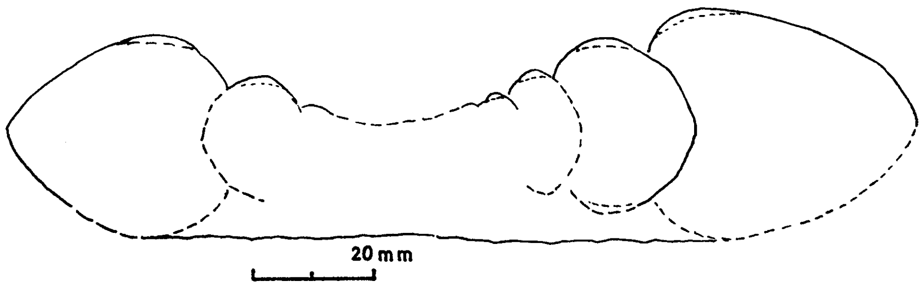


Fig. 9 [110]. *Yabeiceras manasoaensis* COLLIGNON. Diagrammatic sectional view of a probably adult example from Obirashibetsu (MURAMOTO Coll.).
(T. M. *delin.*)

Although there remain some questionable points, I dare to identify the Hokkaido specimen with the Madagascar species, assuming that the former represents a full-grown shell.

Occurrence.—Loc. R2282p, Sato-no-sawa, a stream in the upper reaches of the Kamikinebetsu, a branch of the Obirashibetsu, Rumoi area, Teshio Province, Hokkaido. It is worthwhile to note that a probably identical species occurs from Hokkaido and Madagascar, which are apparently separated for a long distance. According to COLLINGTON *Y. manasoaense* occurs in the zone of *Kossmaticeras theobaldianum-Barroisiceras onilahyense*, "Middle Coniacian."

Subfamily Texanitinae

Genus *Protexanites* MATSUMOTO, 1955

Type-species.—*Ammonites bourgeoisi* D'ORBIGNY, 1850.

Remarks.—See MATSUMOTO, 1970, p. 227, for the generic diagnosis, subgeneric classification, relations with other genera and distribution.

Subgenus *Protexanites* MATSUMOTO, 1955

Protexanites (*Protexanites*) *bontanti shimizui* MATSUMOTO

Pl. 23 [54], Fig. 4; Text-fig. 10 [111]

1970. *Protexanites* (*Protexanites*) *bontanti shimizui* MATSUMOTO, *Mem. Fac. Sci., Kyushu Univ.*, D, vol. 20, no. 2, p. 237, pl. 31, figs. 1–2; text-fig. 6.

Material.—TKU. 30724, collected by K. NAGASE, which was provided for my study through Prof. W. HASHIMOTO.

Descriptive remarks.—The specimen is small but fairly well preserved and certainly represents a young shell which was lacking in the previous material.

In laterial view the protoconch is comparatively small, measuring about 0.2 mm. in diameter. The first and the second whorls are smooth. In the third whorl prorsiradiate ribs begin to appear. They are simple, sparse, widely separated, and provided with umbilical bullae. Presumably the inner and outer ventrolateral tubercles and the ventral keel are developed at this stage, although they are concealed by the embracing outer whorl.

In the fourth whorl, with approximate diameters from 3.5 to 8.0 mm., the

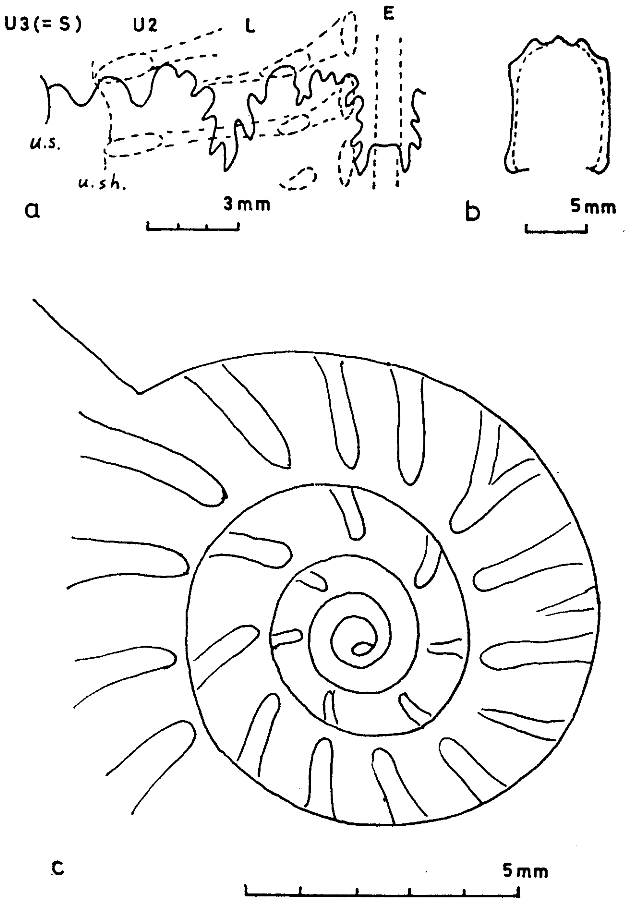


Fig. 10 [111]. *Protexanites* (*Protexanites*) *bontanti shimizui* MATSUMOTO
a. External suture at whorl-height=7.5 mm. of an immature example, TKU. 30724. b. Diagrammatic whorl-section of the same specimen. c. Enlarged sketch of the inner whorls of the same specimen in lateral view. (T. M. *delin.*)

ribs become gradually crowded and intercalation or branching of the secondary ribs are discernible.

In the succeeding whorl the specific characters (see DE GROSSOUVRE, 1894, p. 77; MATSUMOTO, 1970, p. 235) are better manifested, although it is somewhat less compressed than the adult one. The keel is entire. The longer, simple ribs occur more frequently and do not always have branched or intercalated shorter rib. The first lateral lobe (L) is roughly V-shaped. Accordingly the the specimen is identified with *Protexanites* (*Protexanites*) *botanti shimizui* MATSUMOTO, 1970 (p. 237). The specimen was labelled as *Submortoniceras chicoense*, but this is an apparent resemblance, just as the holotype of *P.* (*P.*) *botanti shimizui* was once considered as an example of *Submortoniceras* (see MATSUMOTO, 1970, p. 238–239).

Measurements.—

Specimen	Diameter	Umbilicus	Height	Breadth	B./H.
TKD. 30724	26.0(1)	9.0(.34)	10.8(.41)	9.2(.35)	0.85

Occurrence.—Loc. 82206, Ootodo-sawa, upper reaches of the Haboro, north-western Hokkaido. According to kind information from Prof. W. HASHIMOTO (letter of April 19, 1971) the locality is most probably assigned to the upper part of unit Uy3 of YAMAGUCHI et al. 1965 (Geological Map of the Sankei quadrangle, 1 : 50,000), which is referred to Santonian.

Genus *Texanites* SPATH, 1932
Subegnus *Plesiotexanites* MATSUMOTO, 1970

Type-species.—*Mortoniceras kawasakii* (KAWADA, 1929)

Texanites (*Plesiotexanites*) *pacificus* MATSUMOTO
Pl. 10 [54], Fig. 5; Text-fig. 11 [112]

1970. *Texanites* (*Plesiotexanites*) *pacificus* MATSUMOTO, *Mem. Fac. Sci., Kyushu Univ.*, D, vol. 20, no. 2, p. 289, pl. 42, fig. 2; pl. 45, figs. 1–2; pl. 46, fig. 5; text-fig. 24.

Material.—A fairly well preserved specimen, from M-6-1p, in the collection of MURAMOTO Museum.

Descriptive remarks.—In the previous description a small specimen, GK. H5640, was regarded as probably an immature example. The present specimen, about 50 mm. in diameter, is a good material which connects that younger shell with the more grown holotype (GK. H5506) and paratype (GK. H5644), showing the change of characters with growth.

In this specimen the shell is nearly smooth in the very early stage up to the diameter of about 3.5 mm. Then the ribbing appears and the trituberculate state like that of *Protexanites* (*Protexanites*) continues for about two ($+\alpha$) volutions up to the shell diameter of about 30 mm. There are 15 to 17 ribs per whorl in this stage. The ribs are coarse and strong. They are separated by fairly wide interspaces on the flank, but on the ventral part they are broadened and the interspaces are narrowed. Accordingly the ventral tubercles are longly clavate and the ventrolateral tubercles are stronger and more prominent (somewhat spinose) as compared with those in the succeeding stages.

At the shell diameter of about 30 mm. the ventrolateral tubercle is doubled and later than that stage, the whorl becomes more compressed (i.e. becoming higher), ribs are dense, occasionally with inserted ones, the two ventrolateral tubercles are gradually separated, with inward shifting of the weaker, inner ones and somewhat clavate disposition of the stronger, outer ones, a row of faint, inner lateral tubercles is developed and the umbilical tubercles become more bullate. Thus, the diagnostic characters of *T.* (*P.*) *pacificus*, as described in the previous paper, are developed. The pattern of the suture (Fig. 11) in this specimen is fundamentally similar to that of the larger paratype. (MATSUMOTO, 1970, p. 290, text-fig. 24).

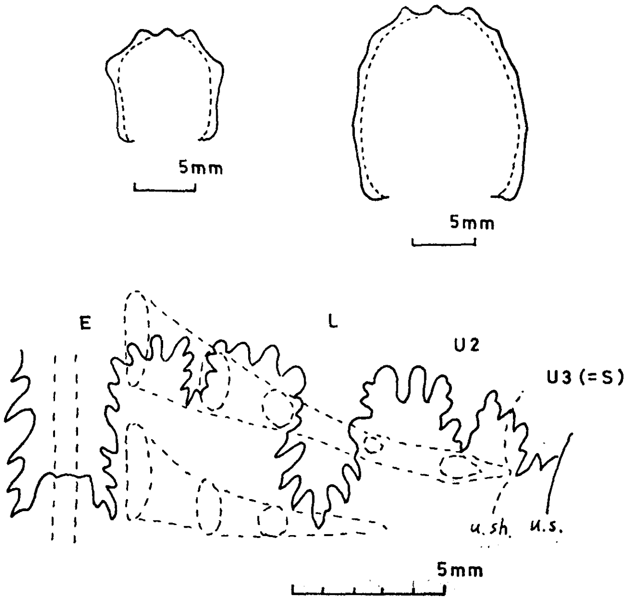


Fig. 11 [112]. *Texanites (Plesiotexanites) pacificus* MATSUMOTO. Additional example of an immature shell, from Ik-M-6-1p (MURAMOTO Coll.). Diagrammatic whorl-sections (above) and external suture at whorl-height=12 mm. (below). (T. M. *delin.*)

To sum up the present specimen gives confirmation of the previous description of *T.* (*P.*) *pacificus.*

Occurrence.—The specimen came from a rolled calcareous nodule in a left branch (near its entrance) of the upper reaches of the Ikushumbets, immediately above the confluence of Samata-zawa. *Inoceramus* sp. cf. *I. amakusensis* occurs in the same nodule.

Concluding Remarks

Summarizing the serial parts of this monograph of the Collignoniceratidae from Hokkaido, I should like to give concise remarks on the following three points.

(1) *Classification*

Through the study of the collignoniceratid ammonites from Hokkaido and those from other areas, the major framework of classification summarized by WRIGHT (1957) in the *Treatise* is fundamentally acknowledged, but it is to some extent modified and refined. The revised classification at the generic level is summarized as follows, with the type-species in square brackets;

Subfamily Collignoniceratinae

Collignoniceras BREISTROFFER, 1947 [*C. woollgari* (MANTELL, 1822)]

C. (*Collignoniceras*)

C. (*Selwynoceras*) WARREN and STELCK, 1940 [*C.* (*S.*) *borealis* (WARREN, 1930)]

Prionocyclus MEEK, 1876 [*P. wyomingensis* MEEK, 1876]

?*Germariceras* BREISTROFFER, 1947 [*G. germari* (REUSS, 1845)]

Lymaniceras MATSUMOTO, 1965 [*L. planulatum* MATSUMOTO, 1965]

Prionocycloceras SPATH, 1926 [*P. guayabanum* (STEINMANN, 1881)]

Subprionotropis BASSE, 1950 [*S. colombianus* BASSE, 1950]

Subprionocyclus SHIMIZU, 1932 [*S. hitchinensis* (BILLINGHURST, 1927)]

Reesidites WRIGHT and MATSUMOTO, 1954 [*R. minimus* (HAYASAKA and FUKADA, 1951)]

Niceforoceras BASSE, 1948 [*N. columbianum* BASSE, 1948]

Subfamily Peroniceratinae

Gauthiericeras DE GROSSOUVRE, 1894 [*G. margae* (SCHLÜTER, 1867)]

G. (*Gauthiericeras*)

G. (*Ciryella*) WIEDMANN, 1959 [*G.* (*C.*) *vascogoticum* WIEDMANN, 1959]

Sornayceras MATSUMOTO, 1965 [*S. proteus* MATSUMOTO, 1965]

Peroniceras DE GROSSOUVRE, 1894 [*P. moureti* DE GROSSOUVRE, 1894]

Cobbanoceras MATSUMOTO, 1965 [*C. tanakai* MATSUMOTO, 1965]

Ishikariceras MATSUMOTO, 1965 [*I. binodosum* MATSUMOTO, 1965]

Reymentites MATSUMOTO, 1965 [*R. hataii* MATSUMOTO, 1965]

Reginaites REYMENT, 1957 [*R. quadrituberculatus* (REYMENT, 1957)]

Subfamily Barroisiceratinae

Barroisiceras DE GROSSOUVRE, 1894 [*B. haberfellneri* (HAUER, 1866)]

B. (*Barroisiceras*)

B. (*Basseoceras*) COLLIGNON, 1965 [*B.* (*B.*) *colcanapi* COLLIGNON, 1965]

Solgerites REESIDE, 1932 [*S. brancoi* (SOLGER, 1904)]

Forresteria REESIDE, 1932 [*F. forresteri* (REESIDE, 1932)=*F. alluaudi* (BOULE, LEMOINE and THEVENIN, 1907)]

F. (*Forresteria*)

F. (*Reesideoceras*) BASSE, 1947 [*F.* (*R.*) *petrocoriensis* (COQUAND, 1859)]

F. (*Edenoceras*) VAN HOEPEN, 1968 [*F.* (*E.*) *multicostata* (VAN HOEPEN, 1968)]

F. (*Muramotoa*) MATSUMOTO, 1969 [*F.* (*M.*) *yezoensis* MATSUMOTO, 1969]

?*F.* (*Zumpangoceras*) BASSE, 1947 [*F.* (*Z.*) *burckhardti* (BASSE, 1947)]

Harleites REESIDE, 1932 [*H. harlei* (DE GROSSOUVRE, 1894)]

Subbarroisiceras BASSE, 1946 [*S. mahafalense* BASSE, 1946]

Yabeiceras TOKUNAGA and SHIMIZU, 1926 [*Y. orientale* TOKUNAGA and SHIMIZU, 1926)

Pseudobarroisiceras SHIMIZU, 1932 [*P. nagaoi* SHIMIZU, 1932] (see MATSUMOTO, 1970b, p. 305–310)

Subfamily Texanitinae

Protexanites MATSUMOTO, 1955 [*P. bourgeoisi* (D'ORBIGNY, 1850)]

P. (*Protexanites*)

P. (*Anatexanites*) MATSUMOTO, 1970 [*P.* (*A.*) *fukazawai* (YABE and SHIMIZU, 1925)

P. (*Miotexanites*) MATSUMOTO, 1970 [*P.* (*M.*) *minimus* MATSUMOTO, 1970]

Paratexanites COLLIGNON, 1948 [*P. zeilleri* (DE GROSSOUVRE, 1894]

P. (*Paratexanites*)

P. (*Parabevahites*) COLLIGNON, 1948 [*P.* (*P.*) *serratomarginatus* (REDTENBACHER, 1873)]

Texanites SPATH, 1932 [*T. texanus* (ROEMER, 1852)]

T. (*Texanites*)

T. (*Plesiotexanites*) MATSUMOTO, 1970 [*T.* (*P.*) *kawasakii* (KAWADA, 1929)]

Pleurotexanites MATSUMOTO, 1970 [*P. superbus* (COLLIGNON, 1966)]

Australiella COLLIGNON, 1948 [*A. australis* (BESAIRIE, 1930)]

Bevahites COLLIGNON, 1948 [*B. quadratus* COLLIGNON, 1948]

Submortoniceras SPATH, 1921 [*S. woodsi* SPATH, 1921]

Menabites COLLIGNON, 1948 [*M. menabensis* COLLIGNON, 1948]

M. (*Menabites*)

M. (*Bererella*) COLLIGNON, 1948 [*M.* (*B.*) *bererensis* COLLIGNON, 1948]

Delawarella COLLIGNON, 1948 [*D. delawarensis* (MORTON, 1830)]

Defordiceras YOUNG, 1963 [*D. hazzardi* YOUNG, 1963]

Subfamily Lenticeratinae

Lenticeras GERHARDT, 1897 [*L. andii* (GABB, 1877)]

Paralenticeras HYATT, 1900 [*P. sieversi* (GERHARDT, 1897)]

Eulophoceras HYATT, 1903 [*E. natalense* (HYATT, 1903)]

Diaziceras SPATH, 1921 [*D. tissotiaeforme* SPATH, 1921]

The relationships between the genera have been discussed through the study of allied species. The concluded affinities are still provisional, showing only possible lines of descent. The result in the monograph may be merely a step towards more intensive researches in the evolutional problems.

In addition to the revision of many species, the following new species have been established on the material from Hokkaido:

(Part-page)

Prionocyclus cobbani MATSUMOTO, 1965 (I-21)

Prionocyclus aberrans MATSUMOTO, 1965 (I-25)

Lymaniceras planulatum MATSUMOTO, 1965 (I-31)

Prionocycloceras sigmoidale MATSUMOTO, 1965 (I-41)

Prionocycloceras wrighti MATSUMOTO, 1971 (V-134)

Subprionotropis muramotoi MATSUMOTO, 1965 (I-47)

Reesidites elegans MATSUMOTO, 1971 (V-139)

Cobbanoceras tanakai MATSUMOTO, 1965 (II-220)

Sornayceras proteus MATSUMOTO, 1965 (II-227)
Sornayceras omorii MATSUMOTO, 1965 (II-230)
Sornayceras wadae MATSUMOTO, 1971 (V-142)
Ishikariceras binodosum MATSUMOTO, 1965 (II-236)
Reymentites hataii MATSUMOTO, 1965 (II-240)
Barroisiceras (*Basseoceras*) *inornatum* MATSUMOTO, 1969 (III-303)
Forresteria (*Forresteria*) *armata* MATSUMOTO, 1969 (III-313)
Forresteria (*Muramotoa*) *yezoensis* MATSUMOTO, 1969 (III-317)
Forresteria (*Muramotoa*) *muramotoi* MATSUMOTO, 1969 (III-320)
Protexanites (*Mitotexanites*) *minimus* MATSUMOTO, 1970 (IV-246)
Protexanites (*Miotexanites*) *japonicus* (MATSUMOTO, 1965) (I-71, under *Niceforoceras* (?); see IV-247)
Paratexanites (*Paratexanites*) *compressus* MATSUMOTO, 1970 (IV-255)
Paratexanites (*Paratexanites*) *muramotoi* MATSUMOTO, 1970 (IV-257)
Paratexanites (*Paratexanites*) *mikasaensis* MATSUMOTO, 1970 (IV-258)
Texanites (*Plesiotexanites*) *pacificus* MATSUMOTO, 1970 (IV-289; V-148)
Texanites (*Plesiotexanites*) *yezoensis* MATSUMOTO, 1970 (IV-294)
Defordiceras (?) *japonicum* MATSUMOTO, 1970 (IV-301)

In the discussion of the systematic descriptions many species occurring outside Hokkaido have been revised and the following new specific names have been introduced:

Barroisiceras (*Basseoceras*) *peruvianum* MATSUMOTO, 1969 (III-303)
Protexanites (*Protexanites*) *peroni* MATSUMOTO, 1970 (IV-230)
Protexanites (*Anatexanites*) *reymenti* MATSUMOTO, 1970 (IV-240)
Paratexanites (*Paratexanites*) *rex* MATSUMOTO, 1970 (IV-249)
Texanites (*Plesiotexanites*) *schlueteri* MATSUMOTO, 1970 (IV-278)

On the other hand several nominal species have proved to be identical, as shown in the following examples:

Collignoniceras woollgari (MANTELL) [=*Ammonites carolinus* D'ORBIGNY] [=*Ammonites serratocarinatus* STOLICZKA]
Subprionocyclus branner (ANDERSON) [=*Prionotropis teshioensis* YABE and SHIMIZU] [=*Prionotropis cristatum* BILLINGHURST]
Forresteria alluaudi (BOULE, LEMOINE and THEVENIN) [=*Barroisiceras* (*Forresteria*) *forresteri* REESIDE] [=?*Collignoniceras peregrinator* VAN HOEPEN]

Relationships between allied species have been ontogenetically examined. In such a case as in *Collignoniceras woollgari*, plastically variable characters in an early growth-stage seem to foreshadow the various species (of *Subprioncyclus*) of the succeeding age, with caenogenetic development of the characters. In other cases the characters of the infant shell are common between the allied species and a novelty or deviation occurs in the course of the later growth-stages, which may be abrupt with a critical change of characters at a certain stage or may develop rather gradually. Apparent reappearance of an ancestral character in the late growth-stge is sometimes noticed. Discussions presented in the systematic descriptions (under *comparison and affinity*) are rather provisional and may merely give suggestions for further researches in evolutional problems, which are outside the scope of the present paper.

(2) *Distribution*

For some reasons collignoniceratid ammonites do not occur abundantly in the Cretaceous deposits of Hokkaido. The collected specimens for a species are not generally numerous, although the number of the described species are unexpectedly great. One of the reasons may be in the environmental conditions. The sediments of the shallow-sea shelf facies are not preserved in Hokkaido, although they may have been originally distributed to some extent and then eroded away. The exposed strata are predominantly muddy sediments of geosynclinal basin and now form folded structures. They may be of rather off-shore facies, in which the collignoniceratid ammonites occur sparsely. In some western part of the basin where sandy siltstone of less off-shore, more favourable conditions are distributed, such as in the case of the Pombets area near Ikushumbets and the Haboro-Kotanbetsu area near Rumoi, the collignoniceratid ammonites are found comparatively commonly if not very abundantly. *Reesidites minimus* at a limited stratigraphic position (probably uppermost Turonian) of the sandy siltstone in the Ikushumbets area may be an exceptional case where numerous individuals were collected (the localities are now under an artificial lake of he Katsuragawa dam). Even in this case the collected ammonites are mostly immature and adult shells are very few.

In other parts of the Japanese islands, *Yabeiceras* occurs in the shallow sea sediments of a narrow shelf facies in the Futaba area, northeast Japan, and several texanitine ammonites are not uncommon in a comparatively shallower facies of the Senonian Himenoura Group of western Kyushu. There are a few other areas of more scattered occurrence.

In better known regions outside Japan the collignoniceratids are generally common in some sediments of the epicontinental, probably shallow seas, as exemplified by the Western Interior to Gulf-Atlantic province of North America, central Europe, Madagascar and South Africa. The kind of bottom sediments is not consistent, being sometimes mudstone, sometimes marl, some other times chalk and even calcareous sandstone. Food conditions as well as the temperature of the sea waters may have been more important than the nature of the bottom sediments.

Many genera of the Collignoniceratidae are geographically widespread, as exemplified by *Collignoniceras, Subprionocyclus, Prionocycloceras, Gauthiericeras, Peroniceras, Barroisiceras, Forresteria, Protexanites, Paratexanites, Texanites, Bevahites* etc. Even at the specific level there are several world-wide species, such as *Collignoniceras woollgari, Subprionocyclus neptuni, Prionocycloceras guayabanus, Paratexanites serratomarginatus, Texanites oliveti* and *T. stangeri*. It may be interesting to find identical or closely allied species of such a rare genus as *Yabeiceras* occurring in two remote places, Japan and Madagascar. This is probably due to collection failure in other areas, since there are several other species which occur commonly in these better investigated areas. Collignoniceratid ammonites may have been mostly good swimmers who migrated freely in as much as the sea water contained their foods. They are distributed generally in the regions of intermediate to lower latitudes and rare or absent in those of higher latitudes, although some continents may have displaced or rotated for a considerable degree from their original site in the late Cretaceous times. It is noted that in contrast to the common occurrences in Madagascar and South Africa the collignoniceratids are very rare or almost unknown in New Zealand, Graham Land (Antarctica) and southern part of South America.

Unmistakable examples of the Lenticeratinae have not been found from Hokkaido and other areas of Japan. *Lenticeras, Paralenticeras* and *Eulophoceras,* together with some Senonian pseudoceratitic genera of other families, such as *Tissotia, Plesiotissotia, Heterotissotia, Paratissotia, Hemitissotia, Buchiceras, Hoplitoides* and *Coilopoceras,* seem to have been distributed mainly in the so-called Tethys region (in a broad sense), including Indonesia and Peru at its eastern and western ends, and some of them migrated or floated to the adjoining sea areas.

(3) *Correlation*

Collignoniceratid ammonites are generally useful for the biostratigraphic subdivision and correlation of the Upper Cretaceous sequences in various parts of the world. Careful examination is, however, needed for the correct evaluation of them and further work may be required to refine the procedures for this purpose.

Good examples of zonal subdivision may be that of the Turonian sequence in the Western Interior province of the United States wih successive species of the Collignoniceratinae (and also those of the Scaphitidae) (COBBAN and REESIDE, 1952 *plus* COBBAN, 1953), that of the Senonian sequence in the Gulf Coast of the United States with those of the Peroniceratinae and the Texanitinae (YOUNG, 1963) and that of the Senonian sequence in Madagascar with those of the Barroisiceratinae and the Texanitinae (COLLIGNON, 1948, 65, 66, 69).

In the classical areas of western Europe many of the important ammonites are of old collections and need up-to-date reexamination of their stratigraphic occurrence (and also taxonomy) as was done by WRIGHT and WRIGHT (1951) on the British material.

International correlation can be concluded approximately but is fairly difficult in a precise scale, because the diagnostic species are sometimes different between provinces and because they may show dissimilar stratigraphical ranges between distant provinces, even if the same species occur.

Now in the biostratigraphic sequences of Hokkaido the collignoniceratid ammonites take a subsidiary part because of their less abundance. A comparatively better case may be their succession in the Ikushumbets area, as has already been shown in the introduction of this monograph (Part I) (MATSUMOTO, 1965, text-figs. 4, 5). In other areas their occurrence is not so successive. The scattered data can be, however, compiled, if we consider their association with more abundantly and successively occurring species of *Inoceramus* (s.l.) and certain other ammonites as well as their position in the local sequence.

The following is a result of the compiled succession of selected species. The international age correlation indicated in parentheses may be approximate or provisional.

(1) Zone of *Inoceramus labiatus* (Lower Turonian)
No collignoniceratid has been found in Hokkaido, although *Collignoniceras* (*Selwynoceras*) sp. could be expected, since a poorly preserved example of the subgenus was found in the island of Amami-Oshima, Kyushu (MATSUMOTO et al., 1966).

(2) Zone of *Inoceramus hobetsensis* (Middle Turonian, i.e. lower part of Upper Turonian if the Turonian is bipartite)
(a) *Collignoniceras woollgari* (MANTELL) (including subspecies *bakeri* ANDERSON)
(b) *Subprionocyclus bravaisianus* (D'ORBIGNY)
The relative stratigraphic position of (a) and (b) has not yet been accurately known in the sequence of Hokkaido, although (b) is assumed to be somewhat higher than (a).
(c) *Subprionocyclus neptuni* (GEINITZ), which ranges up to the lower part of the next zone.

(3) Zone of *Inoceramus teshioensis-tenuistriatus*
(Upper Turonian, i.e. upper part of Upper Turonian if the Turonian is bipartite)
(a) *Subprionocyclus neptuni* (GEINITZ)
(b) *Subprionocyclus normalis* (ANDERSON)
(c) *Reesidites minimus* (HAYASAKA and FUKADA)
(c′) *Prionocyclus wyomingensis* MEEK, which may have been delayed to come into Hokkaido as compared with its home province in North America
Prionocyclus cobbani MATSUMOTO
Prionocyclus aberrans MATSUMOTO
Lymaniceras planulatum MATSUMOTO
Subprionotropis muramotoi MATSUMOTO
The levels (c) and (c′) are represented by sandy siltstone of about 20 m. thick below the green sandstone exposed respectively on the eastern and western wings of the Ikushumbets anticline. Therefore they are probably contemporary and in fact *Reesidites minimus* is rarely found also at (c′)

(4) Zone of *Inoceramus uwajimensis* (Lower to Middle Coniacian)
Finer subdivision of this zone by ammonites is yet difficult on the available evidence, although the following species sparsely occur within the zone:
Pseudobarroisiceras nagaoi SHIMIZU
Barroisiceras (*Basseoceras*) *inornatum* MATSUMOTO
Forresteria (*Forresteria*) *alluaudi* (BOULE, LEMOINE and THEVENIN)
Forresteria (*Muramotoa*) *yezoensis* MATSUMOTO
Yabeiceras orientale TOKUNAGA and SHIMIZU
Prionocycloceras wrighti MATSUMOTO
Prionocycloceras sigmoidale MATSUMOTO

Ishikariceras binodosum MATSUMOTO
Sornayceras wadae MATSUMOTO [? may be in (5)]
Paratexanites (Parabevahites) serratomarginatus (REDTENBACHER)

(5) Zone of *Inoceramus mihoensis* (Upper Coniacian)
Sornayceras proteus MATSUMOTO
Sornayceras omorii MATSUMOTO
Protexanites (Protexanites) planatus (LASSWITZ) [? could be in (6)]
Paratexanites (Paratexanites) orientalis (YABE)
Paratexanites (Parabevahites) serratomarginatus (REDTENBACHER)

(6) Zone of *Inoceramus amakusensis-Inoceramus japonicus* (Santonian)
The following subdivision may be still provisional.
(a) (probably Lower Santonian)
Protexanites (Protexanites) bontanti shimizui MATSUMOTO
(which is evidently younger than *P. (P.) bontanti bontanti* in France)
Paratexanites (Paratexanites) compressus MATSUMOTO (?)
Paratexanites (Paratexanites) mikasaensis MATSUMOTO (?)
Texanites (Texanites) sp. aff. *T. (T.) quinquenodosus* (REDTENBACHER)
Defordiceras (?) *japonicum* MATSUMOTO
(b) (probably Middle Santonian)
Protexanites (Anatexanites) fukazawai (YABE and SHIMIZU)
Texanites (Plesiotexanites) kawasakii (KAWADA)
Texanites (Plesiotexanites) pacificus MATSUMOTO
(c) (possibly Upper Santonian)
Texanites sp. cf. *T. (Plesiotexanites) shiloensis* YOUNG
(whose precise stratigraphic evidence is yet insufficient)

(7) Zone of *Inoceramus orientalis* (Lower Campanian)

(8) Zone of *Inoceramus schmidti* (Middle to Upper Campanian)

Probably because of the unfavourable conditions of sedimentary facies no example of the Texanitinae has been found from the Campanian of Hokkaido.

Acknowledgements.—To accomplish the serial parts of this monograph I am indebted to many persons whose names are recorded in Part I. With respect to the supplementary study in Part V I am especially grateful for the kind help of Messrs. Tatsuo MURAMOTO, Kikuwo MURAMOTO, Takemi TAKAHASHI and Professor Wataru HASHIMOTO who have provided me with valuable specimens. Dr. Itaru HAYAMI and Miss Yuko WADA have continued to assist me in preparing the plates of photographs and typescript.

The symbols to denote the institutions are the same as I used in the preceding Parts (see list in p. 303 of Part IV).

References Cited

References cited in Part V are included in the bibliography in Part I (p. 74–80) and the supplemental lists in Part II (p. 242–243), Part III (p. 329–330) and Part IV (p. 303–304). For brevity they are not repeated here, but the following four should be added.

MATSUMOTO, Tatsuro (1970a): A monograph of the Collignoniceratidae from Hokkaido. Part IV. *Mem. Fac. Sci., Kyushu Univ.*, Ser. D, **20**, (2), 225–304, pls. 30–47.

——— (1970b): Uncommon keeled ammonites from the Upper Cretaceous of Hokkaido and Saghalien. *Ibid.* **20**, (2), 305–317, pls. 48–49.

——— and NODA, Masayuki (1966): Notes on *Ammonites bravaisianus* D'ORBIGNY from the Cretaceous of France. *Trans. Proc. Palaeont. Soc. Japan*, [N. S.], (64), 359–365, pl. 40.

THOMEL, Gérard (1969): Sur quelques ammonites turoniennes et sénoniennes nouvelles ou peu connues. *Ann. Paléont.*, **55**, (1), 111–124, pls. A–G.

Index of Genera and Species

Names of genera subgenera, species and subspecies described and/or discussed in Part I (*Mem. Fac. Sci., Kyushu Univ.*, Ser. D, Geol., Vol. 16, No. 1, pp. 1–80, plates 1–18, March, 1965), Part II (*Ibid.*, Ser. D, Geol., Vol. 16, No. 3, pp. 209–243, pls. 36–43, November, 1965), Part III (*Ibid.*, Ser. D, Geol., Vol. 19, No. 3, pp. 297–330, pls. 39–45, November, 1969), Part IV (*Ibid.*, Ser. D, Geol., Vol. 20, No. 2, pp. 225–304, pls. 30–47, November, 1970) and Part V (*Ibid.*, Ser. D, Geol., Vol. 21, No. 1, pp. 129–162, pls. 21–24, October, 1971) of this monograph are listed below, followed by Part(s) and page(s). Those described or discussed by MATSUMOTO, 1970b are sometimes shown, if necessary. The generic (or subgeneric) names in square brackets are revised ones. Plates and figures can be traced from the writing in the indicated pages.

A

aberrans, *Prionocyclus*, I, 25; V, 133
allaudi [sic], *Forresteria* cf., III, 313
alluaudi, *Forresteria* (*Forresteria*), III, 308
Alstadenites, III, 307, 328
amakusense, *Peroniceras*, IV, 230
americanus, *Texanites*, IV, 271, 272
ampozaloakaense, *Barroisiceras* (*Forresteria*) [*Forresteria*] (*Muramotoa*), III, 316, 319
Anatexanites, IV, 239
angolanus, *Texanites*, IV, 276
ankinatsyense, *Yabeiceras*, III, 323
armata, *Forresteria* (*Forresteria*), III, 313
Australiella, IV, 297
australis, *Australiella*, IV, 298
austinensis, *Australiella*, IV, 300
antsirasiraensis, *Australiella*, IV, 298

B

bajuvarica, *Schloenbachia* (*Gauthiericeras*) [*Prionocycloceras sp.*], II, 233
bajuvaricum, *Gauthiericeras* [*Sornayceras*], II, 216
bajuvaricus, *Ammonites* [*Sornayceras*], II, 226, 232
bakeri, *Collignoniceras woollgari*, I, 16; V, 130
Barroisiceras, III, 300
basseae, *Forresteria* (*Forresteria*), III, 308. 313, 319
Basseoceras, III, 301
Basseoceras [*Muramotoa*], III, 316
Berellela, IV, 298
besairiei, *Australiella*, IV, 298
Bevahites, IV, 252
bibaiense, *Submortoniceras*, IV, 293
binodosum, *Ishikariceras*, II, 236
bontanti, *Protexanites* (*Protexanites*), IV, 235, 240, 256
borealis, *Prionotropis* [*Collignoniceras* (*Selwynoceras*)], I, 9
boreaui, *Schloenbachia* [*Pseudobarroisiceras* ?], I, 73
bourgeoisi, *Protexanites* (*Protexanites*), IV, 228, 234, 238, 240
brancoi, *Barroisiceras* [*Solgerites*], III, 302
branneri, *Subprionocyclus*, I, 50; IV, 235
bravaisianus, *Prionotropis* [*Subprionocyclus*], I, 54; IV, 247
bravaisianus, *Subprionocyclus*, V, 137,

C

canaensis, *Protexanites*, (*Protexanites*) IV, 230, 240, 244, 260
candelariae, *Submortoniceras* [*Texanites* (*Plesiotexanites*)], IV, 278
canthus, *Collignoniceras* (*Selwynoceras*), I, 10
carolinus, *Ammonites*, V, 131
casterasi, *Subprionocyclus*, V, 136
castellensis, *Harleites*, III, 329
chicoense, *Submortoniceras*, IV, 241
cobbani, *Prionocyclus*, I, 21
Cobbanoceras, II, 219
compressus, *Paratexanites* (*Paratexanites*), IV, 255
costatum, *Yabeiceras*, III, 323
cristatus, *Prionotropis* [*Subprionocyclus*], I, 50
czoernigi, *Peroniceras*, II, 217
czoernigi, *Peroniceras* sp. nov. (?) aff., II, 216
colcanapi, *Basseoceras* [*Barroisiceras* (*Basseoceras*)], III, 302
Collignonella [*Forresteria*], III, 307
collignoni, *Submortoniceras*, IV, 238
Collignoniceras, I, 9; 10; V, 130
Collignoniceras [*Forresteria*], III, 307
colombianus, *Subprionotropis*, I, 48

columbianum, Niceforoceras, I, 71
congoensis, Solgerites, III, 303

D

dartoni, Texasia, III, 300
Defordiceras, IV, 301
Delawarella, IV, 299
dentatocarinatus, Ammonites, III, 300
dentatocarinata, Texasia, III, 300
desmondi, Mortoniceras, IV, 251
dichotomus, Texanites (Texanites), IV, 270
dravidicum, Peroniceras, II, 213
dubius, Parabevahites [Texanites (Plesiotexanites ?)], IV, 275
durhami, Reginaites [Reymentites], II, 239, 242

E

eaglensis, Prionotropis, I, 19
Eboroceras, III, 323
eboroense, Piveteauceras [Solgerites], III, 302, 305
Edenoceras, III, 307
elegans, Reesidites, V, 139
elimatum, Submortoniceras, IV, 293
emscheris, Ammonites [Paratexanites (Parabevahites)], IV, 249
emscheris, Parabevahites cf., IV, 251
Eucalycoceras, I, 11
ezoense, Prionocycloceras, I, 37

F

fleuriausianum, Collignoniceras (Selwynoceras), I, 10
flexuosa, Schloenbachia [Niceforoceras], I, 61, 73
forresteri, Barroisiceras (Forresteria), III, 311
Forresteria, III, 306
Forresteria (Forresteria), III, 307
fukazawai, Mortoniceras aff., IV, 284
fukazawai, Mortoniceras [Protexanites (Anatexanites)], IV, 241
fukazawai, Protexanites (Anatexanites), IV, 244, 283
fukazawai, Protexanites (Anatexanites) sp. cf. *P. (A.)*, IV, 241

G

gabrielense, Prionocycloceras, I, 41
gallicum, Reesideoceras, III, 308
gallicus, Texanites, IV, 267
Gauthiericeras, II, 210, 227
germari, Ammonites, V, 134
Germariceras, V, 134
graysonensis, Ammonites, I, 20
grossouvrei, Paratexanites (Paratexanites) serratomarginatus, IV, 263
guayabanum, Prionocycloceras sp. aff., I, 43; V, 136
guayabanus, Prionocyclus [Prionocycloceras], I, 39, 44

H

haasi, Peroniceras, II, 216
haberfellneri, Barroisiceras, I, 68; III, 300
hammersleyi, Collignoniceras [Forresteria], III, 307, 312
harlei, Harleites, III, 329
harlei, Harleites sp. cf., III, 328
Harleites, III, 307, 327
hataii, Reymentites, II, 240
hazzardi, Defordiceras, IV, 302
hazzardi, Prionocycloceras, I, 41
himuroi, Yabeiceras, III, 323
hispanicus, Texanites (Texanites), IV, 270, 273
hobsoni, Forresteria, III, 307, 312
hourcqui, Texanites (Texanites), IV, 270
hyatti, Prionocyclus, I, 16
hyatti, Prionotropis, [Prionocyclus], I, 19

I

imbecilluscostatus, Prionocyclus, I, 37
inornatum, Barroisiceras (Basseoceras), III, 303
interpositus, Texanites (Texanites), IV, 270
isamberti, Ammonites [Sornayceras], II, 226, 232
isamberti, Sornayceras aff., II, 232; V, 143
Ishikariceras, II, 235, III, 323
itwebae, Forresteria (Forresteria), III, 308, 315

J

japonicum, Defordiceras (?), IV, 301
japonicum, Niceforoceras (?), I, 71
japonicum, Niceforoceras (?) *[Protexanites (Miotexanites)]*, IV, 247
japonicus, Submortoniceras, IV, 239
Jimensites, IV, 227

K

kawasakii, *Texanites* (*Plesiotexanites*), IV, 280, 288, 291
kotoi, *Yabeiceras*, III, 323
krameri, *Basseoceras* [*Forresteria* (*Muramotoa*)], III, 316

L

laevis, *Solgerites* (?), III, 306
Ledoceras, I, 49
leei, *Reginaites*, II, 239
lenti, *Gauthiericeras* [*Prionocycloceras*], I, 37, 46
lenti, *Prionocycloceras*, II, 235
lenti, *Prionocycloceras* sp. aff., I, 45
lonsdalei, *Texanites*, IV, 271
Lymaniceras, I, 29

M

macombi, *Prionocyclus*, I, 20, 37
magnaumbilicatum, *Eboroceras* [*Yabeiceras*], III, 323
manasoaense, *Yabeiceras*, V, 144
margae, *Gauthiericeras*, II, 211; V,
massoni, *Ledoceras*, I, 49
massoni, *Subprionocyclus*, V, 136
menabense, *Yabeiceras*, III, 323
Menabites, IV, 298
mexicana, *Pseudoschloenbachia*, III, 300
mexicanum, *Collignoniceras* (*Selwynoceras*), I, 10
mikasaensis, *Paratexanites* (*Paratexanites*), IV, 258
mikobokensis, *Texanites*, IV, 271
minimum, *Barroisiceras* [*Reesidites*], I, 62
minimus, *Protexanites* (*Miotexanites*), IV, 246, 277
minimus, *Reesidites*, I, 63; V, 141
Miotexanites, IV, 245
monchicourti, *Mortoniceras* [*Protexanites* (*Anatexanites*)], IV, 239
moreti, *Australiella*, IV, 298
moureti, *Peroniceras*, II, 222
multicostatum, *Edenoceras*, III, 308
Muramotoa, III, 315
muramotoi, *Forresteria* (*Muromotoa*), III, 320
muramotoi, *Paratexanites* (*Paratexanites*), IV, 257
muramotoi, *Subprionotropis*, I, 47

N

nagaoi, *Pseudobarroisiceras*, I, 73; (see also MATSUMOTO, 1970b)
namikawaense, *Submortoniceras*, IV, 239
Neocardioceras, I, 10
neptuni, *Subprionocyclus*, I, 52; IV, 238; V, 136
Niceforoceras, I, 70
ninakawai, *Cobbanoceras*, II, 223, 242
nomii, *Protexanites* (*Anatexanites*), IV, 242, 294
normalis, *Subprionocyclus*, I, 55; V, 136
novi-mexicani, *Ammonites*, I, 20; V, 133

O

obatai, *Protexanites* [*Pleurotexanites*], IV, 232
oliveti, *Texanites*, IV, 271
omeraense, *Mortoniceras* [*Texanites*], IV, 277
omorii, *Sornayceras*, II, 230
onilahyense, *Barroisiceras*, III, 305
oregonensis, *Schloenbachia*, I, 63
Oregoniceras, I, 63
orientale, *Yabeiceras*, III, 324
orientalis, *Paratexanites* (*Paratexanites*), IV, 253

P

pacificus, *Texanites* (*Plesiotexanites*), IV, 289; V, 148
papale, *Collignoniceras* (*Selwynoceras*), I, 10
papaliforme, *Collignoniceras* (*Selwynoceras*), I, 10
Paralenticeras, I, 61, 63, 71
Paratexanites, IV, 247
pattoni, *Australiella*, IV, 300
pattoni, *Australiella* sp. aff. *A.*, IV, 300
peregrinator, *Collignoniceras* [*Forresteria*], III, 312
peroni, *Protexanites* (*Protexanites*), IV, 230
Peroniceras, II, 211
peruanum, *Forresteria* (*Forresteria*), III, 308
peruvianum, *Barroisiceras* (*Basseoceras*), III, 303
petrocoriensis, *Ammonites* [*Forresteria* (*Reesideoceras*)], III, 308, 321
pitalensis, *Forrestesia* (*Edenoceras*), III, 308, 315

Piveteauoceras, III, 302
planatus, *Protexanites* (*Protexanites*), IV, 232, 265, 284
planulatum, *Lymaniceras*, I, 31
platycostatum, *Peroniceras*, II, 215
platycostatum, *Peroniceras* sp. nov. (?) aff., II, 214
Plesiotexanites, IV, 267, 275
Pleurotexanites, IV, 232, 299
Prionocycloceras, I, 38; V, 134
Prionocyclus, I, 17; V, 132
Prionotropis, I, 18
propoetidum, *Ammonites* [*Sornayceras*], II, 227, 234
propoetidum, *Sornayceras* sp. cf. *S.*, II, 233
Protacanthoceras, I, 11
proteus, *Sornayceras*, II, 227; V, 144
Protexanites, IV, 227; V, 146
Protexanites (*Protexanites*), IV, 228
Pseudaspidoceras, IV, 232
Pseudobarroisiceras, I, 73; (see also MATSUMOTO, 1970b, 305)
Pseudoschloenbachia, I, 30; (see also MATSUMOTO, 1970b, 315)
pseudotexanus, *Texanites*, IV, 269, 295

Q

quadrangulatus, *Texanites*, IV, 271
quadratus, *Prionocyclus*, I, 21
quadrituberculatus, *Reginaites*, II, 239
quinquenodosus, *Texanites* (*Texanites*), IV, 270, 272
quinquenodosus, *Texanites* (*Texanites*) sp. aff. *T.* (*T.*), IV, 273

R

ralijaonai, *Texanites*, IV, 276
rarecostatus, *Texanites*, IV, 271
razafiniparanyi, *Forresteria*, (*Forresteria*), III, 307, 312, 315
Reesideoceras, III, 307, 308
reesidi, *Prionocyclus*, I, 21
Reesidites, I, 61; V, 138
Reginaites, II, 239
rex, *Paratexanites* (*Paratexanites*), IV, 249
reymenti, *Forresteria*, III, 307
reymenti, *Protexanites* (*Anatexanites*), IV, 240
Reymentites, II, 238
roemeri, *Texanites* (*Texanites*), IV, 270, 295
romieuxi, *Barroisiceras* [*Solgerites*], III, 303
rousseauxi, *Peroniceras*, II, 218

S

salmuriensis, *Ammonites* [*Pseudaspidoceras*], IV, 232
sanushibensis, *Texanites* (*Plesiotexanites*), IV, 292
schlueterianum, *Selwynoceras*, I, 10
schlueteri, *Texanites* (*Plesiotexanites*), IV, 278, 293
schneeblii, *Schloenbachia* [*Ishikariceras*], II, 235, 237
sellardsi, *Paratexanites* (*Parabevahites*), IV, 265
sellardsi, *Paratexanites* (*Parabevahites*) sp. cf., IV, 264
Selwynoceras, I, 9
sequens, *Barroisiceras*, I, 63
serrato-carrinatus, *Ammonites*, I, 18; V, 131
serrato-carinatus, *Ammonites* (*Pleuroceras* ?), I, 18
serratomarginatus, *Paratexanites* (*Parabevahites*), IV, 260, 291
servierense, *Forresteria* (*Forresteria*), III, 312, 319
shastense, *Peroniceras* [*Cobbanoceras*], II, 225
shiloensis, *Texanites*, IV, 277, 297
shimizui, *Protexanites*, (*Protexanites*) *bontanti*, IV, 237; V, 146
shoshonensis, *Protexanites*, IV, 234
sigmoidale, *Prionocycloceras*, I, 41
Solgerites, III, 302
Sornayceras, II, 226; V, 142
soutoni, *Mortoniceras* sp. nov. aff., IV, 243
soutoni, *Ammonites* [*Texanites*], IV, 279
soutoni, *Submortoniceras* (?) aff. IV, 276
spathi, *Paralenticeras*, I, 61, 63
stangeri, *Texanites* (*Plesiotexanites*), IV, 285
stantoni, *Forresteria* (*Edenoceras*), III, 308, 312, 315
subaustralis, *Australiella*, IV, 298
Subbarroisiceras, III, 298 (see also MATSUMOTO, 1970b, 313)
Submortoniceras, IV, 239, 269
Subprionocyclus, I, 49; V, 136
Subprionotropis, I, 47
subtricarinatum, *Peroniceras*, II, 225

subtuberculata, Schloenbachia [Reesidites], I, 63, 70
subtuberculatus, Reesidites, I, 69
superbus, Protexanites [Pleurotexanites], IV, 232

T

tanakai, Cobbanoceras, II, 220
tehamense, Peroniceras (?) sp. cf., II, 217
tehamensis, Ammonites, II, 218
tequesquitense, Submortoniceras, IV, 277
teshioensis, Prionotropis, I, 51
Texanites, IV, 266
Texanites (Texanites), IV, 267
texanus, Ammonites, IV, 248, 251, 278
texanus, Texanites, IV, 267
Texasia, III, 300; (see also MATSUMOTO, 1970b, 315)
thompsoni, Protexanites, IV, 240
thompsoni, Protexanites [Texanites (Plesiotexanites)], IV, 277, 295
transitorius, Parabevahites (?) *[Texanites (Plesiotexanites)]*, IV, 275, 284
tridorsatus, Ammonites, II, 224
tridorsatum, Peroniceras, II, 225
tuberculatus, Solgerites [Barroisiceras (Basseoceras)], III, 303
turoniense, Collignoniceras (Selwynoceras), I, 10

U

umkwelanensis, Paratexanites (Paratexanites), IV, 254
undulatocarinatum, Peroniceras [Sornayceras], II, 227

V

venustus, Texanites (Texanites), IV, 270
vinassai, Forresteria (Forresteria), III, 313
vinassai, Mortoniceras [Forresteria], IV, 298

W

wadae, Sornayceras, V, 142
welderi, Australiella, IV, 298
westphalicum, Peroniceras, II, 229
woodsi, Submortoniceras, IV, 269
woollgari, Collignoniceras, I, 11; V, 130
wrighti, Prionocycloceras, V, 134
wyomingensis, Prionocyclus, I, 18; V, 132

Y

Yabeiceras, II, 236; III, 322; V, 144
yezoensis, Forresteria (Muramotoa), III, 317
yezoensis, Texanites (Plesiotexanites), IV, 294

Z

zeilleri, Mortoniceras, IV, 249
zeilleri, Paratexanites (Paratexanites), IV, 249, 254
Zumpangoceras, III, 307

Tatsuro MATSUMOTO

A Monograph of the Collignoniceratidae from Hokkaido
Part V

Plates 21 [52]—24 [55]

Kyushu University (I. HAYAMI) photos, with whitening,
unless otherwise stated

Plate 21

Explanation of Plate 21 [52]

Fig. 1. *Prionocyclus aberrans* MATSUMOTO............................Page 133
An immature example, GK. H5553, from loc. Ik. 2012, the Pombets, a tributary of the Ikushumbets (Coll. T. TAKAHASHI). Two lateral (a, b), frontal (c) and ventral (d) views, ×1.5.

Fig. 2. *Prionocyclus wyomingensis* MEEK............................Page 132
A wholly septate example, GK. H5552, from loc. Ik. 2012, the Pombets, a tributary of the Ikushumbets (Coll. T. TAKAHASHI). Lateral (a) and ventral (b) views, ×1.

Fig. 3. *Subprionocyclus bravaisianus* (D'ORBIGNY) ....Page 137
Lateral view of an example from Obirashibetsu (MURAMOTO Museum, Ob. 001 p), ×1.

Fig. 4. *Collignoniceras woollgari* (MANTELL) ....Page 130
Lateral view of an example from loc. Y5206, Hakkin-zawa, Oyubari (MURAMOTO Museum, Ob. 43. 10. 14), ×1.

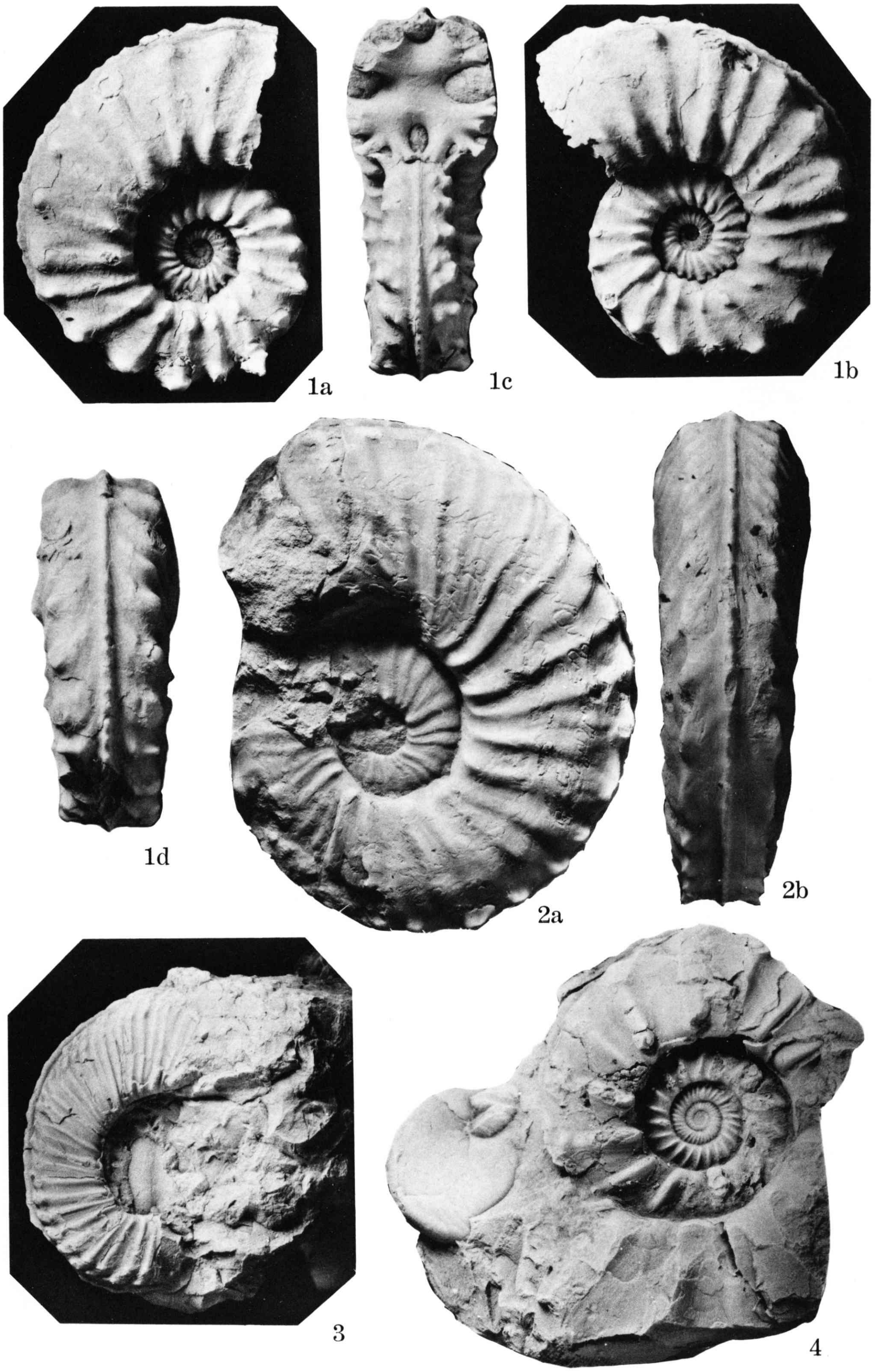

1a
1c
1b
1d
2a
2b
3
4

Plate 22

Explanation of Plate 22 [53]

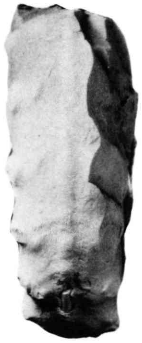
Fig. 1. *Prionocyclus wyomingensis* MEEK............................Page 132
A wholly septate example, GK. H5552, from loc. Ik. 2012, the Pombets, a tributary of the Ikushumbets (Coll. T. TAKAHASHI). Two lateral and ventral views, without whitening to show sutures, ×1. The same specimen is illustrated in Pl. 21, Fig. 2, with whitening.

Fig. 2. *Prionocycloceras wrighti* sp. nov. ....Page 134
Holotype, GK. H5556, from Kami-ichino-sawa, a tributary of the Ikushumbets (Coll. T. TAKAHASHI). Lateral (a) and ventral (b) views, ×1.5.

Fig. 3. *Subprionocyclus neptuni* (GEINITZ)..........................Page 136
A probably adult shell, GK. H5551, from loc. Ik. 2014, the Pombets, a tributary of the Ikushumbets (Coll. T. TAKAHASHI). Lateral view, ×1.

1a

1b



2b

1c

3

2a

Plate 23

Explanation of Plate 23 [54]

Figs. 1–3. *Reesidites elegans* MATSUMOTO and INOMA, sp. nov. .....Page 139

1. Holotype, TKU. 30376–(1), from a rolled nodule (no. 15) at loc. 71505, Shirochiune-zawa, Nakafutamata-gawa, the Haboro, presumably derived from unit Uy2 in the geological map "Soeushinai" (Coll. W. HASHIMOTO). Lateral (a) and ventral (b) views, ×1.5.
2. Paratype, TKU. 30376–(2), from the same nodule as the holotype (Coll. W. HASHIMOTO). Lateral (a) and frontal (b) views, ×1.5.
3. Paratype, TKU. 30376–(3), from the same nodule as the holotype (Coll. W. HASHIMOTO). Lateral (a) and frontal (b) views, ×1.5.

Fig. 4. *Protexanites (Protexanites) bontanti shimizui* MATSUMOTO....Page 146
An immature example, TKU. 30724, from loc. 82206, Ootodosawa, upper reaches of the Haboro, probably unit Uy3 of the geological map "Sankei". Two lateral (a, b), ventral (c) and frontal (d) views, ×1,5,

Fig. 5. *Texanites (Plesiotexanites) pacificus* MATSUMOTO.............Page 148
An immature example in the collection of MURAMOTO Museum, M-6-1-p, upper reaches of the Ikushumbets. Lateral (a) and ventral (b) views, ×1.

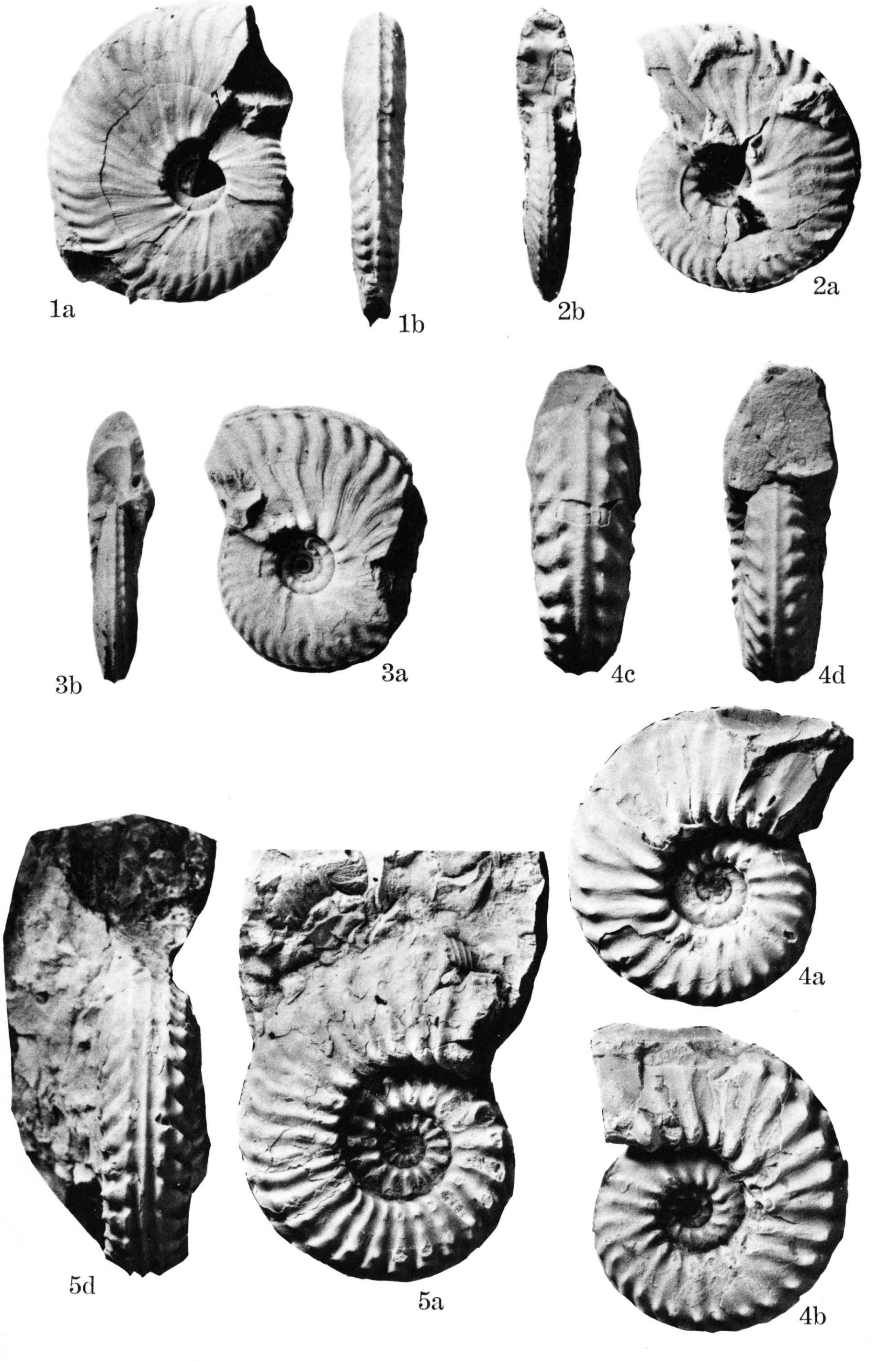
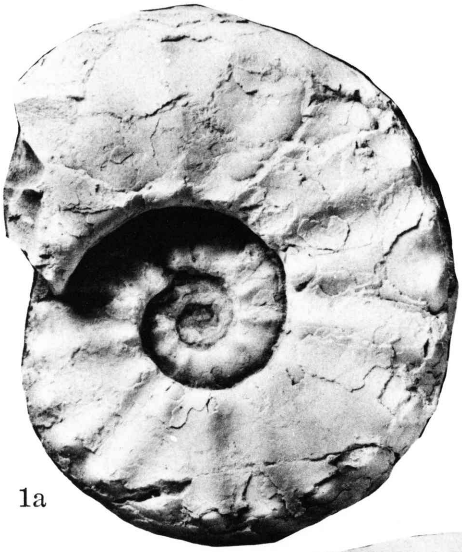

1a
1b
2b
2a
3b
3a
4c
4d
4a
5d
5a
4b

Plate 24

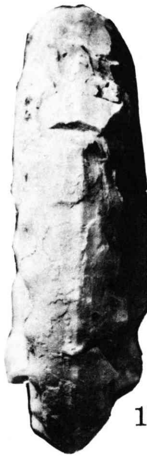
Explanation of Plate 24 [55]

Fig. 1. *Sornayceras wadae* sp. nov. .... Page 142
Holotype, GK. H5647, from loc. Ik. 1527, the Ikushumbets, the zone of *Kossmaticeras theobaldianum*, Coniacian (Coll. T. MURAMOTO). Lateral (a) and ventral (b) views, ×1.

Fig. 2. *Yabeiceras manasoaense* COLLIGNON .... Page 144
A probably adult example, larger than the holotype, from Sato-no-sawa, upper reaches of the Kami-Kinebetsu-zawa, a branch of the Obirashibe, Rumoi area (MURAMOTO Museum Coll. Ob-5-6-p1). Lateral view, ×0.85.



1a



1b

2

T. MATSUMOTO: Collignoniceratidae [Pl. 55]