

NEW AMMONITES FROM THE BARREMIAN OF NORTH BULGARIA

by J. R. MANOLOV

ABSTRACT. In the Barremian of North Bulgaria are found some new ammonite genera and species; *Phyllopachyceras bontshevi* sp. nov. occurs in the Upper Barremian, *Costidiscus recticostatus* Zone. *Pseudothurmannia karakaschi* sp. nov. and *Holcodiscus caseyi* sp. nov. are found in the Lower Barremian. *Eoleptoceras* (*Tzankoviceras*) *tzankovi* gen. et sp. nov., *Eoleptoceras* (*Wrightites*) *wrighti* gen. et sp. nov., *E. (W.) parvulum kraptschenensis* gen. and subsp. nov., and *Hemibaculites zaharievae* sp. nov. occur in the Lower Barremian of North-western Bulgaria, in the *Crioceratites emericianus* Zone. *Eoleptoceras* gen. nov., with its subgenera *Tzankoviceras* subgen. nov. and *Wrightites* subgen. nov., represents one of the latest members of the morphological series of Leptoceratinae. The latter is a new subfamily of Ancyloceratidae, created for the unification of the early representatives of the family, and showing close relations with *Leptoceras*. *Acanthoptychoceras spinatocostatum* gen. et sp. nov., described from the Lower Barremian of North Bulgaria, is one of the earliest representatives of the Ancyloceratinae. It appears to be an intermediate link between *Acantholytoceras* Spath and *Lithancylus* Casey, and shows the origin of the Ancyloceratinae from a group of coarsely sculptured Ptychoceratidae.

THE genera and species described in this paper are of Barremian age and are based on new discoveries. This work is the result of the study of a rich collection of Barremian ammonites, collected by the author in North Bulgaria and recently prepared for publication.

My best thanks are due to Mr. C. W. Wright and Dr. R. Casey (Geological Survey of Great Britain) who kindly helped me to solve questions connected with some of the genera and species described below.

The type-specimens of the newly named species are kept in the State's Geological Museum, which is situated in the University of Sofia, in the author's collection. When mentioning the name of the Museum the abbreviation S.G.M. will be used.

Order AMMONOIDEA Zittel, 1884
Suborder PHYLLOCERATINA Arkell, 1950
Superfamily PHYLLOCERATAEAE Zittel, 1884
Family PHYLLOCERATIDAE Zittel, 1884
Subfamily PHYLLOCERATINAE Zittel, 1884
Genus PHYLLOPACHYCERAS Spath, 1925

Phyllopachyceras bontshevi sp. nov.

Plate 73, figs. 1-3; text-fig. 1a

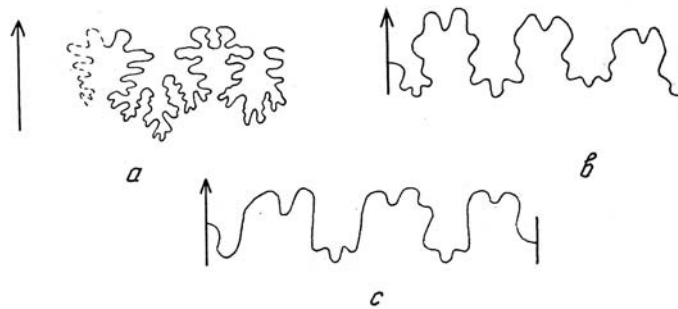
Holotype. S.G.M., No. Cr₁ 1, Upper Barremian, North Bulgaria (my Collection); paratype 1—S.G.M., No. Cr₁ 2, paratype 2—S.G.M., No. Cr₁ 3.

Material. I have named this species after my teacher Academician Prof. Dr. Ek. Bontshev. I possess five well-preserved specimens, two of which show the suture clearly.

Description. Very involute, rather inflated, with feeble ornamentation consisting of broad slightly projecting rounded ribs, which extend over the outer two-thirds of the

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whorl-height. The ribs are straight, divided by broad interspaces and bending sharply backward in the umbilical area where they disappear, so that a wide, smooth, rapidly expanding funnel-shaped area forms, which occupies the inner third of the whorl-height. Fine striae like prolongations of the ribs are observed here. The venter, as far as discernible on our specimens, is rounded and the ribs pass over it without interruption. Deep, narrow umbilicus. Suture-line moderately complex. Ventral saddle and lobe unknown. The first and second lateral saddles tetraphyllic, the first and second lateral lobes complex-triphyllic. The other saddles and lobes unknown.



TEXT-FIG. 1. External suture-lines of some new species; a, *Phyllopachyceras bontshevi* sp. nov. at 45 mm. diameter (holotype, S.G.M., No. Cr₁ 1, my Collection). b, *Eoleptoceras (Wrightites) wrighti* gen. et sp. nov. (holotype, S.G.M., No. Cr₁ 33, my Collection). c, *E. (W.) parvulum kraptschenensis* gen. et subsp. nov. (holotype, S.G.M., No. Cr₁ 30, my Collection).

Dimensions (given in millimetres; the figures in brackets give the dimensions as percentage of the diameter):

	Holotype (Pl. 73, fig. 1)	Paratype 1 (Pl. 73, fig. 2)	Paratype 2 (Pl. 73, fig. 3)
Diameter	64	34	41
Whorl-height	36 (0.56)	20 (0.58)	24 (0.58)
Whorl-thickness	?15 (0.23)	?	?10 (0.24)
Umbilicus	3 (0.05)	2.4 (0.07)	?

EXPLANATION OF PLATE 73

All figures are of natural size. Photo V. Makariev (Geol. Inst., Bulg. Acad. of Sci.).

Figs. 1-3. *Phyllopachyceras bontshevi* sp. nov.; Upper Barremian, zone of *Costidiscus recticostatus*, Bistrilitza, North-western Bulgaria. 1, Side view of holotype. 2, Side view of paratype 1. 3, Side view of paratype 2.

Figs. 4-6. *Hemibaculites zaharievae* sp. nov. Lower Barremian, zone of *Crioceratites emericanus*, Kraptshe, North-western Bulgaria. 4, Side view of holotype. 5, Ventral view of holotype. 6, Side view of a specimen from the same locality.

Figs. 7-8. *Eoleptoceras (Tzankoviceras) assimilis* (Uhlig); Lower Barremian, Mistrowitz, Silesia (Copy of Uhlig, 1883, pl. xxxii, fig. 9a-b). 7, Side view of holotype. 8, Suture of holotype (enlarged).

Fig. 9. *Pseudothurmannia karaschi* sp. nov., side view of holotype. Lower Barremian, Jablanitza, North Bulgaria.

Comparisons. Differs from *Phyllopachyceras infundibulum* (d'Orbigny) by lacking secondary ribs, the less prominent main ribs that bend backward, the wide funnel-shaped smooth area around the umbilicus and the suture.

Occurrence. *Phyllopachyceras bontshevi* sp. nov. was collected from the Upper Barremian marls of the gully near the school of the village of Bistrilitza, Mihailovgrad district (North-western Bulgaria) and was found with *Macroscaphites yvani* (Puzos), *Costidiscus recticostatus* (d'Orbigny), *Silesites seranonis* (d'Orbigny), *Phyllopachyceras infundibulum* (d'Orbigny), and others.

Distribution. Upper Barremian (*Costidiscus recticostatus* Zone).

Suborder LYTOCERATINA Hyatt, 1889
Superfamily ANCYLOCERATAEAE Meek, 1876
Family ANCYLOCERATIDAE Meek, 1876

Discussion. The definition and the subdivision of *Ancyloceratidae* into subfamilies has been revised lately. Casey (1960, p. 17) eliminates the subfamily Crioceratitinae from the Ancyloceratidae in which it was placed by Wright (1957, p. L208), and treats it as a separate family. He divides the Ancyloceratidae (Ancyloceratinae of Wright 1957) into two subfamilies, Ancyloceratinae s.s. and Helicancylinae (Helicancyllidae of Hyatt 1894—see Casey's footnote, 1960, p. 18) and takes out of the family the genera *Uhligia* Koenen, *Aspinoceras* Anderson, and *Dirrymoceras* Hyatt which he attaches to the Heteroceratidae. In this way he considerably narrows the family Ancyloceratidae. I agree, in this respect, with Casey (1960, pp. 17–19) but, in my opinion, the inclusion of *Leptoceras* Uhlig in the Helicancylinae (Casey, 1961, p. 76) is rather doubtful. The separation of the above-mentioned genus, together with *Eoleptoceras* gen. nov., in a new subfamily called the Leptoceratinae, seems more appropriate. Here also, in my opinion, must be included *Karsteniceras* Royo y Gomez and *Veleziceras* Wright, which show characters much closer to *Leptoceras* than to *Crioceratites*, and their inclusion in the Crioceratitidae seems very uncertain.

Subfamily ANCYLOCERATINAE Meek, 1876
Genus ACANTHOPTYCHOCERAS gen. nov.

Type-species. *Acanthoptychoceras spinatocostatum* gen. et sp. nov., Lower Barremian, North Bulgaria.

Generic characters. With straight, slowly increasing shafts, which are parallel but not touching; very sharply ribbed, main ribs spinous and simple secondary ribs. The main ribs high, excessively projecting like bars, with long spines. The section is elliptical, with greater width than height. The suture is unknown.

Remarks. *Acanthoptychoceras* is one of the earliest representatives of the Ancyloceratinae. In its type of coiling it resembles a *Ptychoceras* which is very highly ornamented. The existence of an initially spirally coiled part (as in *Ancyloceras*) is equally probable or not; my specimen cannot distinguish between the two possibilities. However, the difference between it and *Ancyloceras* is evident. In the latter the younger shaft of the hook is approximately as wide as the older shaft and is slightly arched inwards, while in *Acanthoptychoceras* it widens gradually, and is straight and parallel to the second shaft.

In its type of ribbing and the shape of its shell, it is an intermediate link between *Lithancylus* Casey and *Acantholytoceras* Spath (concerning *Acantholytoceras* see Casey's footnote 1, 1960, p. 16). While in the latter a considerable number (8–12) of well-expressed simple ribs come between the spinous main ribs, in *Acantholytoceras* the main ribs are strengthened, greatly projecting, and among them are only three to four weak simple ribs. In *Lithancylus* the intermediate ribs disappear and the distant main ribs only remain, having as have the above-mentioned genera, three rows of spinae on each side. The cross-section of *Acantholytoceras* is transversely elliptical, while in *Lithancylus* it is almost circular and in *Ancyloceras* it is longitudinally elliptical.

The discovery of *Acantholytoceras* comes to support Casey's opinion (1960, p. 16) about the origin of the Ancyloceratinae from an extreme group of coarsely sculptured Ptychoceratidae like the group of *Acantholytoceras alpinum* (d'Orbigny). I agree with Casey's opinion (1961, p. 91), that the Ptychoceratidae must be taken out of the Turrititaceae and be included in the Ancylocerataceae.

Distribution. Lower Barremian, Lovetsh district, North Bulgaria.

Acantholytoceras spinatocostatum gen. et sp. nov.

Plate 74, fig. 1; Plate 75, fig. 1; Plate 76, fig. 1; text-fig. 2

Holotype. S.G.M., No. Cr₁ 8, Lower Barremian, North Bulgaria (my Collection). I possess an incomplete but perfectly well-preserved specimen of this species.

Description. A very strongly ornamented Ptychoceratid consisting of two straight, slowly increasing shafts, running parallel to each other, not touching. The ornamentation consists of very prominent, thick, bar-like main ribs passing over the venter without interruption. Each main rib has six long spines, three on each side. The spines are distributed almost regularly, near the dorsal area, in the middle of the side and near the venter. The spines are long, with an almost round section, somewhat flattened on one side at the base where they are hollow; higher up, however, they become solid. They are 14–16 mm. long with a diameter of 5–6 mm. at the base and project at a slight angle from the ribs. Three or four secondary ribs are to be observed between the main ribs. They are low, broad, rounded, free of spines. All ribs (main and secondary) pass over the venter without interruption. The section is elliptical, with greater width than height. The suture is unknown.

Dimensions of the holotype (in millimeters):

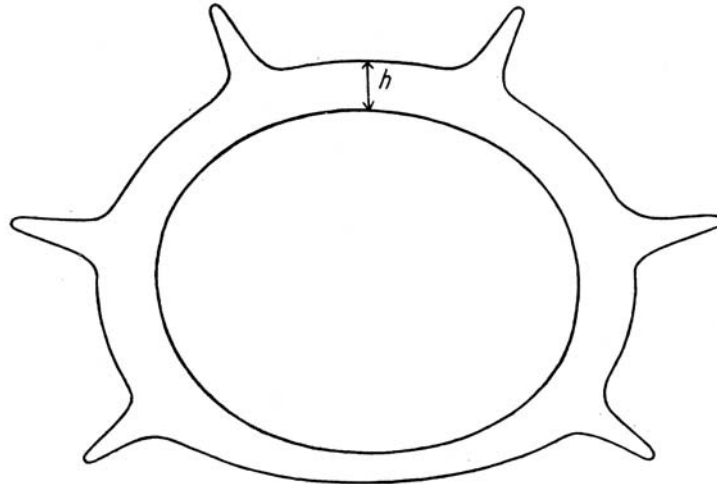
Length of the young shaft		160
Length of the adult shaft		139
Height of section of the young shaft (without tubercles)		34
Width of section of the young shaft	„	45
Height of section of the adult shaft	„	55
Width of section of the adult shaft	„	68
Height of main rib		9
Width of main rib		9

Remarks. *Acantholytoceras spinatocostatum* gen. et sp. nov. was collected from the marls which appear in alternation with limy sandstones in the lower part of the Lower Barremian (its thickness is about 350 metres) near the village of Jablanitza, about 10

metres above the beds with *Pseudothurmannia karakaschi* sp. nov., *Calliphylloceras ponticuli* (Rousseau), and *Barremites difficilis* (d'Orbigny).

Distribution. Lower Barremian.

Locality. The valley near the hamlet of Darvena Koshara, 2 km. to the west of the village of Jablanitza, Lovetsh district (North Bulgaria).



TEXT-FIG. 2. Cross-section of *Acanthoptychoceras spinatocostatum* gen. et sp. nov. (venter up); *h*, height of the main rib.

Subfamily LEPTOCERATINAE NOV.

Type genus. *Leptoceras* Uhlig, 1883, Barremian, Silesia.

Discussion. The creation of a new subfamily within the family Ancyloceratidae is necessary to bring together the early representatives of the family, which show close relations among themselves. As mentioned above, included here are *Leptoceras* Uhlig, *Karsteniceras* Royo y Gomez, *Veleziceras* Wright, and *Eoleptoceras* gen. nov.

These are ammonites of small size (very rarely more than 5 cm.). At the beginning, the shell of all of them is smooth but later on, little by little, it is covered with ribs. The ribs are simple, straight, equal, and non-tuberculate. The ammonites of the Leptoceratinae are defined with a simplified suture-line, with simple or slightly indented bifid saddles and uneven (trifid to finger-like) lobes with slight indentation.

The subfamily *Leptoceratinae* is limited in its distribution to the Barremian only. The beginning of the subfamily should be sought, probably, in the Upper Hauterivian in some representative of the Crioceratitidae, small in size and with simple ribs. The members of the subfamily originate from this prototype. Morphologically the earliest type is *Leptoceras*, followed on one side by *Eoleptoceras* (*Wrightites*), and *Eoleptoceras* (*Tzankoviceras*), and on the other hand by *Karsteniceras*. For the present,

the position of *Veleziceras* remains unexplained. Parallel with the simplifying of the sculpture went on the simplifying of the suture-line. This is most clearly shown in *Karsteniceras* where the lobes are quite simple and finger-like. The divergence of the genera has taken place probably very quickly, as in the Lower Barremian they already all exist together.

Representatives of the subfamily in the Hauterivian have not yet been found, but their establishment in the Upper Hauterivian must be expected, as in the Lower Barremian the subfamily is greatly developed. The presence of *Leptoceras* in the Berriasian (Nikolov 1960, p. 192) is rather doubtful, because this genus has not been established in the Valanginian and the Hauterivian. The presence of the same genus in the Lower Aptian is also uncertain, because the forms described by Drushchitz (1960, p. 295) from the Lower Aptian of the Northern Caucasus are poorly preserved and their application to *Leptoceras* is doubtful. All the remaining genera of the Leptoceratinae are known from the Barremian only, and mainly from the Lower Barremian. Towards the end of the Barremian the representatives of the subfamily disappear.

Genus EOLEPTOCERAS gen. nov.

Type species. Crioceras (Leptoceras) parvulum Uhlig, 1883, Lower Barremian, Silesia (Plate 75, fig. 3).

Generic characters. Small with Ancyloceratid coiling and slowly increasing shafts. The shell makes initially one to one and a half whorls around the protoconch and then forms an Ancyloceratid hook. The young shaft is initially smooth and later ornamented by dense simple non-tuberculate ribs, which become more spaced on the second shaft and pass over the venter without interruption. The section is elliptical to rounded quadrate. The suture is simple, with slightly indented bifid saddles and trifid lobes.

Remarks. *Leptoceras* was created by Uhlig [1883, pp. 259-60 (135-6)] as a subgeneric name in order to denote a group of ammonites, small in size, with a Crioceratid or Ancyloceratid coiling, which he included in *Crioceras* in a wide sense. Basse (1952, p. 609) and Luppov and Mikhailov (1958, p. 105) consider *Leptoceras* as an independent genus (with type species *Crioceras brunneri* Ooster) in the same sense as Uhlig takes it. Wright (1957, p. L211) points out as a type species of the genus, *Leptoceras pumilum* Uhlig which has typical Crioceratid coiling. In the diagnosis of the genus, however, Wright includes both types of coiling of the shell. Observations on rich material from the Lower Barremian of North-western Bulgaria prove that one species never appears with the two different types of the shell, i.e. it always keeps the type of coiling of its shell. This fact is especially pointed out by Uhlig (1883, p. 259). In my opinion, however,

EXPLANATION OF PLATE 74

All figures are of natural size. Photo V. Makariev.

Fig. 1. *Acanthoptychoceras spinatocostatum* gen. et sp. nov., side view of holotype; Lower Barremian, Jablanitza, North Bulgaria.

Fig. 2. *Pseudothurmannia karakaschi* sp. nov., side view of cast of the holotype; Lower Barremian, Jablanitza, North Bulgaria.

Figs. 3-4. *Eoleptoceras (Tzankoviceras) assimilis* (Uhlig); Lower Barremian, zone of *Crioceratites emericianus*, Kraptshene, North-western Bulgaria. 3, Side view of plesiotype, S.G.M., No. Cr₁ 9. 4, Side view of other specimen, S.G.M., No. Cr₁ 10.

the separation of the species with an Ancyloceratid coiling in a different genus appears to be necessary, and *Eoleptoceras* gen. nov. fills this requirement.

Eoleptoceras includes two groups of ammonites clearly distinguished by the morphology of their shell. In one of the groups the young shaft is characterized by a bending in its lower part and by forming an acute angle when it joins the old shaft. This group is enclosed under the subgeneric name of *Tzankoviceras*. In the second group, enclosed under the subgeneric name of *Wrightites*, the two shafts are slightly arched and run subparallel to each other, without forming an acute angle when joining at the hook.

Distribution. Lower Barremian, Mihailovgrad district, North-west Bulgaria (*Crioceratites emericianus* Zone).

Subgenus TZANKOVICERAS subgen. nov.

Type species. *Crioceras (Leptoceras) assimile* Uhlig, 1883, Lower Barremian, Silesia (Plate 73, figs. 7–8, Pl. 74, figs. 3–4).

Subgeneric characters. *Eoleptoceras* in which the young shaft proceeds initially straight or is slightly arched for some distance, after that forming a bend of a very characteristic obtuse angle in its lower part and then grows straight to the final acute angled hook. The section is rounded quadrate. The suture is simple with slightly indented trifid lobes and bifid saddles.

Remarks. *Tzankoviceras* is the latest known member of the morphological series of the Leptoceratinae. On one side, *Tzankoviceras* preserves the ancestor's characters of simple ribs, bifidity of the saddles and trifidity of the lobes. On the other hand, in its straight shafts it recalls some representatives of the Ptychoceratidae from which it differs in the characteristic bending of its shell and in the formation of an acute angle when the young shaft joins the old shaft.

Distribution. Lower Barremian, Mihailovgrad district, North-western Bulgaria (*Crioceratites emericianus* zone).

Eoleptoceras (Tzankoviceras) tzankovi gen. et sp. nov.

Plate 75, figs. 2, 7–8

Holotype. S.G.M., No. Cr₁ 12, Lower Barremian, North Bulgaria (my Collection), paratype 1—S.G.M., No. Cr₁ 13.

Material. I have named this species after my teacher Prof. Dr. V. Tzankov. I possess seven specimens, three very well preserved, but all laterally flattened.

Description. Small, with a well-defined bend at the beginning of the young shaft. The two shafts form an acute angle at the final hook. The shell makes one and a half whorls around the protoconch and proceeds slightly arched to a bend after which it straightens up to the hook. The second shaft is likewise straight and forms an acute angle with the first. The young shaft is initially smooth, but later has sharp dense somewhat oblique ribs. The ribs on the second shaft are sharper and more spaced. The suture is unknown.

Comparison. Resembles *Eoleptoceras (Tzankoviceras) assimilis* (Uhlig) but differs from it by the more acute angle at which the two shafts meet in the hook, 5° to 6° compared

with 14° to 15° in *E. (Tz.) assimilis*, and the angle of bend of the young shaft, about 145° compared with about 115° in *E. (Tz.) assimilis*.

Distribution. Lower Barremian (*Crioceratites emericianus* Zone).

Locality. The thin bedded marls in the base of the Barremian at the southern end of the village of Kraptshene and the same marls in the valley North-west of Vlashki vrah, 2 km. to the west of the village of Bistrilitza, Mihailovgrad district (North-west Bulgaria).

Subgenus WRIGHTITES subgen. nov.

Type species. *Crioceras (Leptoceras) parvulum* Uhlig, 1883 [p. 273 (149), pl. xxix, fig. 3a-c, non fig. 10], Lower Barremian, Silesia (Plate 75, figs. 3a-c, 11-12).

Subgeneric characters. *Eoleptoceras* in which the young shaft forms a slight arch, in which it differs from *Anahamulina*, where it is straight, and from *Tzankoviceras*, where it bends at an obtuse angle. The second shaft is slightly arched too, subparallel to the first and does not meet it at an angle in the final hook. The ribs are more prominent and more spaced on the older shaft. The section is elliptical, almost circular. The suture is simple, with slightly indented trifold lobes and bifid saddles.

Remarks. *Wrightites* is very closely related to *Tzankoviceras* in the form of its ribbing and its suture-line. Morphologically it represents an earlier degree of passing towards an uncoiled shell. It differs from *Leptoceras* in the greater indentation of the lobes as well as in the Ancyloceratid type of coiling of the shell.

Distribution. Lower Barremian, Mihailovgrad district, North-west Bulgaria (*Crioceratites emericianus* Zone).

EXPLANATION OF PLATE 75

All figures, except fig. 10, natural size. Photo V. Makariev.

Fig. 1. *Acanthoptychoceras spinatocostatum* gen. et sp. nov., ventral view of holotype; Lower Barremian, Jablanitza, North Bulgaria.

Fig. 2. *Eoleptoceras (Tzankoviceras) tzankovi* gen. et sp. nov., side view of holotype; Lower Barremian, zone of *Crioceratites emericianus*, Kraptshene, North-western Bulgaria.

Fig. 3. *Eoleptoceras (Wrightites) parvulum* (Uhlig); Lower Barremian, Wernsdorf, Silesia (Copy of Uhlig, 1883, pl. xxix, fig. 3). 3a, Side view of holotype. 3b, Ventral view of holotype. 3c, Suture of holotype (enlarged).

Figs. 4-6. *Eoleptoceras (Wrightites) parvulum kraptshenensis* gen. et subsp. nov.; Lower Barremian, zone of *Crioceratites emericianus*, Kraptshene, North-western Bulgaria. 4, 6, Side views of holotype. 5, Ventral view of holotype.

Figs. 7-8. *Eoleptoceras (Tzankoviceras) tzankovi* gen. et sp. nov. 7, Side view of an adult specimen; Lower Barremian (*Crioceratites emericianus* Zone), Kraptshene. 8, Side view of paratype 1; Lower Barremian (*Crioceratites emericianus* Zone), west of Bistrilitza, North-western Bulgaria.

Figs. 9-10. *Eoleptoceras (Wrightites) wrighti* gen. et sp. nov.; Lower Barremian, zone of *Crioceratites emericianus*, Kraptshene, North-western Bulgaria. 9, Side view (reconstructed) of holotype. 10, Side view of holotype ($\times 2$).

Figs. 11-12. *Eoleptoceras (Wrightites) parvulum* (Uhlig); Lower Barremian, zone of *Crioceratites emericianus*, Kraptshene, North-western Bulgaria. 11, Side view of pleseio-type, S.G.M., No. Gr₁ 19. 12, Side view of other specimen, S.G.M., No. Cr₁ 20.

Eoleptoceras (Wrightites) parvulum kraptschenensis gen. et subsp. nov.

Plate 75, figs. 4-6; text-fig. 1c

Holotype. S.G.M., No. Cr₁ 30, Lower Barremian, North Bulgaria (my Collection). I possess three specimens, one of which is perfectly preserved.

Description. Small in size with arched, slowly increasing shafts. Shell initially smooth, then ornamented by sharp simple oblique ribs passing over the dorsum and venter without interruption and having wide rounded interspaces. The ribs on the hook and older shaft are still more spaced. The section is elliptical, almost circular, somewhat higher than wide. The last suture is situated before the hook at a distance approximately equal to a quarter of the entire length of the shell. The suture is simple with trifold lobes and bifid saddles. The first lateral lobe is clearly trifold, the second is hardly perceptibly denticulate. The first and third lateral saddles are simply bifid, the second having a slight accessory inflection in its backward half.

Dimensions of the holotype (in millimeters):

Entire length	28
Height of section at the last suture	3.6
Width of section at the last suture	3.3

Comparison. Differs from *E. (W.) parvulum* (Uhlig) in its less denticulate suture, the almost circular section and the greater distance from the last suture to the hook.

Distribution. Lower Barremian (*Crioceratites emericianus* Zone).

Locality. The thin bedded marls in the base of the Barremian at the southern end of the village of Kraptschene, Mihailovgrad district (North-western Bulgaria).

Eoleptoceras (Wrightites) wrighti gen. et sp. nov.

Plate 75; figs. 9-10; text-fig. 1b

Holotype. S.G.M., No. Cr₁ 33, Lower Barremian, North Bulgaria (my Collection).

Material. I have named this species after Mr. C. W. Wright. I possess an incomplete but very well-preserved specimen.

Description. Small, of slow growth, ornamented by thin, slightly projecting oblique ribs, with wide interspaces between them, which pass without interruption over the dorsum and venter. At every three to five ribs the interspace becomes almost twice as wide, so that between every pair of wide interspaces there is a group of three to five ribs. The section is elliptical, almost circular. The suture is simple. The saddles are bifid, laterally complicated with shallow accessory lobes. The lobes are trifold.

Comparison. It differs from *E. (W.) parvulum* (Uhlig) in its suture, its almost circular section, and the less prominent ribs which form groups.

Distribution. Lower Barremian (*Crioceratites emericianus* Zone).

Locality. The thin-bedded marls in the base of the Barremian at the southern end of the village of Kraptschene, Mihailovgrad district (North-western Bulgaria).

Family HETEROCERATIDAE Hyatt, 1900

Genus HEMIBACULITES Hyatt, 1900

Hemibaculites saharievae sp. nov.

Plate 73, figs. 4-6

Holotype. S.G.M., No. Cr₁ 34, Lower Barremian, North Bulgaria (my Collection).*Material*. I have named this species after my teacher Dr. Kr. Sahariva. I possess twelve adult and four juvenile specimens of this species, all laterally flattened.*Description*. A toxicone of medium size, of rapidly expanding section, ornamented by simple, straight, rather prominent, rounded, oblique ribs, which pass without interruption over the dorsum and venter. Tubercles are not present. The section is elliptical, with greater height than width. The suture is unknown.*Dimensions of the holotype (in millimetres):*

Entire length	57
Height of section at the base	3.2
Width of section at the base	2.8

Comparison. Differs from *Hemibaculites obliquatus* (d'Orbigny) in its smaller size, rounder section, and type of ribbing; its ribs are denser and more prominent than in *H. obliquatus* and pass without interruption over the dorsum, where in *H. obliquatus* they are interrupted.*Distribution*. Lower Barremian (*Crioceratites emericianus* Zone).*Locality*. The thin-bedded marls in the base of the Barremian at the southern end of the village of Kraptshene, Mihailovgrad district (North-western Bulgaria).

Family HEMIHOPLITIDAE Spath, 1924

Genus PSEUDOTHURMANNIA Spath, 1923

Pseudothurmannia karakaschi sp. nov.

Plate 73, fig. 9; Plate 74, fig. 2.

1907 *Crioceras angulicostatum* d'Orbigny; Karakasch, p. 134, pl. xv, fig. 1 (*non* pl. xiv, figs. 4, 7 = *Pseudoth. picteti* Sarkar)*Holotype*. S.G.M., No. Cr₁ 50, Lower Barremian, North Bulgaria (my Collection).*Material*. I have named this species after the great Russian palaeontologist N. I. Karakasch, since he was the first to figure a specimen of this species. I possess a comparatively well-preserved specimen with an absolute likeness to the specimen figured by Karakasch (1907, pl. xv, fig. 1) and very different from the other species of this genus.

EXPLANATION OF PLATE 76

Photo V. Makariev.

Fig. 1. *Acanthoptychoceras spinatocostatum* gen. et sp. nov., side view of holotype (of natural size); Lower Barremian, Jablanitza, North Bulgaria.Figs. 2-5. *Holcodiscus caseyi* sp. nov.; Lower Barremian, south of Dobrevtzi, North Bulgaria. 2, Side view of holotype ($\times 1.5$). 3, Ventral view of holotype ($\times 1.5$). 4, Side view of holotype ($\times 3$). 5, Ventral view of holotype ($\times 3$).

Description. Medium in size, with evolute coiling, slowly increasing whorls, slightly overlapping to just touching, laterally flattened, with an almost rectangular section as in the other species of *Pseudothurmannia*. The ornamentation consists of main ribs, with elongated bullae in the umbilical area, bending slightly forwards towards the venter, some bifurcating; between the main ribs come three to four intercalatory ribs, some of which reach the umbilical area, while the rest spread only over the outer two-thirds of the whorl-height. The umbilical wall is steep, almost vertical. The ribbing, main and intercalatory, as far as discernible, passes without interruption over the venter. The suture is unknown.

<i>Dimensions (in millimeters)</i>	<i>Holotype</i> (Pl. 73, fig. 9)	<i>Karakasch's specimen</i> (1907, pl. xv, fig. 1)
Diameter	81	80
Whorl-height	28 (0.34)	27 (0.34)
Whorl-thickness	?	22 (0.27)
Umbilicus	32 (0.40)	32 (0.40)

Comparison. The species described differs from *Pseudothurmannia angulicostata* (d'Orbigny) in having more and longer intercalatory ribs, usually three to four, while in *P. angulicostata* they are one to two, occupying one-third of the whorl-side. It differs from *P. picteti* Sarkar by the greater number of the intercalatory ribs and the lack of ventral tubercles.

Remarks. The described species was collected from the marls of the alternation of limy sandstones and marls in the lowermost part of the Lower Barremian near the village of Jablanitza (see Manolov, 1960) together with *Calliphylloceras ponticuli* (Rousseau), *Barremites difficilis* (d'Orbigny), and others.

Distribution. Lower Barremian.

Locality. The Lower Barremian marls in the valley near the hamlet of Darvena Koshara, 2 km. to the west of the village of Jablanitza, Lovetsh district (North Bulgaria).

Suborder AMMONITINA Hyatt, 1889
 Superfamily DESMOCERATAEAE Zittel, 1895
 Family HOLCODISCIDAE Spath, 1924
 Genus HOLCODISCUS Uhlig, 1882

Holcodiscus caseyi sp. nov.

Plate 76, figs. 2-5

Holotype. S.G.M., No. Cr₁ 51, Lower Barremian, North Bulgaria (my Collection).

Material. I have named this species after Dr. R. Casey. I possess a perfectly well-preserved juvenile specimen of this species.

Description. Somewhat involute with slowly increasing, richly ornamented whorls of a rounded whorl-section, with greater height than width. Each whorl has seven constrictions at each side on which there is a thick rib, so that it resembles *Spitidiscus*. Each rib situated in front of the constrictions has a big elongated club-shaped bulla, that almost reaches the middle of the whorl. Four intercalatory ribs come between the

thicker ribs situated at the constrictions. They are straight, rounded, and bifurcate in the umbilical area at one-third of the whorl-height into two equally strong ribs. All ribs pass over the rounded venter without interruption. The suture is unknown.

Dimensions of the holotype (in millimeters)

Diameter	12.5
Whorl-height	4.3 (0.34)
Whorl-thickness	3.2 (0.26)
Umbilicus	3.8 (0.30)

Comparison. It resembles *Holcodiscus gastaldinus* (d'Orbigny) in the bifurcation of the ribs but differs in the slower growth of the whorls and the wider umbilicus, the constrictions with thicker ribs flanking them, the presence of umbilical bullae and the lack of ventral tubercles.

Remarks. *Holcodiscus caseyi* sp. nov. was collected from the middle part of the Lower Barremian, in the base of the marls with sphaerical weathering, above the beds with *Pseudothurmannia karakaschi* sp. nov. and *Acanthoptychoceras spinatocostatum* gen. et sp. nov.

Distribution. Lower Barremian.

Locality. The marls with sphaerical weathering, 1 km. to the south of the village of Dobrevtzi, Lovetsh district (North Bulgaria).

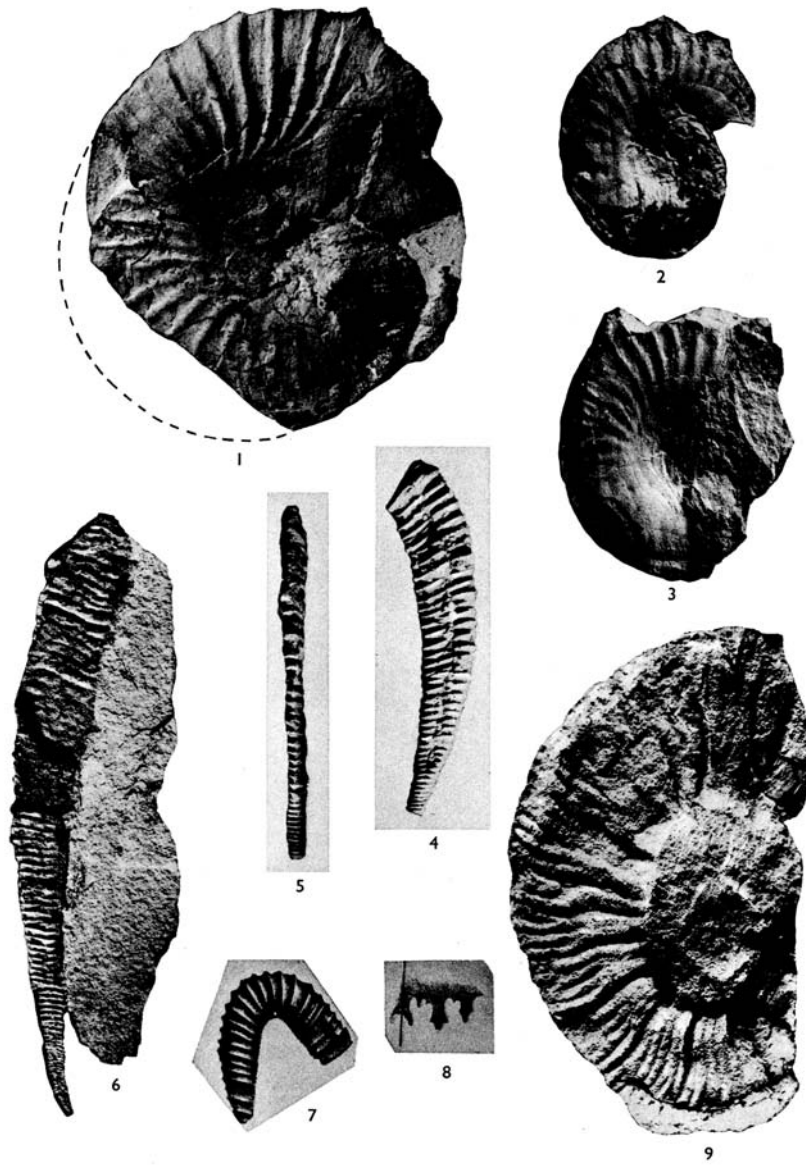
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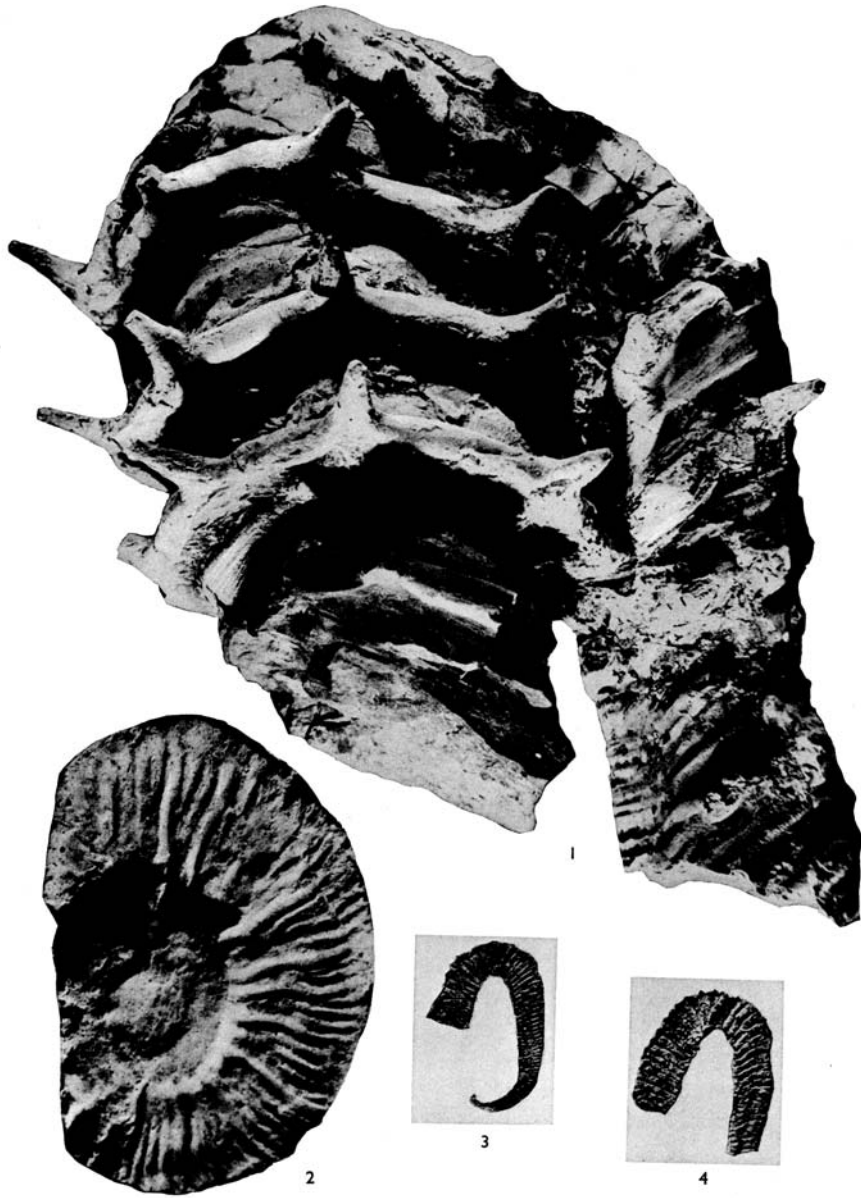
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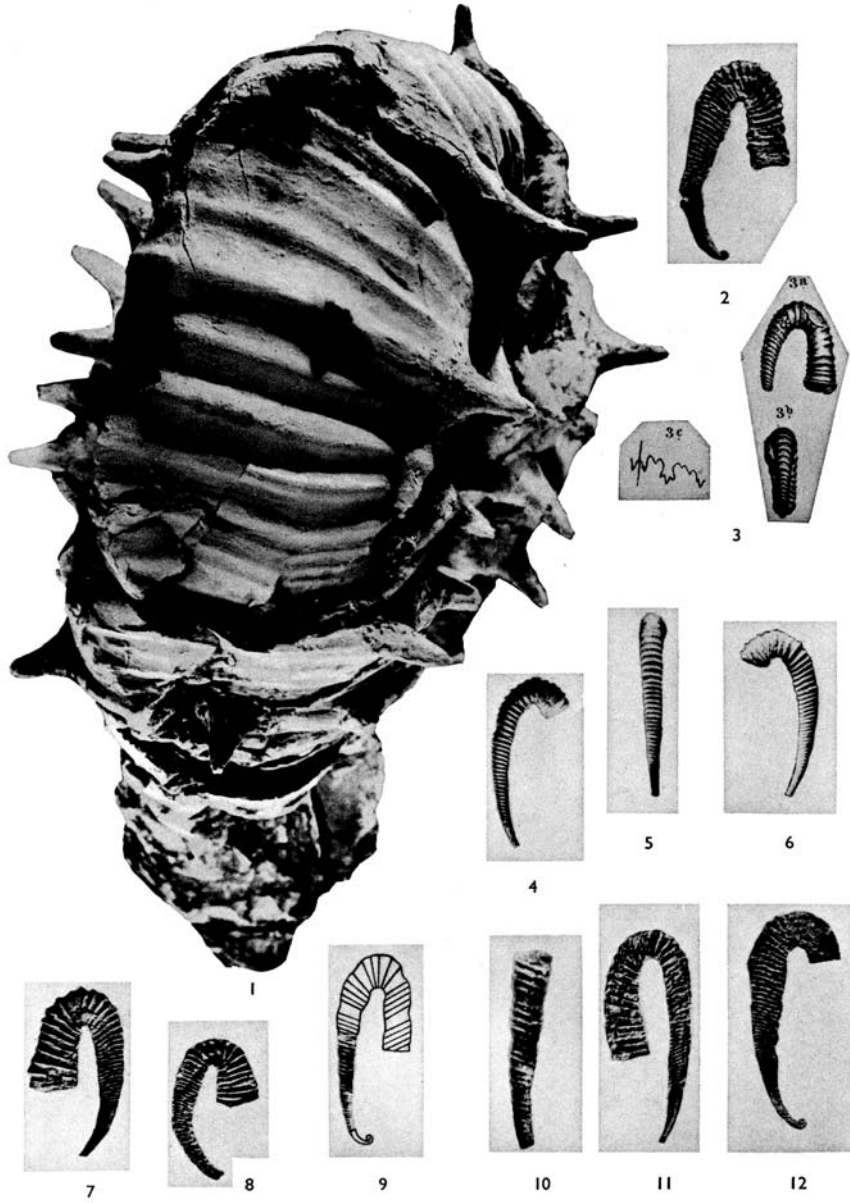
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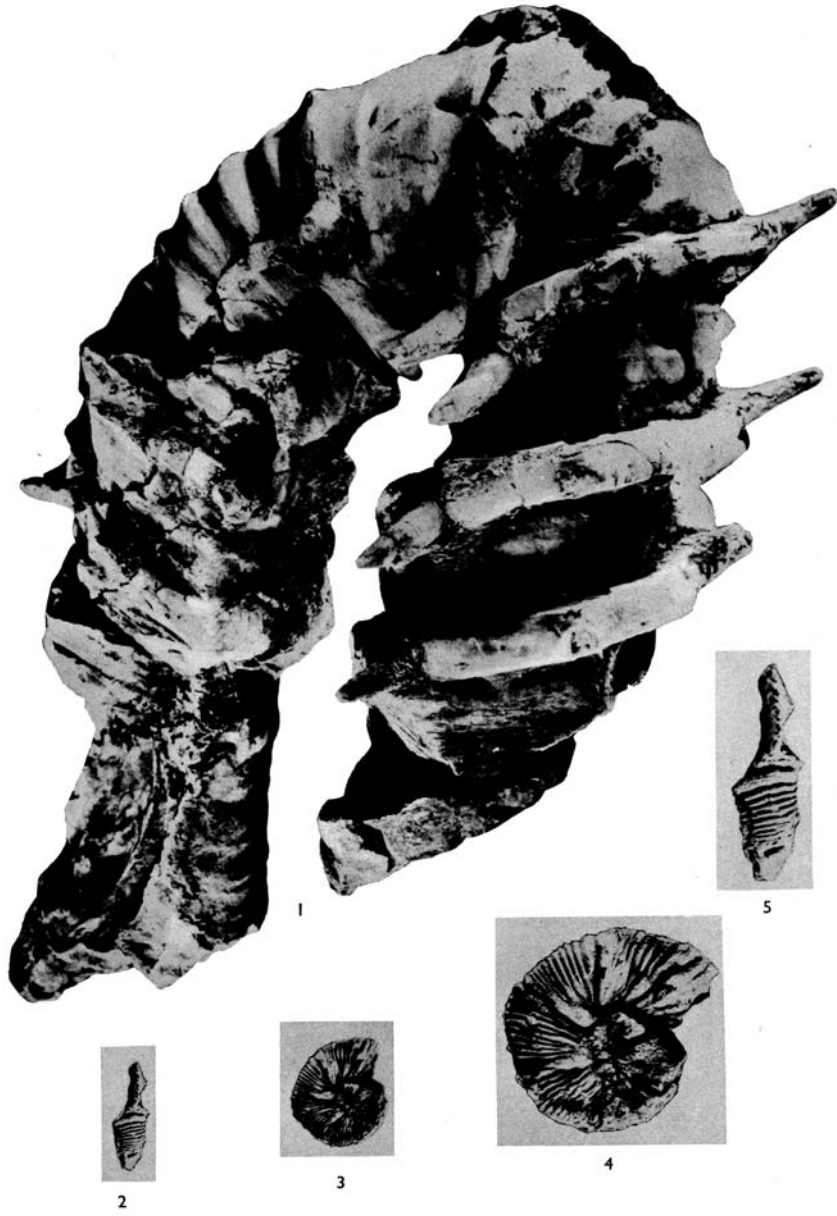
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