

A phylloceratid ammonite species from the Maastrichtian of the Hobetsu district, Hokkaido. (Studies of the Cretaceous ammonites from Hokkaido-LXXVIII)

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Abstract

Several specimens in the collection of the Hobetsu Museum from the lower Maastrichtian Fukau-shi Formation of the Hobetsu district are identified to *Phylloceras* (*Neophylloceras*) *nera* (Forbes). As this species was somewhat ambiguous in the previous literature, a revised diagnosis is given in this paper, with description in detail of the Hobetsu specimens and comparison with certain other species. On this occasion the taxonomic status of *Neophylloceras* is settled.

Key words — *Phylloceras*, *Phylloceras* (*Neophylloceras*) *nera*, Maastrichtian, Fukaushi Formation, Hobetsu

Introduction

The ammonite species described in this paper is an element of a fossil faunule from the Fukaushi Formation of a Maastrichtian age. Numerous fossils were collected on the occasion of a repair work of the road cutting at locality H311, where the formation is well exposed. Loc. H311 is shown in a geological map by Matsumoto and Toshimitsu (1995, fig. 1) and the collected specimens are mostly held in the Hobetsu Museum. Among the species which constitute the faunule, *Sphenoceras* *hetonaianus* (Matsumoto) (see Matsumoto *et al.*, 1993) of the Inoceramidae is most abundant. *Gaudryceras* *venustum* Matsumoto (see Matsumoto and Toshimitsu, 1995), *Pachydiscus* (*Pachydiscus*) *kobayashii* (Shimizu) (see Matsumoto and Toshimitsu, 1992) and *Pachydiscus* (*Neodesmoceras*) *gracilis* Matsumoto are ammonite species which have been recently described, although the last one should be restudied. In this paper a phylloceratid species is described as an additional element. We identify it to *Phylloceras* (*Neophylloceras*) *nera* (Forbes). This species was estab-

lished on a small, probably immature specimen from the Maastrichtian of South India. The Hobetsu material consists of three larger specimens and a smaller one. We hope that the present description may improve the previous knowledge on this species.

For the descriptive terms we follow those used in recent papers. Repositories are abbreviated as BMNH: British Natural History Museum; GK: Type room in the Department of Earth and Planetary Sciences, Kyushu University; HMG: Hobetsu Museum. South India is a geologically defined region which was a separated part of the Gondwana Land.

Palaeontological description

Family Phylloceratidae Zittel, 1884

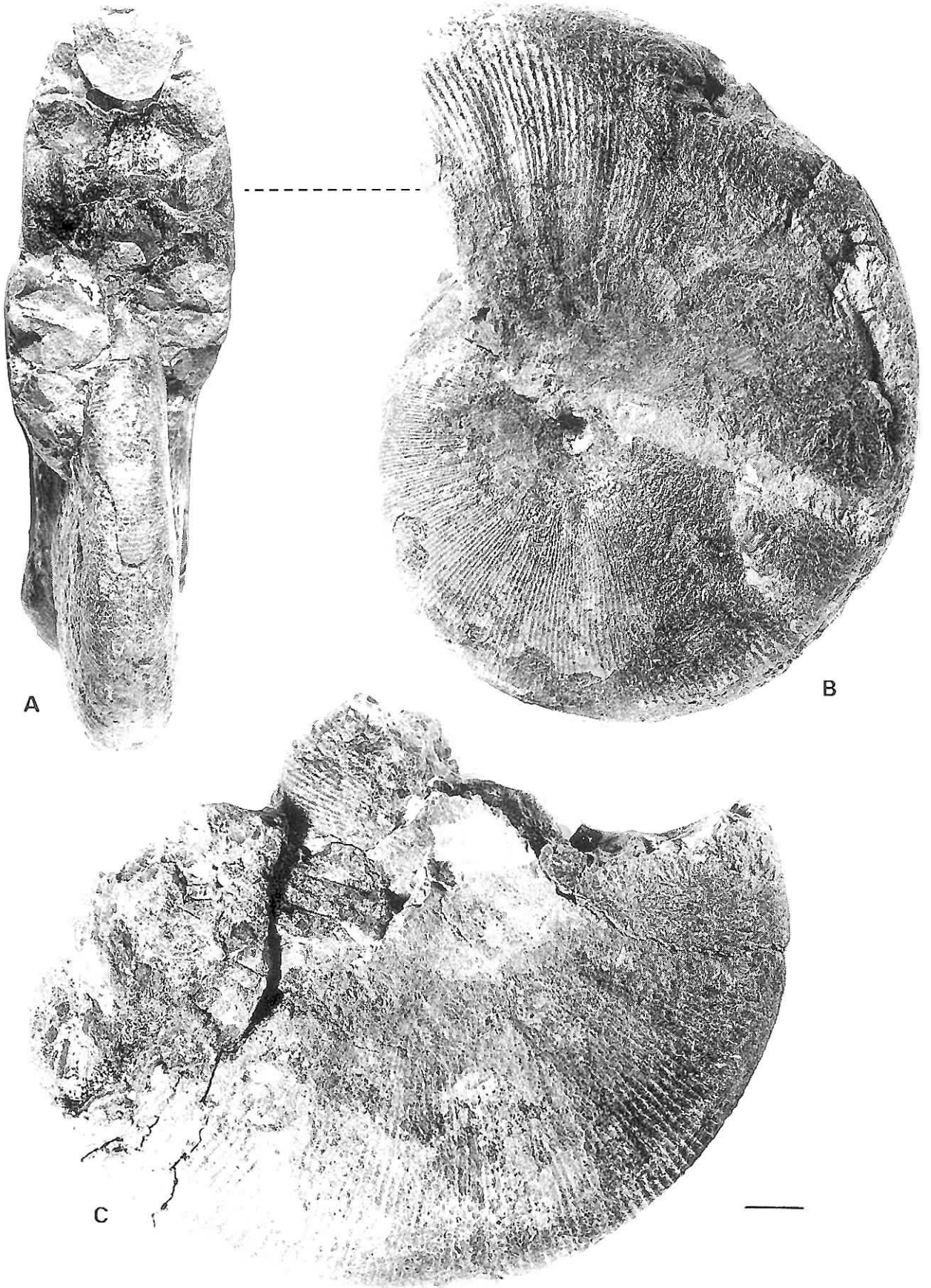
Genus *Phylloceras* Suess, 1865

Subgenus *Neophylloceras* Shimizu, 1934

Type species.—*Ammonites* (*Scaphites*?) *ramosus* Meek, 1858, by original designation.

Remarks.—Validity of *Neophylloceras* Shimizu, 1934 (p. 61, *in* Shimizu and Obata) was ack-

Plate I



nowledged by Wright and Matsumoto (1954, p. 109) with necessary discussion. It may be desirable to rank it as a subgenus of *Hypophylloceras* Salfeld, 1924, as Birkelund (1965, p. 21) did. If *Hypophylloceras* is ranked as a subgenus of *Phylloceras*, *Neophylloceras* has to be treated as *Phylloceras* (*Neophylloceras*), unless it is suppressed as a synonym of *Hypophylloceras*.

The above three taxa of generic rank are similar in shell shape, ornament and the fundamental pattern of suture, but they are different in the complexity of suture, e.g. the saddle endings, degree of incisions and aspects of phylloid shape of folioles. Furthermore, they occur generally in different but successive geological ages, although there may be overlap of age in some species of the subgenera. To express generally the natural history, it is favourable to treat them as subgenera; namely *Phylloceras* (*Phylloceras*), *Phylloceras* (*Hypophylloceras*) and *Phylloceras* (*Neophylloceras*).

This scheme of taxonomy was proposed by Matsumoto (1984, p. 8) and independently by Henderson and McNamara (1985, p. 38). The illustrations of sutures in Matsumoto (1959a, figs. 3-7) and Henderson and McNamara (1985, text-fig. 2) may be helpful to discriminate the three subgenera.

Phylloceras (*Neophylloceras*) *nera* (Forbes, 1846)

Plate I, A-B, C; Plate II, A-D, E-G

Ammonites Nera Forbes, 1846, p. 106, pl. 8, fig. 7.

Phylloceras nera (Forbes); Kossmat, 1895, p. 109, 160, pl. 16, fig. 2a-d.

Neophylloceras cf. *nera* (Forbes); Matsumoto, 1984, p. 10, pl. 1, fig. 3.

Phylloceras (*Neophylloceras*) *nera* (Forbes); Kennedy and Henderson, 1992, p. 389, pl. 1, figs. 10-12; pl. 15, figs. 1-2; text-fig. 3A.

Type.—Holotype, by monotypy, is BMNH C22682, the original of Forbes (1846, pl. 8 fig. 7), Kossmat (1895, pl. 6, fig. 2) and Kennedy and Henderson (1992, pl. 1, figs. 10-12; pl. 15, figs. 1-2), from the Valudayur Formation of Pondicherry, South India.

Material.—The specimens from loc. H311 of the Hobetsu district are HMG 928 (Pl. I, C; Pl. II, E-G), HMG 929 (Pl. II, A-B), HMG 930 (eroded and unfigured) and HMG 931 (Pl. II, A-D). They are all collection of the township of Hobetsu. For comparison GK. H5943 (Matsumoto, 1984, pl. 1, fig. 3) from the late Campanian Zone of *Metaplacenticerias subtilistriatum* at loc. E33 of the Wembetsu-Rubeshube of northern Hokkaido is reexamined.

Diagnosis.—Shell large, e.g. about 135 mm in diameter at the end of phragmocone. Whorls much compressed, nearly parallel sided, with the maximum breadth at about mid-height; flanks very slightly convex. Fine and fairly dense lirae or subcostae very weakly flexuous; several of them may be faintly bundled on the inner flank and separated by very shallow grooves of variable breadth. Suture as for the subgenus *Neophylloceras*.

Description.—HMG 928 has a posterior portion of the body chamber at its preserved last part. Diameter of its phragmocone is estimated as 135 mm. HMG 929 has the last suture near its preserved end, where its diameter is 136 mm. HMG 930, about 130 mm in diameter, is wholly

← Plate I

Phylloceras (*Neophylloceras*) *nera* (Forbes).

A-B: HMG 929, frontal and right lateral views, ×1.

C: HMG 928, left lateral view, ×1. Scale bar: 10 mm.

Plate II

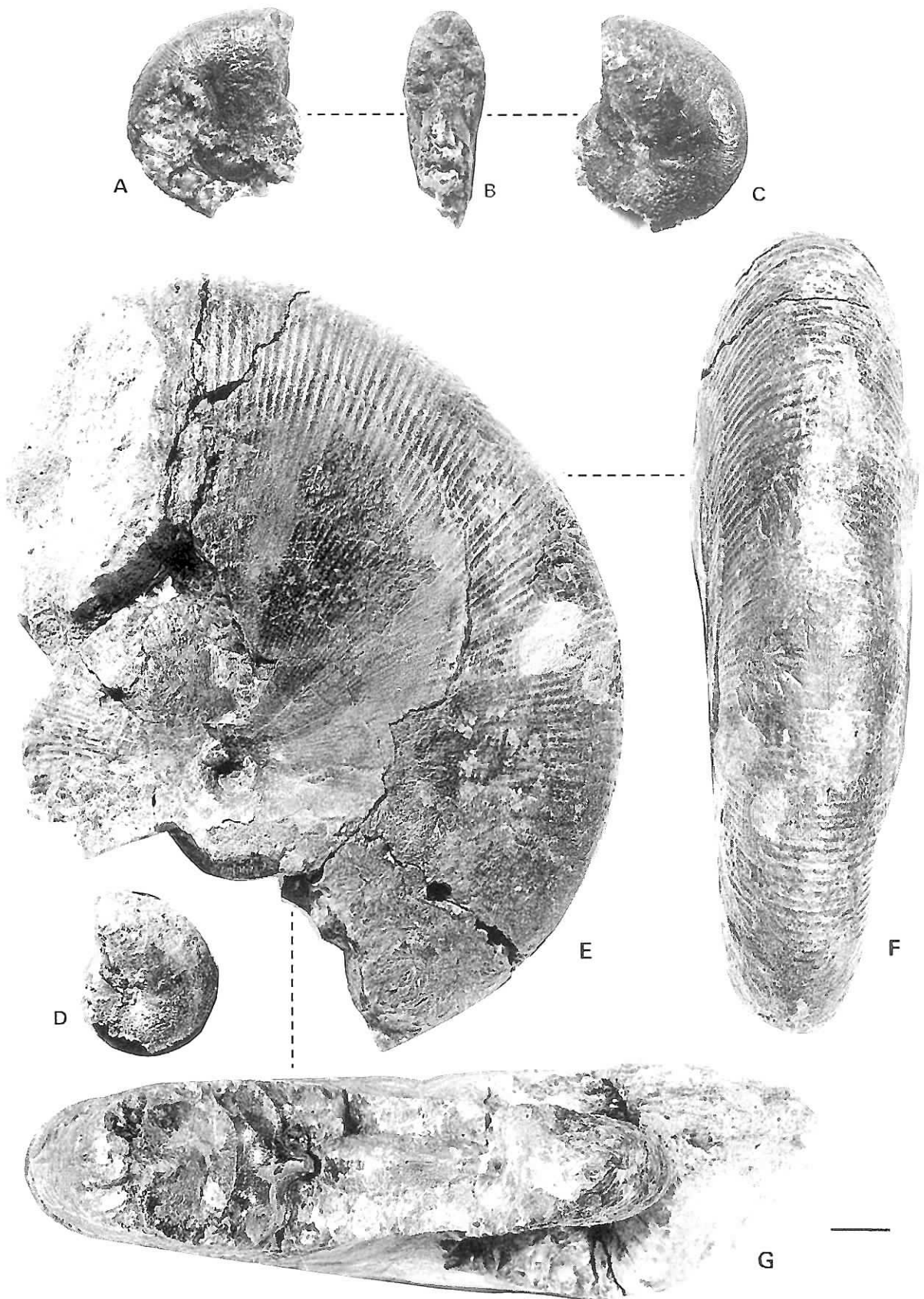


Table 1. Measurements of *Phylloceras* (*Neophylloceras*) *nera* and certain other species.

Specimen	D	U	U/D	H	H/D	B	B/D	B/H	H/h	R
Holotype	20.4	1.7	.08	11.6	.57	5.6	.27	.48	1.6	15?
HMG 929 (E)	136.0	7.7	.06	79.0	.58	36.5	.27	.46	—	18
„ (E-180°)	—	—	—	49.4	—	22.2	—	.45	—	15
HMG 928 (LS)	~135.0	7.5	.06	82.5	.61	37.5	.28	.45	1.8	18
„ (LS-90°)	105.0	6.2	.06	64.0	.61	30.5	.29	.48	1.6	16
„ (LS-140°)	—	—	—	54.5	—	27.5	—	.50	—	—
HMG 931	~ 20	—	—	11.6	—	6.3	—	.54	—	17
GK. H 5943	33.0	2.5	.07	19.2	.58	9.2	.28	.48	1.7	16
Ng, HT	53.5	2.4	.045	33.3	.62	19.2	.36	.58	1.9	—
Nh, LT	31.0	2.0	.06	17.5	.50	10.0	.32	.57	1.5	18
Nr, HT	39.2	3.2	.08	22.3	.57	11.7	.30	.52	1.62	17
Ns, LT*	36.5	3.5	.10	20.0	.55	11.0	.30	.55	1.5	15

Ng: *Phylloceras* (*Neophylloceras*) *groenlandicum*; Nh: *P.(N.) hetonaiense*; Nr: *P.(N.) ramosum*, Ns: *P.(N.) surya*. ~: approximate; R: number of ribs on the venter in the distance as long as B; HT: holotype, LT: lectotype. *BMNH.C51075 was indicated as LT by Henderson and McNamara (1985, p. 42) prior to Kennedy and Henderson's (1992, p. 391) BMNH C51074. The illustration of LT (C51075) by Kennedy and Henderson (1992, pl. 1, figs. 4-5) should be x2, although the authors indicated as x1.

septate but somewhat eroded. HMG 931 is small, imperfect and probably juvenile, as is GK. H5943. Although the length of the body chamber is not known, it may be at least half a whorl as is presumed by the trace of umbilical seam. The full grown shell must have been fairly large, presumably with D about or over 230 mm.

The shell is discoidal and very much involute, with the measured umbilical ratio (U/D) 6 to 8 percent, well below 10 percent. The whorl expands with a high ratio, showing the measured ratio of H/h about 1.6 to 1.8. It is much compressed, showing B/H about or slightly below 0.5 in most of the measured examples. Its maximum breadth is situated between the middle flanks, which are nearly parallel. The whorl section is suboval-subrectangular, with moderately or rather broadly rounded venter, nearly flat or

slightly convex flanks, which converge very slightly toward the venter and gradually toward the dorsum, without abrupt umbilical shoulders, and slope down to steep umbilical walls.

The ornament is primarily represented by fine and dense lirae. They are sharp-crested on the external surface of the outer shell layer, but they may have a blunt elevation on their base on the intermediate and even on the internal shell layers in the late growth stage, and can be called riblets or subcostae. Their curvature may vary to some extent from part to part even within the same individual, but in general the curvature is very weak. Namely, lirae are slightly prorsiradiate and may be weakly or broadly concave on the inner (i. e. dorsal) flank; they may show a slight convexity or may run subradially on the middle flank; they may curve weakly forward or may be

←Plate II

Phylloceras (*Neophylloceras*) *nera* (Forbes).

A-C: HMG 931 (imperfect juvenile), left lateral, frontal and right lateral views, X2.

D: HMG 931, right lateral views in different lighting, X1.5.

E-G: HMG 928, right lateral, ventral and end-on views, X1.

Scale bar: 10 mm.

subradial on the outer flank; finally they run almost vertically across the venter, without notable projection. On some places, in both young and late growth stages, several lirae or subcostae are very faintly bundled on the inner flank or around the umbilicus, with very shallow grooves in between, but on some other parts such bullae and grooves are undeveloped.

Dimensions.— See Table 1.

Comparison and discussion.— *P.(N.) nera* resembles *P.(N.) ramosum* (Meek) in shell shape, especially in the cross-section of the whorl, but the two species are distinguished by the ornament. Namely, the lirae or subcostae of *P.(N.) ramosum* are more flexuous than those of *P.(N.) nera*, in spite of some variability in the latter species as described above. In *P.(N.) ramosum* the lirae are distinctly prorsiradiate and concave on the inner flank, show a clearly convex curve on the middle part of flank, swinging backward, and then run forward on the outer flank, passing across the venter with some projection (see Matsumoto, 1959b, pl. 1, fig. 1; Matsumoto, 1984, pl. 1, fig. 1).

P.(N.) groelandicum (Birkelund, 1965) (p. 23, pl. 1, figs. 1-4) shows a similar curvature of lirae to that of *P.(N.) ramosum*, but it is distinct in the peculiar cross-section of its whorl, with the maximum breadth at the umbilical shoulder, convergent flanks and rather narrowly arched venter.

P.(N.) hetonaiense Matsumoto, 1943 (p. 675, fig. 1a3, 1b3; Spath, 1953, p. 5, pl. 1, fig. 2; Matsumoto, 1959b, p. 5, pl. 3, fig. 1; Matsumoto, 1984, p. 11, pl. 1, figs. 4-5) is closely allied to *P.(N.) nera* in the general shell shape and the mode of ornamentation. In its whorl section the inner flanks are rather flat and roughly parallel but the outer flanks gradually converge to the rounded venter. In young shells of *P.(N.) hetonaiense* more or less blunt bullae separated by shallow grooves often occur on the inner flank. This feature may have relation with the

bundling of the lirae or subcostae and shallow grooves that are discernible indistinctly and rather irregularly even on the whorls of late growth stage in *P.(N.) nera*. *P.(N.) woodsii* Hoepen (1921, p. 3, pl. 2, figs. 1-6, text-fig. 1; Kennedy and Klinger, 1977, p. 307, figs. 4-6; pl. 13, figs. 3-5) seems to resemble *P.(N.) nera*, but we hesitate to give a definite decision without examining the material.

The radial major ribs are developed more distinctly and more regularly in *P.(N.) surya* (Forbes, 1846) (see Henderson and McNamara, 1985, p. 42, pl. 1, figs. 7-8, 11-12; pl. 2, figs. 1-2; text-fig. 2g; Kennedy and Henderson, 1992, p. 391, pl. 1, figs. 1-2, 3, 4-5, 6-7, 9, 13-14; pl. 15, figs. 4-5) than those of *P.(N.) nera*. The former shows a whorl section with the maximum breadth at a point on the inner flank from where the flanks converge to a narrowly arched venter. This is another criterion to separate the two species.

In conclusion, *P.(N.) nera*, revised in this paper, can be distinguished from such species as *P.(N.) ramosum*, *P.(N.) groelandicum* and *P.(N.) surya*, which occur in at least partly contemporary beds. The true relationships of *P.(N.) nera* with *P.(N.) hetonaiense* and *P.(N.) woodsii* should be investigated by more substantial material. The true geological range of *P.(N.) nera* should be determined on the basis of the future investigations.

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(地名表)

Fukaushi 深牛, Fukuoka 福岡, Hobetsu 穂別, Tsukuba つくば

(和文要旨)

Matsumoto, T. and Toshimitsu, S. (1996) A phylloceratid ammonite species from the Maastrichtian of the Hobetsu district, Hokkaido. *Bull. Hobetsu Museum*, (12), 1-6.

(松本達郎・利光誠一, 1996. 北海道穂別地域のマストリヒチアン階から産出したフィロケラス科アンモナイトの1種. 穂別博研報, (12), 1-8.)

穂別地域の深牛砂岩層(マストリヒチアン)の露頭(loc. H311)から産出した Phylloceratidae 科のアンモナイト(当館所蔵の複数標本)を調べて, これが *Phylloceras* (*Neophylloceras*) *nera* (Forbes)に同定されることを究明した. 本種は従来資料が不十分なため不明確であったが, この論文でその特徴を明らかにし, 既知のいくつかの他種との比較をも論述した. またこの機会に, *Neophylloceras* の分類上の取り扱いを国際的にも通ずるよう決着させた.