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An Upper Albian ammonite fauna from Crimea

ABSTRACT. The paper deals with the Upper Albian ammonites occurring in the transgressive deposits of south-western Crimea in the Soviet Union. On the basis of faunistic and lithological criteria, the stratigraphic subdivision of these deposits is presented, and its scheme compared with those of the platform and geosynclinal areas of Europe and adjacent regions of Asia. In the paleontological part, described are 30 ammonite genera or species, one of which is new: *Prohysteroceras (Goodhallites) tauricense* sp. n. The investigated ammonites represent the families Hamitidae, Scaphitidae, Desmoceratidae, Hoplitidae, Brancoceratidae and Lyellicerati-dae, and they bear close resemblances to the assemblages known from western and central Europe.

INTRODUCTION

The paper presents the results of investigations of the Upper Albian ammonites and stratigraphy from the area between the Katsha and Bodrak rivers in the eastern part of the Bakhtshisaray Region in the Highland of Crimea, Soviet Union (*cf.* Fig. 1). This area is only a small section of a lengthy zone of the Upper Albian deposits exposed along the so-called Second Ridge in the south-western Crimean Highland.

Karakash (1907) was the first who discovered the paleontologically documented Albian deposits in the SW Highland of Crimea. These deposits were investigated by Weber, Malysheva & Neyman (1911), Weber & Malysheva (1924), and Weber (1937). A radical change in the structural development of the Crimean Highland during the Albian was evidenced by Muratov (1949, 1960). As a result, a part of the Albian deposits (roughly corresponding to the Lower and Middle Albian) in some regions is lacking due to tectonic upheaval and marine regression, followed by the Upper Albian transgressive succession. In others, the Lower Cretaceous marine sequence continues through the Upper Cretaceous.

Some data on the Upper Albian biostratigraphic zonation in the Crimean Highland were supplemented by Muratov (1949, 1960) and Drushtchic (1956, 1960). The regional development of the Upper Albian deposits

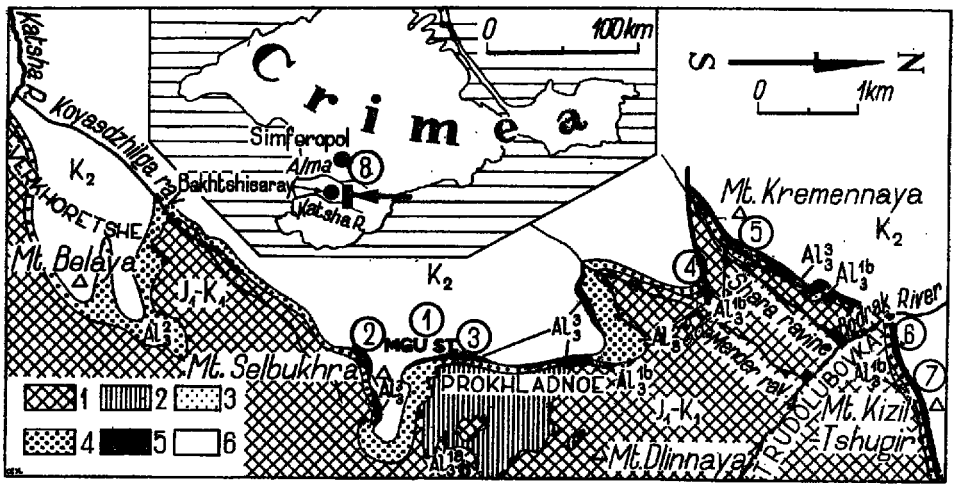

Fig. 1. Geological sketch-map of the area between rivers Katsha and Bodrak in Crimea (arrowed in the inset)

Stratigraphic subdivision of the Upper Albian deposits is presented in Tables 1 and 4; circled numbers denote the investigated profiles (*cf.* Figs 3—4)

1 pre-Albian substrate (Lower and Middle Jurassic, Neocomian and Aptian — J_1–K_1), *2* beds with *Hysteroceras* (Al_3^{1a}), *3* beds with *Scaphites* (Al_3^{1b}), *4* beds with *Mortoniceras* (Al_3^2), *5* beds with *Stoliczkaia* (Al_3^3), *6* Upper Cretaceous (K_2)

between the Katsha and Bodrak rivers was discussed by Janin (1964), Naidin & Janin (1965).

According to Drushtchic (1956, p. 6; 1960, p. 72), the Upper Albian of this region can be divided into two zones: (*1*) the Hysteroceras orbignyi Zone with clays and sands containing *H. varicosum* (Sowerby), *Epihoplites gibbosus* Spath, *Puzosia mayoriana* (d'Orbigny), *Neithea quinquecostata* (Sowerby), and (*2*) the Pervinquieria inflata Zone with quartz-glauconitic sandstones containing *P. inflata* (Sowerby), *Aucellina gryphaeoides* (Sowerby), *Plicatula inflata* (Sowerby), serpulids and abundant associates.

The Upper Albian ammonites of the SW Crimean Highland have not hitherto been described systematically. The collected material from the area between the Katsha and Bodrak rivers presents therefore the first approach to the paleontological and stratigraphical recognition of the Mid-Cretaceous transgressive deposits of Crimea.

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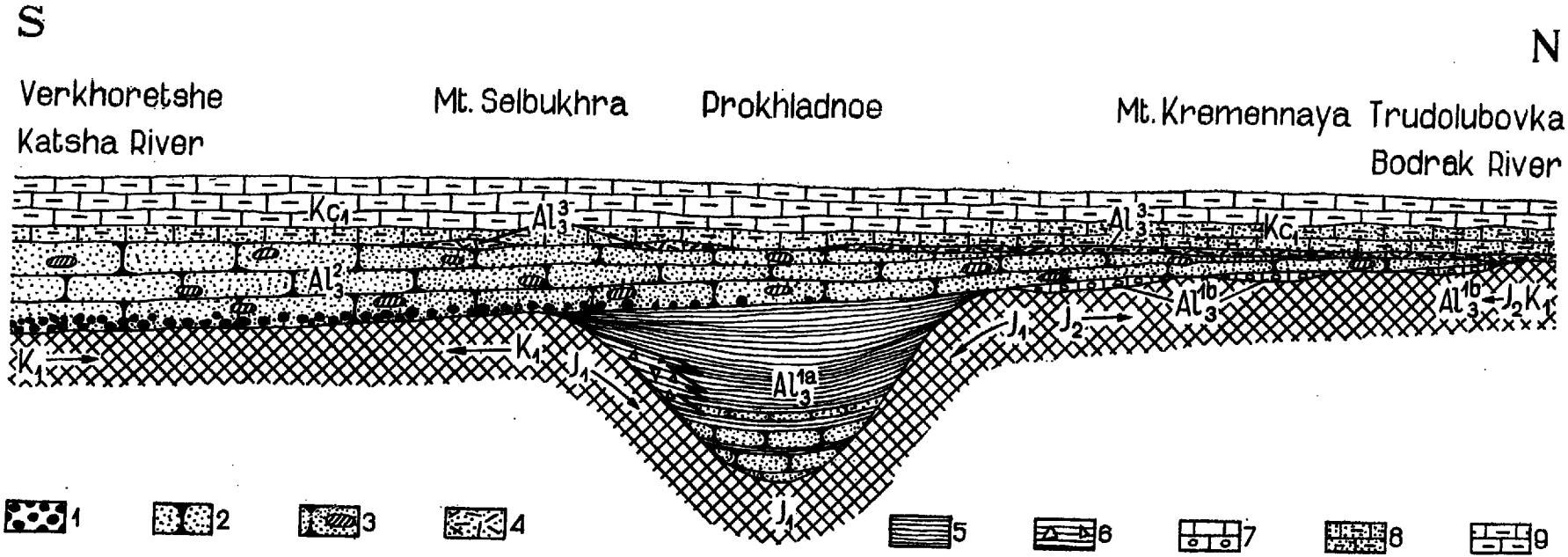
Upper Albian deposits between rivers Katsha and Bodrak, and their relation to the substrate (J_1-K_1 – cf. Fig. 1) and to the overlying strata (Lower Cenomanian – Kc_1)



1 pebbles of quartz and substrate rocks, 2 sandstones, 3 calcareous glauconitic sandstones, silicified in patches, 4 calcareous glauconitic sandstones with tuffaceous material, 5 clays, 6 clays with blocks of substrate rocks, 7 limestones and calcareous conglomerates, 8 sandy marls with glauconite, 9 marls

SUBDIVISION OF THE INVESTIGATED UPPER ALBIAN DEPOSITS

As appears from the lithological composition and paleontological content, the Upper Albian deposits between Katsha and Bodrak rivers may be subdivided into the three successive units, called here as the *beds* (*cf.* Table 1 and Figs 1—2).

BEDS WITH *HYSTEROCERAS* AND BEDS WITH *SCAPHITES*

The oldest are yellowish-grey, grey and dark-grey limy or, in some places, sandy clays. In the lower part, the clays contain intercalations of pinkish-brown and yellow-brown inequigranular sands or sandstones and conglomerates. The gravels in the latter consist of quartz and various rocks of the Taurica Formation (Upper Triassic — Lower Jurassic), and of the Lower Cretaceous strata. Fine carbonized detritus is indicative of the clays and fine-grained varieties of sands or sandstones. The clays attain a thickness of 80 m, and they fill a pre-Upper Albian valley (*cf.* Figs 2—3), lying therefore hypsometrically lower than the Hauterivian sandstones which build the summits of the Mt. Dlinnaya and Mt. Sheludivaya (*cf.* Figs 1—2). The transgressive character of this sequence was first recognized by Muratov (1949).

From the lower part of these beds exposed in the village of Prokhladnoe, the pelecypods, i.a. *Neithea quinquecostata* (Sowerby), *Plicatula gurgites* Pictet & Roux, as well as ammonites *Hysteroceras varicosum* (Sowerby), *Epihoplites gibbosus* Spath, *Puzosia mayoriana* (d'Orbigny)

Table 1

Stratigraphic subdivision of the Upper Albian deposits exposed between rivers Katsha and Bodrak

Lower Cenomanian

Upper Albian	Beds with *Stoliczkaia* (Al_3^3): *Stoliczkaia* (*Stoliczkaia*) *notha* (Seeley), *Lechites* cf. *gaudini* (Pictet & Campiche)	
	Beds with *Mortoniceras* (Al_3^2): *Mortoniceras* (*Mortoniceras*) *inflatum* (Sowerby), *M.* (*M.*) *pricei* (Spath), *M.* (*M.*) *rostratum* (Sowerby), *Mortoniceras* (*Durnovarites*) *perinflatum* (Spath), *M.* (*D.*) *postinflatum* Spath, various *Puzosia*	
	Beds with *Hysteroceras* (Al_3^{1a}): *Hysteroceras varicosum* (Sowerby), *H. orbignyi* (Spath), *Euhoplites inornatus* Spath, *Puzosia* (*Puzosia*) *mayoriana* (d'Orbigny), *Scaphites* (*Scaphites*) cf. *hugardianus* d'Orbigny	Beds with *Scaphites* (Al_3^{1b}): *Scaphites* (*Scaphites*) *simplex* Jukes-Browne, *Scaphites* sp. [close to *S. meriani* Pictet & Campiche]

pre-Albian substrate

have been collected by Drushtchic (1960), Janin (1964) and Naidin & Janin (1965). The same outcrops have recently yielded a few minute guards of *Neohibolites* and a mould of *Scaphites (Scaphites)* cf. *hugardianus* d'Orbigny.

The clay deposits of the southern edge of the discussed valley have been reached by boreholes at the Field Station of the Moscow University (= MGU Station) located at the northern slope of the Mt. Selbukhra (*cf.*

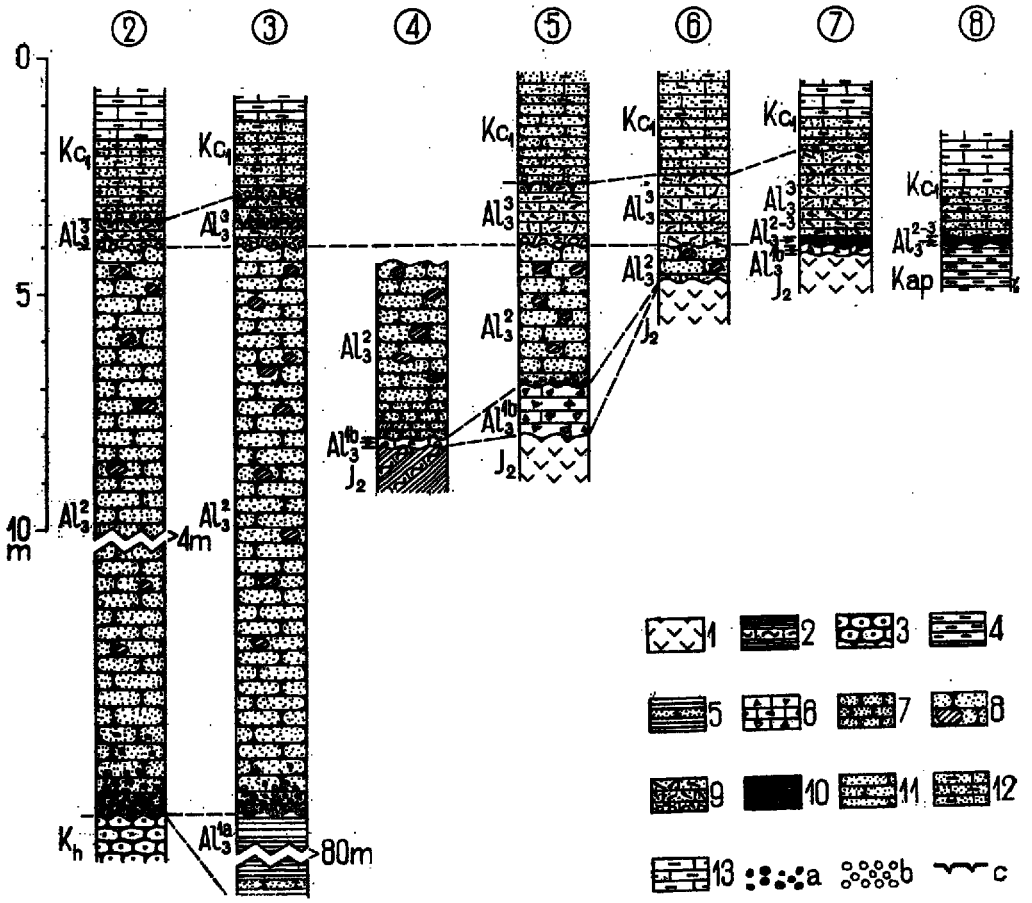


Fig. 3. Profiles (*Nos* 2–8) of the investigated Upper Albian deposits (for their location in Crimea see Fig. 1)

K_h Hauterivian, K_{ap} Aptian, Al_3^{2-3} redeposited fragments from the beds with *Mortoniceras* in the beds with *Stoliczkaia;* other stratigraphic indices as in Figs 1–2

Pre-Albian substrate: *1* basic lavas and/or intrusives, *2* siltstones and claystones, *3* calcareous sandstones, *4* clays

Upper Albian: *5* clays with sandstone intercalations at the bottom, *6* limestones with gravels, gravelstones, *7* sandstones rich in glauconite, *8* calcareous glauconitic sandstones, silicified in patches, *9* calcareous glauconitic sandstones with tuffaceous material, in places (profile No. 5) cross-bedded, *10* calcareous glauconitic sandstones with redeposited fragments from the beds with *Mortoniceras* (*cf.* Fig. 5A, C)

Lower Cenomanian: *11* calcareous glauconitic sandstones, *12* sandy marls with glauconite, *13* marls

a quartz gravels, *b* polymictic gravels, *c* hardgrounds (*cf.* Fig. 6)

Figs 1—2, 4). The lower part of these clays contains blocks (max. 0.5—0.6 m) of the Taurica Formation, Upper Jurassic limestones, as well as of the Lower Cretaceous sandstones and limestones. The ammonites obtained

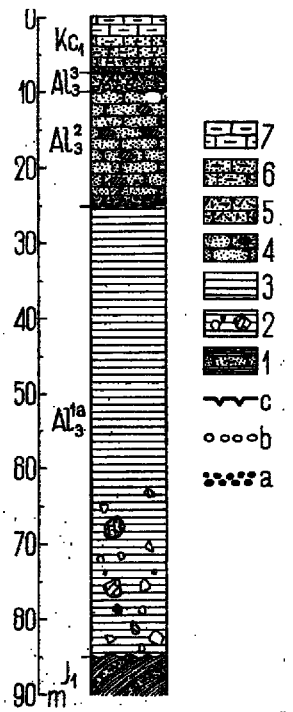


Fig. 4

Compiled profile of the Upper Albian deposits pierced by boreholes at the MGU Station (profile *No. 1* in Fig. 1)

1 siltstones and shales (Taurica Formation: Upper Triassic — Liassic), *2* limy clays with blocks derived from the substrate (Taurica Formation, Upper Jurassic limestones, various Lower Cretaceous deposits), *3* limy clays, *4* calcareous glauconitic sandstones, silicified in patches, *5* calcareous glauconitic sandstones with tuffaceous material, *6* sandy marls with glauconite, *7* marls

a quartz gravels, *b* polymictic gravels, *c* hardground; other explanations as for Figs 1—2

from these clays, chiefly from the depth range of 35—60 m (*cf.* Fig. 4) contain i.a. *Hysteroceras varicosum* (Sowerby), *H. orbignyi* (Spath), *Euhoplites inornatus* Spath, *Puzosia mayoriana* (d'Orbigny) (see Table 2). Rarely, minute (juvenile?) guards of *Neohibolites* were found here, while more common were pelecypods, identified by Dr. B. T. Janin as *Inoceramus anglicus* Woods, *I. sulcatus* Parkinson, *Nucula pectinata* Sowerby, *Plicatula gurgites* Pictet & Roux, *Neithea quinquecostata* (Sowerby), *Leda* sp. and others.

These clays are called by the authors as the beds with *Hysteroceras*, and denoted as Al_3^{1a} (*cf.* Tables 1 and 4, and Figs 1—4).

These beds have most likely their stratigraphic equivalent in a very thin horizon (with a thickness varying from 0.1—0.2 to 0.8—1.0 m) of limestones and/or conglomerates, preserved only in separate patches between the northern outskirts of Prokhladnoe and Trudolubovka (*cf.* Figs 1—3 and 5).

Previously, these limestones and conglomerates as having a superficial resemblance to the Hauterivian rocks in the vicinity of Prokhladnoe were referred to the Hauterivian stage. Janin (1964) proved that the Hauterivian fossils in the discussed deposits were redeposited, while of the

Upper Albian fossils there occurred abundant pelecypods with *Aucellina gryphaeoides* (Sowerby), and rare moulds of *Scaphites*.

The present authors have from these deposits one mould of *Scaphites (Scaphites) simplex* Jukes-Browne, two of *Scaphites* sp. [close to *S. (S). meriani* Pictet & Campiche], and two fragments of *Puzosia*.

Table 2

Stratigraphic distribution of the ammonites occurring in the Upper Albian deposits exposed between rivers Katsha and Bodrak

Species	Al_3^{1a}	Al_3^{1b}	Al_3^2	Al_3^3	Outcrops
Hamites /Hamites/ compressus Sowerby	+				MGU Station
H. /H./ aff. attenuatus Sowerby	+				MGU Station
H. /Stomohamites/ virgulatus Brongniart	+				MGU Station
H. /Plesiohamites/ similis /Casey/	+				MGU Station
Hamites sp.	+				MGU Station
Scaphites /Scaphites/ simplex Jukes-Browne		+			Mt. Kremennaya
S. /S./ cf. hugardianus d'Orbigny	+				Prokhladnoe
S. /S./ sp. [close to S. meriani Pictet & Campiche]		+			Mender, Mt. Kremennaya
Puzosia /Puzosia/ mayoriana /d'Orbigny/	+				MGU Station
P. /P./ sharpei Spath			+		Trudolubovka, Alma, Prokhladnoe
P. /P./ cf. communis Spath			+		Koyasdzhilga, Prokhladnoe
P. /Puzosia/ sp.	+				MGU Station
Euhoplites inornatus Spath	+				MGU Station
Hysteroceras orbignyi /Spath/	+				MGU Station
H. cf. orbignyi /Spath/	+				MGU Station
H. varicosum /Sowerby/	+				MGU Station
Hysteroceras sp.	+				MGU Station
Mortoniceras /Mortoniceras/ inflatum /Sowerby/			+		Prokhladnoe
M. /M./ pricei /Spath/			+		Alma, Trudolubovka
M. /M./ stoliczkai /Spath/			+		Mt. Kizil-Tshugir
M. /M./ rostratum /Sowerby/			+		Shara-Mender
Mortoniceras /Durnovarites/ perinflatum /Spath/			+		Shara-Mender, Koyasdzhilga
M. /D./ postinflatum Spath			+		Shara, Shara-Mender
M. /D./ subquadratum subquadratum Spath			+		Alma
M. /D./ vraconense Renz			+		Shara-Mender
M. /Durnovarites/ sp.			+		Shara-Mender
Mortoniceras sp.			+		Shara-Mender, Verkhoretshe
Prohysteroceras /Goodhallites/ tauricense sp.n.			+		Koyasdzhilga
Stoliczkaia /Stoliczkaia/ notha notha /Seeley/			?	+	Selbukhra, Prokhladnoe, Trudolubovka
S. /S./ notha cf. inflata Spath				+	Selbukhra

The discussed limestones and conglomerates are called as the beds with *Scaphites*, and denoted as Al_3^{1b} (*cf.* Tables 2 and 4, and Figs 1–3 and 5).

BEDS WITH *MORTONICERAS*

Both the beds with *Hysteroceras* and those with *Scaphites* are overlapped by the next stratigraphic unit which is developed not only between the Katsha and Bodrak rivers but also wide-spread in other parts of the Second Ridge of the Crimean Highland. Lithologically, these are calcareous, glauconitic sandstones, usually very compact, and greenish-grey or yellowish-grey in colour; they usually contain grey or dark grey silicified patches. In the south of the region, the sandstones at their bottom part are overloaded with gravel of quartz, fine-grained clastics of the Taurica Formation as well as of various Lower Cretaceous rocks. In the south, the

thickness of sandstones reaches 18—20 m. At the right bank of the Katsha River, above the village of Verkhoretshe, they from a picturesque escarpment. Towards the north, the thickness of the sandstones decreases, being at the Mt. Kremennaya not more than 3 m. In some places in the vicinity of Trudolubovka, the cover of these sandstones has completely been destroyed before sedimentation of the successive beds (Al_3^{2-3} — *cf.* profile No. 7 in Fig. 3 and Fig. 5 C) in which only their fragments are to be found.

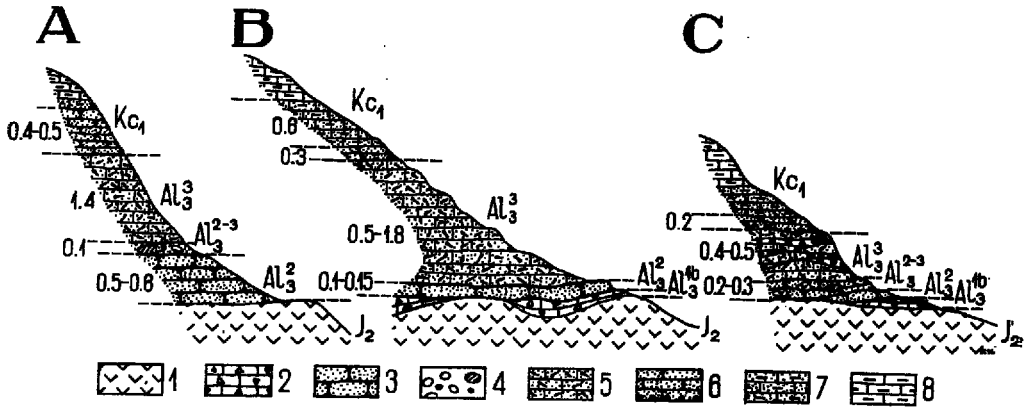


Fig. 5. Detailed sections of the Upper Albian deposits exposed near village Trudolubovka (right edge of the Bodrak river)

A — escarpment of the Bodrak river (profile *No. 6* in Fig. 3)

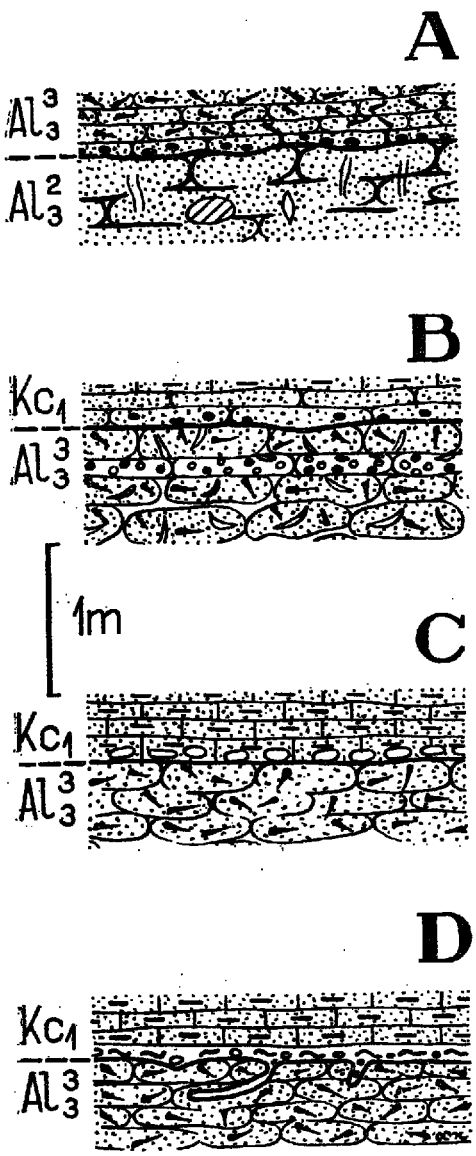
B — northern part of the village

C — southern slope of Mt. Kizil-Tshugir (profile *No. 7* in Fig. 3)

1 effusives, *2* limestones with pebbles of effusives and other rocks, and with abundant pelecypods, *3* calcareous glauconitic sandstones, silicified in places, and locally with phosphatized fauna and quartz pebbles, *4* redeposited fragments of underlying glauconitic sandstones, *5* calcareous glauconitic sandstones with tuffaceous material, pebbles derived from substrate, and with abundant pelecypods *Aucellina*, *6* calcareous glauconitic sandstones with frequent guards of *Neohibolites menjailenkoi* Gustomesov, and locally with quartz gravel at bottom, *7* sandy marls with glauconite, *8* marls; other explanations as for Figs 1—3

The most common fossils in the sandstones are helical tubes of serpulids, often *Rotularia damesii* (Noetling), and rarely *Filograna* cf. *sollistima* Regenhardt (as determinated by Dr. S. I. Pasternak), as well as moulds or shells of pelecypods (*cf.* Janin 1964, p. 118): *Inoceramus anglicus* Woods, *Aucellina gryphaeoides* (Sowerby), *Gryphaea arduennensis* (d'Orbigny), *Lima canalifera* Goldfuss, *Neithea quinquecostata* (Sowerby), *N. aequicostata* (Lamarck), *Plicatula inflata* Sowerby, and *Pterotrigonia* sp. Less common are gastropods, brachiopods, and echinoids *Holaster leavis* de Luc. The cephalopods are represented by scarce guards of *Neohibolites*,

as well as by moulds of nautiloids *Eutrephoceras* sp. and of poorly preserved ammonites, primarily of the genera *Mortoniceras* [represented i.a. by the species *M. (M.) inflatum* (Sowerby), *M. (M.) pricei* (Spath), *M. (Durnovarites) perinflatum* (Spath), *M. (D.) postinflatum* Spath] and *Puzosia*



A — Mt. Kremennaya
(cf. profile No. 5 in Fig. 3)
Al_3^3 calcareous glauconitic sandstone with tuffaceous material, and with quartz gravel at bottom
Al_3^2 calcareous glauconitic sandstone, silicified in patches, and containing vertical burrows; hardground at the top

B — Prokhladnoe, near Post Office
Kc_1 calcareous glauconitic sandstone with fine quartz gravel, and frequent current-oriented belemnite guards; overlaid by sandy marls with glauconite
Al_3^3 calcareous glauconitic sandstone with tuffaceous material, and containing small burrows; overlaid by a layer of quartz gravel (*white*) and small limonitic concretions (*black*); at top — hard-cemented sandstone with vertical burrows, truncated by a hard-ground surface

C — Mangush ravine, left edge, below the MGU Station
Kc_1 sandy marls with glauconite and well-rounded and well-sorted gravel, primarily of quartz
Al_3^3 calcareous glauconitic sandstone with tuffaceous material; hardground at the top

D — Mt. Tsheger at Prokhladnoe (cf. profile *No. 3* in Fig. 3)
Kc_1 clays with polymictic gravel, overlaid by sandy marls with frequent belemnite guards
Al_3^3 calcareous glauconitic sandstone with tuffaceous material; hardground with burrows at the top

Fig. 6. Detailed profiles at the boundaries between the beds with *Mortoniceras* and with *Stoliczkaia* (Al_3^2/Al_3^3), as well as between the beds with *Stoliczkaia* and the Lower Cenomanian (Al_3^3/Kc_1)

(*cf.* Table 2). Remains of other genera are preserved so poorly that they should not be regarded as determinable.

To the upper part of the sandstones are confined the finds of large *Puzosia*, the shells of which exceed 1 m in diameter.

The discussed sandstones are called as the beds with *Mortoniceras*, and denoted as Al_3^2 (*cf.* Tables 1 and 4, and Figs 1—6).

BEDS WITH *STOLICZKAIA*

The Upper Albian sequence completes with calcareous glauconitic sandstones of dark-green or rusty-brown colour. They contain thin intercalations of quartz gravel and tuffaceous material, the latter mostly recognizable in thin sections. The sandstones vary from compact to loose, whereas their thickness ranges from 1.8 to several centimeters, and in some places they completely wedge out (*cf.* Figs 1—5).

The sandstones contain pelecypods, determined by Dr. B. T. Janin as *Aucellina gryphaeoides* (Sowerby), abundant in places, as well as *Neithea* aff. *sexicostata* (Woods), *Biauris biauriculata* (Lamarck), *Gryphaeostrea canaliculata* (Sowerby), *Liostrea* sp., *Plicatula* sp. and others. There also occur brachiopods, echinoids *Holaster laevis* de Luc, and poorly preserved belemnites *Parahibolites* and *Neohibolites*, the latter represented i.a. by *N. menjailenkoi* Gustomesov, the index species for the Lower Cenomanian. Rare ammonites are preserved as moulds of *Puzosia*, and of *Stoliczkaia (Stoliczkaia) notha notha* (Seeley) and *S. (S.) notha* cf. *inflata* Spath.

The discussed sandstones comprising tuffaceous material are called as the beds with *Stoliczkaia* and denoted as Al_3^3 (*cf.* Tables 1 and 4, and Figs 1—6). The boundaries of this unit, both lower and upper, are of the hardground type (*cf.* Fig. 6).

The base of the overlying Cenomanian deposits between the Katsha and Bodrak rivers is developed as greenish-grey, calcareous glauconitic sandstones or sandy marls, which higher up soon appear to be replaced with marls comprising *Schloenbachia varians* (Sowerby), *Mantelliceras mantelli* (Sowerby), *Puzosia planulata* (Sowerby) and *Neohibolites menjailenkoi* Gustomesov. Locally, at the bottom part of the Cenomanian the latter species displays current-oriented mass occurrences of the "belemnite churchyard" type (*cf.* Alekseev & Naidin 1970; Naidin, Wantchurov & Alekseev 1975).

REGIONAL VALUE OF THE UPPER ALBIAN SUBDIVISION

The biostratigraphic subdivision of the Upper Albian deposits of South England introduced by Spath (1923—1943, pp. 4, 668; 1923a, p. 13; 1926, p. 425 and finally 1941, p. 668), contains two ammonite zones and several subzones (*cf.* Table 3). It corresponds to the succession of ammonites as follows: at the bottom, there occur numerous hysteroceratids accompanied by some mortoniceratids, *Mortoniceras (M.) pricei*

(Spath) in particular; higher up, the representatives of the latter genus become predominant, while at the very top, *Stoliczkaia* makes its appearance.

A similar succession of ammonites is recognizable over a vast area stretching from western and central Europe (*cf.* also Passendorfer 1930; Breistroffer 1936, 1947) as far as to Crimea and Caucasus, the Transcaspian region and Georgia in the Soviet Union (Sokolov 1956; Atabekyan 1960; Atabekyan & Likhatcheva 1960; Luppov, Sirotina & Tovbina 1960; Eristavi 1962; Bogdanova, Luppov & Jakhnin 1963; Drushtchic & Mikhailova 1966; Urmanova & Tashliev 1967). Besides this area, which embraces both the northern platform of the Tethys Ocean as well as a part of this Ocean itself, a similar succession is also known on the southern platform, as evidenced on Madagascar (*cf.* Collignon 1963, 1965).

UPPER ALBIAN ON THE RUSSIAN PLATFORM

North of the Tethys, in the southern part of the Russian platform, a hiatus is recorded at the Lower/Upper Cretaceous boundary. In a number of regions, however, the Upper Albian deposits are preserved in small erosional patches. Thus, Dobrov (1915) found in the central part of the platform, in the valley of the Tsna River, ammonites closely related to *Callihoplites vraconensis* (Pictet & Campiche). The finds of *Mortoniceras inflatum* (Sowerby) and *Stoliczkaia dispar* (d'Orbigny) were reported from the vicinity of Kanev on the Dnieper (Arkhangelsky, Krestovnikov & Shatsky 1927), while Bushynsky (1954) discovered *Mortoniceras* cf. *inflatum* (Sowerby) near Kursk. Finally, the authors include in the present paper a description of *Callihoplites* aff. *tetragonus* (Seeley) from the southern part of the Donbass, the region closest to Crimea.

UPPER ALBIAN AMMONITES OF THE CRIMEAN HIGHLAND

The assemblage of the Upper Albian ammonites from Crimean Highland displays a far-reaching resemblance with that of England and France. Almost all the species described in the present paper are known from the classical Upper Albian sections of these countries (*cf.* Spath, 1923—1942; Breistroffer 1947; and Table 3 in the present paper).

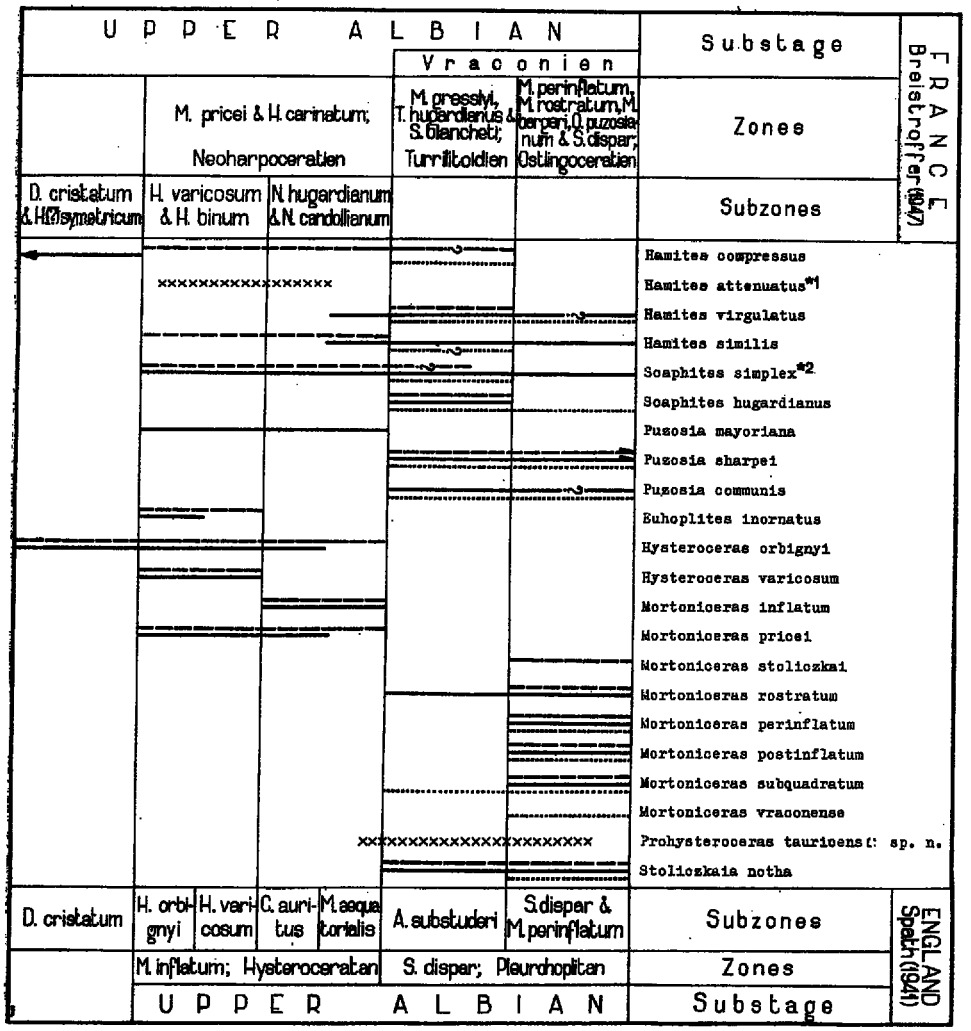
The ammonite assemblage under study is of a wide geographic distribution, as many of its species occur not only in Europe, but also in North Africa, Nigeria, Madagascar, South Africa, India and even in Venezuela and Texas (*cf.* occurrence in the paleontological part of this paper).

When comparing the stratigraphic range of individual species in western Europe it appears that in the Upper Albian deposits of Crimea, all the ammonite zones and subzones of the Upper Albian can be recognized (*cf.* Tables 3—4). A precise recognition of the west European Upper Albian zone or subzone boundaries is not, however, possible here (*cf.* Table 4) due to the following reasons.

Firstly, the ammonite assemblage of Crimea is incomparably poorer than the respective European associations. Some forms, e.g. *Scaphites*, are so rare that their range in the section could not be established. Secondly, no bed-by-bed occurrences of *Mortoniceras* were available. Thirdly, in Crimea, distribution of the Upper Albian ammonites is limited by the

Table 3

Stratigraphic range of the investigated ammonites in the Upper Albian deposits of France and England (correlation *after* Breistroffer 1947); subspecies and assignations *affinis* or *conformis* are omitted (*cf.* Table 2 and paleontological descriptions)



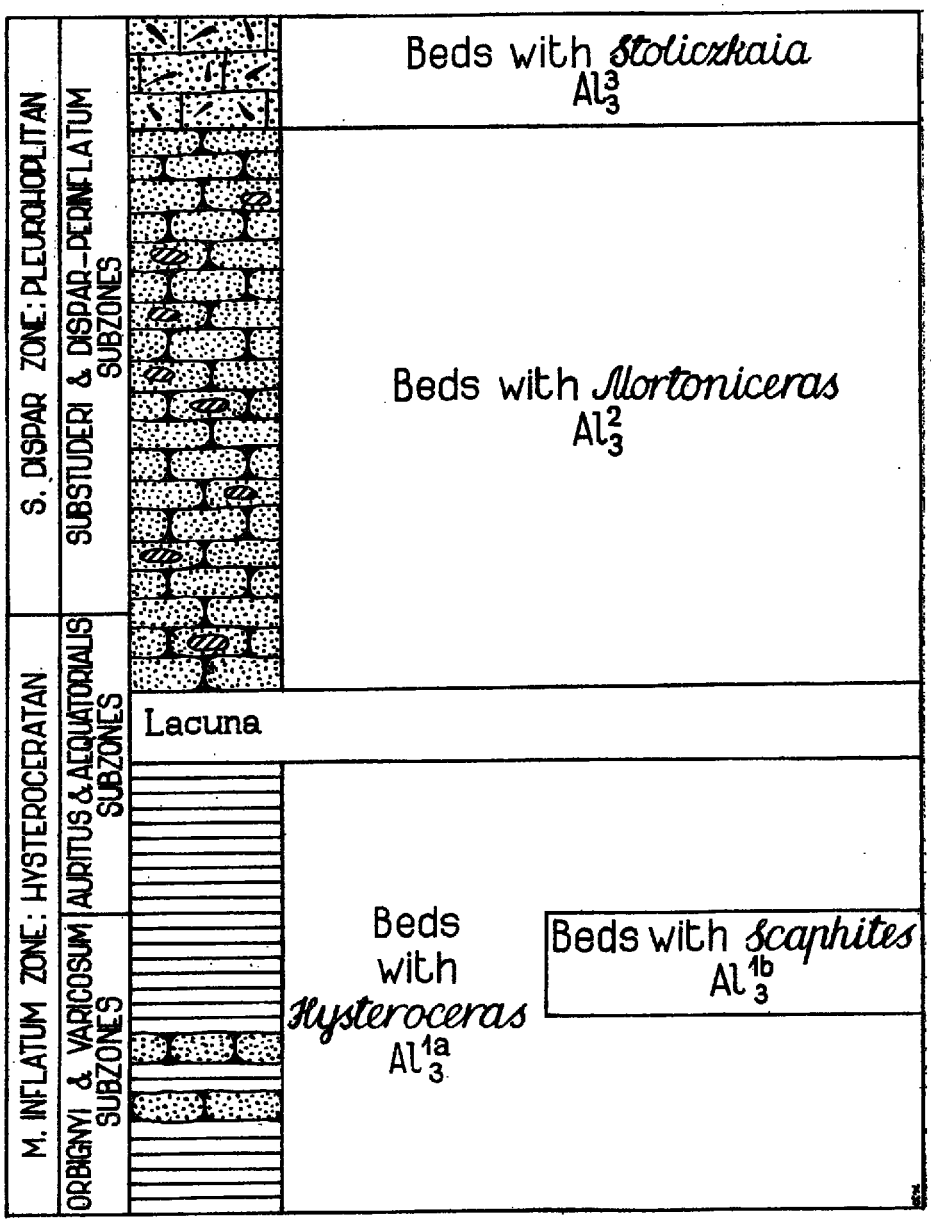
Continuous line — stratigraphic ranges *after* Spath (1942), broken line — stratigraphic ranges *after* Breistroffer (1936, 1947), dotted line — stratigraphic ranges in the Vraconian stratotype *after* Renz (1968), crossed line — probable range of the new species, and of the species unknown hitherto from the Upper Albian (*cf.* footnote No. 1)

[1] The species known in western Europe in deposits older than Upper Albian; in Crimea, it is represented by the forms determined as *H.* aff. *attenuatus*.

[2] According to Wiedmann (1965a), this species ranges through the whole Upper Albian

successive facies: the genus *Hysteroceras* occurs primarily in clays and, more rarely, in sandstones, while *Mortoniceras* is confined exclusively to glauconitic sandstones, and finally *Stoliczkaia* is encountered only in sandstones with tuffaceous material distributed at the top of the sequence.

Table 4
Position of the investigated Upper Albian deposits in the stratigraphic schema of Spath (1941)



In Western Europe the genus *Hysteroceras*, independantly of facies, occurs alongside with *Mortoniceras*, and *Mortoniceras* alongside with *Stoliczkaia* (*cf.* Table 3).

The available data allow to correlate the major part of the beds with *Hysteroceras* (Al_3^{1a}) with the lower part of the Mortoniceras inflatum Zone (orbignyi and varicosum Subzones — *cf.* Table 4). The uppermost beds with *Hysteroceras* correspond probably to the higher part of the M. inflatum Zone, as *Hamites (S.) virgulatus* Brongniart occurs (*cf.* Table 3) with *Hysteroceras varicosum* (Sowerby). The beds with *Hysteroceras* (Al_3^{1a}) and these with *Mortoniceras* (Al_3^2) are separated by a break in sedimentation (*cf.* Table 4) .

The beds with *Mortoniceras* (Al_3^2) may be correlated with the upper part of the Mortoniceras inflatum Zone (auritus and aequatorialis Subzones), as evidenced by the finds of *Mortoniceras (M.) pricei* and *M. (M.) inflatum*, as well as with the major part of Stoliczkaia dispar Zone (*cf.* Tables 3—4).

Finally, the beds with *Stoliczkaia* (Al_3^3) are likely to correspond only to the topmost part of the Stoliczkaia dispar Zone (*cf.* Table 4). These beds are of the condensed nature and, thus, the upper boundary of the latter Zone being itself the Lower/Upper Cretaceous boundary, cannot be precisely established in Crimea, similarly as in other European regions.

In Crimea a redeposition horizon is well developed in the vicinity of Trudolubovka on the Bodrak River and near the village of Partizany on the Alma River (*cf.* Fig. 3, profiles *Nos* 7 and 8). At the top of the Lower Cretaceous in Sardinia, Dieni & Massari (1965) distinguished a horizon with condensed fauna, embracing the interval from the orbignyi to dispar Subzones. In the epicontinental area of Poland, some deposits at the Albian/Cenomanian boundary are also stratigraphically condensed (Cieśliński 1959; Marcinowski 1974, pp. 183—184). Furthermore, the same is with the standard sections of Switzerland and England. Thus, in the middle part of the type-Vraconian sandstones, large, bottom derived fragments do occur being indicative of a subaqueous erosion (Renz 1968, p. 10—11). In England, the Cambridge Greensand ("Pleurohoplitan") is also condensed and yields ammonites of the three topmost Albian horizons (*cf.* Spath 1923, p. 49; 1926, p. 423).

REMARKS ON THE TERM VRACONIAN

The Vraconian was distinguished by Renevier (1868) in the Swiss Jura for the beds containing, in his opinion, a mixed fauna of the Albian (Gault) and Cenomanian (Rotomagian). According to Renevier (1897, Table 4), his stage Vraconian together with Albian and Rotomagian (Cenomanian s. str.) from a Cenomanian "series" as a part of the Upper Cretaceous. The term Vraconian has got a wide application in particular among French geologists. It has been and still is very popular in some other countries, for example in Rumania (Chiriac 1960; Mutiu 1969, 1972, 1974; Stefa-

nescu & Zamfirescu 1964). Some authors followed Renevier in referring it to the Upper Cretaceous, whereas others placed it at the top of the Lower Cretaceous. At present, the Vraconian is mostly regarded as embracing the topmost horizons of the Albian, and being understood as the terminal Albian.

The stratigraphic range and faunal characteristics of the Vraconian, chiefly on the basis of French sections were studied in details by Breistroffer (1936, 1947, 1965, 1967). According to him (*cf.* primarily Breistroffer 1947), sous-étage Vraconien (= the Pleurohoplitan or Stoliczkaian) forms the topmost substage of the Albian. A similar view is also presented by Destombes & Destombes (1965).

Renz (1968) and Renz & Luterbacher (1965) revised the ammonite fauna (comprising about 125 forms) and gave a new description of the Vraconian stratotype located near the village of La Vraconne, 2.2 km NW of the town Ste-Croix in the Canton de Vaud, Switzerland. They recognized that the type of the Vraconian corresponded to the substuderi and dispar-perinflatum Subzones (*cf.* Table 3), that is the Cambridge Greensand of South England which was well stratigraphically defined by Spath (1923—1943, 1923a, 1926). In such a situation, a recommendation by the *Colloque sur le Crétacé inférieur* in Lyon, 1963, to eliminate the Vraconian from the scheme of the Albian Stage subdivision (*cf.* Conclusions générales, 1965, p. 832) should be reminded here, and the standard zonation should only be used for stratigraphic correlations.

VRACONIAN IN THE USSR

In the Russian geological tradition the term Vraconian (*"Vrakon"* in Russian) was introduced in 1899 by Semenov as a synonym for the Upper Albian substage of the Mangyshlak section in the Transcaspian Region. The problem of distinguishing the Vraconian substage on the Russian platform was discussed by Mazarovich (1917); Arkhangelsky (1922); Arkhangelsky, Krestovnikov & Shatsky (1927). Later, Eristavi (1951) distinguished this substage in the Transcaucasian Region, while in the Transcaspian Region it was discussed again by Sokolov (1958, 1966) and Savelev (1969).

In Crimea, it was Weber (1937) who first used the term Vraconian. In the section on the Katsha River, at the village of Vershkhoretshe she distinguished:

2) Vraconian substage — greenish-grey, friable glauconitic sandstones (1—1.5 m) with *Neohibolites, Aucellina, Inoceramus concentricus* Parkinson.

1) Lower and Middle Albian — greenish-grey, hard glauconitic sandstones (10 m) with *Puzosia sharpei* Spath, *Holaster laevis* de Luc, *Serpula* sp.

The units 2 and 1 of Weber correspond in the present paper to Al_2^3 and Al_2^2 respectively.

In later years, Muratov (1949) distinguished the glauconitic sandstones with *Aucellina* (units 1 and 2 of Weber) and referred them to the Vraconian. The latter term has become popular with the Crimean field geologists. On the whole, however, it is of quite limited application in the Soviet Union. Most of the authors avoid this term, which is fully accepted by the present writers.

SYSTEMATIC DESCRIPTION OF AMMONITES

The facies variability of the deposits yielding Upper Albian ammonites in Crimea results in a various state of their preservation. The ammonites coming from limy clays and claystones of the beds with *Hysteroceras* (Al_3^{1a}) are diagenetically flattened but their ornamentation is well pronounced, and they often bear the shell. The specimens from the calcareous sandstones of the beds with *Mortoniceras* (Al_3^2) and beds with *Stoliczkaia* (Al_3^3) are preserved as moulds, making the ornamentation details less discernible. The moulds of phragmocones are usually undeformed, while the more complete specimens often display a lateral flattening of the body chamber and adjacent parts of the phragmocone.

The investigated specimens are characterized by the following parameters (in milimeters):

D — diameter of specimen,

Wh — height of whorl,

Wb — thickness of whorl,

U — diameter of umbilicus.

When referencing the stratigraphic position of the investigated species (*cf.* Table 2), the nomenclature and subdivision is used that as offered by Spath (1941—1943) for the classical sections of Upper Albian deposits in England. The Albian deposits of France were subdivided by Breistroffer (1947) who also correlated them with those of England (*cf.* Table 3).

Family **Hamitidae** Hyatt, 1900
Genus *HAMITES* Parkinson, 1811
Subgenus *HAMITES* Parkinson, 1811
Hamites (Hamites) compressus J. Sowerby, 1814
(Pl. 1, Fig. 2)

1941. *Hamites compressus*, J. Sowerby; Spath, pp. 617—619; Text-fig. 222, Pl. 68, Figs 10—13.
1947. *Hamitoides compressus* Spath; Breistroffer, p. 52.
1968. *Hamites (Hamites)* cf. *compressus compressus* J. Sowerby; Renz, pp. 64—65; Text-fig. 28a; Pl. 11, Fig. 6.

Material. — One fragment of the whorl (*No.* 139).

Remarks. — The specimen rather well corresponds to the forms displaying scarce sculpture and illustrated by Spath (1941, Pl. 68, Figs 10—11). It differs a little from that presented by Renz (1968, Pl. 11, Fig. 3), but these differences seem to result from the intraspecific variability.

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU Station = the Field Station of the Moscow University (*cf.* Text-Fig. 4).

The species *Hamites (H.) compressus* J. Sowerby is known from the Upper part of the Middle Albian in England, Upper Albian of France, Switzerland and Angola (Spath 1941; Breistroffer 1947; Renz 1968).

Hamites (Hamites) aff. *attenuatus* J. Sowerby, 1814
(Pl. 1, Fig. 3)

(aff.) 1939—1941. *Hamites attenuatus*, J. Sowerby; Spath, pp. 607—611; Text-fig. 218; Pl. 67, Figs 1—13, 15; Pl. 68, Figs 4—5.

Material. — One fragment of the whorl (*No.* 300).

Remarks. — The investigated specimen, as appears from its ornamentation, is close to the forms called "*Hamites attenuatus* transitional to *H. compressus*" by Spath (1941, Pl. 68, Fig. 4); it may also be compared to "*Hamites* sp. = transitional from *H. attenuatus* to *H. maximus*, var. *rectus*" of Spath (1941, Pl. 68, Fig. 17). As the Crimean specimen differs from the typical representatives of the species, it is designated with *affinis*.

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU Station (*cf.* Text-Fig. 4).

Subgenus *STOMOHAMITES* Breistroffer, 1940
Hamites (Stomohamites) virgulatus Brongniart, 1822
(Pl. 1, Figs 4—5)

1861. *Hamites virgulatus*, (Brong.?) d'Orb.; Pictet & Campiche, pp. 85—87; Pl. 54, Figs 6—7 [*only*].
1922. *Torneutoceras virgulatum*, Brongniart sp.; Spath, pp. 148—149.
1930. *Hamites virgulatus Brongniart*; Passendorfer, p. 660.
1941. *Hamites (Stomohamites) virgulatus* (Brongniart?), Pictet and Campiche; Spath, pp. 635—638; Text-Fig. 230; Pl. 71, Figs 7—10; Pl. 72, Fig. 11.
1947. *Stomohamites Brongniarti* Breistr. n. n.; Breistroffer, pp. 86, 93.
1962. *H. (Stomohamites) virgulatus* (Brongniart); Wiedmann, pp. 180—181, Text-fig. 40; Pl. 10, Fig. 3.
1965. *Stomohamites virgulatus* (Brongniart); Clark, pp. 21—22; Text-fig. 5; Pl. 1, Fig. 13; Pl. 2, Fig. 15.
1968. *Hamites (Stomohamites) virgulatus virgulatus* Brongniart; Renz, pp. 65—66; Text-fig. 23 b-d; Pl. 11, Figs 9—11.

Material. — Two specimens, one of which is flattened dorso-ventrally (*No.* 670/1), while the other displays irregular ornamentation (*No.* 670/2).

Remarks. — The specimen *No.* 670/1 bears rather scarcely distributed, but well pronounced single ribs both on the ventral and lateral sides. On the dorsal side (*cf.* Pl. 1, Fig. 5), the ribs are much weaker (sculpture vanishes), but some of them bifurcate. The latter feature makes this specimen similar to *Hamites (Stomohamites) duplicatus* Pictet & Campiche, although it rather bears more characteristics of the species "*virgulatus*". The bifurcation of ribs on the dorsal side probably appears also in other species of *Hamites* (*fide* Spath 1941, p. 640), but its recognition seems to depend on the state of preservation. In some species, for example *H. (S.) duplicatus*, this ribbing, which is a diagnostic feature of the species, occurs not in every specimen (*cf.* Renz 1968, p. 68).

The other of the investigated specimens (*No.* 670/2; *cf.* Pl. 1, Fig. 4) matches well to a specimen of *H. (S.)* aff. *virgulatus* with disturbed ornamentation described by Spath (1941, p. 638; Pl. 72, Fig. 11), which was, however, regarded by Renz (1968, *cf.* his synonymy) as belonging to the species "*virgulatus*".

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}), borehole at the MGU Station (*cf.* Text-fig. 4).

The species *Hamites (Stomohamites) virgulatus* Brongniart is widely distributed, and is known from the Upper Albian of England (?aequatorialis to substuderi Subzones), Switzerland, France, Sardinia, Spain, Polish Tatra Mts, Tunis, Algeria, Angola, Madagascar and Texas (Passendorfer 1930; Spath 1922, 1941; Breistroffer 1947; Wiedmann 1962; Clark 1965; Renz 1968).

Subgenus *PLESIOHAMITES* Breistroffer, 1947
Hamites (Plesiohamites) similis (Casey, 1961)
(Pl. 1, Fig. 1)

1941. *Hamites (Stomohamites?) multicostatus*, Brown; Spath, pp. 648—650; Text-fig. 236 c—f; Pl. 71, Figs 15—17.
1947. *Stomohamites (Plesiohamites* n. subgen.) n. sp. gr. *multicostatus* (Brown); Breistroffer, pp. 52, 93.
1961. *Lytohamites simdlis* sp. n.; Casey, p. 92.
1962. *H. (Plesiohamites) multicostatus* (Brown) = *H. (Plesiohamites) similis* (Casey); Wiedmann, p. 181, Text-fig. 41; p. 225 (Nachtrag).
?1968. *Hamites (Plesiohamites) aff. similis* (Casey); Renz, pp. 69—70; Text-figs 23p, 24e; Pl. 11, Figs 29—30.

Material. — One fragment of the whorl (*No.* 655).

Remarks. — The investigated specimen displays oblique, densely distributed fine ribs, primarily single, which become more pronounced towards the ventral side; these features make it similar to the form described by Spath (1941, Pl. 71, Fig. 17). However, Casey (1961, p. 92) showed that the specimens illustrated by Spath (1941, Text-fig. 236 c—f; Pl. 71, Figs 15—17) differed from the species *"multicostatus"*, and included them into his new genus and species, *Lytohamites similis*. Wiedmann (1962, p. 225) and Renz (1968, p. 69) recognized furthermore that the features emphasized by Casey (1961) were of smaller importance and of the specific rank only; they consequently were to regard the genus *Lytohamites* Casey as the synonym of *Hamites* Parkinson.

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU Station (*cf.* Text-fig. 4).

The species *Hamites (Plesiohamites) similis* (Casey) is known primarily from the higher part of the Upper Albian (aequatorialis to dispar-perinflatum Subzones) of England, France (Spath 1941; Breistroffer 1947), northern Spain (Wiedmann 1962), and supposedly of Switzerland (Renz 1968).

Hamites sp.
(Pl. 1, Fig. 6)

Material. — One poorly preserved whorl fragment (*No.* 300/2).

Remarks. — As appears from the papers referenced above, this specimen should be attributed to the genus *Hamites*, but its state of preservation hinders a more exact determination.

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU Station (*cf.* Text-fig. 4).

Family **Scaphitidae** Meek, 1876
Subfamily **Scaphitinae** Meek, 1876
Genus *SCAPHITES* Parkinson, 1811
Subgenus *SCAPHITES* Parkinson, 1811
Scaphites (Scaphites) simplex Jukes-Browne, 1875
(Pl. 1, Fig. 7)

1848. *Scaphites Hugardianus* d'Orbigny; Pictet, p. 370, Pl. 12, Fig. 2.
1861. *Scaphites Meriani*, Pictet et Campiche; Pictet & Campiche, p. 16; Pl. 44, Fig. 7 [*only*].
1875. *Scaphites Meriani* var. *simplex*; Jukes-Browne, p. 287, Pl. 14, Fig. 3.

1937. *Scaphites simplex* Jukes-Browne; Spath, p. 504; Text-figs 176c-f, 177a, b, d, e; Pl. 57, Figs 13—22, ?23.
1965a. *Scaphites (Scaphites) simplex* Jukes-Browne; Wiedmann, p. 412; Text-fig. 6e; Pl. 54, Figs 1, 7; Pl. 55, Figs 4—5.
1968. *Scaphites simplex* Jukes-Browne; Renz, p. 93.

Material. — One incomplete specimen, being a part of the shaft, and the hook (*No.* 101).

Remarks. — In the investigated specimens the ventral side of the shaft is slightly convex, and much more wider than the whorl side. The ribs on the shaft are thin, densely distributed and bifurcating on the latero-ventral margin. Straight, single ribs are very rare. On the hook, the ribs become more pronounced and scarce, and at the partition points indistinct tubercles appear.

The species *Scaphites (Scaphites) simplex* Jukes-Browne is very similar to *S. (S.) hilli* Adkins & Winton from the Upper Albian of Texas (Clark 1965).

Occurrence. — Beds with *Scaphites* (Al_3^{1b}); limestones exposed at Mt. Kremennaya (*cf.* profile *No.* 5 in Text-fig. 3).

The species *Scaphites (Scaphites) simplex* Jukes-Browne is known from the Upper Albian of Switzerland (St. Croix — substuderi Subzone), England (varicosum, auritus, aequatorialis Subzones), France (Spath 1937; Renz 1968), Rumania, and supposedly of northern Spain (Mortonicératien — Albien *IV* of Wiedmann 1965b) and Tunis.

Scaphites (Scaphites) cf. *hugardianus* d'Orbigny, 1841
(Pl. 1, Fig. 8)

Material. — One incomplete specimen (*No.* 6319; collection of Dr. B. T. Janin, University of Moscow).

Remarks. — The investigated, poorly preserved specimen cannot be precisely determined; it is the most similar to *Scaphites (Scaphites) hugardianus* d'Orbigny (*cf.* d'Orbigny 1842, pp. 521, 525; Pictet & Campiche 1861, p. 16, Pl. 44, Figs 5—6 [*only*]; Spath 1937, p. 502, Pl. 57, Fig. 24 and Text-figs 175 a—b, 176 a—b, g—i; Wiedmann 1965a, p. 423, Pl. 54, Fig. 5, Pl. 57, Figs 1—2, 6—7; Renz 1968, p. 93, Pl. 18, Fig. 17).

Occurrence. — Beds with *Hysteroceras* (Al_3^{1c}); sandstones exposed near the spring at Prokhladnoe (*cf.* profiile *No.* 3 in Text-fig. 3).

The species *Scaphites (Scaphites) hugardianus* d'Orbigny occurs in the Upper Albian of Switzerland (St. Croix — substuderi and dispar-perinflatum Subzones), England (substuderi Subzone), France and Sardinia (Spath 1937; Wiedmann 1965a; Renz 1968). The species is also known from the Upper Albian of Rumania, Hungary and Caucasus (Khalilov, Aliev & Askerov 1974). Eristavi (1951, 1955) reports the specimens determined as *Scaphites* aff. *hugardianus* d'Orbigny from the Upper Albian of Georgia, Soviet Union.

Scaphites (Scaphites) sp. [close to *S. (S.) meriani* Pictet & Campiche, 1851]
(Pl. 1, Figs 9—10)

Material. — Two fragments of the last whorl, both of which represent the shaft passing into the hook (*No.* 102, 1001).

Description. — The estimated diameter is not smaller than 25—30 mm. The ventral side is convex and twice as wide as height of the whorl side. The ribs are well pronounced, and the interareas are a little larger than the rib width. Between trifurcate ribs one or two single ribs occur, and the tubercles appear at the partition point of trifurcate ribs.

Remarks. — The investigated specimens differ from all the hitherto known species. As appears from their shape and sculpture, they are most similar to *Scaphites (Scaphites) meriani* Pictet & Campiche (*cf.* Pictet & Campiche 1861, p. 16, Pl. 44, Figs 1—4 [*only*]; Wiedmann 1965a, p. 426, Pl. 54, Fig. 6; Pl. 57, Figs 3, ?4; ?Collignon 1963, p. 56, Pl. 262, Fig. 1141 [*only*].

Occurrence. — Beds with *Scaphites* (Al_3^{1b}); Mender ravine (*No.* 1001) and Mt. Kremennaya (*No.* 102 — *cf.* profile *No.* 5 in Text-fig. 3).

The species *Scaphites (Scaphites) meriani* Pictet & Campiche is known from the Upper Albian of Switzerland (St. Croix — dispar-perinflatum Subzone), France, Rumania, Polish Tatra Mts (*cf.* Passendorfer 1930; Renz 1968), Sardinia and Mallorca (Mortonicératien — Albien *IV* of Wiedmann 1965b), and supposedly of Madagascar (Collignon 1963).

Family **Desmoceratidae** Zittel, 1895
Subfamily **Puzosiinae** Spath, 1922
Genus *PUZOSIA* Bayle, 1878 *
Subgenus *PUZOSIA* Bayle, 1878
Puzosia (Puzosia) mayoriana (d'Orbigny, 1841)

1841. *Ammonites Mayorianus*, d'Orbigny; d'Orbigny, p. 267, Pl. 73, Figs. 1—3.
1923. *Puzosia mayoriana* (d'Orbigny); Spath, p. 42; Text-fig. 10; Pl. 1, Figs 9—10.
1930. *Puzosia Mayoriana* d'Orb.; Passendorfer, pp. 631—633, Pl. 3, Figs 57—58.
1972. *Puzosia mayoriana* (d'Orbigny); Mutiu, p. 143; Pl. 8, Figs 1—2.

Material. — One external cast of a 50—55 mm diameter (*No.* 665).

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU Station (*cf.* Text-fig. 4) .

The species *Puzosia (Puzosia) mayoriana* (d'Orbigny) is known from the Upper Albian of Switzerland, France, Rumania, Polish Tatra Mts, and from various areas of the Soviet Union (North Caucasus, Transcaucasian and Transcaspian).

Puzosia (Puzosia) sharpei Spath, 1923
(Pl. 1, Fig. 11)

1855. *Ammonites planulatus* Sowerby; Sharpe, p. 29; Pl. 12, Fig. 4 [*only*].
1923. *Puzosia sharpei*, sp. nov.; Spath, p. 46; Text-fig. 11b; Pl. 1, Figs 11—12.
1951. *Puzosia sharpei* Spath; Wright & Wright, p. 19.
1968. *Puzosia (Puzosia) sharpei* Spath; Renz, p. 21; Pl. 1, Figs 4, 8.
1971. *Puzosia (Puzosia) sharpei* Spath; Kennedy, p. 36; Pl. 10, Fig. 5; Pl. 14, Fig. 6.

Material. — Three fragments of phragmocones (*No.* 1659, 4055/1, 7651/3a).

Occurrence. — Beds with *Mortoniceras* (Al_3^2); Trudolubovka (*No.* 7651/3a), Prokhladnoe (*No.* 4055/1 — *cf.* profile *No.* 3 in Text-fig. 3), Alma River (*No.* 1659, redeposited in Al_3^{2-3} — *cf.* profile *No.* 6 in Text-fig. 3).

The species *Puzosia (Puzosia) sharpei* Spath is known from the uppermost Albian (Spath 1923) and Cenomanian (Kennedy 1971) of England, Cenomanian of Turkmenia in the Soviet Union (Manija 1974), as well as from the Upper Albian of Switzerland, France, and North Caucasus (Eristavi 1961; Renz 1968).

* The collaboration of Dr. N. Vl. Shimanskaya, University of Moscow, in determination of the *Puzosia* species is here acknowledged.

Puzosia (Puzosia) cf. *communis* Spath, 1923
(Pl. 1, Fig. 12)

Material. — Three badly preserved parts of phragmocones (*No.* 17, 18, 6008/2).

Remarks. — The features observed in the investigated, badly preserved specimens are similar to those of *Puzosia communis* presented by Spath (1923, p. 47; Pl. 2, Fig. 3; Text-fig. 11a) and Renz (1968, p. 20, Pl. 1, Figs 5, 10—11).

Occurrence. — Beds with *Mortoniceras* (Al_3^3); Koyasdzhilga ravine (*No.* 18), Prokhladnoe (*No.* 17, 6008/2 — *cf.* profile *No.* 3 in Text-fig. 3).

The species *Puzosia (Puzosia) communis* Spath is known from the Upper Albian of England, Switzerland, France (Spath 1923; Renz 1968), and supposedly of the North Caucasus (Eristavi 1961, p. 48).

Puzosia (Puzosia) sp.
(Pl. 1, Fig. 13)

Material. — Three badly preserved, diagenetically flattened specimens (*No.* 310, 660/1, 660/2).

Remarks. — The investigated specimens display fine and densely distributed ribs which appear at the mid-lateral part of the whorl and continue to the ventral side; all the ribs are single. These specimens are therefore attributable to the nominative subgenus of *Puzosia* Bayle (*cf.* Wright 1957; Renz 1972, p. 704). Obliteration of sculpture and deformation of the specimens hinders a specific assignation.

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU Station (*cf.* Text-fig. 4).

Family **Hoplitidae** H. Douvillé, 1890
Subfamily **Hoplitinae** H. Douvillé, 1890
Genus *EUHOPLITES* Spath, 1925
Euhoplites inornatus Spath, 1930
(Pl. 1, Fig. 14)

1930. *Euhoplites inornatus*, nom. nov.; Spath, pp. 292—294; Text-fig. 97; Pl. 28, Fig. 5; Pl. 29, Figs 3, 5; Pl. 30, Figs 3—4 (with synonymy).
1947. *Hoplites (Euhoplites) inornatus* Spath; Breistroffer, p. 51.

Material. — One flattened specimen (*No.* 1964).

Biometry (all linear measurements in mm):

	D	Wh	U
No. 1964 (Pl. 1, Fig. 14)	18	7.4	4.6
Ratio to D:		0.41	0.25

Remarks. — In result of poor preservation, the distinct striation on the lateral side (*cf.* Spath 1930, Pl. 28, Fig. 5) is not visible, although peripheral crenulations are well pronounced. The specimen corresponds rather well to "an immature example" illustrated by Spath (1930, Pl. 29, Fig. 5).

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU Station (*cf.* Text-fig. 4).

The species *Euhoplites inornatus* Spath occurs in England and France in the orbignyi Subzone being typical of the bottom parts of this Subzone (*cf.* Spath 1930; Breistroffer 1947; Owen 1971, pp. 127—128).

Genus *CALLIHOPLITES* Spath, 1925
Callihoplites aff. *tetragonus* (Seeley, 1865)
(Pl. 1, Fig. 15)

Material. — One well-preserved specimen (*No.* 7142).

Description. — The whorl section is subhexagonal, the ventral side being narrow and gently raised in indistinct median line. The umbilical wall is low and rounded. The sculpture consists of 11 prominent umbilical tubercles and 18 clavi at the ventro-lateral margin; both tubercles and clavi are indistinctly connected by irregular rough ribs.

Remarks. — The investigated specimen is similar to *Callihoplites tetragonus* (Seeley) presented by Spath (1928, p. 210—213, Pl. 22, Figs 1—2, 9—10, Text-fig. 66); it differs by its smaller width of the ventral side and by thicker but scarcer ribs. On the other hand, it is also similar to *C. vraconensis* (Pictet & Campiche) presented e.g. as *Ammonites vraconensis* by Pictet & Campiche (1860, p. 231, Pl. 31, Fig. 1), *Callihoplites vraconensis* by Spath (1928, p. 208—210, Pl. 22, Fig. 5; Pl. 23, Figs 4—5, 13; Pl. 24, Fig. 10, Text-fig. 65), or *C. vraconensis vraconensis* by Renz (1968, p. 40, Pl. 5, Fig. 3); it differs by its narrower ventral side, and by a smaller number of clavi. As presented by Spath (1928, p. 213, Pl. 23, Fig. 11), there are transitional forms between the two discussed species.

The investigated specimen bears also some resemblances to *Callihoplites auritus* (Sowerby), especially to the forms presented by Spath (1927, p. 197—200, Pl. 17, Fig. 1; Pl. 19, Fig. 2; Text-figs 60—61), from which it differs by a more convex shape, smaller flateness of the ventral side, and by more delicate but more numerous clavi.

Occurrence. — Upper Albian (certainly its topmost part), at Lisogorovka, on the Tuzlov River, Rostov district, southern Donbass.

Family **Brancoceratidae** Spath, 1933
Subfamily **Brancoceratinae** Spath, 1933
Genus *HYSTEROCERAS* Hyatt, 1900
Hysteroceras orbignyi (Spath, 1922)
(Pl. 2, Figs 1 and 3—4)

1840—1842. *Ammonites varicosus*, Sowerby; d'Orbigny, p. 294 [*pars*]; Pl. 87, Fig. 3 [*only*].
1922. *Brancoceras orbignyi*, n.n.; Spath, p. 99.
1934. *Hysteroceras orbignyi* (Spath); Spath, pp. 463—468; Text-figs 161a—d, 166a, 167a—e, 168a; Pl. 49, Fig. 4; Pl. 50, Fig. 2; Pl. 52, Figs 2—4, 8; Pl. 56, Fig. 15.
1947. *Hysteroceras Laferreri* var. *Orbignyi* Spath; Breistroffer, pp. 91—92.
1952. *Hysteroceras orbignyi* Spath; Glazunova, pp. 94—96; Pl. 2, Figs 1—2.
1955. *Hysteroceras orbignyi* (Spath); Reyment, p. 26; Pl. 4, Fig. 1.
1963. *Hysteroceras orbignyi* Spath; Collignon, p. 123; Pl. 289, Figs 1262—1263.
1966. *Hysteroceras orbignyi* Spath; Collignon, p. 17; Pl. 3, Fig. 7.
1968. *Hysteroceras orbignyi* (Spath); Wiedmann & Dieni, pp. 137—138; Text-figs 84—85; Pl. 18, Figs 1—3.
1969. *Hysteroceras orbigny* Spath; Muttu, p. 506; Pl. 3, Figs 2—6.

1971. *Hysteroceras orbignyi* (Spath); Renz, pp. 578—580; Text-figs 2a—e, 3a; Pl. 1, Figs 1—2, 4, 6—8; Pl. 3, Figs 6—7.

1972. *Hysteroceras orbigny* Spath; Mutiu, p. 142; Pl. 6, Figs 6—7.

Material. — One specimen with preserved internal whorls, and two separate fragments (No. 74/74/2, 652, 74/67).

Biometry (all linear measurements in mm):

	D	Wh	U	Ribs
No. 74/74/2 (Pl. 2, Fig. 3)	20	6.4	9	16 (per 1/2 whorl)
Ratio to D:		0.32	0.45	
No. 652 (Pl. 2, Fig. 4)	—	9	—	8 (per ca 1/4 whorl)
No. 74/67 (Pl. 2, Fig. 1)	27?	8.6	10	13? (per ca 1/2 whorl)
		0.32?	0.37?	
	14	4.5	5.5	22 (per 1 whorl)
		0.32	0.39	
	9	3.5	4.4	17 (per 1 whorl)
		0.39	0.49	

Remarks. — Specimens *No.* 74/74/2 and 652 display sigmoidal ribs, some of which bifurcate. These specimens are therefore most similar to those described by Spath (1934, Pl. 56, Fig. 15), Wiedmann & Dieni (1968, Pl. 13, Fig. 2), and Renz (1971, Pl. 1, Fig. 6). Specimen *No.* 74/67 (*cf.* Pl. 2, Fig. 1) represents the forms with a stronger ribbing, and thereby similar to *Hysteroceras varicosum* (J. de C. Sowerby); although it has more features of the species *"orbignyi"* (*cf.* Spath 1934, Pl. 52, Fig. 2; *cf.* also Wiedmann & Dieni 1968, Pl. 13, Fig. 1). According to Renz (1971, *cf.* his synonymy), the specimen presented by Spath (1934, Pl. 52, Fig. 2) is out of the specific variability of *H. orbignyi* (Spath). Due to incomplete preservation, the present authors cannot judge the taxonomic value of the varieties distinguished in the species *"orbignyi"* by Glazunova (1952, pp. 96—97, Pl. 11, Figs 3—4).

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU Station (*cf.* Text-fig. 4).

The species *Hysteroceras orbignyi* (Spath) occurs in England in the uppermost Middle Albian, and primarily in the Upper Albian (orbignyi, varicosum and auritus Subzones, *cf.* Spath 1942)[1]. The species is widely distributed, as it is also known from the Upper Albian of France, Sardinia, Rumania, Morocco, Turkmenia, Madagascar, Nigeria, Angola, and of the Venezuelan Ands (Breistroffer 1947, Glazunova 1952, 1953; Reyment 1955; Collignon 1963, 1966; Wiedmann & Dieni 1968; Mutiu 1969, 1972; Renz 1971).

Hysteroceras cf. *orbignyi* (Spath, 1922)
(Pl. 2, Fig. 2)

Material. — One strongly deformed specimen (No. 74/74/2a).

Remarks. — The investigated specimen displays rather scarcely distributed thick, well pronounced ribs. These features make it similar to the forms described by Renz (1971, Pl. 3, Fig. 6), and assigned to the species *"orbignyi"*. A poor preservation of the specimen hinders its certain determination.

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU Station (*cf.* Text-fig. 4).

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[1] Owen (1971) includes the Diploceras cristatum Subzone into the Upper Albian; in result, the orbignyi Subzone becomes the second of this substage (*cf.* Owen 1971, p. 10), and the range of *H. orbignyi* is limited to the Upper Albian (*cf.* Table 3).

Hysteroceras varicosum (J. de C. Sowerby, 1824) (Pl. 2, Figs 5—6)

1930. *Mortoniceras varicosum* Sow.; Passendorfer, p. 658.
1934. *Hysteroceras varicosum* (J. de C. Sowerby); Spath, pp. 473—478; Text-figs 162 a—e, 164a.
1947. *Hysteroceras varicosum* Sow. sp.; Breistroffer, p. 51.
1969. *Hysteroceras varicosum* Sowerby; Mutiu, pp. 506—507; Pl. 2, Figs 18—19; ?Pl. 8, Fig. 1.
1972. *Hysteroceras varicosum* Sowerby; Mutiu, pp. 142—143; Pl. 7, Figs 1—3.

Material. — One well preserved specimen (*No.* 600), and one fragment (*No.* 74/74/1a).

Biometry (all linear measurements in mm):

	D	Wh	U	Ribs
No. 600 (Pl. 2, Fig. 5)	25	8.4	9.8	21
Ratio to D:		0.34	0.39	

Remarks. — Specimen *No.* 600 displays wedge-shaped, weakly sigmoidal (almost straight) primary ribs which begin with a distinct tubercle at the umbilical margin, and become thicker near to the ventral margin. Between primaries, single and shorter intercalary ribs appear. These features make the specimen similar to the typical form of the species, as presented by Spath (1934, Text-fig. 162 d—e). Having a very scarce material, the present authors cannot recognize the intraspecific variability in the Crimean specimens and make some comparisons with the forms regarded by Spath (1934, Pl. 49, Figs 5, 10—11) as transitional from the species "*varicosum*" to other species or varieties.

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU station (*cf.* Text-fig. 4).

The species *Hysteroceras varicosum* (Sowerby) occurs in England in the lower part of the Mortoniceras inflatum Zone (orbignyi, varicosum Subzones — *cf.* Spath 1942), and in the same position also in France, Rumania (*cf.* Breistroffer 1947; Mutiu 1969, 1972), and in the Polish Tatra Mts (Passendorfer 1930).

Hysteroceras sp. (Pl. 2, Fig. 7)

Material. — One specimen (*No.* 10).

Remarks. — The specimen probably represents an inner part of the phragmocone; it lacks therefore of ornamentation features indicative of a definitive species.

Occurrence. — Beds with *Hysteroceras* (Al_3^{1a}); borehole at the MGU Station (*cf.* Text-fig. 4).

Subfamily **Mortoniceratinae** Spath, 1925
Genus *MORTONICERAS* Meek, 1876
Subgenus *MORTONICERAS* Meek, 1876
Mortoniceras (Mortoniceras) inflatum (J. Sowerby, 1818) (Pl. 3, Fig. 1)

1840—1842. *Ammonites inflatus*, Sowerby; d'Orbigny, pp. 304—307; Pl. 90.
1921. *Mortoniceras inflatum* Sow.; Passendorfer, pp. 244—245 [*pars*]; non Pl. 9, Figs 4—5.
1921. *Subschloenbachia pictetti*, n. nov.; Spath, p. 284.

1921. *Subschloenbachia orbignyi*, n. nov.; Spath, p. 284.
1922. *Subschloenbachia inflata*, J. Sowerby sp.; Spath, p. 101, Text-fig. A, 1.
1922. *Subschloenbachia aequatorialis*, Kossmat sp.; Spath, p. 121 [*pars*].
1930. *Mortoniceras (Subschloenbachia) inflatum* Sow.; Passendorfer, pp. 655—656 [*pars*].
1932. *Mortoniceras (Pervinquieria) inflatum* (J. Sowerby); Spath, pp. 381—391; Text-figs 125, 126 c—d, 127—129, 130 a—b; Pl. 35, Fig. 9; Pl. 37, Fig. 1; Pl. 39, Fig. 2; Pl. 42, Fig. 6; Pl. 43, Fig. 1; Pl. 46, Figs 1—2.
1947. *Pervinquieria inflata* Sow.; Breistroffer, p. 51.
1955. *Pervinquieria inflata* Sow.; Eristavi, pp. 137—138; Pl. 6, Fig. 1.
1962. *Mortoniceras (Perrinquieria) inflatum* Sow.; Chlebowski, pp. 226—227; Text-fig. 4.
1966. *Mortoniceras (Pervinquieria) inflatum* J. Sow.; Collignon, p. 21; Pl. 9, Fig. 2.
1969. *Mortoniceras (Pervinquieria) inflatum* (Sowerby); Hakenberg, p. 105; Pl. 8.

Material. — One specimen, being a part of the phragmocone (*No.* 4102).
Biometry (all linear measurements in mm):

	D	Wh	Wb	Wb/Wh	U
No. 4102 (Pl. 3, Fig. 1)	157	55.5	48	0.86	63
Ratio to D:		0.35	0.30		0.40

Remarks. — According to Wright (1957), the subgenus *Pervinquieria* Böhm is a synonym of the nominative subgenus of *Mortoniceras* Meek, and the present authors accept this statement.

The investigated specimen (*No.* 4102) displays ornamentation, whorl section, and umbilicus width (U : D) very close to those in the specimen illustrated by Spath (1932, Text-fig. 127) and regarded as the variety "*orbignyi*" of the species "*inflatum*". Having a very scarce material, the present authors cannot judge whether the varieties distinguished or accepted by Spath (1932) within the species "*inflatum*" are of intraspecific variability, or are separate subspecies. It may be recalled that some authors interprete the Spath's varieties as separate species, e.g. *M. (M.) inflatum* var. *aequatorialis* (Kossmat) is regarded by Collignon (1966, p. 21, *cf.* his synonymy) as such a separate species.

The synonymy presented by Passendorfer (1921, 1930) shows a much wider understanding of the species "*inflatum*", and some items included into this synonymy represent rather different species (*cf.* Spath 1932). The material presented by Passendorfer from the Tatra Mts is rather badly preserved, and some specimens are difficult to the certain determination: one of them (Passendorfer 1921, Pl. 9, Fig. 5), represents rather *Mortoniceras (M.) pricei* (Spath) or *M. (M.) pachys* (Seeley), whereas another one (Passendorfer 1921, Pl. 9, Fig. 4) seems to be undeterminable. Within the remaining material presented by Passendorfer (1921, 1930), there are however unquestionable specimens of *M. (M.) inflatum* (J. Sowerby).

Occurrence. — Beds with *Mortoniceras* (Al_3^2) at Prokhladnoe (*cf.* profile *No.* 3 in Text-fig. 3).

The species *Mortoniceras (Mortoniceras) inflatum* (J. Sowerby) is widely distributed; it is known from the Upper Albian of England (auritus and aequatorialis Subzones), and in the similar position from France, Holy Cross Mts and Tatra Mts in Poland, Morocco, Georgia and Transcaspian in the Soviet Union, and Angola (d'Orbigny 1840; Passendorfer 1921, 1930; Spath 1922, 1932; Breistroffer 1947; Glazunova 1953; Eristavi 1955; Chlebowski 1962; Collignon 1966; Hakenberg 1969).

Mortoniceras (Mortoniceras) pricei (Spath, 1922)
(Pl. 2, Figs 8—9)

1922. *Subschloenbachia pricei*, n.n.; Spath, p. 101.
1932. *Mortoniceras (Pervinquieria) pricei* (Spath); Spath, pp. 391—395; Text-figs 130c, 131—132; Pl. 36, Figs 11—12; Pl. 37, Fig. 3.

1947. *Pervinquieria Pricei* Spath; Breistroffer, p. 52.
1956. *Mortoniceras (Mortoniceras) pricei* (Spath); Reyment, pp. 31—33; Pl. 4, Fig. 10.
1966. *Mortoniceras (Pervinquieria) pricei* Spath; Collignon, p. 23; Pl. 9, Fig. 5.
1971. *Mortoniceras (Mortoniceras) pricei* (Spath); Renz, pp. 595—596; Text-figs 5f—g, 7i; Pl. 4, Fig. 2; Pl. 8, Fig. 2; Pl. 9, Fig. 2.

Material. — Two specimens, one of which is well preserved (*No.* 9045/2), and the other being only a fragment (*No.* 5078).

Biometry (all linear measurements in mm).

	D	Wh	Wb	$\frac{Wb}{Wh}$	U
No. 9045/2 (Pl. 2, Fig. 3)	88	37.8	32	0.85	29.7
Ratio to D:		0.43	0.36		0.34
No. 5078 (Pl. 2, Fig. 9)	—	33	29.6	0.90	—

Remarks. — Specimen *No.* 9045/2 matches well to the holotype (*cf.* Spath 1932, Text-fig. 131), and it is close to the specimens presented by Renz (1971, Pl. 8, Fig. 2; Pl. 9, Fig. 2). The other specimen (*No.* 5078) also displays ornamentation features indicative of this species.

Since within the species *Mortoniceras (Mortoniceras) pricei* (Spath) distinguished are various subspecies or varieties (*cf.* Spath 1932; Collignon 1966; Renz 1971), the stratigraphic range and geographic distribution are listed below generally for the species only.

Occurrence. — Beds with *Mortoniceras* (Al_3^2); Alma River (*No.* 9045/2 — redeposited in Al_3^{2-3}, *cf.* profile *No.* 8 in Text-fig. 3), and at Trudolubovka (*No.* 5078 — redeposited in Al_3^3, *cf.* Fig. 5A).

The species *Mortoniceras (Mortoniceras) pricei* (Spath) is widely distributed, and it is known from the lower part of the Upper Albian of England (orbignyi, varicosum and auritus Subzones), France, Transcaspian, Morocco, Algeria, Nigeria, Madagascar and Zululand, as well as the Venezuelan Ands (Spath 1932; Glazunova 1953; Reyment 1955; Collignon 1966; Renz 1971).

Mortoniceras (Mortoniceras) stoliczkai (Spath, 1921) (Pl. 4, Fig. 1)

1921. *Subschloenbachia stoliczkai*, nov.; Spath, p. 284.
1922. *Subschloenbachia stoliczkai*, Spath; Spath, pp. 119—120; Text-fig. C.
1932. *Mortoniceras (Pervinquieria) stoliczkai*, Spath, sp.; Spath, pp. 385, 389; Text-fig. 126 e—f.
1947. *Pervinquieria (Subschloenbachia) Stoliczkai* Spath var.; Breistroffer, p. 61.
1966. *Mortoniceras (Pervinquieria) stoliczkai* Spath; Collignon, p. 154; Pl. 303, Fig. 1307.

Material. — One well preserved fragment, being more than a half-whorl (*No.* 4100), and containing both a part of the phragmocone and of the body chamber.

Biometry (all linear measurements in mm):

	D	Wh	Wb	$\frac{Wb}{Wh}$	U
No. 4100 (Pl. 4, Fig. 1)	133.2	38.5	40.5	1.05	63.7
Ratio to D:		0.29	0.30		0.48

Remarks. — The investigated specimen, by its whorl section and the presence of pronounced, stretching-out, and sharp latero-ventral nodes (besides, there also are smaller mediolateral and umbilical ones), displays the diagnostic features presented by Spath (1921, 1922). It is most similar to a specimen illustrated by

Collignon (1963, Pl. 303, Fig. 1307), although it has a wider umbilicus (U : D = 0.48, while in the Collignon's specimen U : D = 0.41).

Occurrence. — Beds with *Mortoniceras* (Al_3^2) at Mt. Kizil-Tshugir redeposited at the bottom of Al_3^3 — *cf.* profille *No.* 7 in Text-fig. 3).

The species *Mortoniceras (Mortoniceras) stoliczkai* (Spath) is known from the Upper Albian of France, India, Madagascar and Angola (Spath 1922; Breistroffer 1947; Collignon 1966).

Mortoniceras (Mortoniceras) rostratum (J. Sowerby, 1817) (Pl. 5, Fig. 1 and Pl. 9, Fig. 2)

1922. *Subschloenbachia rostrata*, J. Sowerby sp.; Spath, p. 101; Text-fig. A, 2.
?1930. *Mortoniceras* sp. cf. *rostratum* Sow.; Passendorfer, pp. 658—659.
1932. *Mortoniceras (Pervinquieria) rostratum* (J. Sowerby); Spath, pp. 400—405; Text-figs 136 a—b, 139 f—g, 136; Pl. 34, Fig. 5; ?Pl. 38, Fig. 4; Pl. 40, Fig. 1 [*only*].
1947. *Pervinquieria (Subschloenbachia) rostrata* Sow. sp.; Breistroffer, p. 61.
[non] 1960. *Mortoniceras (Pervinquieria) rostratum* (Sowerby); Cieśliński, pp. 12—13; Pl. 5, Figs 1—2 [= *Mortoniceras* (Mortoniceras) *inflatum* (J. Sowerby)].
[non] 1962. *Mortoniceras (Perrinquieria) rostratum* Sow.; Chlebowski, p. 227, Text-fig. 5 [= = *Mortoniceras (Mortoniceras) aff. inflatum* (J. Sowerby)].
1963. *Mortoniceras (Pervinquieria) rostratum* J. Sow.; Collignon, p. 156; Pl. 304, Fig. 1306.
1966. *Mortoniceras (Pervinquieria) rostratum* J. Sow.; Collignon, p. 21; Pl. 9, Fig. 3.

Material. — Two specimens, one of which (*No.* 4063/4) attains a diameter of 189 mm, but its body chamber is diagenetically deformed (flattened laterally) in a similar way as in the holotype illustrated by Spath (1932, Text-fig. 136). The other specimen (*No.* 4063/2) is of a 115 mm diameter; it is poorly preserved and its external part is also laterally flattened.

Biometry (all linear measurements in mm); presented only for undeformed parts of the specimens:

	D	Wh	Wb	$\frac{Wb}{Wh}$	U
No. 4063/4 (Pl. 5, Fig. 1)	177	63	50.6	0.80	73.8
Ratio to D:		0.35	0.28		0.42
	140	48.5	49.5	1.02	57
		0.35	0.35		0.41
	115	45	46.5	1.03	—
		0.39	0.40		—

Remarks. — Specimen No. 4063/4 (*cf.* Pl. 5, Fig. 1a) displays a forward leaning of single ribs on the most external part of the last whorl, their arching suggesting a nearby aperture (*cf.* Spath 1932, Text-fig. 136). In specimen *No.* 4063/2, regardless its smaller diameter, the single ribs featured with well pronounced mediolateral nodes are visible (*cf.* Pl. 9, Fig. 2a); this ornamentation points to the youngest part of the phragmocone and, maybe, to a part of the body chamber (*cf.* Spath 1932; Collignon 1963, Pl. 304, Fig. 1308).

The investigated specimens display well pronounced and spiny mediolateral nodes, and therefore also a characteristic section of the whorl; flattening of external nodes and their elongation parallel to the keel; and comparably smaller dimensions. They correspond therefore to the species "rostratum", and differ from the aforediscussed species *M. (M.) inflatum* to which some resemblances they have (*cf.* also Spath 1932).

Occurrence. — Beds with *Mortoniceras* (Al_3^2); the area between the Shara and Mender ravines.

The species *Mortoniceras (Mortoniceras) rostratum* (J. Sowerby) is known from the Upper Albian of England (substuderi and dispar-perinflatum Subzones), France, Morocco, Madagascar, Angola (Spath 1922, 1932; Breistroffer 1947; Collignon 1963; 1966), and supposedly from the Tatra Mts (Passendorfer 1930).

Subgenus *DURNOVARITES* Spath, 1932
Mortoniceras (Durnovarites) perinflatum (Spath, 1922)
(Pl. 6, Figs 1—2)

1859. *Ammonites inflatus*, Sow.; Pictet & Campiche, pp. 178—181; Pl. 21, Fig. 5; Pl. 22, Fig. 3 [*only*].
1922. *Subschloenbachia* sp. nov. aff. *perinflata*, n. n.; Spath, p. 113; Text-fig. B, 1.
1933. *Mortoniceras (Durnovarites) perinflatum* (Spath); Spath, pp. 430—431; Text-fig. 150; Pl. 40, Fig. 2.
1933. *Mortoniceras (Durnovarites) quadratum* (Spath); Spath, pp. 432—433; Text-fig. 151; Pl. 45, Fig. 3; Pl. 46, Fig. 6; Pl. 49, Fig. 12.
1947. *Pervinquieria (Durnovarites) perinflata* Spath; Breistroffer, p. 61.
1968. *M. (Durnovarites) perinflatum* (Spath); Wiedmann & Dieni, pp. 142—144; Text-fig. 92; Pl. 14, Figs 3—4.
1968. *M. (Durnovarites) quadratum* (Spath); Wiedmann & Dieni, p. 145; Text-fig. 93.
1968. *Mortoniceras (Durnovarites) perinflatum* (Spath); Renz, pp. 51—53; Text-figs 17a, 18c, 19c, f; Pl. 8, Figs 3, 5, 9; Pl. 9, Figs 1—2.

Material. — One specimen (*No.* 4063/1) being a bigger part of the phragmocone, and the other being a part of a single whorl (*No.* 5001).

Biometry (all linear measurements in mm):

	D	Wh	Wb	Wb/Wh	U
No. 4063/1 (Pl. 6, Fig. 1)	100.4	98	45.2	1.19	33.6
Ratio to D:		0.98	0.45		0.33
No. 5001 (Pl. 6, Fig. 2)		39.5	44.5	1.13	

Remarks. — Renz (1968) when investigating ontogenic changes in ornamentation, stated that the forms included by Spath (1933) into a separate species, *M. (D.) quadratum*, belong actually to the species *"perinflatum"*, and this opinion is accepted by the present authors. Specimen *No.* 4063/1 does not deviate from the typical specimens, and it is most similar to those presented by Wiedmann & Dieni (1968, Pl. 14, Fig. 3) and Renz (1968, Pl. 9, Figs 1—2), although it is slightly less involute (U : D = = 0.33). Specimen *No.* 5001 corresponds well to that presented by Renz (1968, Pl. 9, Fig. 2).

Occurrence. — Beds with *Mortoniceras* (Al_3^2); the area between the Shara and Mender ravines (No. 4063/1) and Koyasdzhilga ravine (*No.* 5001).

The species *Mortoniceras (Durnovarites) perinflatum* (Spath) is known from the uppermost Albian of England (dispar-perinflatum Subzone), France, Switzerland, Sardinia and Angola (Spath 1922, 1933; Breistroffer 1947; Wiedmann & Dieni 1968; Renz 1968).

Mortoniceras (Durnovarites) postinflatum Spath, 1933
(Pl. 7, Fig. 1 and Pl. 8, Fig. 1)

1933. *Mortoniceras (Durnovarites) postinflatum*, sp. n.; Spath, pp. 433—434; Pl. 40, Fig. 5 [*only*].
1947. *Pervinquieria (Durnovarites) postinflata* Spath; Breistroffer, p. 61.

1968. *Mortoniceras (Durnovarites) postinflatum* (Spath); Renz, pp. 53—54; Text-figs 17b, d, 18b, 19 a—b, d; Pl. 8, Figs 1—2, 6.

Material. — Two well preserved specimens, one of which (No. 4063/3) is the phragmocone with the deformed body chamber (deformation is marked within the diameter range of 121—191 mm, and this part is ommitted for measurements). The other specimen (No. 4101) is a part of the phragmocone.

Biometry (all linear measurements in mm):

	D	Wh	Wb	$\frac{Wb}{Wh}$	U
No. 4063/3 (Pl. 7, Fig. 1)	104	45.5	66	1.45	34
Ratio to D:		0.44	0.63		0.33
No. 4101 (Pl. 8, Fig. 1)	118.4	45	64	1.42	45
Ratio to D:		0.38	0.54		0.38

Remarks. — The investigated specimens display whorls wider than high (*cf.* biometry), and broader ventral side with a relatively flat keel. In specimen *No.* 4063/3, the external nodes (4th row) are well pronounced and sharp, pressed forwardly. A rapid increase in the whorl width, and the presence and shape of the external nodes are typical of the species *"postinflatum"*; they are different from those in the aforediscussed species *M. (D.) perinflatum* (*cf.* Spath 1933; Renz 1968). Both Spath (1933) and Renz (1968) had only the phragmocones of the species "postinflatum", so there is no possibility of comparing the body chambers. The authors' specimen (*No.* 4063/3) has its body chamber almost complete which is featured by single, thick ribs slightly leaning forwards. A stronger leaning is visible in the terminal part of the body chamber, which is a feature of many species of *Mortoniceras* (*cf.* Pl. 7, Fig. 1a). The ribs on the body chamber are not so sharply pronounced as those on the internal whorls, and the marginal nodes (of the 3rd and 4th rows) joint into one, double node.

Occurrence. — Beds with *Mortoniceras* (Al_3^2); the right edge of the Shara ravine (*No.* 4101 — *cf.* profile *No.* 4 in Text-fig. 6), and the area between Shara and Mender ravines (No. 4063/3).

The species *Mortoniceras (Durnovarites) postinflatum* (Spath) is known from the uppermost Albian of England (disar-perinflatum Subzone), France and Switzerland (Spath 1933; Breistroffer 1947; Renz 1968).

Mortoniceras (Durnovarites) subquadratum subquadratum Spath, 1933 (Pl. 6, Fig. 3)

1933. *Mortoniceras (Durnovarites) subquadratum*, sp. nov.; Spath, pp. 435—436; Pl. 37, Fig. 6; Pl. 43, Fig. 7; Pl. 44, Fig. 6; Pl. 45, Fig. 5; Pl. 47, Figs 2—4; Pl. 48, Fig. 2.

1947. *Pervinquieria (Durnovarites) subquadrata* Spath; Breistroffer, pp. 61—62.

1951. *Durnovarites spinosum* n. sp.; Van Hoepen, pp. 323—324; Text-figs 380—383.

1955. *Mortoniceras (Durnovarites) quadratum* (Spath); Reyment, p. 36; Text-fig. 15; Pl. 6, Figs 4—5; Pl. 7, Fig. 3.

1968. *M. (Durnovarites) subquadratum subquadratum* Spath; Wiedmann & Dieni, p. 142; Text-fig. 90; Pl. 18, Fig. 9.

1968. *Mortoniceras (Durnovarites) subquadratum subquadratum* Spath; Renz, pp. 55—56; Text-fig. 17f_1, f_2; Pl. 7, Figs 8, 10; Pl. 10, Figs 1—4, 7—8.

Material. — One specimen being a half-whorl (*No.* 9045/2a).

Biometry (all linear measurements in mm):

	D	Wh	Wb	$\frac{Wb}{Wh}$	U
No. 9045/2a (Pl. 6, Fig. 3)	38.3	13	14	1.08	14.6
Ratio to D:		0.34	0.36		0.38

Remarks. — The investigated specimen displays ornamentation and whorl section very similar to that of the form presented by Renz (1968, Pl. 10, Fig. 3). The ratio U : D (= 0.38) is, however, slightly smaller than in typical specimens of the subspecies *"subquadratum"* (*cf.* biometry by Spath 1933; Renz 1968).

Occurrence. — Beds with *Mortoniceras* (Al_3^2): Alma River (redeposited in Al_3^{2-3} — *cf.* profile *No.* 6 in Text-fig. 3).

The subspecies *Mortoniceras (Durnovarites) subquadratum subquadratum* Spath is known from the uppermost Albian of England (dispar-perinflatum Subzone), France, Switzerland, Sardinia, Nigeria and South Africa (Spath 1933; Breistroffer 1947; Van Hoepen 1951; Reyment 1955; Wiedmann & Dieni 1968; Renz 1968).

Mortoniceras (Durnovarites) vraconense Renz, 1968
(Pl. 9, Fig. 1)

1968. *Mortoniceras (Durnovarites) vraconense* n. sp.; Renz, p. 54; Text-fig. 19e; Pl. 7, Figs 6—7, 11.

Material. — One specimen (*No.* 1003/1), being the phragmocone with a part of the damaged body chamber.

Biometry (all linear measurements in mm):

	D	Wh	Wb	$\frac{Wb}{Wh}$	U
No. 1003/1 (Pl. 9, Fig. 1)	130.5	?46.2	?49	?1.06	45.5
Ratio to D:		? 0.35	? 0.37		0.35
	96	43.8	52	1.19	?31.5
		0.46	0.54		? 0.33

Remarks. — Renz (1968), when establishing the species *"vraconense"*, had only parts of phragmocones at his disposal. The presence of the body chamber in the authors' specimen allows to complete the specific description.

In the investigated specimen, the internal whorls are wider than high, but an increase in the whorl thickness turns gradually smaller (*cf.* biometry). There are four rows of strongly pronounced nodes (primarily the umbilical and latero-ventral ones), which dominate over the connecting ribs. On the ventral side, the external nodes are pressed forwardly. In the chambered part, the ribs bifurcate from an umbilical node, whereas on the body chamber the ribs become single and scarcely distributed. In some places of the body chamber, the well pronounced umbilical nodes are still discernible. Ornamentation of the internal whorls is most similar to that in the paratype presented by Renz (1968, Pl. 7, Fig. 6) which is an internal part of the phragmocone with the Wb/Wh ratio higher (1.30) and umbilical width smaller (U : D = 0.30) than in the investigated specimen (*cf.* biometry).

Occurrence. — Beds with *Mortoniceras* (Al_3^2); the area between the Shara and Mender ravines.

The species *Mortoniceras (Durnovarites) vraconense* Renz occurs in the uppermost Albian of the Sainte-Croix section (type Vraconian) in Switzerland (Renz 1968).

Mortoniceras (Durnovarites) sp.
(Pl. 6, Fig. 4)

Material. — One badly preserved specimen (*No.* 1003/2).
Biometry (all linear measurements in mm):

	D	Wh	Wb	Wb/Wh	U
No. 1003/2 (Pl. 6, Fig. 4)	113.5	43	43.5	1	47.2
Ratio to D:		0.38	0.38		0.41

Remarks. — The investigated specimen displays latero-ventral and ventral nodes (others are missing due to poor preservation). The keel runs along a shallow furrow. The whorl section is subquadrate. In some places of the external side, single and massive ribs are discernible; they supposedly point to the body chamber, similarly as in other species of *Mortoniceras*. The whorl section, umbilical width (U : D = = 0.41), and a strong, forward arching of ribs on the ventral side, make the specimen similar to *Mortoniceras (Durnovarites) subnanum* (Breistroffer), although all the hitherto known specimens of this species are much smaller (*cf.* Renz 1968). A bad preservation (lack of sculpture on the sides of whorls) hinders a specific determination of the examined specimen.

Occurrence. — Beds with *Mortoniceras* (Al_3^2); the area between the Shara and Mender ravines.

Mortoniceras sp.

Material. — Two badly preserved fragments of whorls (*No.* 6018 and 104).

Description. — Specimen *No.* 104 displays the whorl section higher than wide (Wb : Wh = 0.87), and is ornamented with the ribs leaning strongly forward and continuing onto the ventral side. The ribs are covered by nodes; some of the ribs bifurcate, and the position point is marked by a node. A total number of nodes on a rib, as may be estimated in poorly preserved material, is at least three.

Specimen *No.* 6018 displays the whorl section wider than high (Wb : Wh = 1.16), and is ornamented by straight, massive, single ribs and nodes. Every rib has three nodes — umbilical, mediolateral, and latero-ventral, the latter of which are the largest and straddle the marginal part of the ventral side. The keel is thick and runs along a shallow furrow. All these features seem to decide upon the attribution of the specimens to *Mortoniceras (Mortoniceras)* sp., but a very unconvenient state of their preservation hinders their more exact recognition.

Occurrence. — Beds with *Mortoniceras* (Al_3^2) at Verkhoretshe (*No.* 104), and the area between the Shara and Mender ravines (No. 6018).

Genus *PROHYSTEROCERAS* Spath, 1921
Subgenus *GOODHALLITES* Spath, 1932
Prohysteroceras (Goodhallites) tauricense sp. n.
(Pl. 6, Fig. 5)

Holotype: the specimen presented in Pl. 6, Fig. 5.
Type horizon: Upper Albian.
Type locality: beds with *Mortoniceras* (Al_3^2) in the Koyasdzhilga ravine, Crimea, Soviet Union.
Derivation of the name: Tauricа — Latin name of the mountain, coastal part of Crimea.

Diagnosis. — The whorls moderately high, ornamentation irregular, consisting of pronounced, single and bifurcate, thick ribs terminated with bullae. Venter relatively broad, keeled and moderately fastigate.

Material. — One specimen, being a well preserved part of the phragmocone (*No.* 5000).

Biometry (all linear measurements in mm):

	D	Wh	Wb	Wb/Wh	U
No. 5000 (Pl. 6, Fig. 5)	98.9	42.5	34.2	0.80	33.2
Ratio to D:		0.43	0.34		0.33

Description. — The whorls involute in one-third. The whorl higher than wide (Wb : Wh = 0.80), with flat, slightly converging sides (*cf.* Pl. 6, Fig. 5b). Venter relatively broad and fastigate, featured with a keel. Umbilical wall high and vertical. The ribs are weakly sigmoid, thick and well pronounced. On the inner part of the whorl, short massive ribs appear at the umbilical margin, and at a short distance turn into either a bulla or a flat tubercle. At the bullae, the ribs bifurcate and continue on the ventral side and lean here forward. On the more external part of the whorl, the ribs are single, start on the umbilical margin and becoming gradually thicker turn into bullae on the latero-ventral margin (*cf.* Pl. 6, Fig. 5c). Between single ribs, the intercalary ones appear, and on the ventral side they become shaped the same as the main ribs. On a whorl there are 36 ribs on average, 22 of which begin at the umbilical margin.

Remarks. — The species *Prohysteroceras (Goodhallites) tauricense* sp. n., as featured by its flat sides, the whorl section, and the absence of nodes on the latero-ventral margin, is close to *Prohysteroceras* sp. indet. presented by Spath (1922, pp. 146—147; Pl. 4, Fig. 12).

The species *P. (G.) tauricense* sp. n., by general shape of the whorls, their proportions and ornamentation, is also close to *P. (G.) goodhalli* (J. Sowerby), from which it differs by the following features:

(i) the presence of bullae on the ribs, both near to the umbilicus and on the latero-ventral margin; in the species "*goodhalli*", at the similar diameter, the nodes appear (*cf.* Spath 1934, Text-fig. 154; Renz 1971, Pl. 3, Fig. 15);

(ii) thicker and more pronounced ribs;

(iii) smaller height of the whorl: in *P. (G.) tauricense* sp. n. the ratio Wb : Wh = 0.80, whereas in *P. (G.) goodhalli* (J. Sowerby), its various varieties *sensu* Spath (1934) including, at the diameter of 15 to 145 mm, the ratio Wb : Wh ranges in limits of 0.77—0.56, reaching usually rather the latter value (*cf.* biometry in Spath 1934; Renz 1971).

Occurrence. — Beds with *Mortoniceras* (Al_3^2), Koyasdzhilga ravine.

Family Lyelliceratidae Spath, 1921
Genus *STOLICZKAIA* Neumayr, 1875
Subgenus *STOLICZKAIA* Neumayr, 1875
Stoliczkaia (Stoliczkaia) notha notha (Seeley, 1865)
(Pl. 8, Fig. 2 and Pl. 9, Figs 3—4)

1860. *Ammonites dispar*, d'Orb.; Pictet & Campiche, pp. 264—267; Pl. 38, Fig. 7 [*only*].
1931. *Stoliczkaia notha* (Seeley); Spath, pp. 335—337; Text-fig. 110 a—c; Pl. 31, Figs 1, 11; Pl. 32, Fig. 6.

1947. *Stoliczkaia notha* Seel. sp.; Breistroffer, p. 62.
1968. *Stoliczkaia (Stoliczkaia) notha notha* (Seeley); Renz, p. 50; Text-fig. 16g; Pl. 6, Fig. 11.

Material. — Three fragments, two of which (*No.* 4025 and 7651/3) are parts of the phragmocone, and the other (*No.* 7660/1) is the body chamber.

Biometry (all linear measurements in mm):

	Wh	Wb	Wb/Wh
No. 4025 (Pl 8, Fig. 2)	19.5	13	0.66
No. 7660/1 (Pl. 9, Fig. 3)	43.5	27.5	0.63

Remarks. — Specimen *No.* 4025 matches well to that presented by Spath (1931, Pl. 32, Fig. 6), while one *No.* 7651/3 (*cf.* Pl. 9, Fig. 4) has the preserved sutures, and it is almost identical with the holotype illustrated by the same author (Spath 1931, Text-fig. 110 a–c). In the specimen being the body chamber (No. 7660/1), the ribs gradually vanish towards the aperture in a way similar to that presented by Renz (1968, Pl. 6, Fig. 11).

Occurrence. — Beds with *Stoliczkaia* (Al_3^3): Trudolubovka (*No.* 7651/3 — Bodrak River), Mt. Selbukhra (*No.* 7660/1), Prokhladnoe (*No.* 4025 — collected in the scree; it might come from the beds with *Mortoniceras*).

The subspecies *Stoliczkaia (Stoliczkaia) notha notha* (Seeley) is known from the uppermost Albian (substuderi and dispar-perinflatum Subzones) of England, France, Switzerland and Sardinia (Spath 1931; Breistroffer 1947; Renz 1968).

Stoliczkaia (Stoliczkaia) notha cf. *inflata* Spath, 1931
(Pl. 8, Fig. 3)

1931. *Stoliczkaia notha* (Seeley) var. *inflata*, nov.; Spath, pp. 335–337; Pl. 31, Figs 6, 8.
1947. *Stoliczkaia notha* var. *inflata* Spath; Breistroffer, pp. 62, 65.
1968. *Stoliczkaia notha inflata* Spath; Renz, p. 50; Pl. 6, Fig. 8.

Material. — One fragment of the whorl (*No.* 7660/2).

Biometry (all linear measurements in mm):

	Wh	Wb	Wb/Wh
No. 7660/2 (Pl. 8, Fig. 3)	35.5	20.5	0.58

Remarks. — The investigated specimen is ornamented closely to that presented by Renz (1968, Pl. 6, Fig. 8), the former being a part of the body chamber. A fragmentary material hinders its subspecific assignation.

Occurrence. — Beds with *Stoliczkaia* (Al_3^3), southern slope of the Mt. Selbukhra (*cf.* profile *No.* 2 in Text-fig. 3).

The subspecies *Stoliczkaia (Stoliczkaia) notha inflata* Spath is known from the uppermost Albian (dispar Zone) of England and France; in the Sainte-Croix section in Switzerland it occurs in its topmost part (Spath 1931; Breistroffer 1947; Renz 1968).

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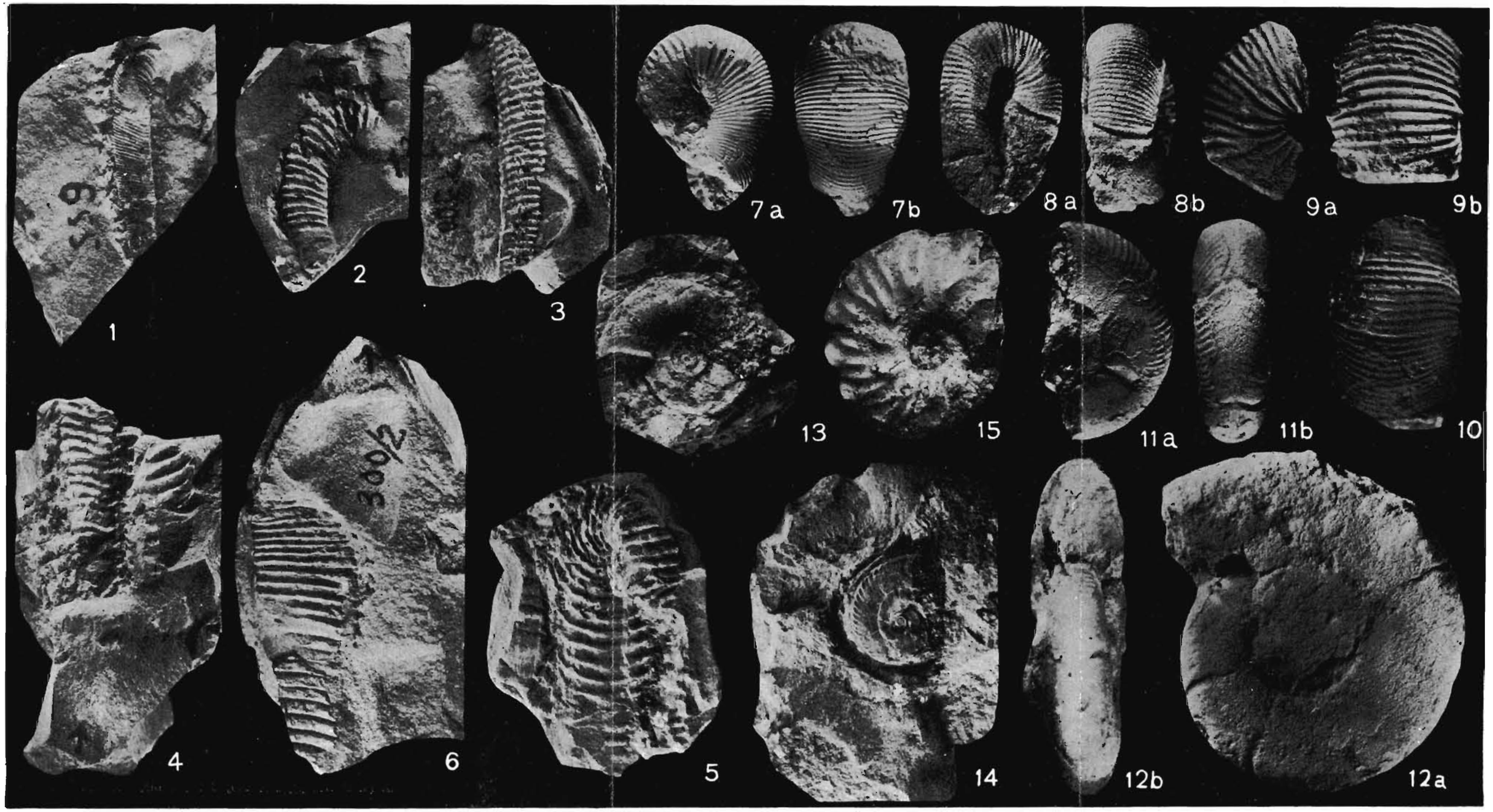
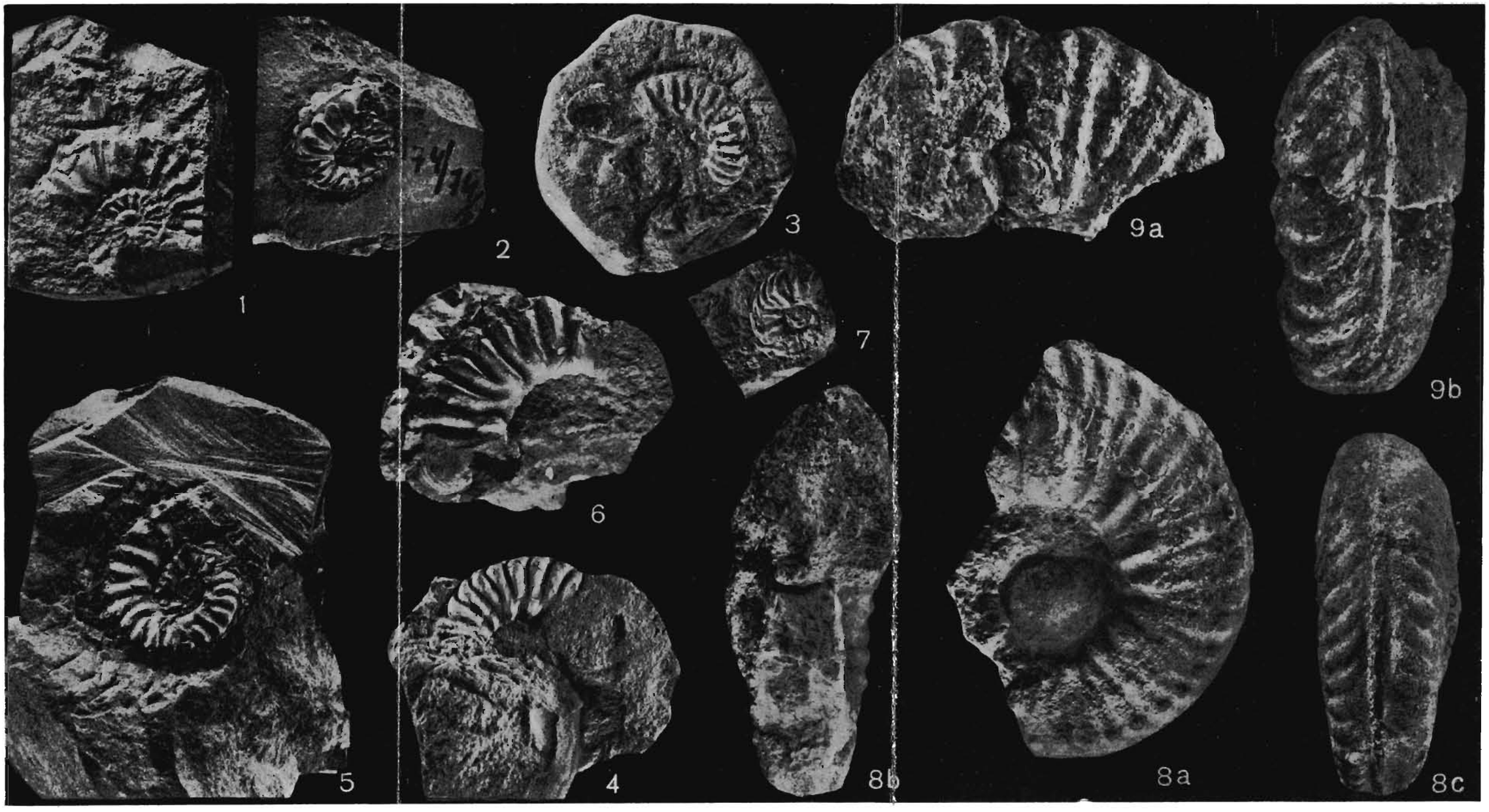


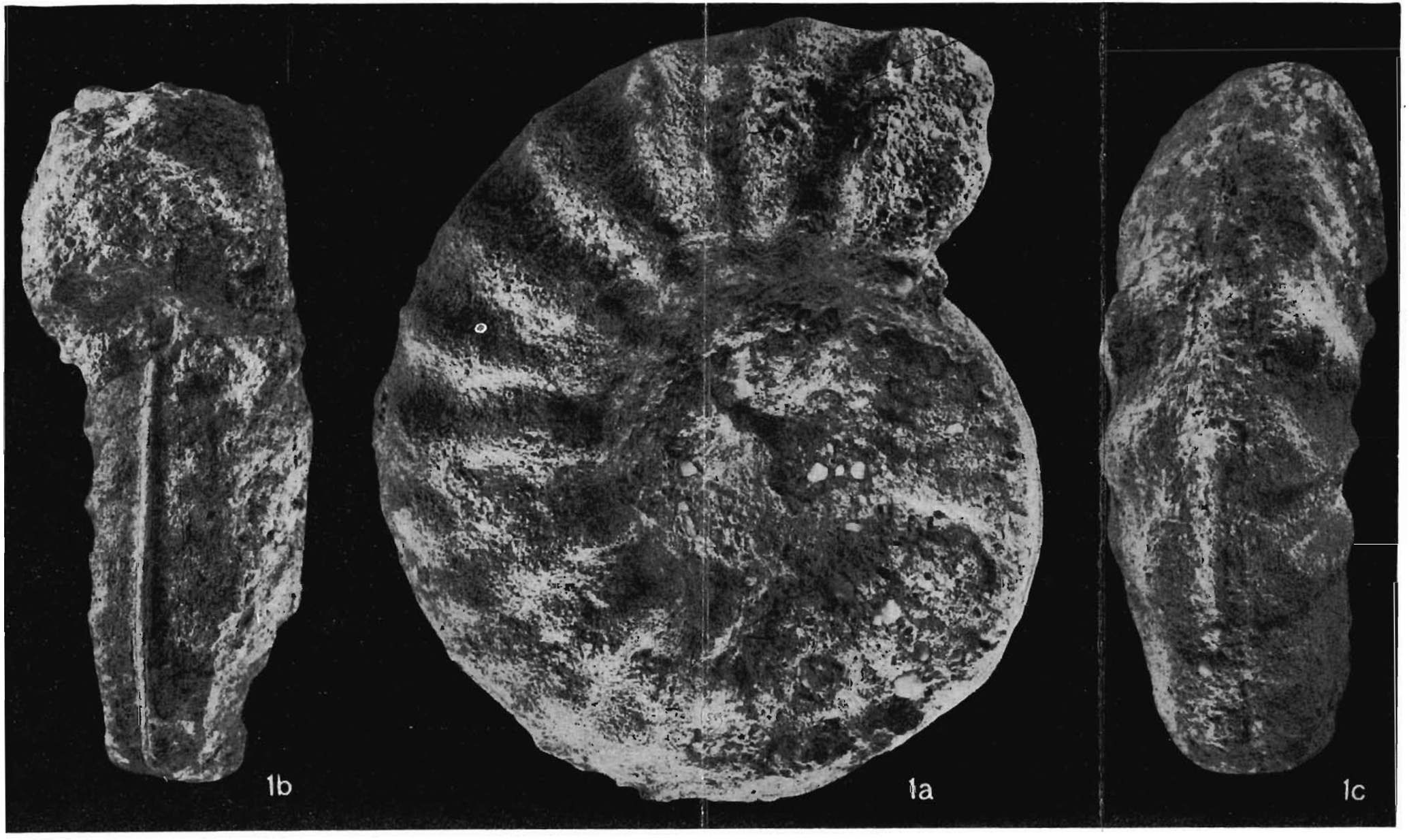
1 *Hamites (Plesiohamites) similis* (Casey), specimen No. 655; **2** *H. (Hamites) compressus* J. Sowerby, No. 139; **3** *H. (Hamites)* aff. *attenuatus* J. Sowerby, No. 300; **4** *H. (Stomohamites) virgulatus* Brongniart, No. 670/2; **5** the same, No. 670/1; **6** Hamites sp., No. 300/2; **7** *Scaphites (Scaphites) simplex* Jukes-Browne, No. 101; **8** *S. (Scaphites)* cf. *hugardianus* d'Orbigny, No. 6319; **9** *S. (Scaphites)* sp. [close to *S. (S.) meriani* Pictet & Campiche], No. 102; **10** the same, No. 1001; **11** *Puzosia (Puzosia) sharpei* Spath, No. 7651/3a; **12** *P. (Puzosia)* cf. *communis* Spath, No. 18; **13** *P. (Puzosia)* sp., No. 310; **14** *Euhoplites inornatus* Spath, No. 1964; **15** *Callihoplites* aff. *tetragonus* (Seeley), No. 7142

Figs 1—8 and 13—14 × 1.5; Figs 7—10 × 2; Figs 11—12 and 15 nat. size

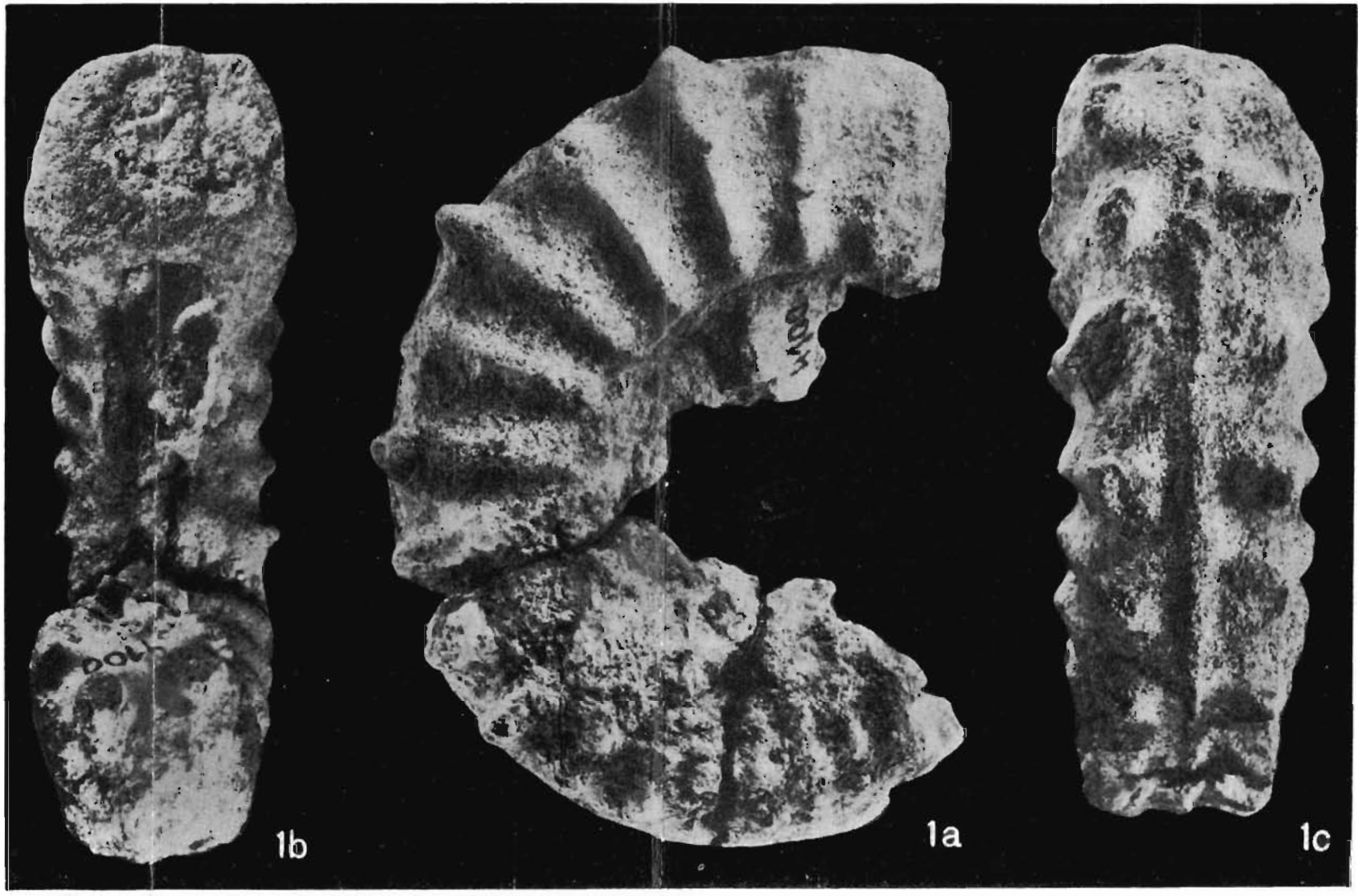


1 *Hysteroceras orbignyi* (Spath), specimen No. 74/67; 2 *H.* cf. *orbignyi* (Spath), No. 74/74/2a; 3 *H. orbignyi* (Spath), No. 74/74/2; 4 the same, No. 652; 5 *H. varicosum* (J. Sowerby), No. 600; 6 the same, No. 74/74/1a; 7 *Hysteroceras* sp., No. 10; 8 *Mortoniceras (Mortoniceras) pricei* (Spath), No. 9045/2; 9 the same, No. 5078

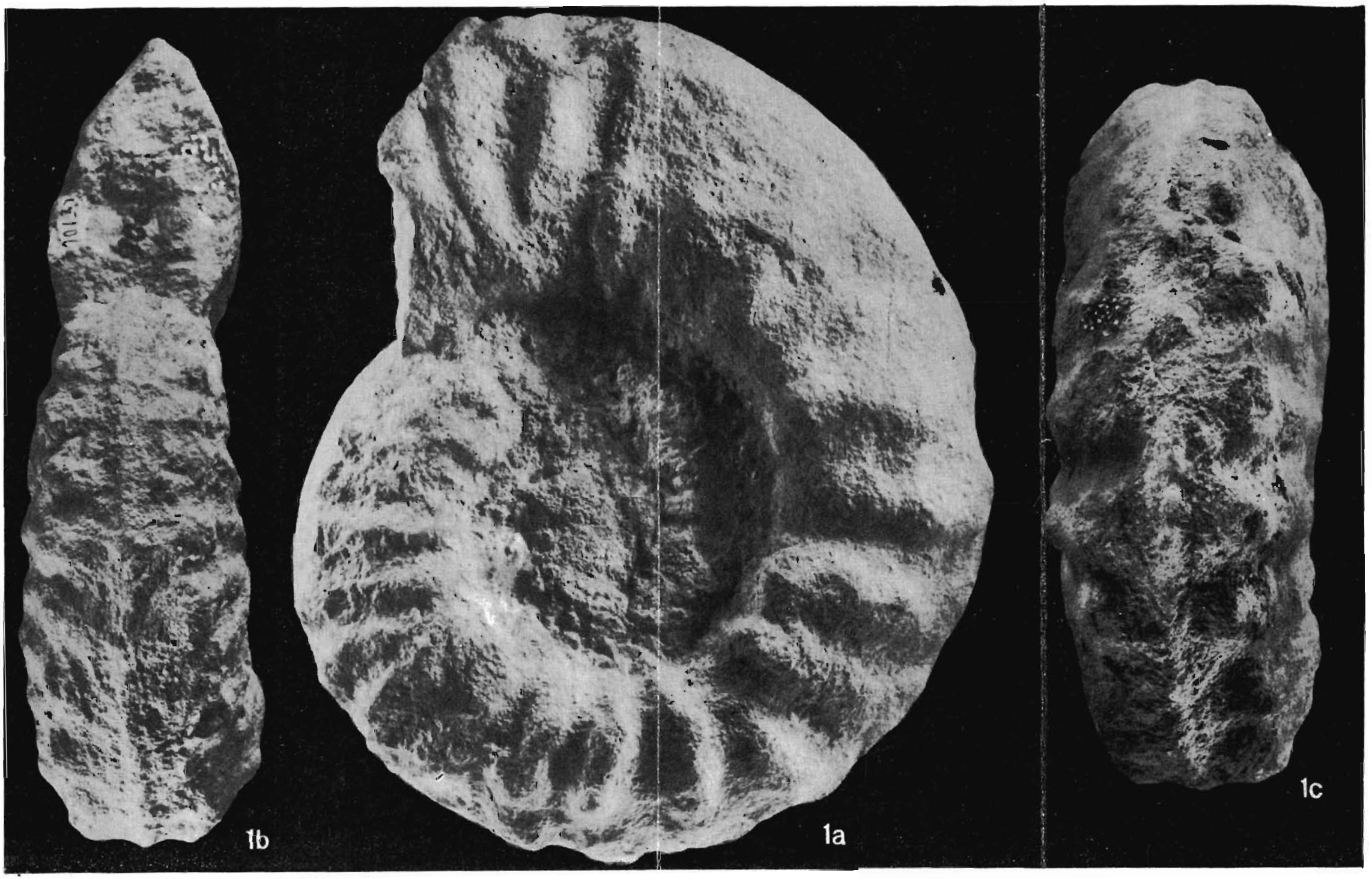
Figs 1—7 and 9 × 1.5; Fig. 8 nat. size



1 *Mortoniceras (Mortoniceras) inflatum* (J. Sowerby); specimen No. 4102, nat. size



1 *Mortoniceras (Mortoniceras) stoliczkai* (Spath); specimen No. 4100, nat. size



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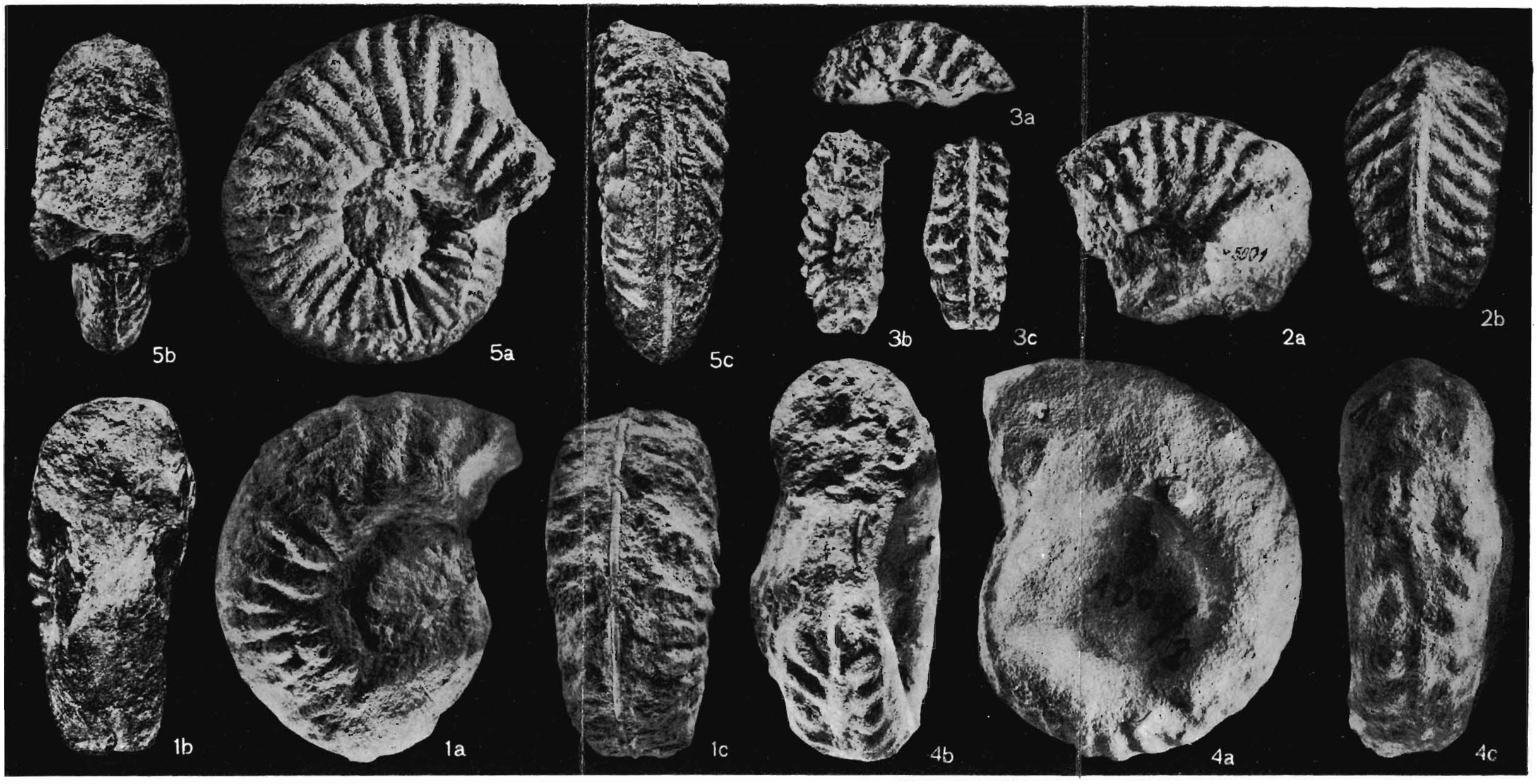
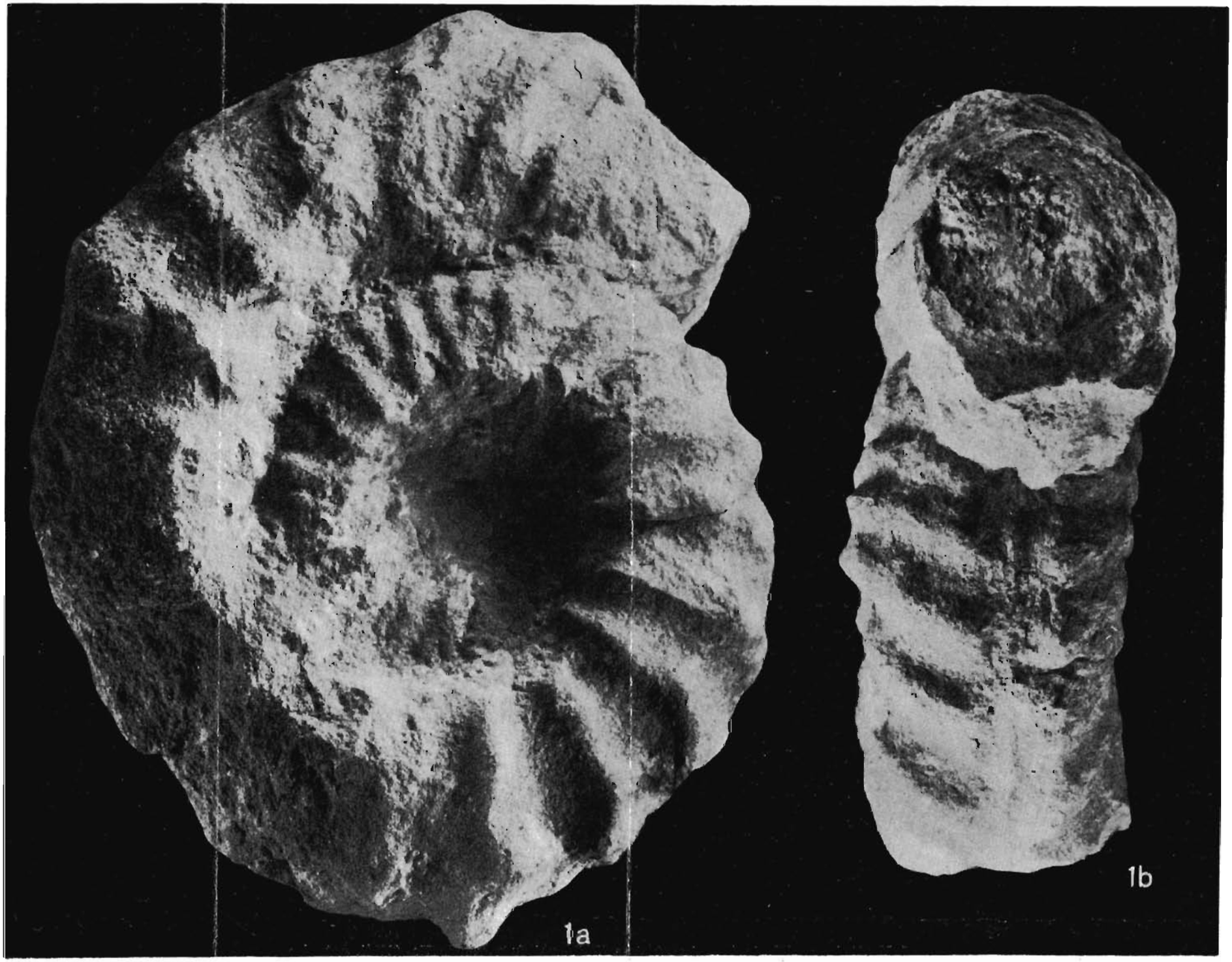
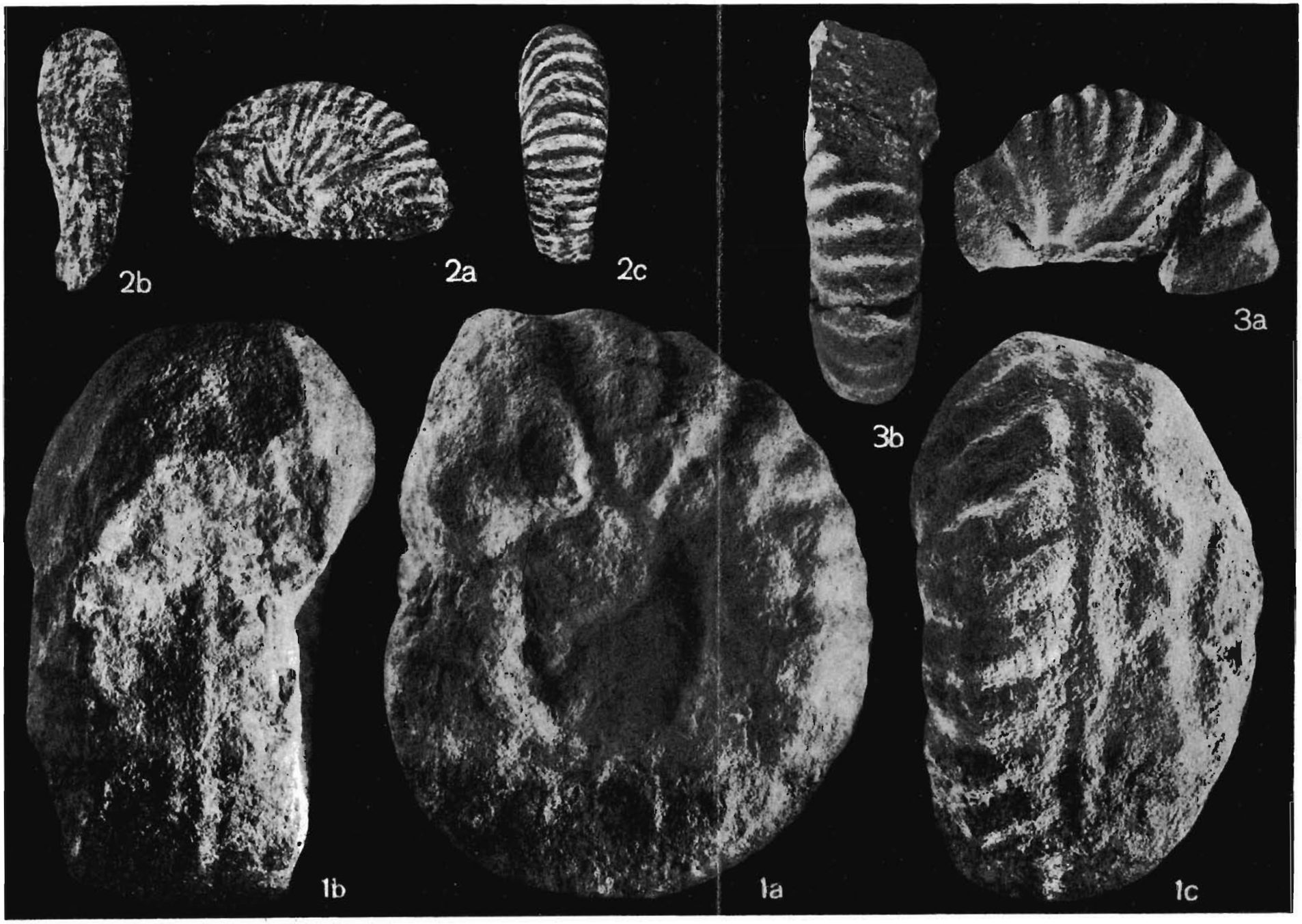


1 *Mortoniceras (Durnovarites) perinflatum* (Spath), specimen No. 4063/1; 2 the same, No. 5001; 3 *M. (Durnovarites) subquadratum subquadratum* Spath, No. 9045/2a; 4 *M. (Durnovarites)* sp., No. 1003/2; 5 *Prohysteroceras (Goodhallites) tauricense* sp. n., No. 5000 (holotype)

Nat. size, except of Fig. 3 (× 1.5)



1 *Mortoniceras (Durnovarites) postinflatum* Spath; specimen No. 4063/3, nat. size



1 *Mortoniceas (Durnovarites) postinflatum* Spath, specimen No. 4101; 2 *Stoliczkaia (Stoliczkaia) notha notha* (Seeley), No. 4025; 3 *S. (Stoliczkaia) notha* cf. *inflata* Spath, No. 7680/2

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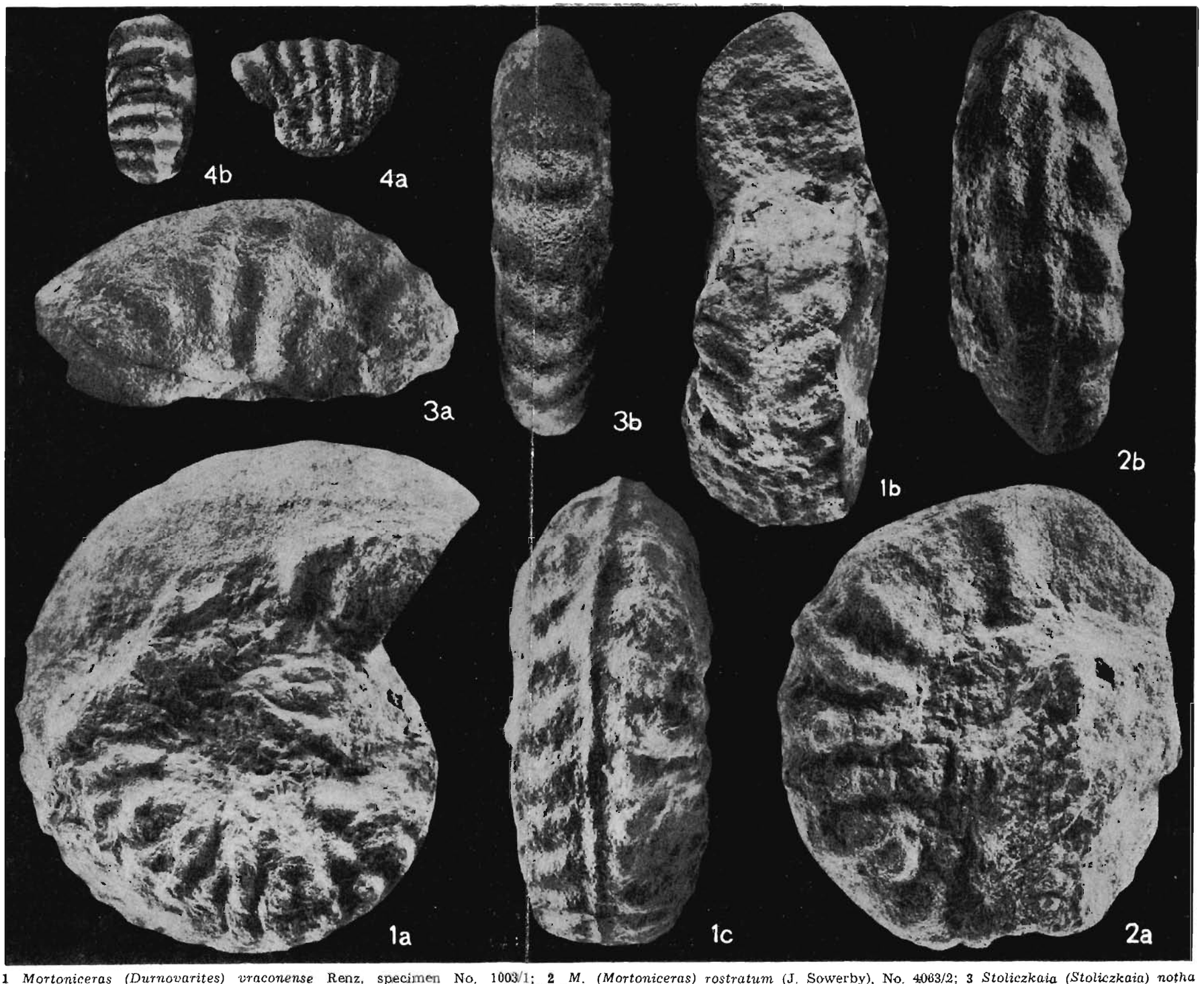

1 *Mortoniceras (Durnovarites) vraconense* Renz, specimen No. 1003/1; 2 *M. (Mortoniceras) rostratum* (J. Sowerby), No. 4063/2; 3 *Stoliczkaia (Stoliczkaia) notha notha* (Seeley), No. 7660/1; 4 the same, No. 7651/3

Nat. size, except of Fig. 4 (× 1.5)

R. MARCINOWSKI i D. P. NAIDIN

GÓRNOALBSKIE AMONITY POŁUDNIOWO-ZACHODNIEGO KRYMU

(Streszczenie)

Przedmiotem pracy jest analiza zespołu amonitów występujących w transgresywnych osadach górnego albu międzyrzecza Kaczi i Bodraka w południowo-zachodniej części Krymu (*por.* fig. 1). W pracy rozpatrzono również wykształcenie litologiczne oraz przestrzenne rozmieszczenie utworów transgresywnych, które spoczywają na rozciętym erozyjnie podłożu (*por.* fig. 1—6). Na podstawie kryteriów faunistycznych oraz litologicznych dokonano w badanych osadach wydzieleń stratygraficznych (tab. 1 oraz 4), które porównano ze schematami stratygraficznymi górnego albu zarówno obszarów platformowych jak i geosynklinalnych Europy oraz przyległych części Azji. Analizując zasięgi stratygraficzne opracowanych amonitów, w górnoalbskich utworach Krymu stwierdzić można obecność wszystkich poziomów i podpoziomów biostratygraficznych znanych z klasycznych profilów południowej Anglii oraz Francji (*por.* tab. 3). Ze względu na stosunkowo ubogi materiał paleontologiczny, brak w pewnych przypadkach dokładniejszej lokalizacji stanowisk amonitów w profilach (część okazów pochodzi z rumoszu), a także obecność licznych powierzchni nieciągłości (*por.* fig. 3 oraz 6), z którymi związane są podmorskie rozmycia i redepozycja osadów (por. fig. 3, profile 7—8; oraz fig. 5A, C), w badanej sekwencji osadów transgresywnych nie jest jednak możliwe precyzyjne wyznaczenie granic pomiędzy poziomami i podpoziomami (*vide* tab. 4). Stratygraficzne następstwo amonitów w profilach górnego albu południowo-zachodniego Krymu jest jednak takie samo, jak w klasycznych profilach Anglii (por. Spath 1926, 1941), tzn. *Hysteroceras* → *Mortoniceras* → *Stoliczkaia*, aczkolwiek ze względów facjalnych jest ono znacznie ostrzej wyrażone.

W paleontologicznej części pracy opisano 30 rodzajów i gatunków amonitów (por. tab. 2 oraz Pl. 1—9), w tym jeden gatunek nowy, *Prohysteroceras (Goodhallites) tauricense* sp. n. Zespół amonitów obejmuje rodziny Hamitidae, Scaphitidae, Desmoceratidae, Hoplitidae, Brancoceratidae i Lyelliceratidae, a wiele gatunków z tego zespołu posiada szerokie rozprzestrzenienie geograficzne, gdyż poza Europą występują w azjatyckiej części Związku Radzieckiego, prawie całej Afryce (Algieria, Tunis, Marokko, Nigeria, Madagaskar), Indiach, oraz w Teksasie i Andach Wenezuelskich.