

On the Ammonite Genus *Busnardoites* Nikolov, 1966 (Berriasellidae, Lower Cretaceous)

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Т. Г. Николов — Об аммонитовом роде *Busnardoites* Nikolov, 1966 (Berriasellidae, нижний мел). Нижнемеловой аммонитовый род *Busnardoites* Nikolov, 1966 представлен четырьмя видами: *Busnardoites subcampylotoxus* sp. n., *B. campylotoxus* (Uhlig, 1902), *B. makariopolskii* sp. n., *B. desori* (Pictet & Camichel, 1860). Этот род распространен в сравнительно ограниченном ареале Средиземноморской провинции: в Юго-Восточной Франции, Швейцарии, Чехословакии, Болгарии, Крыму. Его стратиграфическое распространение связано с валанжинским ярусом. Первые представители рода появляются приблизительно в середине раннего валанжинского подвека (*Busnardoites subcampylotoxus*). Они дают начало двум филогенетическим ветвям: первая ветвь — диморфных планулат *B. subcampylotoxus*, *B. campylotoxus*; вторая ветвь — эксцентрических одностильных эллиптиконов — *B. makariopolskii*, *B. desori*.

Родительская форма *B. subcampylotoxus* продолжает существование и в позднем валанжине, параллельно с более поздними дочерними формами *Busnardoites*, но представлена она уже более редкими экземплярами.

Abstract. The Lower Cretaceous ammonite genus *Busnardoites* Nikolov, 1966 is represented by the following four species: *Busnardoites subcampylotoxus* sp. n., *B. campylotoxus* (Uhlig, 1902), *B. makariopolskii* sp. n., *B. desori* (Pictet & Camichel, 1860). This genus is distributed in a comparatively limited area of the Mediterranean Province: Southeast France, Switzerland, Czechoslovakia, Bulgaria and the Crimea. It occurs in the Valanginian Stage. The earliest representatives of the genus, *Busnardoites subcampylotoxus* sp. n., appeared about the middle of the Early Valanginian. From them originated two phylogenetic branches, a branch of dimorphic planulates. *B. subcampylotoxus* → *B. campylotoxus*; and another branch of excentric single-style ellipticones *B. makariopolskii* → *B. desori*.

The parent form *B. subcampylotoxus* persisted also, although in lesser numbers, throughout the Late Valanginian together with the later daughter forms of *Busnardoites*.

I. Introduction

The ammonites of the Berriasellidae (Spaeth, 1922) family have a planulate coiled and usually compressed conch. Some genera of this family very often exhibit homoeomorphic similarities during the various stages of the development of the conch. That is why the palaeontological studies of the

representatives of the family Berriasellidae usually encounter difficulties in establishing the morphological distinction between some of the genera. It was probably for this reason that a group of Valanginian Berriasellidae were for a long time given little consideration in the study of the ammonite palaeontology of the Lower Cretaceous. They have a fasciculate type of ornamentation, strongly developed umbilical tubercles, sinuous biplicate and intercalatory simple ribs. These ammonites have been regarded most often as belonging to either *Thurmanniceras* or *Sarasinella*.

In 1966, during the investigation of a large ammonite collection, originating mostly from certain fossil-rich sections of the Valanginian Stage in the Eastern Forebalkan (N i k o l o v, 1966), I identified and briefly characterized a new ammonite genus which I named *Busnardoites* in honour of the French palaeontologist R o b e r t B u s n a r d o.

Later I was able to collect more specimens of this genus and to find representatives of *Busnardoites* in the collections of a number of palaeontological museums in other countries (Leningrad, Moscow, Paris, Lyon, Grenoble, Genève, Lausanne). The new material made it possible to complement the original diagnosis of the genus and to tentatively outline the probable trends in the evolution of this interesting Lower Cretaceous ammonite genus.

It is my pleasant duty to express my gratitude to Dr. E. P o r e c k a y a (Leningrad University), Mr. R. B u s n a r d o (Université de Lyon), Mr. J. - P. T h i e u l o y (Université de Grenoble) and to Dr. E. L a n t e r n o (Muséum d'Histoire naturelle, Genève) for their cooperation in looking for representatives of the genus *Busnardoites* in the museum collections in their countries. I am also grateful to Mr. Z d r a v k o M o l l o v, Director of the Museum of the town of Elena, District of Veliko Târnovo, for the excellent conditions offered to me for research work on the ammonite genus *Busnardoites*.

The ammonite collection studied is kept in the Palaeontological Museum of the Sofia University.

II. General Remarks on the Genus *Busnardoites* (Distribution and Probable Phylogenetic Relationships)

For the present the representatives of the genus *Busnardoites* have been identified reliably in a comparatively restricted area of the Mediterranean Province: Southeastern France, Switzerland, Czechoslovakia, Bulgaria and the southern part of the European territory of the USSR (the Crimea).

Stratigraphically the genus *Busnardoites* belongs to the Valanginian Stage. The earliest representatives of the genus, *Busnardoites subcampylotoxus* sp. n., appear about the middle of the Early Valanginian. In their whorls these ammonites have a *Thurmanniceras*-like ornamentation. This fact is regarded as an indication of the early *Busnardoites* originating most probably as a side branch of *Thurmanniceras*. The evolution of *Busnardoites* probably proceeded as a recapitulation by way of palingenesis since the younger (inner) whorls of the early representatives of *Busnardoites* possess features characteristic of the adult representatives of some ancestral forms of *Thurmanniceras*.

It is interesting to note that the earliest *Busnardoites* in Bulgaria (*B. subcampylotoxus* sp. n.) were found in a rich ammonite population consisting

mostly of *Kilianella*, *Sarasinella*, *Neocomites* and very scarce *Thurmanniceras*. It might be assumed that, owing to a certain favourable geographic isolation, the earliest *Busnardoites subcampylotoxus* originated from an ancestral population of *Thurmanniceras thurmanni* (Pictet & Campiche) at the middle of the Early Valanginian.

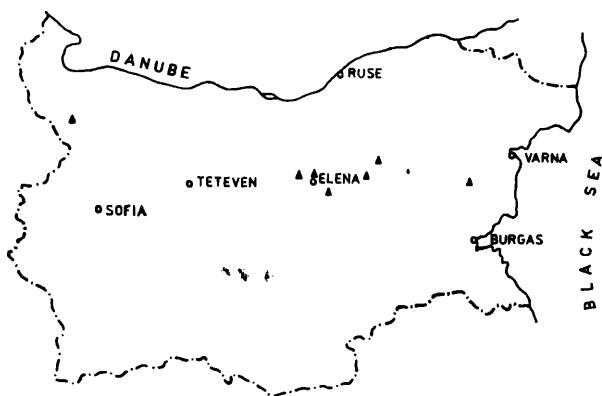


Fig. 1. Distribution of the genus *Busnardoites* in Bulgaria

At the beginning of the Late Valanginian, *Busnardoites subcampylotoxus* branches off into *Busnardoites campylotoxus* (Uhlirg), a species which, though closer to the type of the genus, still shows dimorphic features, such as a *Thurmanniceras*-like ornamentation in the inner whorls and a typical *Busnardoites* ornamentation in the last whorl.

During the Late Valanginian *Busnardoites subcampylotoxus* branches off producing *Busnardoites makariopolskii* which has a single-style ornamentation with marked umbilical tubercles in all stages of development of the conch. *B. makariopolskii* is the predecessor of *B. desori*.

The extremely abundant palaeontological material from the Valanginian in Bulgaria collected in a distinct biostratigraphic sequence suggests the following scheme of probable evolution of *Busnardoites*: (1) a first branch of dimorphic planulates *Busnardoites subcampylotoxus* → *Busnardoites campylotoxus*; and (2) a second branch originating from *B. subcampylotoxus* and developing into the excentric single-style ellipticones *Busnardoites makariopolskii* → *Busnardoites desori*.

There is a possible alternative, that of *Busnardoites makariopolskii* — *B. desori* branch descending from *B. campylotoxus*, which, however, seems less probable from the data available so far.

The parent form *Busnardoites subcampylotoxus* persists also, though in lesser numbers, throughout the Late Valanginian together with the later daughter forms of *Busnardoites*.

Taking into account the common features and the character of ornamentation of *Busnardoites* Nikolov, 1966, and *Karakaschiceras* Thieuloy, 1971, it might be assumed that it is *Busnardoites* (through *B. desori*) that is the ancestor of *Karakaschiceras*. This problem, however, needs a further elucidation through a study of the ontogeny of *Karakaschiceras*.

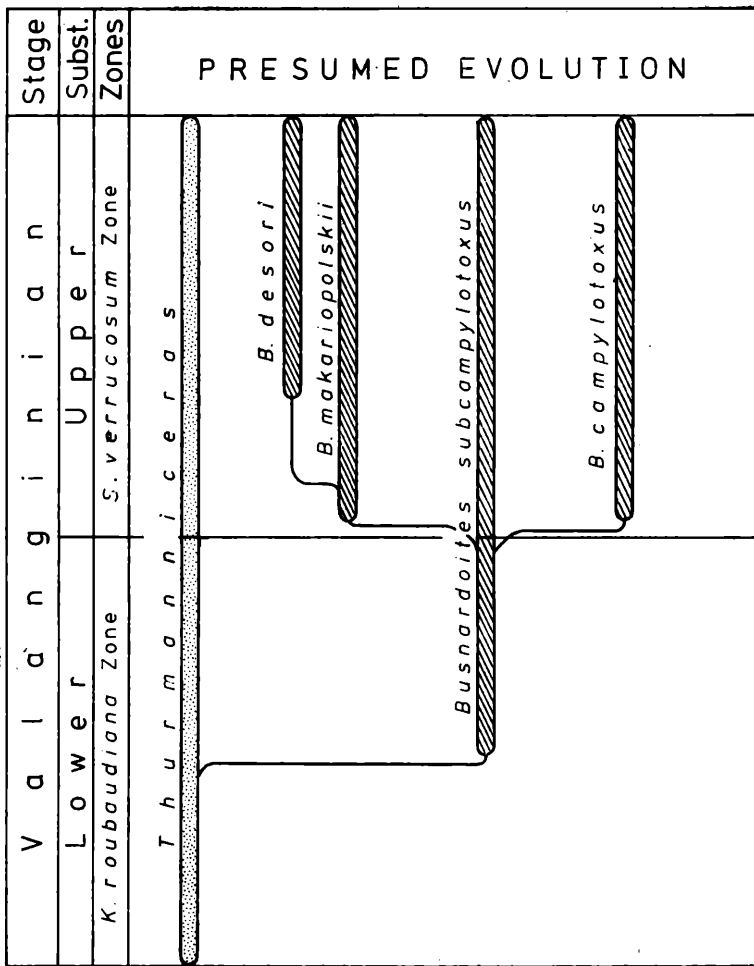


Fig. 2. Presumed phylogeny of *Busnardoites*

III. Systematic Description

Superfamily Perisphinctaceae Steinmann, 1890

Family Berriasellidae Spath, 1922

Subfamily Neocomitinae Spath, 1922

Genus *Busnardoites* Nikolov, 1966

Nomenclature. Type species by original designation is *Ammonites desori* Pictet & Campiche (1858—1860, pl. 33, fig. 4). Valanginian, Switzerland.

Diagnosis. Medium-sized ammonites, moderately compressed, with a medium wide to wide and shallow umbilicus. Planulates to excentric ellip-ticones.

The conch is regularly coiled and is richly ornamented by fasciculate ribs. The lateral walls bulge out slightly. The early representatives are dimorphic: with *Thurmanniceras*-like ornamentation in the inner whorls, strongly developed umbilical tubercles and fasciculate sinuous ribs in the last whorls. The later representatives have a single-style ornamentation with strongly developed umbilical tubercles and fasciculate sinuous ribs in all stages of development. The ribs start out in twos, rarely in threes and fours, from each umbilical tubercle and most of them bifurcate at about the middle of the lateral walls. There are also simple intercalatory ribs. The ribs end in the ventral wall where a distinct marginal edge and a narrow smooth band in the ventral wall itself are formed. Only in the second half of the last whorl and particularly towards its end the ribs are seen to run gradually across the ventral area but are rather reduced and indistinct. The whorl-section is compressed and rounded. The suture line as manifestly broken, with the 1st lateral lobe split into two.

Distribution. Mediterranean Province, Valanginian, from the middle of the *Kilianella roubaudiana* Zone to the top of the *Saynoceras verrucosum* Zone.

Busnardoites subcampylotoxus sp. n.

Pl. I, figs. 1, 1a — d; pl. II, figs. 1—3; pl. III, figs. 1—3

pars 1892. *Hoplites thurmanni* P i c t. et C a m p. sensu K i l i a n, p. 7, pl. V, fig. 3, non pl. III, figs. 1—3, pl. IIIbis, pl. IV.

Nomenclature. The name of the new species derives from its similarity to *B. campylotoxus* (U h l i g). The holotype is the original specimen shown on pl. I, fig. 1, 1a—d (Cr₁ 3101). It originates from the section near the village of Jovkovci, Elena area, District of Veliko Tărnovo (Eastern Forebalkan), Zlatarica Formation, uppermost packet, Lower Valanginian, *Kilianella roubaudiana* Zone, upper part. Paratypes: Cr₁ 3102 — section in the northern end of the Razpopovci quarter of the town of Elena, District of Veliko Tărnovo, Zlatarica Formation, top packet, Lower Valanginian, *Kilianella roubaudiana* Zone, upper part; Cr₁3103—3110 — section along the valley of the Stara Reka River, east of the village of Ćekanci, District of Tărgovište, Zlatarica Formation, top part, Upper Valanginian, *Saynoceras verrucosum* Zone.

Dimensions:	D	O	H	E	O/D	H/D	E/D	E/H
Holotype — Cr ₁ 3101	81	24	31	18	0.29	0.38	0.22	0.58
Paratype — Cr ₁ 3102	67	18	28	14	0.27	0.42	0.20	0.50
Paratype — Cr ₁ 3103	51	13	23	11	0.25	0.45	0.21	0.48

Description. The conch is fairly compressed, moderately evolute discocones of medium size. The whorls increase comparatively slowly, every whorl encircling 1/2 of the preceding one. The umbilicus is moderately wide and the umbilical walls are clearly outlined and steep. The whorl section is rounded-rectangular.

The ornamentation consists of well expressed ribs and tubercles. In the phragmocone the ornamentation is *Thurmanniceras*-like. It consists of slightly

sinuous fasciculate ribs starting out in bundles of two to four from the umbilical tubercles, which in the inner whorls are slightly bulla-like. With the development of the conch these bullae grow more marked and gradually turn into typical strong umbilical tubercles. Most often two ribs come out from each tubercle. In the phragmocone there are often cases of bundles of four ribs. At first they cross the walls without splitting but in the last whorl most of the ribs already bifurcate at about the middle of the lateral walls. There are also occasional single intercalatory ribs.

In the body chamber the ribs and tubercles are very strong. The ribs are distinctly sinuous, most of them regularly bifurcating at about the middle of the lateral walls. Some of the ribs remain simple.

The distinct grouping of the ribs in bundles is often emphasized by fine narrow constrictions observed most frequently in the phragmocone.

All ribs end at the marginal edge with a slight thickening. There is a narrow smooth band on the ventral wall.

The suture line is not well studied. Indistinct traces of a complex differentiated suture line are observed on the holotype.

C o m p a r i s o n s. The species described is closest to *Busnardoites campylotoxus* (U h l i g) from which it differs in its involute conch, smaller umbilicus and in the character of its ornamentation which contains many dichotomous ribs.

The species differs from *Busnardoites makariopolskii* sp. n. in the *Thurmannicer*-like ornamentation of the phragmocone and in the development of bullae in the inner whorls.

D i s t r i b u t i o n. This species has been found in the Valanginian sections in the Eastern Forebalkan. Stratigraphically it occurs in the upper part of the *Kilianella roubaudiana* Zone up to the top of the *Saynoceras verrucosum* Zone.

Busnardoites campylotoxus (U h l i g, 1902)

Pl. III, fig. 4; pl. IV, figs. 1, 2a, b; text-fig. 3.

1902. *Hoplites campylotoxus* n. sp. U h l i g, p. 49, pl. IV, figs. 1—3.

1907. *Thurmannia campyrotaxa* U h l i g sensu S a y n, p. 42, pl. V, fig. 12.

1932. *Thurmannia (Kilianella) campylotoxa* U h l i g sensu A c k e r m a n n, p. 42.
non 1933. *Thurmannia (Kilianella) campylotoxa* U h l i g sensu К о е н, p. 163, pl. II, fig. 11.

non 1934. *Thurmannia (Kilianella) campylotoxa* U h l i g sensu С т е ф а н о в, p. 214, pl. VI, figs. 10, 11.

non 1957. *Thurmannites campylotoxus* U h l i g sensu С а п у н о в, p. 158, pl. III, fig. 7.

1960. *Thurmannicer* *campylotoxum* (U h l i g) sensu Н и к о л о в, p. 178, pl. 19, figs. 1, 2; pl. 20, fig. 3.

1967. *Thurmannicer* *campylotoxum* (U h l i g) sensu Д и м и т р о в а, p. 110, pl. 47, fig. 6.

1975. *Thurmannicer* *campylotoxum* (U h l i g) sensu V a š i č e k, p. 90, pl. VI, figs. 1—3; text-fig. 5.

N o m e n c l a t u r e. The holotype is the original specimen of U h l i g specified by him (U h l i g, 1902, pl. 4, fig. 2) as "Typus der Art". V a š i č e k (1975, p. 90, pl. VI, fig. 1) incorrectly regards this specimen as a lectotype. It comes from the Valanginian, "Obere Tešin-Schichten", Dolní Lištná, Czechoslovakia. The holotype is kept in BSPHG, München, No. AS III 158.

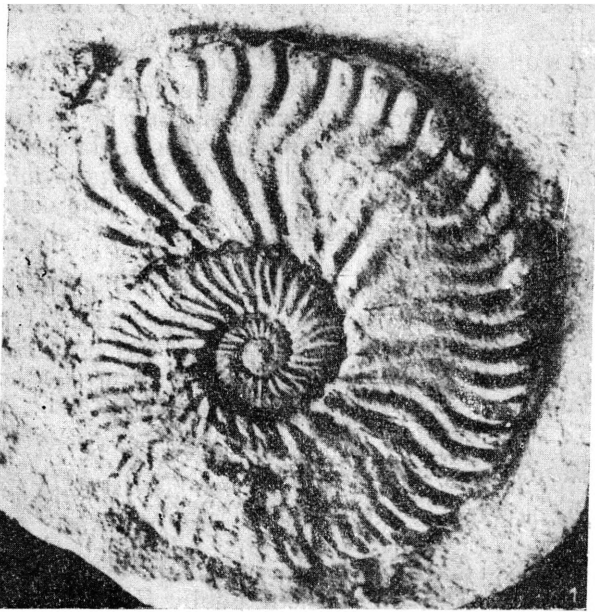


Fig. 3. *Busnardoites campylotoxus* (Uhlig). Holotype; reproduction of the original of Uhlig (1902, pl. 4, fig. 2) by Vašiček (1975, pl. 6, fig. 1). BSPHG — Bayerische Staatssammlung für Paläontologie und hist. Geologie in München, No. AS III 158

Dimensions:

	D	O	H	E	O/D	H/D	E/D	E/H
Holotype — AS III 158	70	25	30	21	0.36	0.42	0.30	0.70
Bulgarian specimen — Cr ₁ 28	100	33	40	18	0.33	0.40	0.18	0.55

Description. Medium-sized ammonites, fairly compressed, moderately evolute. The whorls increase comparatively slowly, every whorl encircling 1/3 of the previous one. The umbilicus is wide and shallow. The umbilical wall is well outlined. The whorl section is compressed.

The ornamentation of the conch consists of well marked, slightly sinuous ribs. In the phragmocone, the ribs are relatively thinner and are slightly bent. They usually grow out in pairs from a slightly expressed umbilical tubercle, one of the ribs frequently bifurcating at about the middle of the lateral walls. In this part of the shell there are also rare single ribs. The umbilical tubercles become gradually stronger and in the last whorl all ribs start out in twos or threes from a well expressed umbilical tubercle, some of them bifurcating in the lower half of the lateral walls. The body chamber occupies approximately one half of the last whorl. The ribs on it are fairly thick, some of them starting out as single ribs from a strong umbilical tubercle either remaining simple or bifurcating at about the middle of the lateral walls.

All ribs end with a characteristic tubercle-like thickening at the marginal edge, a narrow smooth band being formed on the ventral wall. At the

very end of the last whorl there is a slight tendency for the ribs to run across the ventral wall.

C o m p a r i s o n s. The species described is closest to *B. subcampylo-*
toxus from which it differs in its more evolute conch and in the character
of its ornamentation which contains many single simple ribs. It has also
some homeomorphic features with individual representatives of *Endemoceras*
(*E. amblygonium* (N e u m a y r & U h l i g) and *E. oxygonium* (N e u m a y r
& U h l i g), from which it differs in its more involute conch, the absence
of constrictions and the presence of regular umbilical tubercles, as well as
in its stratigraphic occurrence.

D i s t r i b u t i o n. The species described is known from the sub-
Mediterranean and the Mediterranean regions in Europe. It has been found
near Dolni Lištná, Czechoslovakia; at Les Combes near Sisteron, France;
and in the Forebalkan, Bulgaria. Its stratigraphic occurrence covers the upper
part of the Valanginian, the *Saynoceras verrucosum* Zone.

Busnardoites makariopolskii sp. n.

Pl. V, figs. 1a, b, 2a, b, 3; pl. VI, fig. 1

N o m e n c l a t u r e. I have named this species after I l a r i o n M a k a -
r i o p o l s k i (1812—1876), an eminent public figure from the Bulgarian
National Revival period, born in the town of Elena. The holotype is the
original specimen shown on pl. V, fig. 1a, b (Cr₁ 3112). It originates from the
section along the Mijkovci River northwest of the village of Ilakov Răt,
Elena area, District of Veliko Tărnovo, Hănevcı Formation, middle part,
Upper Valanginian, *Saynoceras verrucosum* Zone, lower part. Paratypes: Cr₁
3113 — same locality as the holotype. Cr₁ 3114—3117 — section along the
Stara Reka River, east of the village of Čekanci, District of Tărgovište,
Zlatarica Formation, upper part, Upper Valanginian, *Saynoceras verrucosum*
Zone. Cr₁ 3118 — section along the Belica river, north of the village of Vă-
glevcı, District of Veliko Tărnovo. Zlatarica Formation, upper part; Upper
Valanginian, *Saynoceras verrucosum* Zone.

D i m e n s i o n s:	D	O	H	E	O/D	H/D	E/D	E/H
Holotype — Cr ₁ 3112	81	23	30	15	0.28	0.37	0.18	0.50
Paratype — Cr ₁ 3113	67	19	25	17	0.28	0.37	0.25	0.68
Paratype — Cr ₁ 3117	71	23	28	17	0.32	0.39	0.24	0.60

D e s c r i p t i o n. Medium-sized ammonites, moderately compressed
and moderately evolute ellipticones. This appearance is emphasized by the
secondary deformation. The whorls gradually increase; each whorl encircles
about 1/2 of the preceding one. The lateral walls bulge out slightly. The whorl
section is rounded-elliptical, compressed. The body chamber occupies about
1/2 of the last whorl.

The ornamentation of the conch consists of strong fasciculate slightly
sinuous ribs and sharp conical umbilical tubercles. All ribs start out at the
umbilical edge from conical tubercles in bundles of two and three, most of
them bifurcating at about the middle of the lateral walls. There are also rare

single intercalatory ribs. The style of the phragmocone ornamentation is retained in the area of the body chamber as well, but the ribs and tubercles are much stronger there. The fasciculate nature of the ribbing is better expressed on the phragmocone where it is emphasized by some slightly widened areas between the ribs resembling constrictions.

All ribs end in the ventral area, a narrow smooth siphonal band being formed. Near the end of the last whorl there is a tendency for the ribs to run across the ventral area but with the relief much reduced.

The suture line is not well studied. In the holotype and in some paratypes there are indistinct traces of greatly differentiated and broken suture.

C o m p a r i s o n s. The species described is very close to *Busnardoites desori* (P i c t e t & C a m p i c h e), from which it differs in its weaker umbilical tubercles in the phragmocone area, in its more depressed whorl section and the stronger ribs.

The new species differs slightly from *Busnardoites subcampylotoxus* sp. n., and from *B. campylotoxus* (U h l i g) in the style of ornamentation of the phragmocone where the sharp umbilical tubercles are prominent, as well as in the character of the whorl section.

D i s t r i b u t i o n. The new species is found in the sections of the Hănevci and Zlatarica Formations along the valleys of the Mijkovci, Belica and Stara Reka Rivers (Eastern Forebalkan). It occurs in the Upper Valanginian, the *Saynoceras verrucosum* Zone. See above "Nomenclature".

Busnardoites desori (P i c t e t & C a m p i c h e, 1860)

Pl. VI, figs. 2a, b; text-fig. 4 a, b

1860. *Ammonites Desori* P i c t e t et C a m p i c h e, p. 246, pl. 33, fig. 4.

non 1889. *Hoplites* cf. *Desori* P i c t. sensu K a r a k a s c h, p. 437, pl. 2, fig. 1—6
[-*Karakaschiceras karakaschi* (U h l i g)].

1902. *Hoplites* cf. *Desori* P i c t e t et C a m p i c h e sensu U h l i g, p. 62.

1906. *Hoplites Desori* P i c t e t et C a m p i c h e sensu B a u m b e r g e r, p. 62.

N o m e n c l a t u r e. The holotype is the original specimen from the collection of C a m p i c h e figured by P i c t e t & C a m p i c h e (1858—1860, pl. 33, fig. 4). It originates from "Calcaire roux", Upper Valanginian near Auberson, Sainte-Croix, Switzerland. The holotype is kept in Musée géologique de Lausanne, Switzerland, as No. 17208. I am in possession of a plaster cast of the original, which is kept in the Palaeontological Museum at the Sofia University as No. Cr₁ 3119.

D i m e n s i o n s: D O H E O/D H/D E/D E/H

Holotype — 17208 86 25 37 23 0.29 0.43 0.28 0.62

N o t e. The dimensions given in the paper of P i c t e t & C a m p i c h e are not precisely taken.

D e s c r i p t i o n. Fairly compressed, moderately involute ellipticones of medium size. The whorls increase slowly, each of them encircling about 2/3 of the previous one. The lateral walls are slightly convex along the outer side of the whorls. Moderately wide umbilicus. The whorl section is rounded-elliptical, compressed.

The ornamentation of the conch consists of relief sinuous fasciculate ribs and tubercles. In the inner whorls there are protruding sharp conical

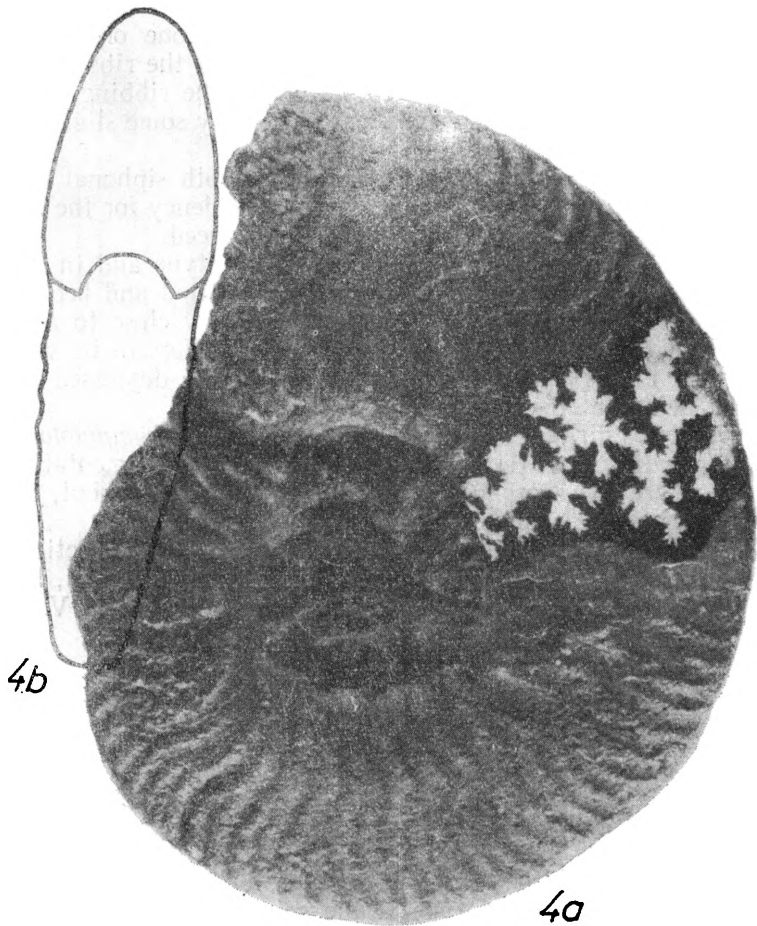


Fig. 4a, b. *Busnardoites desori* (Pictet & Campiche). Holotype; photo of the original specimen of Campiche (Pictet & Campiche, 1858—1860, pl. 33, fig. 4). Geol. Mus. Lausanne, No. 17208. Fig. 4a is slightly enlarged for a better view on the sutures

tubercles, giving rise to 2 or 3 ribs. In the last whorl, these tubercles give rise to 2, infrequently 3 ribs, one of which bifurcates at about the middle of the wall so that three ribs correspond to each umbilical tubercle in the outer end. There are cases when both ribs, starting as single ribs from the umbilical tubercle, bifurcate at about the middle of the wall. All ribs in the last whorl are slightly sinuous, with the umbilical tubercles becoming gradually lower with the uncoiling of the spiral.

On the ventral wall the ribs end and a narrow smooth band is formed.

Comparisons. The species described is closest to *Busnardoites makariopolskii*, from which it differs in its more marked conical umbilical tubercles in the inner whorls and in the lower relief of the ribs.

Busnardoites desori (Pictet & Campiche, 1860) has some homeomorphic features with *Sarasinella? schardti* (Bamberger, 1906) but dif-

fers slightly in the absence of constrictions and in the more elliptical whorl section.

R e m a r k s. When examining the collections of Lower Cretaceous ammonites in the Palaeontological Museum at the Grenoble University, France, I found two specimens¹ identified as *Sarasinella* aff. *desori* (P i c t e t & C a m p i c h e). In fact, they are specimens from the collection of E. R o c h (1930) from Morocco described by him as "*Leopoldia Inostranzewi* K a r a k a s c h" (R o c h, 1930, p. 311, No 43). They originate from Zaouia Ifard, the Amsitten locality, Morocco. It seems to me that these specimens do not belong to *Busnardoites desori*. The smaller specimen (ID 1638) belongs to *Karakaschicerias quadristriangulatum* (Sayn, 1907), and the larger one (ID 1639) is most probably *Sarasinella?* *schardti* (B a u m b e r g e r, 1906).

D i s t r i b u t i o n. *B. desori* is known from the Mediterranean and sub-Mediterranean regions in Europe — Switzerland, Czechoslovakia, and can probably be found in Bulgaria and the Crimea. Stratigraphically, it belongs to the Upper Valanginian, the *Saynoceras verrucosum* Zone.

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¹Through the courtesy of my colleague J.-P. Thieuloy from the Grenoble University I have plaster casts of these specimens,

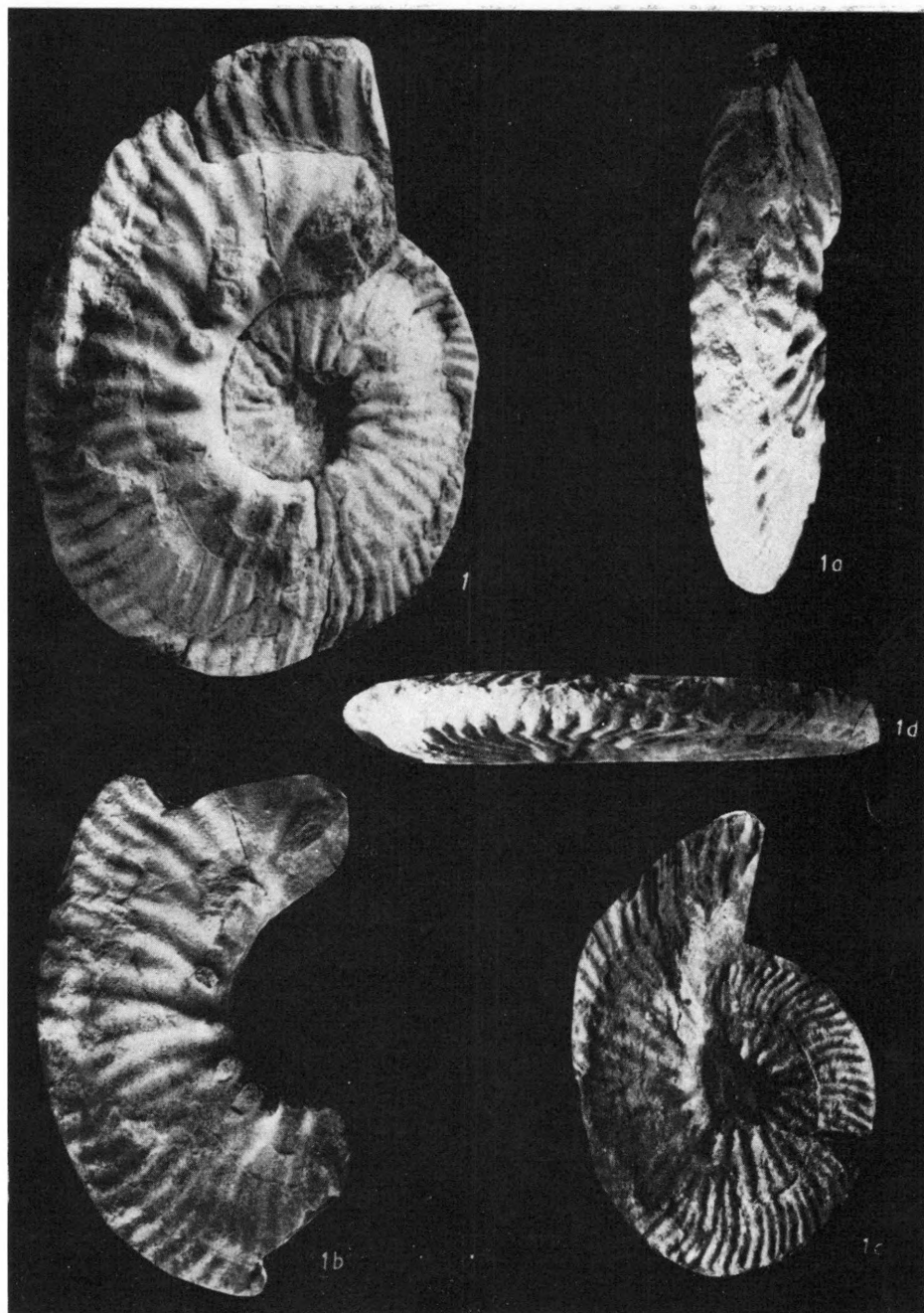
EXPLANATION OF PLATE I

Fig. 1. *Busnardoites subcampylotoxus* sp. n., holotype. Section along the Veselina River in the northern end of the village of Jovkovci, Elena area, District of Veliko Tŕrnovo. Zlatarica Formation, uppermost packet; Lower Valanginian, *Kilianella roubaudiana*, Zone, upper part. Pal. Mus. Univ. Sofia, Cr₁ 3101.

1a, b, c, d. The same specimen broken into fragments to show the development of the ornamentation and the character of the ventral area: 1a — view of the ventral area in the second half of the last whorl; 1b — typical ornamentation in the second half of the last whorl; 1c — *Thurmanniceras*-like ornamentation in the inner whorls with the first stages of a fasciculate type of ribbing and umbilical tubercles; 1d — view of the ventral area in the first half of the last whorl

All specimens are shown in their natural size except for 1d which is slightly enlarged;
Photo — E. D j o n d j o u r o v a

PLATE I



Geologica Balcanica, 7. 4

Todor G. Nikolov — On the genus *Busnardoites* Nikolov, 1966 (Berriasellidae, Lower Cretaceous)

EXPLANATION OF PLATE II

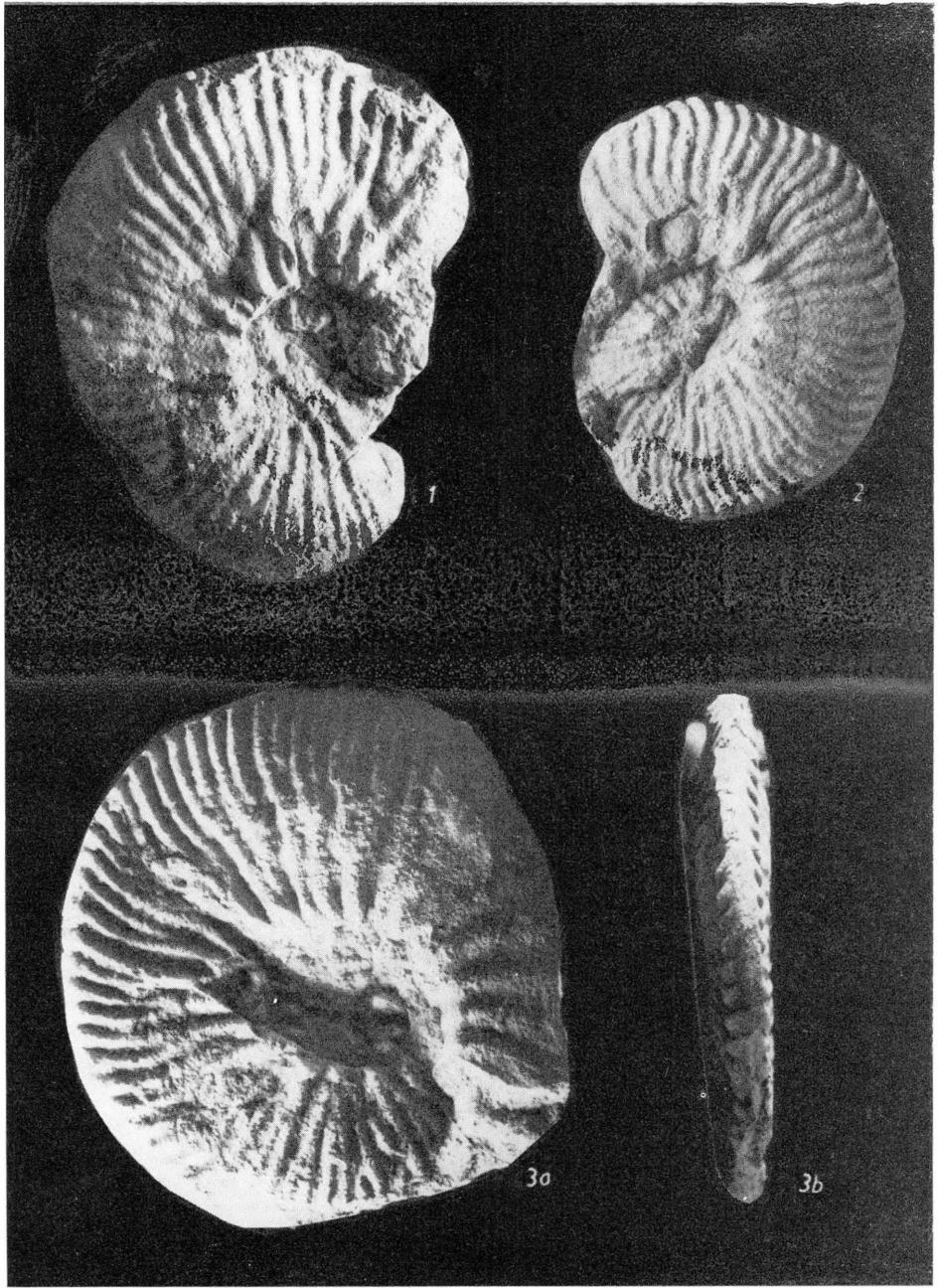
Fig. 1. *Busnardoites subcampylotoxus* sp. n., paratype. Section along the Stara Reka River, east of the village of Čekanci, District of Târgoviște. Zlatarica Formation, upper part; Upper Valanginian. *Saynoceras verrucosum* Zone. Pal. Mus. Univ. Sofia, Cr₁ 3103

Fig. 2. *Busnardoites subcampylotoxus* sp. n., paratype. Ibid. Pal. Mus. Univ. Sofia, Cr₁ 3104

Figs. 3a, b. *Busnardoites subcampylotoxus* sp. n., paratype. Section in the northern end of the Razpopovci quarter of the town of Elena, District of Veliko Târnovo. Zlatarica Formation, uppermost packet; Lower Valanginian, *Kilianella roubaudiana* Zone, upper part. Pal. Mus. Univ. Sofia, Cr₁ 3102

All specimens are shown in their natural size; Photo — E. D j o n d j o u r o v a

PLATE II



EXPLANATION OF PLATE III

Figs. 1a, b, *Busnardoites subcampylotoxus* sp. n., paratype. Section along the Stara Reka River, east of the village of Čekanci, District of Târgoviște. Zlatarica Formation, upper part; Upper Valanginian, *Saynoceras verrucosum* Zone. Pal. Mus. Univ. Sofia, Cr₁ 3105

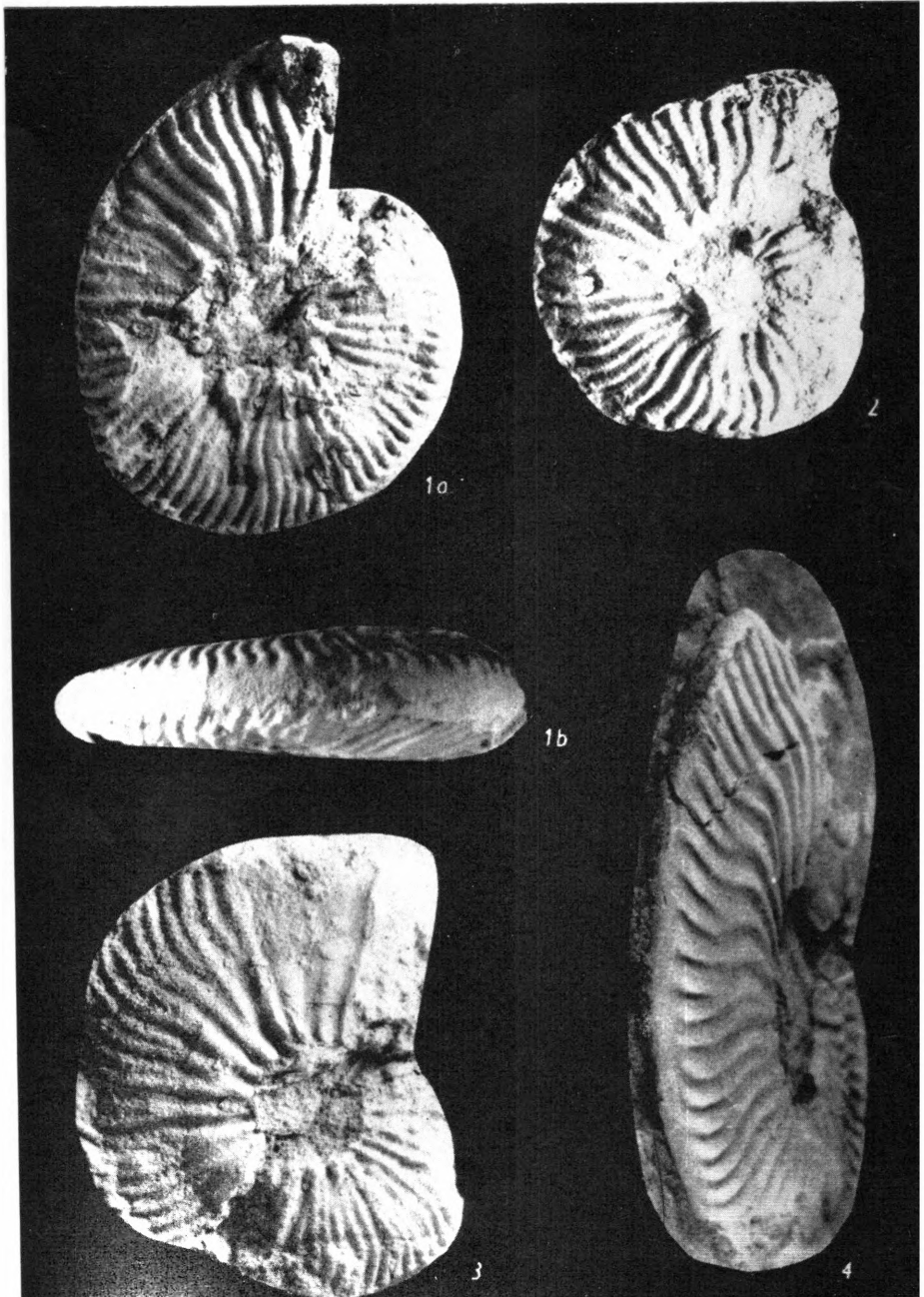
Fig. 2. *Busnardoites subcampylotoxus* sp. n., paratype. Ibid. Pal. Mus. Univ. Sofia, Cr₁ 3106

Fig. 3. *Busnardoites subcampylotoxus* sp. n., paratype. Ibid. Pal. Mus. Univ. Sofia, Cr₁ 3107

Fig. 4. *Busnardoites campylotoxus* (Uhlirg). View of the ventral area. Section along the Belica River near the village of Văgleci, District of Veliko Târnovo. Zlatarica Formation, upper part; Upper Valanginian, *Saynoceras verrucosum* Zone. Specimen of N i k o l o v (1960, pl. XIX, fig. 2). Pal. Mus. Univ. Sofia, Cr₁ 28

All specimens are shown in their natural size; Photo — E. D j o n d j o u r o v a

PLATE III



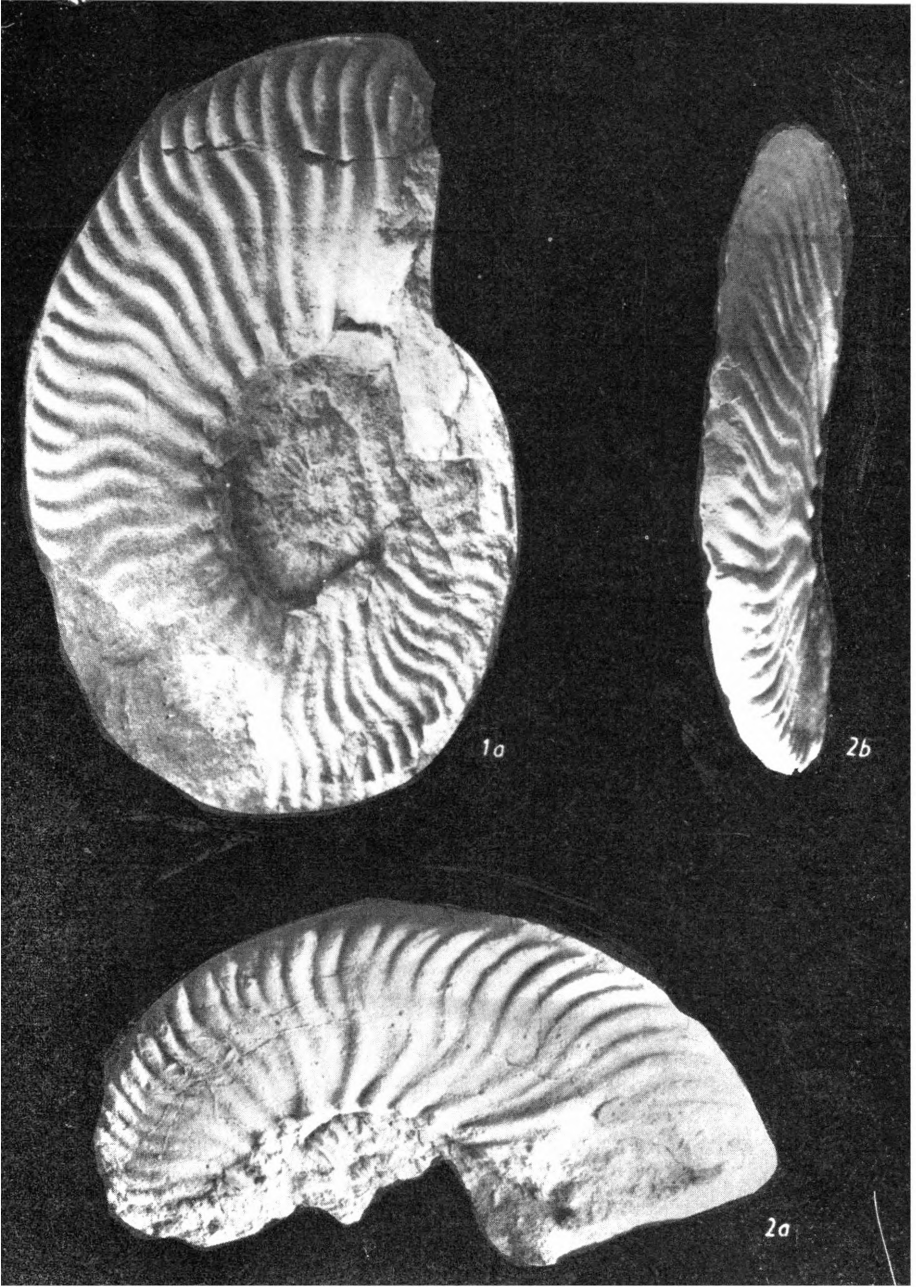
EXPLANATION OF PLATE IV

Fig. 1. *Busnardoites campylotoxus* (Uhlirg). Section along the Belica River near the village of Văglevci, District of Veliko Tărnovo. Zlatarica Formation, upper part; Upper Valanginian, *Saynoceras verrucosum* Zone. Specimen of Nikolov (1960, pl. XIX, fig. 2). Pal. Mus. Univ. Sofia, Cr₁ 28

Figs. 2a, b. *Busnardoites campylotoxus* (Uhlirg). Section along the Stara Reka River, east of the village of Čekanci, District of Tărgovište. Zlatarica Formation, upper part; Upper Valanginian, *Saynoceras verrucosum* Zone. Pal. Mus. Univ. Sofia, Cr₁ 3111

All specimens are shown in their natural size; Photo — E. Djondjorova

PLATE IV



1a

2b

2a

EXPLANATION OF PLATE V

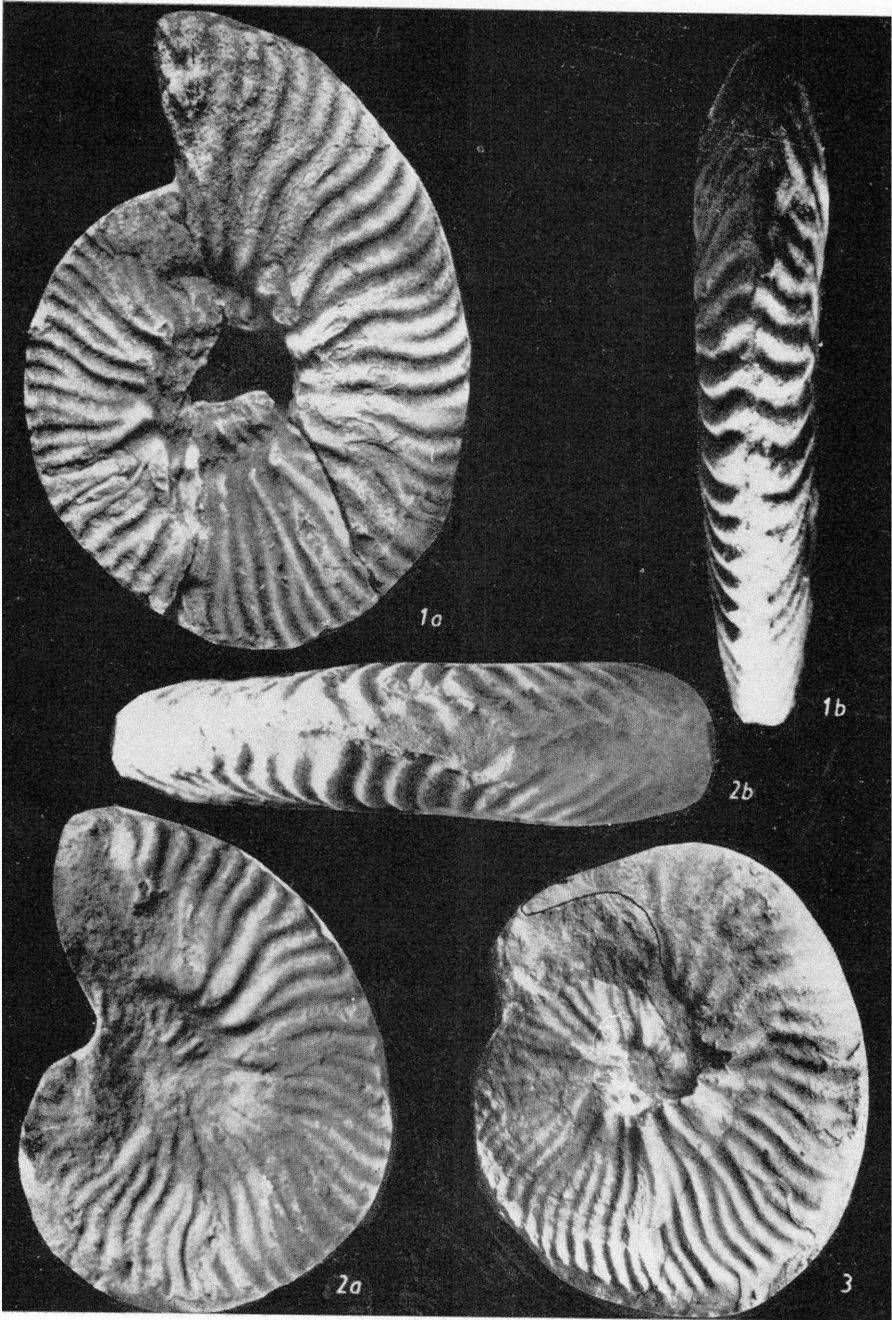
Figs. 1a, b. *Busnardoites makariopolskii* sp. n., holotype. Section along the Mijkovci River, northwest of the village of Ilakov Rät, Elena area, District of Veliko Tärnovö. Hänevci Formation, middle part; Upper Valanginian, *Saynoceras verrucosum* Zone, lower part. The sharp line in the ventral area is caused by a secondary deformation. Pal. Mus. Univ. Sofia, Cr₁ 3112

Figs. 2a, b. *Busnardoites makariopolskii* sp. n., paratype. Ibid. Pal. Mus. Univ. Sofia, Cr₁ 3113

Fig. 3. *Busnardoites makariopolskii* sp. n., paratype. Section along the Belica River, north of the village of Väglevci, District of Veliko Tärnovö. Zlatarica Formation, upper part; Upper Valanginian, *Saynoceras verrucosum* Zone. Pal. Mus. Univ. Sofia, Cr₁ 3118

All specimens are shown in their natural size except for 1b and 2b which are slightly enlarged; Photo — E. D j o n d j o u r o v a

PLATE V



EXPLANATION OF PLATE VI

Fig. 1. *Busnardoites makariopolskii* sp. n., paratype. Section along the Stara Reka River, east of the village of Čekanci, District of Târgoviște. Zlatarica Formation, upper part; Upper Valanginian, *Saynoceras verrucosum* Zone. Pal. Mus. Univ. Sofia, Cr₁ 3115

Figs. 2a, b. *Busnardoites desori* (Pictet & Campiche). Cast of the holotype. "Calcaire roux"; Upper Valanginian near Auberson, Sainte-Croix, Switzerland; described by Pictet & Campiche (1858—1860, p. 246, pl. 33, fig. 4) as *Ammonites Desori*. Geol. Mus. Lausanne (original); Pal. Mus. Univ. Sofia, Cr₁ 3119 (the cast)

All specimen are shown in their natural size; Photo — E. D j o n d j o u r o v a

PLATE VI

