

A Kossmaticeratid ammonite from Noborikawa, Hokkaido,
with remarks on relevant taxa

(Studies of Cretaceous ammonites from Hokkaido—LXVI)

by

Tatsuro MATSUMOTO *

Abstract— An ammonite specimen, collected by Kokitsu YAGI from Noborikawa, central Hokkaido, looks similar to the holotype of *Pseudokossmaticeras tchihatcheffi* (BÖHM, 1927) from Turkey but is distinguished by its oval whorls with tubercles tending to shift outward from the rounded umbilical border and its flared, sometimes spinose, single ribs on the body chamber. It is described as a new species, although it is rare and solitary.

In connexion with the description of this species, some remarks are given on the genera *Pseudokossmaticeras* SPATH, 1922 and *Neograhamites* SPATH, 1953, suggesting that the latter may be regarded as a synonym or may survive as a subgenus of the latter. Should *Neograhamites* be included in *Pseudokossmaticeras*, the geographic distribution of *Pseudokossmaticeras* would become much wider than that written in previous papers, viz. in the Indo-Pacific, the Tethys and northerly adjacent shelf areas.

Key words— Kossmaticeratidae, *Pseudokossmaticeras*, *Neograhamites*, *Brahmaïtes*, Maastrichtian.

I Introduction

Here is a specimen of ammonite which looks strange to palaeontologists in Japan for a palaeogeographic reason. It was obtained by Kokitsu YAGI, a competent geologist of the Hokkaido Colliery and Steamship Company (HCS), from the Upper Cretaceous rock of the Noborikawa area in the Yubari Mountains of central Hokkaido.

When he showed it to me in 1973, I told him preliminarily that it may be referred to either *Pseudokossmaticeras* or *Neograhamites* of the family Kossmati-

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*c/o Department of Geology, Kyushu University 33, Fukuoka 812.

ceratidae. More than 15 years have passed since his discovery, but no example of the same species has been added subsequently. Regrettably Mr. K. YAGI passed away on July 3, 1988. To commemorate the late Mr. Kokitsu YAGI, I should like to give a full description of this ammonite with necessary remarks on relevant genera and species.

II Palaeontological descriptions

Family Kossmaticeratidae SPATH, 1922

The taxonomy of this family was treated comprehensively by COLLIGNON (1954, 1955) and nearly simultaneously by myself (MATSUMOTO, 1955, 1956). This was immediately after SPATH's (1953) proposal of the genus *Neograhamites*, which is allied to *Pseudokossmaticeras* SPATH, 1922 and also to *Brahmaites* KOSSMAT, 1897. In some recent papers several species of these genera have been described. A problematic ammonite described below is also a species of this group.

Genus *Pseudokossmaticeras* SPATH, 1922

Type species.— *Ammonites pacificus* STOLICZKA, 1865 by original designation (SPATH, 1922, p.118).

Diagnosis.— Shell medium sized and relatively evolute, with fairly wide umbilicus. Whorls in early growth-stages nearly as high as broad and provided with major ribs which branch outward from the tubercles at or near the umbilical border. Also short ribs may be intercalated. The whorl become to be compressed in more or less later growth-stage, where branching ribs tend to break up to single, nearly straight, major ribs and fairly long or short, intercalated minor ones. The tubercles on the major ribs at or near the umbilical border persist to outer whorl, although they may be bullate and tend to merge into elevated ribs in some species. Constrictions well marked earlier, double collared, somewhat oblique forward, becoming less frequent and may finally disappear. Sutures as in other kossmaticeratid genera.

Remarks.— The generic diagnosis in my previous paper (MATSUMOTO, 1955, p.144) was too brief. The above is essentially similar to and somewhat modified from that of THIEDIG and WIEDMANN (1976, p.15).

Ammonites pacificus STOLICZKA, the type species of this genus, was established on four syntypes from two localities of South India, of which the illustrated one (STOLICZKA, 1865, p.160, pl.77, fig.3) GSI 326, is designated herein as the **lectotype** (replica GK.H9325). It is an internal mould of a small specimen (see Table 1) and has fairly well marked, oblique constrictions of

Table 1. Measurements (in mm) on selected specimens of *Pseudokossmaticeras* spp.

Species specimen	D	U	H	B	B/H	H/h	MR:VR
<i>P. pacificum</i> LT	54.7(1)	26.7(.49)	16.5(.30)	15.5(.28)	0.94	1.43	18:26
✓ COLLIGNON, 1938	54.0(1)	26.0(.48)	17.0(.31)	17.0(.31)	1.0	—	—
✓ COLLIGNON, 1971	49.0(1)	23.0(.47)	15.0(.31)	16.0(.33)	1.07	1.36	—
<i>P. galicianum</i> LT	67.0(1)	25.0(.37)	25.0(.37)	20.0(.30)	0.80	1.47	14:22
✓ BLASZK., 1980-1	131.5(1)	49.6(.37)	50.0(.38)	25.4(sec. compr.)	1.57	10:15	
✓ BLASZK., 1980-2	76.0(1)	32.0(.42)	26.7(.36)	17.7(.24)	0.66	1.54	13:22
<i>P. tchihatcheffi</i> HT*	~90(1)	~35(.39)	~34(.38)	? 20(.22)	0.6	1.58	12:22

D=diameter, U=width of umdlicus, H=whorl-height, B=whorl-breadth, h=whorl-height at 180° prior to H, MR:VR=number of tuberculate major ribs *versus* that of all ribs on venter per half a whorl, LT=lectotype, HT=hotype, ~ = approximate; Blaszk.1980-1,-2 Blaszkiewicz, 1980, pl.56, fig.1 and fig.2 ; * on fig.7 in KENNEDY and SUMMESBERGER, 1987, pl.2 and fig. 1a in BÖHM, 1927, pl.13.

moderate frequency. It may be still middle-aged, for it is almost wholly septate. A few ribs behind the oblique constriction may be short; others on at least preserved outer whorl are mostly long and have umbilical nodes, whereas the intercalated short ribs are few.

The specimens of the same species from Madagascar described by COLLIGNON (1938, p.54, pl.8, fig.5; 1971, p.20, pl.647, fig.2388) are similar to that lectotype but somewhat larger (see Table 1). The inner whorls are not well preserved in all the specimens mentioned above, but there exist umbilical tubercles where finer ribs seem to branch outward. STOLICZKA used the term "subtuberculate", which may imply weak nodes, but the weakness may owe partly to the situation of preservation (i. e. absence of the shelly substance). He mentioned, furthermore, the existence of a tubercle like elevation at the mid-venter on the ribs which bound the constrictions on the larger specimen, which I was unable to trace at GSI. This character and the evolute shell-form may foretell the genus *Brahmites* KOSSMAT, 1897.

In fact SPATH (1922, p.126) stated that "A late Campanian type that, unlike *Madrasites*, does not tend to involution, but leads, via forms of the group of *Ammonites brandti* REDTENBACHER and *A. duereri* REDTENBACHER, to *Brahmites*, requires a new name, and *Pseudokossmaticeras* gen.nov. (genotype: *A. pacificus* STOLICZKA, 1865, p.160, pl.77, fig.9) is here proposed". In other words, SPATH thought that the ancestry of *Brahmites* should be in some species of *Pseudokossmaticeras*.

Neograhamites SPATH, 1953 is very similar to *Pseudokossmaticeras* in

many respects. SPATH (1953, p.23) mentioned that "*Neograhamites* is closer to *Brahmaites* than any of the other genera of the Kossmaticeratidae".

The type species of *Brahmaites*, *B. brahma* (FORBES, 1846) (see KENNEDY, 1986, p.29, text-fig.10) and its allied species *B. kossmati* HENDERSON et MCNAMARA, 1985 have depressed whorls, whereas *B. vishnu* (FORBES, 1846), *B. haugi* (SEUNES, 1890) and *B. sachalinensis* YABE et SHIMIZU, 1924 have less depressed or weakly compressed whorls as those in early to middle growth-stages of some *Pseudokossmaticeras*. Therefore I agree with HENDERSON and MCNAMARA (1985, p.68) in retrieving the subgenus *B. (Anabrahmaites)* YABE et SHIMIZU, 1924 (p.79), whose type species is *B. (A.) vishnu*.

SPATH (1953, p.23) noted also that *Neograhamites kiliani* SPATH resembles *P. duereri*, *P. pacificum* and especially *B. haugi*. SPATH's (1922, 1953) remarks cited above give me a doubt which of the two genera, *Pseudokossmaticeras* or *Neograhamites*, is the closest ally of *Brahmaites*.

Anyhow, how is *Neograhamites* distinguished from *Pseudokossmaticeras*? HENDERSON and MCNAMARA (1985, p.71), who admit their close alliance, state that *Neograhamites* "differs only in having fewer, more distinct umbilical tubercles to which ribs join in pairs rather than singly". According to SPATH, however, in the course of ontogenetic development of *Neograhamites kiliani* SPATH (1953, p.27-28, pl.4, figs.4,5), which is the type species, "bifurcation of ribs at the umbilical tubercles appears after 40 mm diameter, but the ribs tend to become irregular and finally break up altogether, producing single ribs continuous across the venter." Actually SPATH's holotype and paratype are small, although they have body chamber. They may not represent the full grown stage. Their preserved last part has bifurcate ribs and single one's both. On their inner whorl there are distinct umbilical tubercles at wide intervals and numerous fine ribs, some of which branch from the tubercles and others are intercalary. Double collared, oblique constriction occur periodically in both inner and outer whorls.

Strong umbilical tubercles and paired or single coarse ribs characterize the late growth-stage of *P. cerevicianum* (PETHÖ, 1906) (p.95, pl.6, figs.2,3). The ribs and nodes are fairly coarse in *P. aturicum* (SEUNES, 1890) (p.17, pl.1, figs.2,3), which is regarded as synonym of *P. brandti* (REDTENBACHER, 1873) by THIEDIG and WIEDMANN (1976, p.15).

Neograhamites morenoi RICCARDI, 1983 (p.340, pl.4, figs.1-3), from the Lower Campanian of Argentina, has distinct tubercles and branching ribs on the inner whorl, but the ribs tend to break up very irregularly on the outer whorl.

On the ground of the above observations, I do not recognize distinct difference which is sufficient for the generic separation. In some species (e. g. *P. pacificum* and *P. duereri*) single ribs become predominant from earlier

growth-stage than others; in some others the umbilical bullae with bifurcating ribs look prominent. This may be caused by time lag in ontogenetic change. In still other species, the stages of the ontogenetic change in shell-form and ornament are displayed at moderate rate, as in *P. galicianum* (FAVRE, 1869) (see BLASZKIEWICZ, 1980, p.41, pl.56, figs.1–3), *P. tchihatcheffi* (BÖHM, 1927) and a new species from Japan described below. I would suggest that *Neograhamites* could be a synonym of *Pseudokossmaticeras* or could be retained as a subgenus of the latter. In this paper I avoid to draw a final conclusion, as I have not examined thoroughly the actual specimens of doubtful species.

Should *Neograhamites* be included in *Pseudokossmaticeras*, then the genus would have a wide geographical distribution in various parts of the Indo-Pacific (including South India, Madagascar, West Australia, the Antarctic Peninsula, Argentina and Japan) and the northern marginal belt of the Tethys with some extensions on northerly adjacent epicontinental seas, such as Poland, Ukraina, Donbas (NAJDIN, 1974) and the northern Caucasus (NAJDIN and SHIMANSKY, 1959). The genus ranges stratigraphically from the Upper Campanian to Lower Maastrichtian as determined by the associated guide ammonites in Europe and Madagascar, although there remains a possibility of earlier appearance in some areas, e.g. Argentina and Japan.

Pseudokossmaticeras yagii sp. nov.

Plate 1; Text-fig.1

Material.—The holotype (Plate 1), HCS. No.13, collected by Kokitsu YAGI from a nodule loose on the stream of Kuruki, 4 km northeast of Noborikawa. This is so far a single available specimen.

Description.—Shell medium-sized at adult stage and evolute, with fairly wide umbilicus.

Whorl in young stage thickly suboval in section, with convex flank which passes over subrounded umbilical border to inclined wall, broadest at about or slightly inside the middle of flank; that in middle growth-stage normally suboval in section, somewhat higher than broad, broadest at a point on inner part of the flank outside the subrounder umbilical border, from which the umbilical wall slopes down fairly steeply.

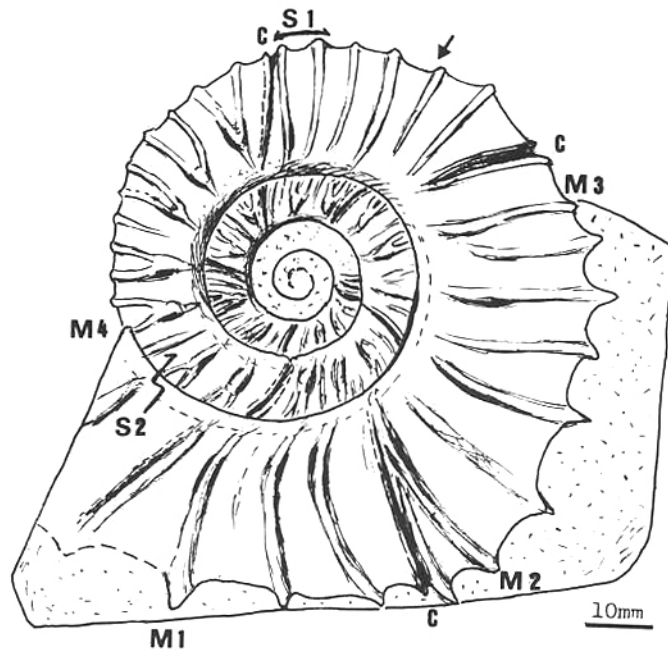
Adult body chamber higher than broad, broadest at about dorsal one third of its height, from where gently convex flanks converge outward to rather narrowly rounded venter and rapidly bend inward at about the subrounded umbilical border to steeply inclined umbilical wall.

In fairly young stage tuberculate major ribs occur at moderately wide intervals, i. e. at each 30° on the average for full one whorl. The tubercles are bullate, rather strong and highest at some distance from the umbilical seam on the

convex inner flank, where ribs bi- or tripartite outward; also a few short or fairly long ribs on each interspace of major ones. Periodic constrictions behind some of major ribs or along the nodeless rib on the interspace, weakly prorsiradiate and apparently double collared.

In the middle growth-stage the tubercles become to be of moderate intensity and well bullate; the tuberculate major ribs frequent, bifurcating outward at the highest point of each bulla on the inner flank; also one or two short or fairly long but nodeless weaker ribs on each interspace of major ones. All the ribs cross the venter nearly at right angle with the siphonal line. Constriction in this stage less distinct and infrequent but cannot be said absent; at least two narrow, somewhat prorsiradiate and double collared ones being discernible.

On the shell of body chamber single major ribs predominant, arising from the umbilical seam, provided with bullate tubercles at the blunt umbilical border and highest on the inner part of the flank, where short rib may occasionally start independently near that peak. The ribs are separated fairly widely, nearly rectiradiate, though may look rursiradiate in some part, fairly coarse and sharp



Text-fig. 1. *Pseudokossmaticeras yagii* sp. nov.

Diagrammatic sketch of the holotype (HCS 13) (partly restored) in lateral view. M1—M4 : Measured points (see Table 2) ; S1, S2 : Part of suture illustrated in Plate 1; C: narrow constriction on outer whorl; arrow: beginning of the body chamber. T. M. delin

Table 2. Measurements (in mm) of *Pseudokossmaticeras yagii* sp. nov.

Specimen, position	D	U	H	B	B/H	H/h	MR:VR
Holotype at M1 (c)	~96.0(1)	42.0(.44)	32.0(.33)	—	—	1.45	11:16
“ M2 (c)	83.0(1)	34.8(.42)	29.0(.35)	—	—	1.51	—
“ M2 (ic)	81.0(1)	34.7(.43)	27.0(.33)	—	—	1.39	10:19
“ M3 (ic)	73.0(1)	31.2(.43)	26.0(.36)	~22(.30)	0.84	1.64	9:20
“ M4 (c)	~50* (1)	23.4(.47)	16.0(.32)	~13(.26)	0.81	1.51	6:24

M1 = last part, M2 = middle part, M3 = early part of the body chamber, M4 = 180° prior to M3 (see Text—fig.1). * D at M4 is inferred on the assumption that whorl overlaps slightly. c = costal, ic = intercostal. Other letters and signs same as those in Table 1.

headed on the flank, and raised to flares on the venter; some may be spinose at the mid-venter. The bullae tend to weaken adorally.

Sutures of the kossmaticeratid pattern, with deep and fine incisions, although they are exposed incompletely.

Dimensions.— See Table 2.

Observations.— The specimen is embedded and seems to be dissolved in the rock matrix on its right side. Moreover, it is somewhat distorted secondarily. The irregularity in H/D and H/h in Table 2 may owe partly to this distortion.

The body chamber begins at about 70 mm in diameter and is preserved for about 200°. Its adoral last part is missing. The decreased rate of whorl expansion at the last stage may owe to the incomplete preservation. Judging from the change in shell form and ornamentation at about the last septum, the specimen is regarded as adult, although the approximated state of the last two sutures is hardly confirmed.

The middle growth-stage in the above description means the last part of the septate whorl for about 210° adapically from the last suture. At that point there is another change in shell form and ornament. It should be noted that in the stage younger than that point for about full one whorl the tubercles on major ribs are comparatively stronger than in later stages. In still younger part with H = 5mm or so, the whorl has several ribs and a well marked constriction. Still younger part is not exposed in this specimen.

Comparison and discussion.— This specimen looks similar to the holotype of *Pseudokossmaticeras tchihatcheffi* (BÖHM, 1927) (p.217, pl.13, fig.1,1a) (also KENNEDY and SUMMESBERGER, 1987, p.29, pl.2, fig.7), from the Bithynian Peninsula, Turkey, in the evolute whorl, fairly wide umbilicus, major ribs with tubercles at or near the umbilical border, branched or intercalated secondary ribs and general broadening of interspaces between the ribs in the late

growth-stage.

There are, however, unnegligible differences between the two specimens. Namely, the Turkish one has much compressed and flat sided whorls with subangular or abruptly bent umbilical border, as compared with the Japanese one described above. Also the tubercles are nearly at the umbilical border in the former, whereas the peak of the tubercles are on the convex inner part of the flank outside the rounded umbilical border in the latter. These differences are maintained persistently almost throughout all the observable growth-stages between the two specimens. Therefore, I would distinguish the two forms as separate species, although more specimens should be added to confirm the specific distinction.

In our form the ribs are flared on the ventral part of the body chamber and some of them become spinose at the mid-venter. The Turkish specimen does not seem to show such a character, although the ventral part is not preserved for nearly a later half of its outer whorl.

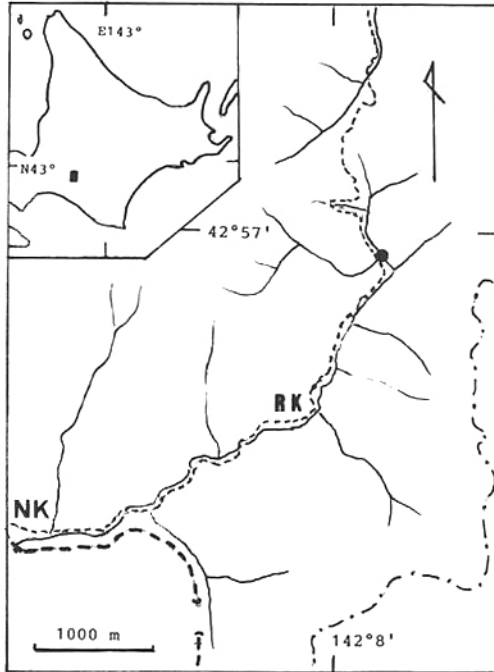
KENNEDY and SUMMESBERGER (1987, p.29) have stated, but not decided, that *P. tchihatchffi* appears to be a synonym of *P. galicianum* (FAVRE, 1869). The lectotype of the latter, figured by NOWAK (1913, pl.41, fig.17) and reproduced by KENNEDY and SUMMESBERGER (1987, pl.2, fig.6), is certainly middle-aged and devoid of the major part of the adult body chamber. The specimens from Poland illustrated by BLASZKIEWICZ (1980, p.41, pl.56, figs.1-3) may be better in showing ontogenetic change of character of *P. galicianum*. In that species the major ribs occur more frequently, their tubercles are situated at the umbilical edge and the spinose flares do not appear on the venter of its body chamber.

To sum up, the described specimen from Hokkaido represents a new species of *Pseudokosmaticeras*, although it is solitary.

Occurrence.—This ammonite was found by K.YAGI in a nodule loose on the upper course of the River Kuruki, 4 km northeast of Noborikawa, one of the coal mines (now abandoned) of the Ishikari Coal-field. The very point was precisely recorded by YAGI, as indicated in a map (Text fig.2). I visited that locality (i. e. T.M.'s loc. H3504) and investigated the geology around there, together with S. TOSHIMITSU, M. NODA and H. TANIGUCHI.

The upper reaches of the River Kuruki are occupied by the Upper Yezo Group, i. e. Coniacian and Santonian mudstone with some interbeds of tuffite and sandstone. The ridge on the west side of the valley is made up of the Hakobuchi Group, i. e. Campanian and Maastrichtian sandstones of various coarseness with two members of sandy siltstone and some interbeds of tuffite.

At another nearby locality in the main stream of the Kuruki, K.YAGI acquired *Peroniceras* sp. (HCS. No.16), which indicates a Coniacian age. A branch stream runs from the ridge of the Hakobuchi Group eastward and H3504 is



Text-fig.2. Map of the Noborikawa area.

Solid circle: locality of the loose nodule which contained the described ammonite; NK: town of Noborikawa; RK: River Kuruki; thick broken line: national highway; thin broken line: forestry road; chain: administrative boundary between Noborikawa and Hobetsu. Inset at the upper left corner is the map of Hokkaido (main part), indicating the map area with a solid rectangle.

located at its confluence with the main Kuruki. At several localities in the lower reaches of this tributary, TOSHIMITSU obtained *Inoceramus* (*Platyceramus*) *mantelli* MERCEY, *I. amakusensis* NAGAO et MATSUMOTO, and then *I. (Platyceramus) japonicus* NAGAO et MATSUMOTO, among many others, which suggest the sequense from Upper Coniacian-Lower to Upper Santonian (or possibly lowest Campanian). The upper reaches may be Campanian.

The Hakobuchi Group in the Noborikawa area is said generally poor in marine fossils, but the same group in the southeasterly adjacent Hobetsu—Tomiuchi [Hetonai] area is fairly fossiliferous. In that area, a member of sandy siltstone in the lower part of the Upper subgroup of the Hakobuchi yields *Pachydiscus* (*Neodesmoceras*) *japonicus* MATSUMOTO and *Inoceramus* (*Endocostea*) *shikotanensis* NAGAO et MATSUMOTO, suggesting an early Maastrichtian age. The other member of sandy siltstone in the upper part of the same subgroup yields *P. (N.) gracilis* MATSUMOTO and *Gaudryceras venustum* MATSUMOTO, suggesting a late Maastrichtian age.

As the provenance of the *Pseudokossmaticeras* bearing nodule is not precisely known, I can merely state on the basis of the geological situation mentioned above that the possible age of the described ammonite should be somewhere in the extent from Coniacian to Campanian. The exact stratigraphic position of this species should be decided by further field work and also by inspecting microfossils.

Previously described species of *Pseudokossmaticeras* from the well defined stratigraphic units are mostly referred to the Lower Maastrichtian (THIEDIG and WIEDMANN, 1976; BLASZKIEWICZ, 1980; KENNEDY and SUMMESBERGER, 1987). Should the nodule of the described ammonite have been derived from the outcrop not far from loc. H3504, then *P. yagii* would become exceptionally older than the well known species. That would be indeed enigmatic, but the possibility of early appearance of the genus in the Pacific region cannot be ruled out.

Apart from BRINKMANN's (1927) and REYMENT's (1958) assignment of *P. brandti* (REDTENBACHER) to Coniacian, which is denied later by THIEDIG and WIEDMANN (1976), THOMEL (1986) listed *P. brandti* as one of the species from the Coniacian of southeast France. He replied to me (*in lit.* Oct. 10, 1989) that it was a poorly preserved *Nowakites*. THOMEL (1988, p.38) also remarked in his description of *Nowakites macoveii* SZASZ that *P. brandti* of SZASZ (1981, p.102, pl.5, figs.1,2) from the Coniacian of Roumania is not referred to *Pseudokossmaticeras*. Such a misidentification can never be considered about the described ammonite from Hokkaido.

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Isikari (石狩), Hakobuchi (函淵), Hobetsu (穂別), Hokkaido (北海道),
 Hetonai (辺富内), Kuruki (クルキ), Noborikawa (登川), Tomiuchi (富内),
 Yezo (蝦夷; エゾ), Yubari (夕張)

北海道登川産のコスマティケラス科アンモナイト
ならびに関連属種についての所見

松本達郎

(和文要旨)

1973年に夕張市鹿の谷の北炭地質調査所に展示された標本の中で、八木孝橘氏が登川で採集したものは、日本では見馴れないアンモナイトであった。当時の私見は八木氏が標本に付けて明記している。残念なことに同氏は逝去された、追悼の意をこめこれを記載し、併せて関連する属種について所見を述べる。

Kossmaticeratidaeの2属 *Pseudokossmaticeras* SPATH, 1922と *Neograhamites* SPATH, 1953は、上部白亜系のカンパニアン～マストリヒチアン階に産するが、個体発生に伴い殻形・装飾が変化する。その過程で分岐肋が離れて単肋が卓越するとともにワールが幅狭くなっていく。両者はシノニムか又は上記過程の遅速に応じて後者を前者の亜属とする程度の差しか認められない。

登川のクルキ川上流転石で採集した八木氏アンモナイトは、トルコ産の *P. tchhatcheffi* (BÖHM, 1927) に一見類似するが、気房部のワールに丸みがあり、へその周りの突起が外方にずれており、住房で肋は高まりを示しその一部は外面で刺状に突出することなどで識別される。よって新種 *P. yagii* として記載した。

転石地点を含むクルキ川上流の谷には上部エゾ層群（主に泥岩、コニアシアン～サントニアン）が分布するが、西側の山地には函淵層群（主に砂岩、山地東側は多分カンパニアン）が分布する。採集地点でこの山地からの支流が合流している。従ってこのアンモナイトを含むノジュールはコニアシアンからカンパニアン迄の範囲のどこかに起源があるので、その正確な時代の決定には、野外調査と微化石の検討を含め、なお今後の改究が必要である。

P 属はテチス海北域とその北隣浅海域、南側のインド・マダガスカル・西豪に産するとされていたが、分布は太平洋域に拡大された。

Explanation of plate I

Pseudokossmaticerous yagii sp. nov.

Holotype (HCS. 13). Lateral views (A, B) in different lighting and the exposed venter (C).

Arrow: beginning of the body chamber;

dotted line: constriction on outer whorl.

Sutures in part (S1, S2) at the position indicated in Text-fig. 1;

u. s. o. : umbilical seam of outer whorl,

v. l. : ventrolateral shoulder. Scale bar : 10mm for A, B, C and 1mm for S1, S2.

Photos by M. Noda.

Plate 1 (T. MATSUMOTO)

