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: Prohysteropectes (Good-hallites) taurocense sp. n. The investigated ammonites represent the families Hammitidae, Scaphitidae, Desmoceratidae, Hoplitidae, Brancoceratidae and Lyellliceratidae, 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 Bakhthshisaray 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 Drushchic (1956, 1960). The regional development of the Upper Albian deposits between the Katsha and Bodrak rivers was discussed by Janin (1964), Naidin & Janin (1965).

According to Drushchic (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), *Epipholites gibbosus* Spath, *Puzosia mayoriana* (d'Orbigny), *Neithea quinquecostata* (Sowerby), and (2) the Pervinquieria inflata Zone with quartz-glaucinitic 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.

**Acknowledgements.** The authors are cordially thankful to Docent A. Radwański for valuable suggestions during preparation of the paper and critical reading of the manuscript. They are also grateful to Dr. A. Kozłowski for making careful drawings, and to Mrs. K. Boruta for making photos of the ammonites.
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 – $K_c$)

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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. *Neithia quinquecostata* (Sowerby), *Plicatula gurgites* Pictet & Roux, as well as ammonites *HysteToce1a varicosum* (Sowerby), *Epihoplites gibbosus* Spath, *Puzosia mayoriana* (d’Orbigny)

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Table 1

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

**Lower Cenomanian**

<table>
<thead>
<tr>
<th>Beds with Stoliczkaia (Al₂):</th>
</tr>
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<tbody>
<tr>
<td><em>Stoliczkaia</em> (Stoliczkaia) <em>notha</em> (Seeley), <em>Lechites</em> cf. <em>gaudini</em> (Pictet &amp; Campiche)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beds with Mortoniceras (Al₂):</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Mortoniceras</em> (Mortoniceras) <em>inflatum</em> (Sowerby), <em>M. (M.) pricei</em> (Spath), <em>M. (M.) rostratum</em> (Sowerby), <em>Mortoniceras</em> (Durnovariés) <em>perinflatum</em> (Spath), <em>M. (D.) postinflatum</em> Spath, various <em>Puzosia</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beds with HysteToce-ra (Al₂⁺):</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>HysteToce varicosum</em> (Sowerby), <em>H. orbignyi</em> (Spath), <em>Euhoplites inornatus</em> Spath, <em>Puzosia (Puzosia) mayoriana</em> (d’Orbigny), <em>Scaphites</em> (Scaphites) cf. <em>hugardianus</em> d’Orbigny</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beds with Scaphites (Al₂⁺):</th>
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<tbody>
<tr>
<td><em>Scaphites</em> (Scaphites) <em>simplex</em> Jukes-Browne, <em>Scaphites</em> sp. [close to <em>S. merianii</em> Pictet &amp; Campiche]</td>
</tr>
</tbody>
</table>

**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.

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

K$_{\text{h}}$, Hauterivian, K$_{\text{A}}$, Aptian: A$_{3}^{1}$–$^{2}$ 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 silstones 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. 8) cross-bedded, 10 calcareous glauconitic sandstones with redeposited fragments from the beds with Mortoniceras (cf. Fig. 5 A, 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 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, *Neithsea quinquecostata* (Sowerby), *Leda* sp. and others.

These clays are called by the authors as the beds with *Hysteroceras*, and denoted as Alg*α* (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**

<table>
<thead>
<tr>
<th>Species</th>
<th>Outcrops</th>
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<tr>
<td>H. /H. / aff. attenuatus Sowerby</td>
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<tr>
<td>H. /H. / virgulatus Bronnart</td>
<td>+</td>
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<tr>
<td>H. /Pleuroschizites / similis /Casey</td>
<td>+</td>
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<tr>
<td>H. Mortonisera / sp.</td>
<td>+</td>
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<tr>
<td>Scaphites /Scaphites / simplex Jukes-Browne</td>
<td>+</td>
</tr>
<tr>
<td>Scaphites /Scaphites / sp. [close to S. meriani Pictet &amp; Campiche]</td>
<td>+</td>
</tr>
<tr>
<td>Puzosia /Puzosia / mayoriana /d’Orbigny</td>
<td>+</td>
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<tr>
<td>Puzosia /Puzosia / sp.</td>
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<td>Puzosia /Puzosia / sp.</td>
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<td>Puzosia /Puzosia / sp.</td>
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<tr>
<td>Puzosia /Puzosia / sp.</td>
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</tbody>
</table>

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

**BEDS WITH MORTONICERAS**

Both the beds with *Hysteroeceras* 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
thicknes 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$_3$–Al$_4$ – 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-Tahugir (profile No. 7 in Fig. 3)

1 effusives, 2 limonites with pebbles of effusives and other rocks, and with abundant pelecypods, 3 calcareous glauconitic sandstones, silted in places, and locally with phosphatized fauna and quartz pebbles, 4 redeposited fragments of underlying glauconitic sandstones, 5 calcareous glauconitic sandstones with tufaceous material, pebbles derived from substrate, and with abundant pelecypods Aucellina, 6 calcareous glauconitic sandstones with frequent guards of Neohibolites menziesi Thomas 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. solstitialis Regenhardt (as determined by Dr. S. I. Pasternak), as well as moulds or shells of pelecypods (cf. Janin 1964, p. 118): Inoceramus anglicus Woods, Aucellina Gryphaea (Sowerby), Gryphaea arduennensis (d'Orbigny), Lima canalifera Goldfuss, Neitha quinquecostata (Sowerby), N. aequicostata (Lamarck), Picatula inflata Sowerby, and Pterotrignia 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 *Morphoniceras* [represented i.a. by the species *M. (M.) inflatum* (Sowerby), *M. (M.) pricei* (Spath), *M. (Duranolites) perinflatus* (Spath), *M. (D.) postinflatus* Spath] and *Puzosia*.

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**A — Mt. Kremenennaya**

(cf. profile No. 5 in Fig. 3)

- $A_{L3}^3$ calcareous glauconitic sandstone with tuffaceous material, and with quartz gravel at bottom.
- $A_{L2}^3$ calcareous glauconitic sandstone, silicified in patches, and containing vertical burrows; hardground at the top.

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**B — Prokhladnoe, near Post Office**

- $K_L^1$ calcareous glauconitic sandstone with fine quartz gravel, and frequent current-oriented belemnite guards; overlaid by sandy marls with glauconite $A_{L3}^3$ 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.

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**C — Mangush ravine, left edge, below the MGU Station**

- $K_L^1$ sandy marls with glauconite and well-rounded and well-sorted gravel, primarily of quartz
- $A_{L3}^3$ calcareous glauconitic sandstone with tuffaceous material; hardground at the top.

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**D — Mt. Teheger at Prokhladnoe** (cf. profile No. 3 in Fig. 3)

- $K_L^1$ clays with polymictic gravel, overlaid by sandy marls with frequent belemnite guards
- $A_{L3}^3$ calcareous glauconitic sandstone with tuffaceous material; hardground with burrows at the top.

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Fig. 6. Detailed profiles at the boundaries between the beds with *Morphoniceras* and with *Stoliczkaia* ($A_{L3}^3$/$A_{L2}^3$), as well as between the beds with *Stoliczkaia* and the Lower Cenomanian ($A_{L3}^3$/$K_L^1$).
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 $A_{1}^{d}$ (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 *Neithaea* *aff. secizostata* (Woods), *Biauris biauriculata* (Lamark), *Gryphaeostrea canaliculata* (Sowerby), *Liostra 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. menjaileenki* Gustomesov, the index species for the Lower Cenomanian. Rare ammonites are preserved as moulds of *Puzosia*, and of *Stoliczkaia* (*Stoliczkaia*) *noha noha* (Seeley) and *S. (S.) noha* *cf. inflata* Spath.

The discussed sandstones comprising tuffaceous material are called as the beds with *Stoliczkaia* and denoted as $A_{1}^{d}$ (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 *Schoenbachia varians* (Sowerby), *Mantelliceras mantelli* (Sowerby), *Puzosia planulata* (Sowerby) and *Neohibolites menjaileenki* 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; Bogdenova, Luppov & Jakhnin 1963; Drushtchic & Mikhailova 1966; Urmanova & Tashlev 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 Tesa River, ammonites closely related to *Callihoplites vunacensis* (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 *Mortonicea* were available. Thirdly, in Crimea, distribution of the Upper Albian ammonites is limited by the

<table>
<thead>
<tr>
<th>UPP R A LBI N</th>
<th>Substage</th>
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<th>Subzones</th>
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<td>Turrilitidien</td>
<td>Turrilitidien</td>
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</tr>
</tbody>
</table>

Continuous line — stratigraphic ranges after Spath (1960), broken line — stratigraphic ranges after Breistroffer (1935, 1947), dotted line — stratigraphic ranges in the Vraconian stratotype after Renz (1965), 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.

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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 conformes are omitted (cf. Table 2 and paleontological descriptions).
successive facies: the genus *Hystericeras* 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*, independently 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* (Ala la) 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* (Ala la) and these with *Mortoniceras* (Ala la) are separated by a break in sedimentation (cf. Table 4).

The beds with *Mortoniceras* (Ala la) 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* (Als) 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; Marcinkowski 1974, pp. 163–164). 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. 10–14). In England, the Cambridge Greensand ("Pleurohoplitian") 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 ("Vracon" 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 (1956, 1960) and Savlev (1960).

In Crimea, it was Weber (1967) who first used the term Vraconian. In the section on the Katsha River, at the village of Vershkhoretahe she distinguished:

2) Vraconian substage — greenish-grey, friable glauconitic sandstones (1–1.5 m) with Neohibotites, Aucellina, Inoceramus concentricus Parkinson.
1) Lower and Middle Albian — greenish-grey, hard glauconitic sandstones (10 m) with Puzosia sharpei Spath, Holaster laevis de Lac, Serpula sp.

The units 1 and 2 of Weber correspond in the present paper to Al1 and Al2 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.
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* (Al4*) 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* (Al4*) and beds with *Stoliczkaia* (Al4*) 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 millimeters):

- **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)*

1947. *Hamitoides compressus* Spath; Breistroffer, p. 53.
1968. *Hamites (Hamites) cf. compressuscompressus* J. Sowerby; Renz, pp. 66–68; Text–fig. 231; Pl. 31, Fig. 8.

**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. 88, Figs 10–11). It differs a little from that presented by Renz (1968, Pl. 11, Fig. 8), but these differences seem to result from the intraspecific variability.

**Occurrence.** — Beds with *Hysteroceras* (Al4*); 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 1841; Breistroffer 1947; Renz 1968).
Hamites (Hamites) aff. attenuatus J. Sowerby, 1814
(Pl. 1, Fig. 3)

Material. — One fragment of the whorl (No. 309).

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. — With Hysteroceras (Alg2a); borehole at the MGU Station (cf. Text-Fig. 4).

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

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 Piclet & 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 (cf. 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. 83).

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. — With Hysteroceras (Alg2a), 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 (tsequatorialis to substudenti Subzones), Switzerland, France, Sardinia, Spain, Polish Tatra Mts, Tunis, Algeria, Angola, Madagascar and Texas (Fassendorfer 1930; Spath 1822, 1841; Breistroffer 1947; Wiedmann 1962; Clark 1965; Renz 1968).
Subgenus *PLESIOHAMITES* Breistroffer, 1947

*Hamites (Plesiohamites) similis* (Casey, 1961)  
(Pl. 1, Fig. 1)

1941. *Hamites (Stomohamites?)* multicus tus; Brown; Spath, pp. 446–450; Text-fig. 236 c–f;  
   Pl. 71, Figs 15–17.

1947. *Stomohamites (Plesiohamites n. subgen.)* n. sp. gr. multicus tus; Breistroffer,  
   pp. 83, 85.


1952. *H. (Plesiohamites) multicus tus* (Brown) = *H. (Plesiohamites) similis* (Casey); Wied-  
   mann, p. 131, Text-fig. 61; p. 225 (Nachtrag).

1968. *Hamites (Plesiohamites) aff. similis* (Casey); Renz, pp. 69–70; Text-figs 32p, 54c; Pl. 41,  
   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 “multicus tus”, 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 *Ham-  
ites* Parkinson.

**Occurrence.** — Beds with *Hystereoceras* (Ala²); 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 *Hystereoceras* (Ala²); borehole at the MGU Station  
(cf. Text-fig. 4).

**Family Scaphitidae** Meek, 1876  
**Subfamily Scaphitininae** 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. 375, Pl. 13, Fig. 2.

1861. *Scaphites Merlandi*; Pictet et Campiche; Pictet & Campiche, p. 196; Pl. 44, Fig. 7 [only].

1875. *Scaphites Merlandi* var. simplex; Jukes-Browne, p. 287, Pl. 14, Fig. 2.
Scaphites (Scaphites) cf. hugaridanus d'Orbigny, 1841
(Pl. 1, Fig. 8)

Material. — One incomplete specimen (No. 9319; 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) hugaridanus d'Orbigny (cf. d'Orbigny 1842, pp. 521, 525; Pictet & Campiche 1851, p. 36, Pl. 44, Figs 5–6 [only]; Spath 1897, p. 503, Pl. 67, Fig. 24 and Text-figs 175 a–b, 176 a–b, g–f; Wiedmann 1900a, p. 423, Pl. 54, Fig. 5, Pl. 57, Figs 1–2, 6–7; Renz 1908, p. 93, Pl. 16, Fig. 17). Occurrence. — Beds with Hystercoceras (Alb.); sandstones exposed near the spring at Proshladnoe (cf. profile No. 3 in Text-fig. 3). The species Scaphites (Scaphites) hugaridanus d'Orbigny occurs in the Upper Albian of Switzerland (St. Croix — substuder; Subzone), England (varicosum, auritus, sequatorialis Subzones), France (Spath 1897; Renz 1908), Rumania, and supposedly of northern Spain (Mortoniétation — Albien IV of Wiedmann 1900b) and Tunisia.

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 1865a, p. 426, Pl. 54, Fig. 6; Pl. 57, Figs 3, 7; Collignon 1863, p. 56, Pl. 292, Fig. 1841 [only]).

Occurrence. — Beds with Scaphites (Ala); 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 1966), Sardinia and Mallorca (Mortoniceratien — 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) mayonian (d’Orbigny, 1841)

1841. Ammonites Mayornani, d’Orbigny; d’Orbigny, p. 287, Pl. 79, Figs. 1–2.
1842. Puzosia mayonian (d’Orbigny); Spath, p. 45; Text-fig. 16; Pl. 1, Figs 8–89.
1843. Puzosia mayonian d’Orbigny; Passendorfer, pp. 65–66, Pl. 3, Figs 17–46.
1847. Puzosia mayonian (d’Orbigny); Mutlu, p. 145; Pl. 3, Figs 1–2.

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

Occurrence. — Beds with Hysteroceras (Alb); borehole at the MGU Station (cf. Text-fig. 4).

The species Puzosia (Puzosia) mayonana (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, Transcaucasion and Transcasplan).

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

1855. Ammonites planulatus Sowerby; Sharpe, p. 38; Pl. 12, Fig. 4 [only].
1856. Puzosia sharpe, sp. nov.; Spath, p. 46; Text-fig. 11b; Pl. 1, Figs 10–12.
1857. Puzosia sharpe Spath; Wright & Wright, p. 18.
1858. Puzosia (Puzosia) sharpe Spath; Renz, p. 21; Pl. 4, Figs 4, 8.
1859. Puzosia (Puzosia) sharpe Spath; Kennedy, p. 56; Pl. 36, Fig. 6; Pl. 14, Fig. 6.

Material. — Three fragments of phragmocones (No. 1559, 4055/1, 7651/3a).

Occurrence. — Beds with Mortoniceras (Alb); Trudolubovka (No. 7651/3a), Prokhladnoe (No. 4055/1 — cf. profile No. 3 in Text-fig. 3), Alma River (No. 1656, re- deposited in Alb [4] — cf. profile No. 6 in Text-fig. 3).

The species Puzosia (Puzosia) sharpe Spath is known from the uppermost Albian (Spath 1859) 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 (Existavi 1961; Renz 1969).

* The collaboration of Dr. N. V. 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 phragmocories (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 *Mortonicerus* (Ala); Koyazolchiga ravine (No. 16), Prokhladnoe (No. 17, 6008/2 — cf. profile No. 3 in Text-fig. 3).

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

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

**Material.** — Three badly preserved, diagnostically flattened specimens (No. 310, 6008/1, 6008/2).

**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 1967; Renz 1972, p. 704). Obliteration of sculpture and deformation of the specimens hinders a specific assignation.

**Occurrence.** — Beds with *Hysteroceras* (Ala); borehole at the MGU Station (cf. Text-fig. 4).

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**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, sp. 206–209; Text-fig. 97; Pl. 29, Fig. 5; Pl. 30, Figs 3–5; Pl. 31, Figs 2–4 (with synonymy).

1937. *Euhoplites (Euhoplites) inornatus* Spath; Breistroffer, p. 81.

**Material.** — One flattened specimen (No. 1064).

**Biometry** (all linear measurements in mm):

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<tr>
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<th>Wh</th>
<th>U</th>
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<tbody>
<tr>
<td>No. 1064 (Pl. 1, Fig. 14)</td>
<td>18</td>
<td>7.4</td>
</tr>
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**Remarks.** — In result of poor preservation, the distinct striation on the lateral side (cf. Spath 1930, Pl. 29, 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* (Ala); 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 16 clavus at the ventro-lateral margin; both tubercles and clavus are indistinctly connected by irregular rough ribs.

**Remarks.** — The investigated specimen is similar to *Callihoplites tetragonius* (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. 41, Fig. 1), *Callihoplites vraconensis* by Spath (1926, 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 (1988, p. 40, Pl. 5, Fig. 3); it differs by its narrower ventral side, and by a smaller number of clavus. 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. 3; Text-figs 80–81), from which it differs by a more convex shape, smaller flatness of the ventral side, and by more delicate but more numerous clavus.

**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* (Spitaly, 1922)

(Pl. 2, Figs 1 and 3–4)

1926. *Ammonites variocus*, Sowerby; d’Orbigny, p. 194 [para]; Pl. 87, Fig. 3 [only].
1932. *Brancoceras orbignyi* n.n.; Spith, p. 86.
1934. *Hysteroceras orbignyi* (Spitaly); Spith, pp. 409–410; Text-figs 15a–c, 16a–c, 17a–c, 18a;
Pl. 49, Fig. 4; Pl. 50, Fig. 1; Pl. 52, Figs 5–4; Pl. 89, Fig. 13.
1947. *Hysteroceras Laferrierei* var. *Orbignyi* Spath; Breistroffer, pp. 81–82.
1948. *Hysteroceras orbignyi* Spath; Glazunova, pp. 84–86; Pl. 3, Figs 1–2.
1955. *Hysteroceras orbignyi* (Spitaly); Heymen, p. 28; Pl. 4, Fig. 5.
1959. *Hysteroceras orbignyi* Spath; Collignon, p. 125; Pl. 26, Figs 129–123.
1960. *Hysteroceras orbignyi* Spath; Collignon, p. 17; Pl. 5, Fig. 7.
1965. *Hysteroceras orbignyi* (Spitaly); Wiedmann & Diden, pp. 127–128; Text-figs 84–86; Pl. 15, Figs 1–6.
1969. *Hysteroceras orbignyi* Spath; Mutti, p. 306; Pl. 5, Figs 2–4.
Hysteroceras orbignyi (Spaïh, 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 (Als<sup>2</sup>)<sup>2</sup>; 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)

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

Biometry (all linear measurements in mm):

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</tbody>
</table>

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. 182 d–e). Having a very scarce material, the present authors cannot recognize the intraspecific variability in the Crimea specimens and make some comparisons with the forms regarded by Spath (1934, Pl. 40, Figs 5, 10–11) as transitional from the species “varicosum” to other species or varieties.

Occurrence. — Beds with Hysteroceras (Al14); 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 (Al14); 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)
Material. — One specimen, being a part of the phragmocone (No. 4102).

Biometry (all linear measurements in mm):

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Wh</td>
<td>Wb</td>
</tr>
<tr>
<td>No. 4102 (Pl. 3, Fig. 3)</td>
<td>157</td>
<td>55.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>0.35</td>
<td>0.30</td>
</tr>
<tr>
<td>Ratio to D:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.86</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.40</td>
</tr>
</tbody>
</table>

Remarks. — According to Wright (1957), the subgenus Pervinqueria Böhm is a synonym of the nominate 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 interpret the Spath’s varieties as separate species, e.g. M. (M.) inflatum var. aequatorialis (Konmat) 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. 9), represents rather Mortoniceras (M.) pricei (Spath) or (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 (Alp) at Ptokhladnoe (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 Transcaucasia in the Soviet Union, and Angola (d’Orbigny 1840; Passendorfer 1921, 1930; Spath 1922, 1932; Breistroffer 1947; Glanzzova 1953; Eristavi 1955; Chlebowstki 1962; Collignon 1966; Hakenberg 1969).

Mortoniceras (Mortoniceras) pricei (Spath, 1922)

(Pl. 2, Figs 8–9)
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).

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>Wh</th>
<th>Wb</th>
<th>Wb/Wh</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 9045/2 (Pl. 2, Fig. 8)</td>
<td>88</td>
<td>37.8</td>
<td>32</td>
<td>0.85</td>
<td>28.7</td>
</tr>
<tr>
<td>Ratio to D:</td>
<td>0.43</td>
<td>0.36</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 5078 (Pl. 2, Fig. 9)</td>
<td>33</td>
<td>29.8</td>
<td>0.90</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 Mortoniceeras (Mortoniceeras) 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 Mortoniceeras (Ala') and Alma River (No. 9045/2 — redeposited in Ala'—3, cf. profile No. 8 in Text-fig. 3), and at Trudobulborska (No. 5078 — redeposited in Ala', cf. Fig. 5A).

The species Mortoniceeras (Mortoniceeras) 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, Transcaspi, Morocco, Algeria, Nigeria, Madagascar and Zululand, as well as the Venezuelan Anda (Spath 1932; Glazunova 1953; Reyment 1965; Collignon 1966; Renz 1971).

**Mortoniceeras (Mortoniceeras) stoliczkai (Spath, 1921)**

(Pl. 4, Fig. 1)

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):

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>Wh</th>
<th>Wb</th>
<th>Wb/Wh</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 4100 (Pl. 4, Fig. 1)</td>
<td>133.2</td>
<td>38.5</td>
<td>40.5</td>
<td>1.05</td>
<td>63.7</td>
</tr>
<tr>
<td>Ratio to D:</td>
<td>0.29</td>
<td>0.30</td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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, 1932). It is most similar to a specimen illustrated by
Collignon (1963, Pl. 303, Fig. 1287), although it has a wider umbilicus (U : D = 0.46, while in the Collignon’s specimen U : D = 0.41).

Occurrence. — Beds with Mortoniceras (M.) at Mt. Kizil-Tshugir redeposited at the bottom of Al2 — cf. profile No. 7 in Text-fig. 3.

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

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

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. 186). The other specimen (No. 4063/2) is of a 316 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:

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>Wh</th>
<th>Wb</th>
<th>Wb / Wh</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 4063/4 (Pl. 5, Fig. 1)</td>
<td>177</td>
<td>69</td>
<td>50.6</td>
<td>0.60</td>
<td>73.8</td>
</tr>
<tr>
<td>Ratio to D:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140</td>
<td></td>
<td>48.5</td>
<td>49.5</td>
<td>1.02</td>
<td>57</td>
</tr>
<tr>
<td>115</td>
<td></td>
<td>55</td>
<td>48.5</td>
<td>1.03</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.39</td>
<td>0.40</td>
</tr>
</tbody>
</table>

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. 186). 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. 1303).

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 comparatively 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 (Ala); the area between the Shara and Mender ravines.

The species Mortoniceras (Mortoniceras) rostratum (J. Sowerby) is known from the Upper Albian of England (substudies and dispar-perinflatum Subzones), France, Morocco, Madagascar, Angola (Spath 1922, 1933; Breistroffer 1947; Collignon 1968; 1966), and supposedly from the Tatra Mts (Passendorfer 1930).

Subgenus DURNOVARITES Spath, 1932
Mortoniceras (Durnovarites) perinflatum (Spath, 1922)
(Pl. 6, 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):

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Wh</td>
<td>Wb</td>
<td>Wh</td>
<td></td>
</tr>
<tr>
<td>No. 4063/1 (Pl. 6, Fig. 1)</td>
<td>100.4</td>
<td>38</td>
<td>45.2</td>
<td>1.19</td>
</tr>
<tr>
<td>Ratio to D:</td>
<td>0.38</td>
<td>0.45</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td>No. 5001 (Pl. 6, Fig. 2)</td>
<td>39.5</td>
<td>44.5</td>
<td>1.13</td>
<td></td>
</tr>
</tbody>
</table>

Remarks. — Renz (1969) 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 (Ala); the area between the Shara and Mender ravines (No. 4063/1) and Koyasdzhiiga 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. 49, Fig. 5 [only].
1947. Pervinqueria (Durnovarites) postinflata Spath; Breistroffer, p. 61.
Mortoniceras (Durnovarites) postinflatum (Spath); Renz, pp. 59–84; Text-Figs 17b, d, 18b, 19 a–b; Pl. 8, Figs 1–3, 4.

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 omitted for measurements). The other specimen (No. 4101) is a part of the phragmocone.

Biometry (all linear measurements in mm):

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>Wh</th>
<th>Wb</th>
<th>Wb/Wh</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 4063/3 (Pl. 7, Fig. 1)</td>
<td>104</td>
<td>45.5</td>
<td>66</td>
<td>1.45</td>
</tr>
<tr>
<td></td>
<td>Ratio to D:</td>
<td>0.44</td>
<td>0.63</td>
<td>0.33</td>
</tr>
<tr>
<td>No. 4101 (Pl. 8, Fig. 4)</td>
<td>118.4</td>
<td>45</td>
<td>64</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td>Ratio to D:</td>
<td>0.38</td>
<td>0.54</td>
<td>0.38</td>
</tr>
</tbody>
</table>

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 (Ala l); 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)

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

Biometry (all linear measurements in mm):

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>Wh</th>
<th>Wb</th>
<th>Wb/Wh</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 9045/2a (Pl. 6, Fig. 3)</td>
<td>36.3</td>
<td>13</td>
<td>14</td>
<td>1.08</td>
</tr>
<tr>
<td></td>
<td>Ratio to D:</td>
<td>0.34</td>
<td>0.36</td>
<td>0.38</td>
</tr>
</tbody>
</table>
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 $U : D (\approx 0.30)$ is, however, slightly smaller than in typical specimens of the subspecies "subquadratum" (cf. biometry by Späth 1933; Renz 1968).

Occurrence. — Beds with Mortoniceras (Alf): Alma River (redeposited in Alf$^4$; — cf. profile No. 8 in Text-fig. 3).

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

Mortoniceras (Durnovarites) vraconense Renz, 1968

(Pl. 9, Fig. 1)

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

Biometry (all linear measurements in mm):

<table>
<thead>
<tr>
<th>D</th>
<th>Wh</th>
<th>Wb</th>
<th>Wb/Wh</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>130.5</td>
<td>?46.2</td>
<td>?49</td>
<td>?1.06</td>
<td>45.5</td>
</tr>
</tbody>
</table>

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 (Alf$^4$); 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):

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>Wh</th>
<th>Wb</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1003/2 (Pl. 6, Fig. 4)</td>
<td>113.5</td>
<td>43</td>
<td>43.5</td>
<td>1</td>
</tr>
<tr>
<td>Ratio to D:</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
<td>47.2</td>
</tr>
</tbody>
</table>

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) subnamum (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 (Alp); 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, mediolate, 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 inconvenient state of their preservation hinders their more exact recognition.

Occurrence. — Beds with Mortoniceras (Alp) 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 Albain.
Type locality: beds with Mortoniceras (Alp) in the Koyavadzhiga ravine, Crimea, Soviet Union.

Derivation of the name: Taurica — 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):

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>Wh</th>
<th>Wb</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 5000 (Pl. 6, Fig. 5)</td>
<td>98.9</td>
<td>42.5</td>
<td>34.2</td>
<td>0.80</td>
</tr>
<tr>
<td>Ratio to D:</td>
<td>0.43</td>
<td>0.34</td>
<td>0.33</td>
<td></td>
</tr>
</tbody>
</table>

**Description.** — The whorls involute in one-third. The whorl higher than wide (Wh : Wb = 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 1894, Text-fig. 154; Renz 1971, Pl. 3, Fig. 15);
(ii) thicker and more pronounced ribs;
(III) smaller height of the whorls: in *P. (G.) tauricense* sp. n. the ratio Wb : Wh = 0.80, whereas in *P. (G.) goodhalli* (J. Sowerby), its various varieties sensu Spath (1894) 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 (Alf), Koyasdzhliga ravine.

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**Family Lylelliceratidae** 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)

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1860. Ammonites dispers, d’Orb.; Piulet & Cmnpche, pp. 204–207; Pl. 28, Fig. 7 [only].

1861. *Stoliczkaia notha* (Seeley); Spath, pp. 206–207; Text-fig. 110 a-c; Pl. 21, Figs 1, 11; Pl. 32, Fig. 6.
1968. Stoliczkaia (Stoliczkaia) notha notha (Seeley); Renz, p. 59; Text-fig. 11a; Pl. 6, Fig. 11.

**Material.** — Three fragments, two of which (No. 4025 and 7661/3) are parts of the phragmococone, and the other (No. 7660/1) is the body chamber.

**Biometry** (all linear measurements in mm):

<table>
<thead>
<tr>
<th></th>
<th>Wh</th>
<th>Wb</th>
<th>Wb</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 4025 (Pl. 8, Fig. 2)</td>
<td>19.5</td>
<td>13</td>
<td>0.66</td>
</tr>
<tr>
<td>No. 7660/1 (Pl. 9, Fig. 3)</td>
<td>43.5</td>
<td>27.5</td>
<td>0.63</td>
</tr>
</tbody>
</table>

**Remarks.** — Specimen No. 4025 matches well to that presented by Spath (1931, Pl. 32, Fig. 6), while one No. 7665/3 (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 (Alp3) Trudolubovka (No. 7651/3 — Bodrak River), Mt. Selbukhra (No. 7660/3), Prokhladnoe (No. 4025 — collected in the screen; it might come from the beds with Mortoniceras).

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

**Stoliczkaia (Stoliczkaia) notha cf. inflata Spath, 1931**

(Pl. 8, Fig. 3)

1931. Stoliczkaia notha (Seeley) var. inflata, nov.; Spath, pp. 335–341; Pl. III, Figs 8, 9.
1947. Stoliczkaia notha var. inflata Spath; Breitstroffer, pp. 63, 65.
1968. Stoliczkaia notha inflata Spath; Renz, p. 59; Pl. 6, Fig. 2.

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

**Biometry** (all linear measurements in mm):

<table>
<thead>
<tr>
<th></th>
<th>Wh</th>
<th>Wb</th>
<th>Wb</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 7660/2 (Pl. 8, Fig. 3)</td>
<td>35.5</td>
<td>20.5</td>
<td>0.58</td>
</tr>
</tbody>
</table>

**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 (Alp3), 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; Breitstroffer 1947; Renz 1968).

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1 Hamites (Pleostomatites) similis (Casey), specimen No. 625; 2 H. (Hamites) compressus J.owerby, No. 139; 3 H. (Hamites) aff. alternatus J.owerby, No. 330; 4 H. (Stromatites) turgidus Brongniart, No. 878; 5 the same, No. 670; 6 Hamites sp., No. 300; 7 Scaphites (Scaphites) simplex Jukes-Browne, No. 101; 8 S. (Scaphites) cf. huguenoti d'Orbigny, No. 631; 9 S. (Scaphites) sp. [close to S. (S.) meriani Pictet & Campiche], No. 102; 10 the same, No. 100; 11 Puzosia (Puzosia) sharpej Spath, No. 765/2a; 12 P. (Puzosia) cf. communis Spath, No. 18; 13 P. (Puzosia) sp., No. 310; 14 Ruhophites insomnatus Spath, No. 1984; 15 Colithopites aff. tetragonus (Searl), No. 748.

Figs 1-6 and 13-14 X 1:5; Figs 7-12 X 2; Figs 15-25 and 18-21 X 4.
1. *Hysteroiceras orbignyi* (Spath), specimen No. 74/67; 2. *H. orbignyi* (Spath), No. 74/74/2a; 3. *H. orbignyi* (Spath), No. 74/74/2; 4. the same, No. 852; 5. *H. varicosum* (J. Sowerby), No. 660; 6. the same, No. 74/74/1a; 7. *Hysteroiceras sp.*, No. 16; 8. *Mortonicerus (Mortoniceras) pricei* (Spath), No. 96/3/2; 9. the same, No. 8678

Fig. 1-7 at 2 X 3.5; Fig. 8 nat. size
1 Mortoniceras (Mortoniceras) inflatum (J. Sowerby); specimen No. 4102, nat. size.
1 Mortoniceras (Mortoniceras) stoliczkoii (Spath); specimen No. 4100, nat. size
1 Mortoniceras (Mortoniceras) rostratum (J. Sowerby); specimen No. 4964/4, nat. size
1 Mortoniceras (Durnovariites) periniflatus (Spain), specimen No. 4063/1; 2 the same, No. 5001; 3 M. (Durnovariites) subquadratum subquadratum Spath, No. 9045/2a; 4 M. (Durnovariites) sp., No. 1098/2; 5 Probassiterites (Goodallites) tournierei sp. n., No. 3000 (holotype).

Nat. s.m., except of Fig. 5 (X 1.8).
1 Mortoniceras (Durnowarites) postinflatum Spath; specimen No. 4062/3, nat. size
1 *Mortoniceas* (Durnovarites) postinflatum Spath, specimen No. 4101; 2 *Stoliczkaias* (Stoliczkaias) norta norta (Seeley), No. 4035; 3 S. (Stoliczkaias) norta cf. infrasta Spath, No. 7080/2

Nat. size, except of Fig. 3 (X 1.9)
1 Mortoniceras (Darnovites) uvaconense Renz, specimen No. 1003/1; 2 M. (Mortoniceras) rostratum (J. Sowerby), No. 4068/2; 3 Stoliczkaia (Stoliczkaia) notha notha (Seeley), No. 7680/1; 4 the same, No. 7651/3

Nat. size, except of Fig. 4 (X 1.5)
GÓRNOALBSKIE AMONITY POŁUDNIOWO-ZACHODNIEGO KRYMU

(Streszczenie)

Przedmiotem pracy jest analiza zespołu amonitów występujących w transgresywnych osadach górnego albu międzyrzeczca Kaszcz i Bohraka w południowo-zachodniej części Krymu (por. fig. 1). W pracy rozstrzygnięto również wykształcenie litologiczne oraz przedstawione rozumienia utworów transgresywnych, które spełniają na rozciągającym się podłożu (por. fig. 1–6). Na podstawie kryterii faunistycznych oraz litologicznych dokonano w badanych osadach wydzielenia stratygraficznych (tab. 1 oraz 4), które porównano ze schematami stratygraficznymi górnego albu zarówno obszarów platformowych jak i geosynklineńskich 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 okresów pochodzi z rumoszu), a także obecność licznych powierzchni niedziękoci (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 osad 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. Hystero- ceras → Mortoniceras → Stoliczkaia, aczkolwiek ze względów facjalnych jest ono znacznie ostryż wyrażone.

W paleontologicznej części pracy opisano 30 rodzajów i gatunków amonitów (por. tab. 3 oraz F1. 1–6), w tym jeden gatunek nowy, Prohystero- ceras (Goodhallites) tauricenae sp. n. Zespół amonitów obejmuje rodziny Hametidae, Spathitidae, Desmo- ceratidae, 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, Tunisa, Maroko, Nigeria, Madagaskar), Indiach, oraz w Tekszanie i Andach Wenezuelskich.