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REMARKS ON SOME TOARCIAN AMMONITES
FROM THE HORNSUND AREA, VESTSPITSBERGEN **

(Figs. 1—5, Tabs. 1—4, Pls. I, II)

Abstract

Ammonites from the so-called Phosphorite Conglomerate (phosphorite layer), cropping out in the close vicinity of Hornsund, Vestspitsbergen, were subject to palaeontological analysis. The presence of the following Lower- and Upper Toarcian species of the *Hildoceras bifrons*- and *Haugia variabilis* Zones was stated: *Dactylioceras boreum* sp. nov., *D.* sp. nov., *Catacoeloceras* sp., *Pseudolioceras compactile compactile* (Simps.), *P.* cf. *compactile gradatum* Buckm. The majority of these forms were previously known from other areas of Vestspitsbergen, the others are new in this area.

Common occurrence of various species derived from various ammonite zones within thin phosphorite layer should be regarded as a result of condensation of these zones.

Among the species described there are some West European and Arctic (*Pseudolioceras*) forms, also a species known from the Canadian Arctic (*Dactylioceras* sp. nov.) and the form (*Dactylioceras boreum* sp. nov.) which is not known from other areas than Spitsbergen.

INTRODUCTION

Among the faunistic material collected in 1958 by Prof. Dr. Krzysztof Birkenmajer, member of the Polish Spitsbergen Expeditions, some interesting Toarcian ammonites were found (cf. Birkenmajer 1960). They derive from a thin layer consisting of phosphorite concretions, that was

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previously known from other areas of Spitsbergen. This layer represents the Upper Liassic transgression in this area.

The fossils found in the phosphorite concretions are mainly pelecypods, brachiopods, belemnites and ammonites. The last group of the greatest stratigraphical importance is described in the present paper.

ACKNOWLEDGMENTS

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STRATIGRAPHIC PART

The problem of the age of the phosphorite layer in Spitsbergen and the identification of particular zones within it were the subject of detailed investigations of many authors. The work of H. Frebold (1929 a, b; 1930, 1951) is the most important one. Many interesting remarks are also to be found in papers by V. I. Bodylevskij (1929), S. Z. Rózycki (1936, 1959) and others.

Frebold (*op. cit.*) had the richest collection of Upper Lias fauna from various regions of Vestspitsbergen. He mentioned the following ammonite species:

Pseudolioceras cf. compactile (Simps.) = *P. aff. compactile* (Simps.) — *vide* Frebold 1958

Pseudolioceras cf. wuerttenbergeri (Denckm.) = *P. aff. compactile* (Simps.) — *vide* Frebold 1958

Pseudolioceras pumilum Buckm.

Grammoceras (?) sp. ind. aff. *doerntense* (Denckm.)

Grammoceras cf. saemanni (Dum.)

Esericeras eseri (Opp.)

Harpoceras sp. ind.

Catacoeloceras polare (Freb.)

Dactylioceras (Peronoceras ?) annuliferum (Simps.) = *D. boreum* sp. nov.

The above mentioned species characterize, in Frebold's opinion, the zone between the *Haugia variabilis* Zone and the *Grammoceras striatum* Zone (lower part of the Upper Toarcian).

Bodylevskij (1929) beside the undetermined Toarcian forms belonging to the genera *Lytoceras*, *Harpoceras* and *Coeloceras* mentioned *Pseudolioceras cf. beyrichi* (Schl.) from the phosphorite layer in the vicinity

of Mohnbukta (east coast of Vestspitsbergen). The latter ammonite is characteristic for the Lower Aalenian (Opalinum Zone). He stated that the phosphorite layer contains a mixed fauna of various stratigraphic zones of the Upper Lias and Lower Dogger.



Fig. 1

Localization of outcrops with Toarcian fauna
in the Hornsund area

In NW Torell Land, south of Van Keulenfjorden, Różycki (1936, 1959) has found in the analogous beds some Toarcian ammonites, identical with those identified by Frebold in the eastern part of Vestspitsbergen. These are: *Pseudolioceras* ex gr. *compactile* (Simps.), "*Coeloceras*" *polare* Freb., *Grammoceras saemanni* (Dum.) and "*Harpoceras*" *eseri* (Opp.). In Różycki's opinion the stratigraphical inconsistency of the phosphorite layer is the result of the action of bottom currents during the Upper Lias time. He mentioned the finding of an ammonite similar to some Lower Vesulian (Upper Bajocian) forms in the vicinity of Lå-gryggen.

Does the ammonitic fauna from the Hornsund area play an important role in the discussion about the age of the phosphorite layer? The major problem is whether the recently described species of the genera *Dactylioceras*, *Pseudolioceras* and *Catacoeloceras* could be treated as an assembly characterizing a given ammonite zone. Or maybe, common occurrence of these forms is a result of condensation of several faunistic zones within one layer of small thickness.

In the present author's opinion the latter possibility is more probable. Though the ammonites of the genus *Dactylioceras* from the Hornsund area (*Dactylioceras boreum* sp. nov., *Dactylioceras* sp. nov.) are represented only by new forms, it is not out of the question that they could be regarded as representatives of the upper parts of the Lower Toarcian. This inference is based on their relationships to the previously known species.

The species *Pseudolioceras compactile compactile* (Simps.) and *P. cf. compactile gradatum* Buckm. seem to be stratigraphically younger forms connected with the *Haugia variabilis* Zone and probably with the *Grammoceras striatulum* Subzone. *Pseudolioceras compactile gradatum* Buckm. is noted as yet (Buckman 1904) from the *Lillia lilli* Subzone*, and the holotype of the form *Pseudolioceras compactile compactile* (Simps.) is known from even higher Toarcian horizons, i.e. from the *Grammoceras striatulum* Subzone. The latter species is commonly found in France and Germany in the *Haugia variabilis* Zone (Monestier 1922; Theobald & Cheviet 1959; Krumbeck 1943—44). In this case, however, it is difficult to ascertain whether these forms are represented by *P. compactile compactile* (Simps.) *sensu* Buckman 1911, or by other varieties of this species.

Despite some uncertainties, one can suppose that the ammonitic fauna from the phosphorite layer in the Hornsund area determines at least two stratigraphical zones of the Toarcian — namely the *Hildoceras bifrons* — and the *Haugia variabilis* Zones (possibly also the *Grammoceras striatulum* Subzone). There is no proof of the presence of other higher zones within the phosphorite layer. However, the presence of other zones is not out of the question. Similarly, the above mentioned fact cannot contradict the possibility of diachronic development of that layer in various areas of Spitsbergen and of adjacent territories. Within the ammonoid fauna of the Hornsund area the species limited either only to Spitsbergen (*Dactylioceras boreum* sp. nov.) — as it may be reckoned from scanty data — or to the Arctic areas

* Actually, it is incorporated into the *Haugia variabilis* Zone. Some authors (e.g. Spath 1942) ascribed it to the *Hildoceras bifrons* Zone.

in general (*Dactylioceras* sp. nov.) are present, as well as those noted from Western Europe (England, France, Germany) and from the northern areas (Canada, Greenland, Spitsbergen) as well. To the latter belong: *Pseudolioceras compactile compactile* (Simps.) and *P. cf. compactile gradatum* Buckm. *.

PALAEONTOLOGICAL PART

Explanations to symbols used:

D — Diameter of shell in mm.

H — Maximum height of the last whorl taken from umbilical seam to siphonal apex

H₁ — Minimum height of the last whorl taken from dorsal apex to siphonal apex

h — Ratio H/D

h₁ — Ratio H₁/H

T — Maximum thickness of whorl

t — Ratio T/D

t₁ — Ratio T/H

U — Width of umbilicus

u — Ratio U/D

R — Quantity of primary and secondary ribs

Family *Dactylioceratidae* Hyatt, 1867

(nom. corr. J. P. Smith, 1913)

Genus *Dactylioceras* Hyatt, 1867

(emend. ICZN, 1958)

Dactylioceras boreum sp. nov.

(Pl. I, Figs. 1, 2; Text-Fig. 2)

1929 *Dactylioceras* (*Peronoceras* ?) *annuliferum* Simps.; H. Frebold, Schichtenfolge ..., pp. 259—260, Pl. 2 (34), Figs. 14, 15

Holotypus: Specimen No. I. G. 949/II-1 ** (Pl. I, Figs. 1, 2).

Derivatio nominis: Latin *boreus* — northern.

Locus typicus: Hyrnefjellet, Hornsund, Vestspitsbergen.

Stratum typicum: Phosphorite layer (Toarcian).

Coll.: K. Birkenmajer, 1958.

Material: 1 specimen, internal mould of a part of external whorls, impression of internal whorls. The Museum of the State Geological Survey, Warszawa: I. G. 949/II-1.

Dimensions (in mm.): — see Table 1.

* The possibility of the presence of this form in Spitsbergen was supposed by Frebold (see remarks below).

** Number refers to Birkenmajer's collection deposited in the Museum of the State Geological Survey, Warszawa, Rakowiecka 4.

Table 1

Dactyloceras boreum sp. nov.

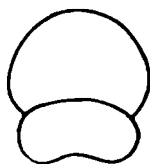
Specimen	D	H	H ₁	h	h ₁	T	t	t ₁	U	u	R	Remarks
No. I.G.949/II-1	ca 55.0	14.0	ca 11.2	ca 0.25	ca 0.80	19.0	ca 0.34	1.36	29.4	ca 0.53	21/—	On the preserved fragment of whorl
Hyrnefjellet	ca 42.0	11.7	10.0	ca 0.27	0.85	15.0	ca 0.36	1.28	20.4	ca 0.51	46/—	
(Various development stages of the shell)	ca 40.0	10.5	9.0	ca 0.26	0.86	17.2	ca 0.43	1.64	18.0	ca 0.49	44/—	
	32.0	9.5	7.7	0.30	0.81	16.0	0.50	1.68	16.2	0.51	42/—	

Description: Shell evolute with 6 whorls preserved. Whorls, up to diameter of ca 40 mm., strongly flattened in dorso-ventral direction, so that their width is greater than height (t_1 — 1.64—1.68). From 42 mm. onwards the whorl becomes more oval in shape but t_1 is still high (1.28—1.36).

Ribs bifurcated on four initial whorls exhibit small tubercle in place of bifurcation. They run almost straight, with slight waving on the siphonal side. Bifurcating ribs concealed under subsequent whorls, and exposed partly only on last but one (fifth) whorl. In this part of the shell there appear also single ribs without tubercles, and the tubercles on the bifurcating ribs are also less marked and disappear. The ratio of non-bifurcating ribs to bifurcating ones is 1:2 or 1:1.

Fig. 2

Dactylioceras boreum sp. nov., Toarcian, Hyrnefjellet. Cross-section of the last two whorls. I. G. 949/II-1. Natural size



On the preserved fragment of the last (sixth) whorl (by the diameter of ca 55 mm.) the ornamentation consists entirely of slightly sigmoidally curved, and pointed toward the front, single ribs. Suture not preserved.

Remarks: Juvenile specimen from Dunérbukta included by Frebold (1929b) to the species *Dactylioceras* (? *Peronoceras*) *annuliferum* (Simps.) is, in general, an accurate image of the juvenile stages of the specimen from Hyrnefjellet. It does not seem probable that these forms belong to Simpson's species (in Buckman 1912), though the specimens from Spitsbergen exhibit some similarities to the last mentioned one. The main difference is the other type of ornamentation on juvenile whorls. The ornamentation of *Peronoceras annuliferum* (Simps.) according to Buckman (*op. cit.*) is fibulate* in initial stages (up to the diameter of 17 mm.). This feature is typical for *Peronoceras*. Tubercles are big, situated relatively low, and the quantity of ribs — when compared with the specimen from Hyrnefjellet — is considerably smaller (25), larger by the diameter of ca 35 mm. (50). Bifurcation points on ribs on the specimen from Whitby are not covered by subsequent whorls, and the shell is less evolute.

* M. Simpson (1855 — *vide* Buckman 1912) does not mention this type of ornamentation. The specimen illustrated by Buckman, however, derived from Simpson's collection (? holotype), so the identification of it with the species *A. annuliferum* Simps. is absolutely sure.

Dactylioceras engeli Mon. (Monestier 1931) exhibits more flat siphonal side by the same diameter (ca 25 mm.).

When compared with *Dactylioceras semicelatum* (Simps.), *D. boreum* sp. nov. is more evolute, exhibits thicker whorls, more solid and more sparsely situated ribs, and one-rib ornamentation stage that does not occur in *D. semicelatum* (Simps.).

Peridactylites consimilis Buckm. (1927—1928, T. A., VI, p. 42, VII, Pl. DCCLXXVIII, Figs. 1, 2), no doubt approximates to the Spitsbergen specimens, differing from them in having smaller size of shell, other type of ornamentation, particularly in the terminal parts of the last whorl, feebler degree of evolution of the shell, and thickness of whorls.

Occurrence: *Dactylioceras boreum* sp. nov. is noted only from the Toarcian phosphorite layer of southern and eastern parts of Vestspitsbergen (Hyrnefjellet, Dunérbukta). The condensation of ammonite zones within this layer of small thickness is a serious obstacle in proper determination of stratigraphic position of the new form. The species was found together with *Dactylioceras* sp. nov., *Pseudolioceras* cf. *compactile gradatum* Buckm., *P. compactile compactile* (Simps.) and *Catacoeloceras* sp. All these forms, *Dactylioceras* sp. nov. excepted, characterize the *Haugia variabilis* Zone (+ ? *Grammoceras striatulum* Subzone). It is highly probable that the *Dactylioceratids* from Spitsbergen could derive from older Toarcian zones (*Hildoceras bifrons* Zone — see remarks below).

Dactylioceras sp. nov.

(Pl. I, Figs. 3, 4; Text-Fig. 3a—b)

?1958 *Dactylioceras commune* (Sow.) var. b; H. Frebold, Prince Patrick Isl., p. 3, Pl. I, Fig. 3a, b

?1964 *Dactylioceras commune* (Sow.) var.; H. Frebold, Illustrations of Canadian fossils, p. 18, Pl. VII, Fig. 6a, b

H o l o t y p u s: Specimen No. I. G. 949/II-2 (Pl. I, Figs. 3, 4).

L o c u s t y p i c u s: Hyrnefjellet and S. Fonnryggen, Torell Land, Vestspitsbergen.

S t r a t u m t y p i c u m: Phosphorite layer (Toarcian).

C o l l.: K. Birkenmajer 1958.

M a t e r i a l: 2 phosphorized specimens, one (Hyrnefjellet I. G. 949/II-2) with partly preserved last whorl and with impression of internal parts of whorl, second (?) one (S Fonnryggen I. G. 949/II-3) is represented by a fragment of the outer part of body chamber with partly preserved aperture. The Museum of the State Geological Survey, Warszawa.

D i m e n s i o n s (in mm.): — see Tab. 2.

Table 2

Dactylioceras sp. nov.

Specimen	D	H	H ₁	h	h ₁	T	t	t ₁	U	u	R
I. G. 949/II-2 (Hyrnefjellet) internal whorl	35.0	10.7	9.6	0.31	0.90	9.6	0.27	0.90	17.0	0.48	22/32 ca 1/2 of whorl
	20.6	6.4	—	0.31	—	7.8	0.38	1.22	9.7	0.47	ca 36/56
H. Frebold (1958) Pl. I. Fig. 3a, b	42.0	12.0	—	0.28	—	8.0	0.19	0.67	20.0	0.48	39/ca 75

Description: Shell evolute with 5 whorls visible. The four initial whorls (by the diameter of ca 20.0 mm.) strongly dorso-ventrally vaulted (Text-Fig. 3a), and exhibit solid primary ribs, the quantity of which increases with the growth of whorls. In these parts of the shell the bifurcating ribs prevail. In some places, however, simple ribs appear.

Fig. 3

Dactylioceras sp. nov., Toarcian, Hyrnefjellet. Cross-section of the shell: a — By the diameter of 20 mm.; b — By the diameter of 35 mm.

I. G. 949/II-2. Natural size



Ribs arch slightly toward the back of the shell. Bifurcation points covered by subsequent whorls. Tubercle stage not recognized. The last visible whorl (diameter of 35 mm.) becomes more slender, with narrow, slightly arching siphonal side. The T/H ratio changes considerably, depending on the shell diameter (1.22—0.90). Sigmoidal ribs sparsely located, rather solid, and slightly bent toward the front. This bending is even more distinct on ventral side. The quantity of simple ribs increases with the growth of the shell. On the fragment of the last whorl they occur most frequently in alternation with bifurcating ribs. Inter-calatory ribs are observed in this stage; they continue on the opposite wall as primary ribs and *vice versa*. Suture line feebly visible.

Beside the above described specimen from Hyrnefjellet a fragment of a larger specimen was found (S Fonnryggen). The latter is characterized by partly preserved aperture with solid simple ribs and whorl broadening strongly towards opening. It may represent the terminal part of the body chamber of the described species. Aperture on this specimen is typical for the genus *Dactylioceras* — in shape of elongated (on siphonal side) and narrowing (on sides) "collar".

Remarks: The specimen from Hyrnefjellet exhibits strong resemblances to some specimens of *Dactylioceras* from the *Hildoceras bifrons* Zone, that derive from Arctic areas of Canada (Imlay 1955; Frebold 1958, 1960, 1964). It seems to be most close to the form from Prince Patrick Island. The latter was compared by Frebold (1958, 1964) to the not precisely determined varieties of *Dactylioceras commune* (Sow.), mostly to the „b”, and less, to the „a” varieties.

Common features of those forms are: very similar type of ribs (simple, bifurcating, and intercalatory ones), high, and in apical parts arching, section of the last whorl, and identical degree of evolution of the shell. There occurs a slightly different quantity of primary and secondary ribs (*vide* Tab. 2), and a slightly narrower section of the last whorl in the Canadian specimens*.

Also the specimens attributed by Frebold (1958, 1960, 1964) to *Dactylioceras commune* (Sow.) var. „a” seem to be somewhat related to the forms from Spitsbergen. This is based on the proportion of the shell and the type of ribs. The relationship of Canadian forms to those from Spitsbergen (Hornsund area), and in the case of Frebold's „b” variety specific identity is very probable. It seems however, that the ascribing of these forms to *D. commune* (Sow.), even to its varieties, is not correct.

Dactylioceras commune (Sow.) (*vide* lectotype of this species — Arkell 1956, Pl. 33, Fig. 4a, b) differs from Canadian and Spitsbergen forms in subquadrate section of the whorl (even in adult stages), and in different type of ribs (bifurcate- and trifurcate ribs).

Dactylioceras toxophorus (Buckman 1927, T. A. VI, pp. 42—45, VII, Pl. 776, Figs. 1, 2) is very similar to *Dactylioceras* sp. nov. The main difference is the presence of small weak tubercles in the form from Barrington, that were not observed in Canadian and Spitsbergen specimens.

Of the other Buckman's species, *Dactylioceras arcus* differs in larger quantity of ribs (mainly on ventral whorls), and *Dactylioceras curvica* has also more ribs and is more evolute than *Dactylioceras* sp. nov.

Close relations can be observed between our form and *Dactylioceras holandrei* (d'Orbigny 1850—60, pp. 330—332, Pl. 105, Figs. 1, 2). Common features are: similarity of the cross-section of the last whorl and of general type of ribs. The differences are: the French species is

* The tendency to enlarging of whorl height in the course of growth, observed on Spitsbergen specimen, should be taken into account (the form from Prince Patrick Island is larger than the specimen from Hyrnefjellet).

more evolute and reveals larger quantity of ribs, that are decisive in the question of the diversity of these two species.

The specimen from Hyrnefjellet, and probably also the Canadian ones, have no exact equivalents in the up-to-date known fauna of Dactyloceratids. Signalling the possibility of creating of a new species the present author decided to hold up giving a new name to this form. The cause was the unsatisfactory state of preservation and unique occurrence of these forms.

Occurrence: The analysed forms have been found within the Toarcian phosphorite layer in southern part of Torell Land, Vestspitsbergen (Hornsund area) together with the other species of the *Haugia variabilis* Zone (+ *Grammoceras striatulum* Subzone ?). The position of this new form in a given ammonite zone is difficult to ascertain. Taking into account the similarities to other known species of *Dactyloceras* it is possible that it derives from higher zones of the Lower Toarcian (*Hildoceras bifrons* Zone).

Genus **Catacoeloceras** Buckman, 1923

Catacoeloceras sp.

(Pl. II, Fig. 1)

Material: A fragment of whorl preserved in form of phosphoritized internal mould, and impression of a part of internal whorl (S Fonnryggen). I.G. 949/II-4. The Museum of the State Geological Survey, Warszawa.

Coll.: K. Birkenmajer 1958.

Description: Specimen represented by a fragment of the last whorl with partly preserved opening. Ribs on terminal parts of the whorl rather solid, simple. Section of the last whorl — oval. The preceding whorl — as it can be reckoned from indistinct internal mould — strongly dorso-ventrally flattened (thicker than the next one, that covers it ?), with sharply turning ribs in the point accentuated with feeble tubercle. These ribs are dichotomically bifurcated on siphonal side.

Occurrence: S Fonnryggen, Torell Land, Vestspitsbergen, phosphorite layer (Toarcian).

Family **Hildoceratidae** Hyatt, 1867

Genus **Pseudolioceras** Buckman, 1889

Pseudolioceras cf. *compactile gradatum* Buckman, 1904

(Pl. II, Fig. 2; Tex-Fig. 4)

1889 *Pseudolioceras compactile* (Simps.); S. S. Buckman, *Inferior Ool. Amm.* (Suppl.), pp. 85—87 (*partim*), Pl. XX, Figs. 3, 4 (holotype)

1904 *Pseudolioceras gradatum* Buckm.; S. S. Buckman, *Inferior Ool. Amm.* (Suppl.), p. 158, Fig. 159

- ?1929 *Pseudolioceras* cf. *compactile* Simps.; H. Frebold, Schichtenfolge..., pp. 261—62 (*partim*)
 1957 *Pseudolioceras compactile* (Simps.); W. J. Arkell, Mesoz. Amm. (in Treatise on Inv. Pal.), p. 258, Fig. 290/4 a, b

Material: 2 specimens: Hyrnefjellet I.G. 949/II-5 (shell impression), S Fonnryggen I.G. 949/II-6 (internal mould). The Museum of the State Geological Survey, Warszawa.

Coll.: K. Birkenmajer 1958.

Dimensions (in mm.): — see Tab. 3.

Description: Shell discoidal with distinct, rather high keel. Strongly accentuated, falcoid ribs particularly well developed in the upper part of the side of shell. In the lower parts of the shell (up to ca 1/3 of height of side) instead of rib of this type, delicate, bent forward "striae" are observed (ca 20 striae per 12 ribs).

Umbilical wall broad, by larger diameters of the shell almost perpendicularly bent, descending step-like towards the centre of umbilicus. Umbilical wall better developed, but of shorter course, on the specimen from S Fonnryggen. Lower parts of lateral walls in cross-section become (in the course of shell growth) more and more parallel to each other.

Remarks: The main diagnostic features such as ornamentation type, outline of the cross-section of whorls, shape and size of umbilicus etc., make the analysed specimens similar to *Pseudolioceras gradatum* Buckman. Undoubtedly, the existing similarity to *Pseudolioceras compactile* (Simps.) frequently causes the coupling of these forms with the latter species (*vide* Arkell 1957). Slightly different cross-section of whorls, other type of umbilical cavity and — as it seems — also the difference in vertical distribution of both these species, gives a basis to the preservation of Buckman's species, though, in the present author's opinion, the above mentioned differences seem to be of subspecific order.

The identity of the described forms with some specimens from Kroghfjellet, Dunérbukta and Wimanfjellet, determined by Frebold (1929 b, 1930) as *Pseudolioceras* cf. *compactile* Simps. and *P. wuerttenbergeri* Denckm., also with some *Pseudolioceratids* from the "compactile" group from the Canadian Arctic Archipelago (Frebold 1958), though very pro-



Fig. 4

Pseudolioceras cf. *compactile gradatum* Buckm., Toarcian, Hyrnefjellet.
 Cross-section of the shell. I. G. 949/II-5. $\times 1.8$

Pseudolioceras compactile gradatum Buckm.

Table 3

Specimen	D	H	h	T	t	U	u	R	Remarks
Hyrnefjellet I. G. 949/II-5 (internal whorl)	ca 55.0	—	—	—	—	9.0	ca 0.16	—	at about 1/2 of whorl
	ca 41.0	21.3	ca 0.52	9.2	ca 0.22	7.0	ca 0.18	14(+3?)	
Fonnryggen I. G. 949/II-6 (internal whorl)	ca 32.5	17.7	ca 0.54	—	—	ca 5.7	ca 0.17	12/20*	at preserved part of whorl
	27.0	13.2	0.48	ca 7.0	ca 0.26	4.6	0.17	—	
S. S. Buckman 1889 Pl. XX, Figs. 3-4 (dimensions from drawing)	62.0	—	0.54	—	0.23	—	0.14	39(-3?)	

* Together with small details of the „striae” type

Pseudolioceras compactile compactile Buckm.

Table 4

Specimen	D	H	h	T	t	t ₁	U	u	R
Hyrnefjellet I. G. 949/II-7 (internal whorl)	44.0	22.0	0.50	ca 8.7*	ca 0.20*	ca 0.39	7.2	0.16	30(+3?)
	35.7	18.1	0.51	ca 7.5*	ca 0.21*	ca 0.41	6.2	0.16	—
S. S. Buckman 1911 Pl. XLI A (dimensions from the photograph)	< 40 mm (38.1?)**	—	? 0.53	—	? 0.25	—	—	0.19	ca 17 (1/2 of whorl)

* One side of specimen flattened

** *Fide* Buckman 1911 (original description by Simpson)

bable, was not univocally proved. Nevertheless, Frebold (1929) himself did not deny the possibility of the existence of the form *gradatum* of Buckman among the specimens examined by him.

Occurrence: The holotype *Pseudolioceras compactile gradatum* Buckm. is cited by Buckman from the "lilli" hemera (Haugian Age), i.e. according to the actually accepted stratigraphic subdivision (*vide* Dean, Donovan & Howarth 1961) from the lower parts of the *Haugia variabilis* Zone.

In the Hornsund area (Hyrnefjellet, S Fonnryggen) this form occurs together with *Pseudolioceras compactile compactile* (Simps.), *Dactylioceras boreum* sp. nov., *D.* sp. nov. and *Catacoeloceras* sp.

Pseudolioceras compactile compactile (Simpson, 1855)

(Pl. II, Figs. 3, 4; Text-Fig. 5)

- 1889 *Pseudolioceras compactile* (Simps.); S. S. Buckman, *Inferior Ool. Amm.* pp. 85—37, *partim* (non Pl. XX, Figs. 3—6)
- 1904 *Pseudolioceras compactile* (Simps.); S. S. Buckman (*op. cit.*), pp. 159—160
- 1911 *Pseudolioceras compactile* Simps.; S. S. Buckman, *Yorkshire Type Amm.* Fig. XLI A (? holotype), B (topotype), 41, 41b, c
- 1929 *Pseudolioceras* cf. *compactile* Simps.; H. Frebold, *Schichtenfolge d. Jura ...*, pp. 261—262, Pl. 2 (34), Figs. 1—4 (*partim* ?)
- ?1929 *Pseudolioceras* cf. *württenbergeri* Denckm.; H. Frebold (*op. cit.*), p. 262, Pl. 2 (34), Figs. 5, 5a
- 1934 *Pseudolioceras compactile* (Simps.); A. Rosenkrantz, *Lower Jurassic rocks*, Pl. 7, Fig. 3
- ?1958 *Pseudolioceras* aff. *compactile* (Simps.); H. Frebold, *Prince Patrick Island...*, pp. 5—6, Pl. III, Figs. 3, 4, 5a—c, 6 (*partim* ?)
- 1962 *Pseudolioceras compactile* (Simps.); M. K. Howarth, *Yorkshire Type Amm.*, p. 121

Material: 3 specimens (Hyrnefjellet). I.G. 949/II, 7—9. The Museum of the State Geological Survey, Warszawa.

Coll.: K. Birkenmajer 1958.

Dimensions (in mm.): — see Tab. 4.

Description: Shell discoidal, involute. Umbilical wall narrow, slightly obliquely bent towards the not so narrow and rather shallow umbilical cavity. Lower (slightly concave ?) part of the lateral wall broadens slightly up, in result of what the shell attains its maximum width approximately in the middle part of side. Outer part of the side gently narrowing toward the apex, in the perisiphonal part strongly bent, passes into narrow, low keel. Falcoid primary ribs rather thick in internal part of the side, thinning considerably in the periumbilical part, and disappearing completely in terminal parts of whorl where they are replaced by small, band-like details of the striae type. The latter much more (two or three times) numerous than the primary ribs,

run in the same direction, and continue in interrib areas (visible only in terminal parts of the last whorl).

Primary ribs in the perisiphonal part strongly bent, continué far toward the front. Bending of ribs in middle parts of the side very gentle, and the angle of bending in this part of the shell changes according to the growth of shell. Suture line not preserved.

Remarks: The relationship of the specimens from Hyrnefjellet to the holotype of *Pseudolioceras compactile compactile* (Simps.) — on the basis of ornamentation and shape of the shell — seems to be close, though the state of preservation does not allow to conclude this with certainty. The differences could be observed (broader umbilicus, less marked keel) only when one compares small specimens (and such are the forms from Spitsbergen) to large ones of *Pseudolioceras compactile compactile* (Simps.) — vide W. Janensch (1902, Pl. V, Figs. 5, 5a), A. Rosenkrantz (1934, Pl. 7, Fig. 3), S. S. Buckman (1911, Pl. XLI-B) etc.

It should be mentioned that the probable holotype of this species (*vide* synonymy) is represented by a small specimen of the diameter up to 40 mm., hence the convergence of specimens from Spitsbergen with the specimen illustrated by Buckman is of great importance. The described species differs from *Pseudolioceras compactile gradatum* in narrower whorl section, more oblique course of umbilical wall, slightly different course of ribs, and less prominent keel. The presence of band-like details of the striae type on outer parts of shell makes the Spitsbergen specimen more close to *Pseudolioceras lythense* (Y. et B.). The features that differ it from the last mentioned species are: smaller quantity of primary ribs and other whorl section.

Identification of specimens from Hyrnefjellet with those associated with *Pseudolioceras compactile* described by Frebold* from other areas of Vestspitsbergen (Kroghfjellet, Dunérbukta), is not absolutely sure,



Fig. 5

Pseudolioceras compactile compactile (Simps.), Toarcian, Hyrnefjellet. Cross-section of the shell (right side slightly flattened).

I. G. 949/II-7. \times ca 2

* This authors suggests now that the forms from Spitsbergen can be stratigraphically older than typical *P. compactile compactile* (Simps.) — vide last chapter of the present paper — and are only related to this group (*P. aff. compactile* — vide Frebold 1958).

nevertheless it seems, that this species occurs in the material of the last mentioned author.

Occurrence: The holotype of *Pseudolioceras compactile compactile* (Simps.) comes from the *Grammoceras thouarsense* Zone (*Grammoceras striatulum* Subzone). The species was observed also in older horizons (France, Germany and Spitsbergen — *Haugia variabilis* Zone). The occurrence of this species in the Hornsund area (Hyrnefjellet) together with other ammonites of the *Hildoceras bifrons* — and *Haugia variabilis* Zones, and simultaneous lack of stratigraphically younger forms can confirm this statement.

The specimens derive from the phosphorite layer that crops out on SE slope of Hyrnefjellet (Hornsund area).

Pseudolioceras sp. (form. juv.)

Several juvenile specimens of *Pseudolioceras* derive also from the same layer in the Hornsund area (S Fonnryggen, Hyrnefjellet). Their fragmentary state of preservation, and most frequently corroded shell surfaces, make the proper identification impossible.

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Janusz Kopik

UWAGI O KILKU AMONITACH TOARKU Z REJONU HORNSUNDU
(ZACHODNI SPITSBERGEN)

Streszczenie

W czasie eksploracji geologicznej terenów w otoczeniu fiordu Hornsund zostały odkryte przez uczestnika polskiej wyprawy na Spitsbergen (w r. 1958) prof. dr K. Birkenmajera — nieznane dotychczas na tym obszarze stanowiska z fauną amonitów toarku. Fauna ta została znaleziona w bardzo charakterystycznej i sygnalizowanej już z innych rejonów Spitsbergenu warstwie o niewielkiej miąższości, złożonej z kongrecji fosforytowych, stanowiącej osad transgredującego na tym obszarze górnego liasu.

Analiza fauny amonitów, stanowiących dla celów stratygraficznych najwartościowszy element zespołu, wykazała obecność następujących gatunków: *Pseudolioceras compactile compactile* (Simps.), *P. cf. compactile gradatum* Buckm., *Catacoeloceras* sp., *Dactylioceras boreum* sp. nov. i *Dactylioceras* sp. nov.

Porównanie pionowych zasięgów tej fauny dało podstawę do wyrażenia poglądu, że warstwa fosforytowa w rejonie Hornsundu obejmuje dwa poziomy amonitowe: *Hildoceras bifrons* i *Haugia variabilis* (+ ewentualnie podpoziom *Grammoceras striatulum*) i nosi cechy utworów o skróconym profilu stratygraficznym. Obecności w warstwie fosforytowej wyższych ogniw stratygraficznych (możliwość tę przyjmowali S. Z. Różycki 1936, 1959 i V. Bodylevskij 1929) amonity z rejonu Hornsundu nie potwierdziły. Nie wyklucza to oczywiście możliwości istnienia w tej warstwie innych ogniw stratygraficznych, jak również nie neguje możliwości diachronicznego powstawania warstwy fosforytowej w różnych częściach Spitsbergenu i w terenach sąsiednich.

W skład zespołu amonitowego z rejonu Hornsundu wchodzi gatunki znajdujące poprzednio, jak można sądzić z dotychczasowych danych, na obszarach Spitsbergenu (*Dactylioceras boreum* sp. nov.) lub innych terenach arktycznych (Arktyka Kanadyjska ? — *Dactylioceras* sp. nov.) oraz formy sygnalizowane zarówno z zachodniej Europy (Anglia, Francja, Niemcy i in.), jak i rejonów północnych (Kanada, Grenlandia, Spitsbergen). Do tych ostatnich należą *Pseudolioceras compactile compactile* (Simps.) oraz *P. cf. compactile gradatum* Buckm.

Plate (Tablica) I

Fig. 1

Dactylioceras boreum sp. nov. (holotype), a part of internal whorls (latex cast). Lower Toarcian, Hyrnefjellet, Hornsund, Vestspitsbergen, phosphorite layer. I.G. 949/II-1. Natural size.

Fig. 2

Dactylioceras boreum sp. nov. (holotype), the same specimen as in Fig. 1, frontal view. Natural size.

Fig. 3

Dactylioceras sp. nov. Lower Toarcian, Hyrnefjellet, Hornsund, Vestspitsbergen, phosphorite layer. I.G. 949/II-2. Natural size.

Fig. 4

Dactylioceras sp. nov., the same specimen as in Fig. 3, internal whorls — latex cast. I.G. 949 II-2. Natural size.

Phot. Danuta Oleksiak

(Photographic Laboratory, State Geological Survey, Warszawa)



Fig. 1



Fig. 2



Fig. 3

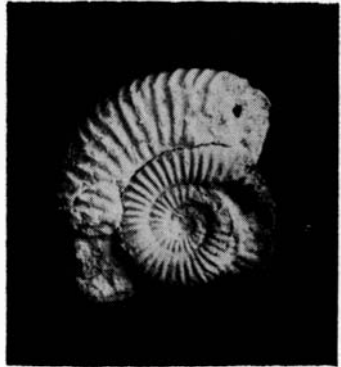


Fig. 4

J. KOPIK — Remarks on some Toarcian ammonites

Plate (Tablica) II

Fig. 1

Catacoeloceras sp. A fragment of internal whorl (latex cast), Toarcian, S. Fonnryggen, Torell Land, Vestspitsbergen, phosphorite layer. I.G. 949/II-4. Natural size.

Fig. 2

Pseudolioceras cf. *compactile gradatum* Buckm. (latex cast). Upper Toarcian, Hyrnefjellet, Hornsund, Vestspitsbergen, phosphorite layer. I.G. 949/II-5. Natural size.

Fig. 3

Pseudolioceras compactile compactile (Simps.), latex cast. Upper Toarcian, Hyrnefjellet, Hornsund, Vestspitsbergen, phosphorite layer. I.G. 949/II-7. Natural size.

Fig. 4

Pseudolioceras compactile compactile (Simps.). The same specimen as in Fig. 3 (internal mould of part of the last whorl). I.G. 949/II-7. Natural size.

Phot. Danuta Oleksiak

(Photographic Laboratory, State Geological Survey, Warszawa)

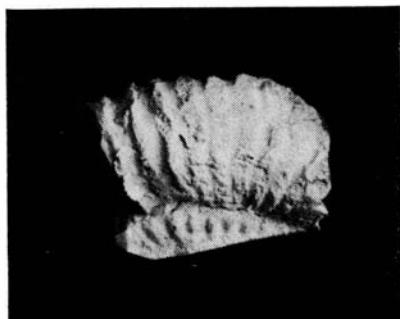


Fig. 1



Fig. 2

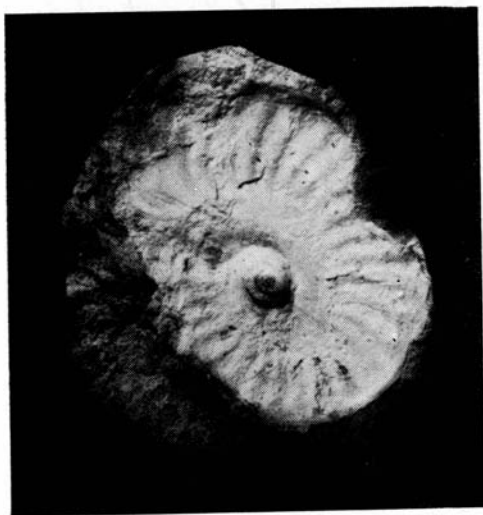


Fig. 3



Fig. 4