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A Peculiar Upper Valanginian Cephalopod Fauna from the Carpathian Bend (Codlea Town Area, Romania): Biostratigraphic and Paleobiogeographic Implications

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With 2 Text-Figures and 7 Plates

Rumänien
Karpaten
Kreide
Valanginien
Cephalopoden
Biostratigraphie
Paläobiogeographie

Contents

Eine bemerkenswerte Cephalopodenfauna aus dem Oberen Valanginien des Karpatenbogens (Gebiet von Codlea, Rumänien): Biostratigraphische und paläobiogeographische Schlußfolgerungen

Zusammenfassung

Eine reiche Cephalopoden-Fauna (Ammoniten, Belemniten, Aptychen) aus dem basalen Anteil der Braşov-Formation (Ober-Valanginian–?Unter-Apt) im „Piatra Mare"-Steinbruch bei Codlea wird beschrieben. Diese Fauna ist aus vier Gründen wichtig: sie enthält neue Valanginien-Ammoniten; sie gibt bei einigen Arten Hinweise auf veränderte altersmäßige Verbreitung; sie liefert einen weiteren Beweis für den faunistischen Austausch zwischen den tethydischen und borealen Lebensräumen im oberen Valanginien; und sie stellt sicher, daß die Ablagerung der Braşov-Formation in der frühen Ober-Valanginien Verrucosum-Zone begann oder sogar im obersten Unter-Valanginien.

39 Arten von *Holcophylloceras, Ptychophylloceras, Lytoceras, Himantoceras, Crioceratites, Euptychoceras, Haploceras (Neolissoceras), Oosterella, Paquiericeras (Julianites), Jeanthieuloyites, Olcostephanus, Subastieria, Neocomites (Teschenites), Karakaschiceras, Eleniceras, Sarasinella, Criosarasinella, Rodighieroites, Sabbaiceras, Lamellaptychus, Duvalia* beweisen das Valanginien-Alter des basalen Anteils der Braşov-Formation. Die Arten *Crioceratites* ex gr. *andersoni* (SARKAR), *Jeanthieuloyites nodosus* (MANDOV), *Olcostephanus catulloi* (RODIGHIERO), *Eleniceras tchechitevi* BRESKOVSKI und *Duvalia binervia* (RASPAIL) werden hier erstmals aus dem Ober-Valanginien beschrieben. Eine rumänische Gattung (*Sabbaiceras*) mit ihrer Art *S. stefanescui* AVRAM & GRADINARU, und drei neue Arten der Gattung *Jeanthieuloyites (J. keyserlingiformis, J. trapezoidalis* und *Jeanthieuloyites* n. sp. ind. werden beschrieben.

Jeanthieuloyites keyserlingiformis wird als Ober-Valanginien-Abkömmling eines mit *Polyptychites* verwandten borealen Einwanderers in den Tethys-Lebensraum betrachtet; er könnte den Valanginien-Vorläufer der Hauterive-Gattung *Spitidiscus* repräsentieren. Andererseits könnte das Genus *Sabbaiceras* in der Tethys der Valanginien-Vorfahre des borealen Hauterive-Genus *Distoloceras* sein. Diese Besonderheit der hier beschriebenen Ober-Valanginien-Ammonitenfauna, insbesondere das Ineinandergreifen tethydischer und borealer Ammonitentaxa, könnte dem Beginn eines neuen Zyklus von Meeresspiegelanstiegen zugeschrieben werden, was auch durch die „transgressive" Position der Braşov-Formation unterstrichen wird.

Abstract

A rich cephalopod fauna (ammonites, belemnites, aptychi), delivered by the basal part of the Late Valanginian–? Early Aptian Braşov Formation cropping out in the "Piatra Mare" quarry near Codlea town, is described. This fauna is important for four reasons: first, by its bearing of new Valanginian ammonite taxa; second, by the reassessment of some species range it induces; third, by proving once more the faunal exchange in the late Valanginian between the Tethyan and Boreal Realms; fourth, by establishing that the Braşov Formation settling started in the early Late Valanginian Verrucosum Zone, or even in the latest Early Valanginian.

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39 species of *Holcophylloceras, Ptychophylloceras, Lytoceras, Himantoceras, Crioceratites, Euptychoceras, Haploceras (Neolissoceras), Oosterella, Paquiericeras (Julianites), Jeanthieuloyites, Olcostephanus, Subastieria, Neocomites (Teschenites), Karakaschiceras, Eleniceras, Sarasinella, Criosarasinella, Rodighieroites, Sabbaiceras, Lamellaptychus, Duvalia* prove the Late Valanginian age of the basal part of the Braşov Formation. From among these species *Crioceratites* ex gr. *andersoni* (SARKAR), *Jeanthieuloyites nodosus* (MANDOV), *Olcostephanus catulloi* (RODIGHIERO), *Eleniceras tchechitevi* BRESKOVSKI, and *Duvalia binervia* (RASPAIL) are here noted for the first time as existing in the Late Valanginian. One Romanian genus: *Sabbaiceras*, with its species *S. stefanescui* AVRAM & GRADINARU, and three new species of the genus *Jeanthieuloyites: J. keyserlingiformis, J. trapezoidalis* and *Jeanthieuloyites* n.sp.ind. are described.

Jeanthieuloyites keyserlingiformis is considered as a Late Valanginian descendant of a *Polyptychites*-related Boreal immigrant into the Tethyan Realm; it could represent the Valanginian forerunner of the Hauterivian genus *Spitidiscus*. On the other hand, the genus *Sabbaiceras* could be a Tethyan Valanginian ancestor of the Boreal Hauterivian genus *Distoloceras*. This peculiarity of the here described Upper Valanginian ammonite fauna, namely the interlacing of the Tethyan and Boreal ammonite taxa, may be ascribed to the onset of a new cycle of sea-level rise, an event clearly evinced by the "transgressive" position of the Braşov Formation.

1. Introduction

In the inner parts of the Carpathian Bend (the junction area between the Eastern and South Carpathians), the Valanginian–Bedoulian rock-sequences display several major isochronous lithofacies. Aside from the deep-water rhythmic terrigenous rock-sequences of pre-flysch type or olistostromic type, developed in large areas of the inner units of the East Carpathian flysch, there are also muddy shelf rock-sequences, particularly rich in ammonite faunas, fairly represented in the easternmost part of the South Carpathian Getic Nappe. In this latter area, the Valanginian–Bedoulian muddy-shelf rock-sequence, of which the primarily large surface of development was drastically reduced by erosion during the Late Aptian to Albian interval, is now geographically limited to three major regions:

1) the Braşov – Codlea region, in the north;
2) the Dîmbovicioara region, in the south, this being the largest;
3) the W-Bucegi region, in an eastward lateral position compared to the first two ones.

Our available data concerning the stratigraphic succession and the facies development of the Valanginian–Bedoulian muddy-shelf rock-sequences fairly reveal the existence of a facies individuality of the two major regions, namely the Braşov –Codlea and the Dîmbovicioara region, respectively*).

It is the ammonite richness which early made the reputation of the Valanginian–Bedoulian muddy rock-sequences, especially of the Dîmbovicioara region. The ammonite content of the "Dîmbovicioara marls" (sensu SIMIONESCU, 1898) were successively inventoried by FOETERLE (1870), STEFĂNESCU (1885), HERBICH (1888), COBĂLCESCU (1890), TOULA (1897), SIMIONESCU (1897 a, b, 1898), POPOVICI-HATZEG (1898), MACOVEI & ATANASIU (1934), ONCESCU (1943), PATRULIUS (1963, 1969), PATRULIUS & AVRAM (1976), AVRAM (1988). References to, and comments on the ammonite faunas of the Dîmbovicioara region were also repeatedly made by several well-known workers of the Lower Cretaceous ammonoids, such as KILIAN (1888, 1910), HAUG (1889), UHLIG (1891), SARKAR (1955), WIEDMANN (1962) and others.

In the Braşov – Codlea region, the ammonite content of JEKELIUS' "Neocommergel von Brassó" (1915) or "Braşov marls" auctorum**) was inventoried by MESCHENDÖRFER (1859), QUENSTEDT, in MESCHENDÖRFER (1860), HERBICH (1872), KOCH (1887), TOULA (1911), PODEK (1913), JEKELIUS (1915, 1923, 1927, 1938), VÎLCEANU (1960), SEMAKA (1967), SĂNDULESCU (1967), PATRULIUS (1969). MANOLIU-NEGREANU (1969), SĂNDULESCU-ION (1970).

*) Some authors (PATRULIUS et al., 1967; PATRULIUS, 1969) have treated the "Dîmbovicioara zone" as a distinct facies zone, in opposition to the "pre-Leaota zone", to emphasize some facies and stratigraphic differences between the Lower Cretaceous rock-sequences of the two areas. In the "Dîmbovicioara zone" there were included the stratigraphically-discontinuous Neocomian–Bedoulian rock-sequences of the so-called "Dîmbovicioara Couloir", and also those of the western part of the Bucegi Massif (Mtn Lespezi section) and of the Postăvaru-Piatra Mare Massif, while the "pre-Leaota zone" included only the apparently stratigraphically-continuous Neocomian rock-sequences of the north-western part of the Bucegi Massif ("Politrie" section). PATRULIUS & AVRAM (1976), although not explicitly, used the term "Leaota zone" instead of "Dîmbovicioara zone". In the present paper, the Dîmbovicioara region refers strictly to the southern (Rucăr-Bran) compartment of the so-called "Dîmbovicioara Couloir", while the northern (Vulcan-Cristian) compartment is here included in the Braşov – Codlea region. SĂNDULESCU (1965, 1967) restricted structurally the "Dîmbovicioara Couloir" only to its southern compartment, while the northern compartment was treated as a distinct unit, the "Vulcan-Cristian synclinorium".

**) As the repetitive usage of the same geographic names for different lithostratigraphic units of variable chronostratigraphic extent could potentially induce some confusions, a historical review of the problem is necessary. SIMIONESCU (1898) has firstly introduced the informal term "Dîmbovicioara marls" for the muddy-shelf rock-sequence from the Dîmbovicioara region. Later, JEKELIUS (1938, p. 388) informally introduced the "mesozoische Schichtenserie von Braşov", to include the Lias to Barremian sedimentary rock-sequence, while such terms as "Neocommergel von Brassó" or "Neocommergel der Serie von Braşov" were introduced by the same author (JEKELIUS, 1915, p. 133; 1938, geological map) for the Valanginian to ? Lower Aptian marly rock-sequence from the Braşov region. In the more recent literature, the term "Braşov marls" was in current usage by SĂNDULESCU (1964, 1967, 1976), SĂNDULESCU-ION (1970) and PATRULIUS & AVRAM (1976). On the other hand, PATRULIUS (1963, 1969), PATRULIUS et al. (1967) extended the stratigraphic interval of the "Braşov Series" by including the whole Triassic to Lower Aptian rock-sequence developed in them, defined by uniform lithologies, "Dîmbovicioara zone", while for the Valanginian–Bedoulian muddy-shelf rock-sequence of this "zone" the same author introduced the collective term "Dîmbovicioara Series". PATRULIUS & AVRAM (1976) pointed, however, to the necessity of a restraint usage of the term "Dîmbovicioara Series", only for the Neocomian–Bedoulian rock-sequence from the southern part of the "Dîmbovicioara Couloir", owing to its particular lithologies as opposed to the "Braşov marls". With the same occasion, the above-mentioned authors formally described the "Dîmbovicioara Formation" and subdivided it into several members. Lastly, BALINTONI et al. (1986) used such terms as "Dîmbovicioara Series", "Braşov Series" and "Holbav Series", giving them a tectonostratigraphic meaning, in order to distinguish the sedimentary covers of the corresponding homologous tectonic units, separated by them in the easternmost part of the Getic Nappe, but the individualisation of which is not yet convincingly demonstrated from the viewpoint of the Valanginian–Bedoulian muddy-shelf paleogeography.
In conclusion, to avoid any kind of confusion which could result from the fact that most part of the above-cited terms were introduced by far off the rules of HEDBERG's code procedures, we retain here only the Dîmbovicioara Formation, already used by PATRULIUS & AVRAM (1976), and the Braşov Formation, used here for the first time.

Obviously, both the Dîmbovicioara Formation and the Braşov Formation paraconformably overlay the Upper Jurassic to lowermost Cretaceous Štramberk-type massive or thick-bedded limestones: in both these formations, a basal bed of nodular to subnodular or breccious limestones directly rests upon a ferruginous-coated hardground, well-developed on the top of the Štramberk-type limestones, which marks a stratigraphic gap of variable extent.

In spite of their rich ammonite faunas, the age of the muddy-shelf rock-sequences in all the above-mentioned regions was, however, a matter of long debate (see for discussions PATRULIUS, 1963, 1969, and PATRULIUS & AVRAM, 1976), as relevant biostratigraphic elements were lacking in their basal part.

Up to the seventies, the only cephalopod fauna yielded by the basal beds of the muddy-shelf rock-sequences from the easternmost part of the Getic Nappe was collected by JEKELIUS (1915) from the Braşov Formation cropping out in the Valea Dracului (= Devil Valley). Discussing upon the biostratigraphic value of this cephalopod fauna, although in several cases his determinations are now obsolete, JEKELIUS (1938, p. 388) has concluded upon the age of the Braşov Formation, as follows:

„ ... Im Mergel sind somit sicher vertreten oberes (eventuell auch mittleres) Valanginien, Hauterivien und Barremien, vielleicht noch unteres Apt ... "

To demonstrate the Valanginian age, the author cited from the basal nodular limestone bed the following species: *"Belemnites Orbignyanus"*, *"Lissoceras grasianum"* and *Astieria psilostoma"*, while from the overlying marls the same author cited *"Aptychus didayi"*, *"Lissoceras grasianum"*, *"Hoplites (Kilianella)* cfr. *asperrimus"*.

As for the Dîmbovicioara Formation, although a reliable cephalopod fauna is lacking yet from its basal part, PATRULIUS (1963, 1969), PATRULIUS et al. (1967), PATRULIUS & AVRAM (1976) did not exclude that this basal part, namely the calcareous Cetatea Neamţului Member, could eventually have a Late Valanginian age, by taking into account the biostratigraphic value of some taxa included in JEKELIUS' (1915) Valanginian cephalopod fauna from the Braşov area. From this fauna, PATRULIUS & AVRAM (1976) retained as indicative for the Valanginian age the following species: *Duvalia lata* BL. (=*Belemnites Orbignyanus* DUV., in JEKELIUS, 1915), *Phylloceras serum* (OPPEL), *Olcostephanus sayni* (KIL) (=*Astieria Sayni* KIL., in JEKELIUS, 1915), *O.* cf. *psilostomus* (NEUM.. & UHLIG) (=*Astieria psilostoma* NEUM. & UHLIG, in JEKELIUS, 1915), *O. atherstoni* (SHARPE) (=*Astieria carpathica* n.sp., in JEKELIUS, 1915, pp. 120–121, Pl. IX, Fig. 3 and Text-Fig. 18). As for the species *Hoplites* cf. *asperrimus* D'ORB. (in JEKELIUS 1915, p. 123, Pl. IX, Fig. 5), the same authors opined that it is distinguished from a true *Kilianella* by its ventral part, of which ribbing, although attenuated, crosses it.

More recently, AVRAM (in PATRULIUS et al., 1980, Annual report, unpublished) adopted THIEULOY's (1977, p. 107) point of view about the biostratigraphic value of *Eleniceras transsylvanicum* (JEKELIUS), establishing that the basal part of the marly Dealu Sasului Member belongs to the uppermost Valanginian (*Callidiscus* Zone). Thus, the Valanginian age was also extended upon the underlying Cetatea Neamţului Member.

In the Braşov town area, where the occurrence of *Eleniceras transsylvanicum* (JEKELIUS) is placed in Valea Dracului by JEKELIUS (1915) in the lower part of the marly sequence of the Braşov Formation, the Valanginian age of both this layer and the basal nodular limestone bed is also to be noted, as previously JEKELIUS (1915, 1938) already observed; in spite of the poor state of knowledge at his time of the real biostratigraphic range of many Lower Cretaceous ammonite species, the general conclusion of JEKELIUS (1938, p. 388) concerning the lower age of the Braşov Formation is now wholly confirmed by the new results of our study.

During the seventies, a rich fauna of cephalopods, brachiopods and (scarcer) gastropods was collected from the basal part of the Braşov Formation, cropping out in the "Piatra Mare" quarry, south-west of the Codlea town. Some preliminary accounts on the biostratigraphic significance of the cephalopod fauna, made by the authors of the present study, are to be found in a paper of GRĂDINARU & BĂRBULESCU (1989), where the brachiopod fauna of this locality is described. At that time, it was concluded that the cephalopod fauna is indicative for the interval between the Upper Valanginian *Trinodosum* Zone and the Lower Hauterivian *Radiatus* Zone, a conclusion which is partly emended in the following chapter of the present study. On the other hand, a heterochrony of the basal nodular limestone bed was supposed to exist during the Upper Valanginian, running from the *Trinodosum* Zone in the Codlea section, to the *Callidiscus* Zone both in the Braşov (Valea Dracului) section and the Dîmbovicioara section, respectively. According to the new results of the present study, it is obvious now that such a heterochrony, even if it exists, is not yet sufficiently proved owing to the incomplete faunal inventory at the layer of the basal nodular limestone in the most part of the outcropping Valanginian–Bedoulian muddy-shelf rock-sequences.

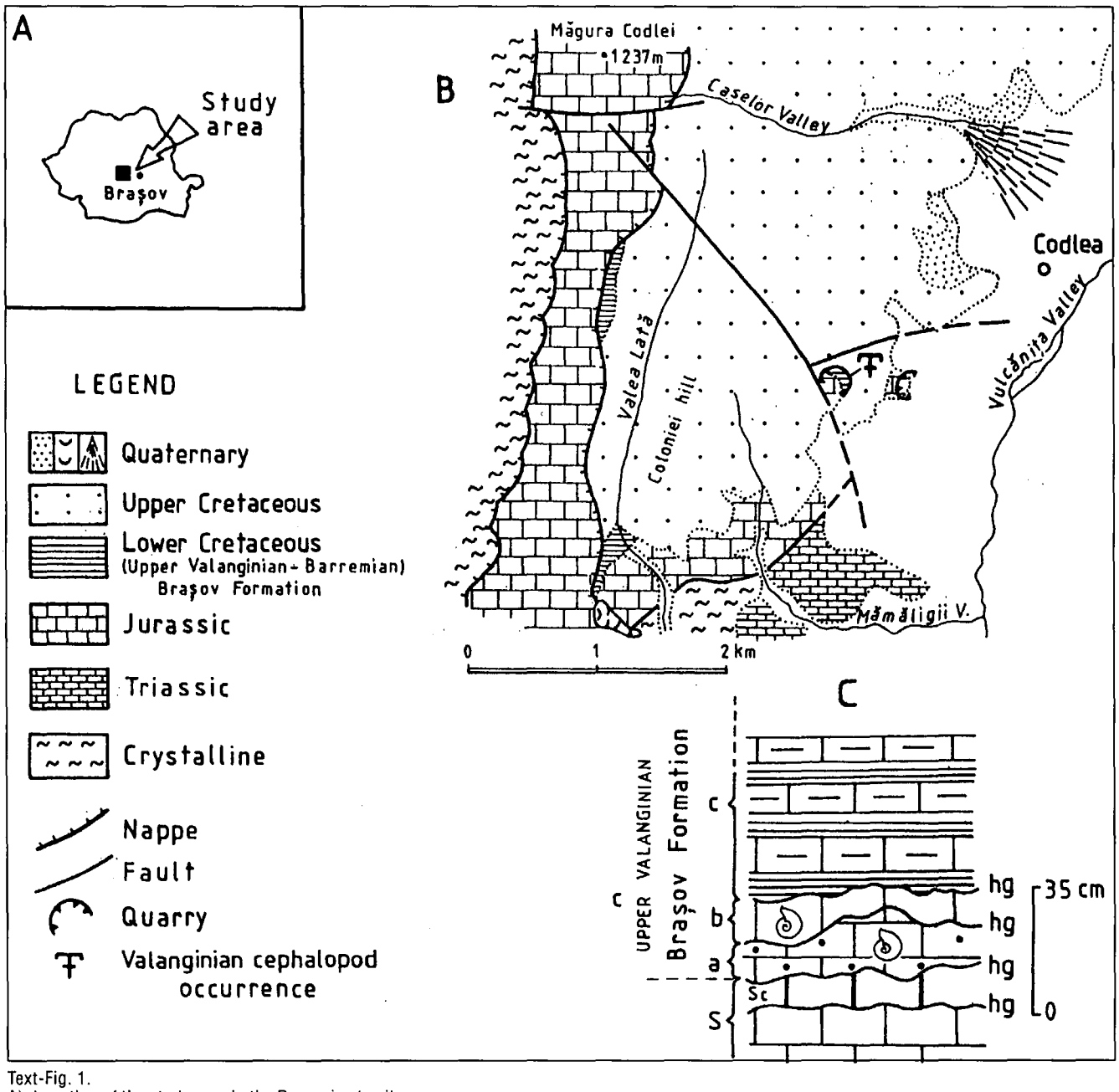
The detailed taxonomic study of the rich Valanginian cephalopod fauna from the Codlea town area, which renders new and very important data not only for the local stratigraphy and for the time-framing of the Braşov Formation depositional onset, but especially for the general biostratigraphy of the Late Valanginian in the Tethyan Realm is the goal of the present paper.

The here described cephalopod fauna is important in four respects: first, by its bearing of new Valanginian taxa; second, by the reassessment of the range of some species it induces; third, by once more proving the exchanges between the Upper Valanginian ammonite faunas of the Tethyan and Boreal Realms; fourth, by establishing that the Braşov Formation setting began in the early Late Valanginian *Verrucosum* Zone, or even in the latest Early Valanginian.

2. Geological Setting and Previous Stratigraphic Data

The Upper Valanginian cephalopod fauna described in the present study was fully collected from the "Piatra Mare" quarry located south-west of the Codlea town (almost 15 km west of Braşov), the geographical position of which is to be found on Text-Fig. 1. This outcropping area of the Braşov Formation was identified by SĂNDULESCU (1967), but the first detailed stratigraphic column was drawn by GRĂDINARU & BĂRBULESCU (1989), although a preliminary stratigraphic sketch was even given earlier by GRĂDINARU, in NEAGU (1975).

The Braşov-Codlea region, to which this outcropping area belongs, is placed in the easternmost part of the South Carpathian Getic Nappe which, by its Cretaceous tectogenesis, pertains to the so-called "Median Dacides"



Text-Fig. 1.
A) Location of the study area in the Romanian territory.
B) Geological map of the Codlea town area.
C) Lithostratigraphic succession at the base of the Braşov Formation in the "Piatra Mare" quarry, SW of the Codlea town.
S = Štramberk-type white massive limestones (Sc = pelletal to intraclastic calcarenites); a = ferruginous limestone, with limonitic ooids; b = marly limestone; c = marly and marlstone alternance; hg = hardgrounds.

(SĂNDULESCU, 1984). If we follow the structural scheme of SĂNDULESCU (1975, 1984), who is trying to distinguish several structural units in the eastern part of the Getic Nappe, then the Lower Cretaceous outcropping area located south-west of the Codlea town apparently could belong to the Getic Holbav Unit.

Beside the Valanginian sequence of the "Piatra Mare" quarry, several outcrops of the Braşov Formation were previously identified in the Codlea town area, in the hydrographic basin of Valea Lată (=Broad Valley) by JEKELIUS (1923, 1927), VÎLCEANU (1960), SEMAKA (1967), SĂNDULESCU (1967), MANOLIU-NEGREANU (1969), who also registered some Hauterivian and Barremian ammonites. The ammonite faunas collected by VÎLCEANU and by SEMAKA were later revised by PATRULIUS (1969), who listed the following Hauterivian–Lower Barremian species: *Pseudobelus bipartitus* (D'ORBIGNY), *Partschiceras winkleri* (UHLIG), *Protetragonites* sp., *Lytoceras* cf. *anisoptychum* UHLIG, *Anahamulina* sp., *Spitidiscus intermedius* (D'ORBIGNY), *S. vandecki* (D'ORBIGNY), *S.* aff. *heeri* OOSTER, *Crioceratites nolani* (KILIAN), *Neolissoceras grasianum* (D'ORBIGNY), *Lamellaptychus angulocostatus* (PETERS), *L. didayi* (COQUAND). All these species were collected from the gray to greenish-gray marls and marly limestones corresponding to the Hauterivian–Barremian stratigraphic interval of the Braşov Formation.

As to the oldest fauna of the Braşov Formation identified up to now in the "Piatra Mare" quarry, it was preliminarily inventoried by GRĂDINARU, in NEAGU (1975). This taxonomic identification, which is now already obsolete, pointed at that time to a Hauterivian age, a conclusion which is now contradicted by the new results of the present study. Consequently, the biostratigraphic interpretation of the

foraminifer fauna described by NEAGU (1975) has to be revised, too.

A more recent preliminary identification of the same ammonite assemblage (for which a Late Valanginian–Early Hauterivian age was proposed) was published by the authors of the present study, in GRĂDINARU & BĂRBULESCU (1989). This identification is here revised, as follows:

Holcophylloceras tethys (D'ORB.)	–	*Hypophylloceras* aff. *perlobatum* (SAYN)
Neolissoceras grasianum (D'ORB.)	–	*Hapl. (Neoliss.) grasianum* (D'ORB.)
Himantoceras cf. *trinodosum* THIEULOY	–	*Himantoceras* cf. *trinodosum* THIEULOY
Teschenites sp.	–	pro parte *Eleniceras transsylvanicum* (JEKELIUS) young stage
Oosterella sp.	–	*Paquiericeras (Julianites)* cf. *mourrei* VERMEULEN
Eleniceras transsylvanicum (JEKELIUS)	–	*Eleniceras transsylvanicum* (JEKELIUS)
Olcosteph. ex gr. *astierianus* (D'ORB.)	–	*Olcosteph. catulloi* (RODIGHIERO)
Acanthodiscus sp.	–	*Rodighieroites* ? *lamberti* (SAYN)
Distoloceras sp.	–	*Eleniceras* sp. aff. *E. spiniger* (V. KOEN.)
Spitidiscus meneghini (ZIGNO in ROD.)	–	*Jeanthieuloyites nodosus* (MANDOV)
Spitidiscus sp. ex gr. *rotula* (SOW.)	–	*Jeanthieuloyites* n. sp .ind.
Lamellaptychus didayi (COQUAND)	–	*Lamellaptychus didayi* (COQUAND)

As a consequence, the proposed Valanginian–Early Hauterivian age of this assemblage needs to be also revised, as will be made in the following chapter.

3. Stratigraphic Occurrence

In the "Piatra Mare" quarry, the Braşov Formation paraconformably overlies the Štramberk-type white massive limestones. These limestones are capped by a bed, up to 20 cm thick, made up of pelletal to intraclastic biocalcarenites, bearing a rich lagoonal assemblage of agglutinant benthic foraminifers, scarce corals, algae, chaetetids and diceratids, which is indicative of a Berriasian–Early Valanginian age. It is to be noted that the bottom of this bed is marked by a well-expressed hardground.

The Braşov Formation starts with a basal bed, 10–30 cm thick, of condensed, subnodular to nodular limestone, in places showing a well-developed breccious structure, emphasized both by its internal clastic lithology and by varied colourings: greenish-gray to brownish-yellow or ferruginous, in the lower part, changing upwards into cream. The contact between this basal bed and the underlying Štramberk-type massive limestone is marked by a clear-cut ferruginous-coated and burrowed hardground.

The internal lithologic anatomy of the basal bed reveals however a composite structure, given by a mixture of several generations of sediments, which allows us to distinguish at least two different layers (Text-Fig. 1), as follows:

a) A lower layer, 10–20 cm thick, made up of greenish-gray to brownish-yellow ferruginous limestone, interspersed with limonitic ooids. Intraformational pebbles of yellowish marly limestones, coated by ferruginous envelopes and also interspersed by limonitic ooids, are also included here and there. A rich fauna of brachiopods, ammonites and belemnites was collected from this lower layer. Scarce gastropods and phyllodont dents are also present;

b) An upper layer, almost 10–15 cm thick, made up of cream to greenish-white marly limestone, devoid of limonitic ooids. This type of sediment is also deeply protruded by burrowings in the lower level. As a consequence of bioturbation, the contact between the two layers is very complicated and only the different colouring makes them distinguishable from one another. Ammonites, belemnites, rare brachiopods, gastropods and aptychi were recorded in this upper layer.

By its intricate internal lithologic structure, this basal bed displays a complex process of deposition, characterised by a low rate of sedimentation or by frequent interruptions of it, the latter materialised by polyphased hardgrounds.

Above this lithologic composite basal bed, a sequence of 2.30–3.00 m thick, truncated upwards by the subaerial erosion, made up of yellowish-gray marls or marlstones, follows abruptly, its basal contact being also an indurated surface.

From the paleontological viewpoint it has to be emphasized that aside the classical section of the Braşov Formation from Valea Dracului, it is especially the section of the "Piatra Mare" quarry of which the basal bed yielded a rich and diverse fauna.

Here, the richest and varied cephalopod fauna was yielded by the lower layer (a), as follows: *Hypophylloceras* aff. *perlobatum* (SAYN), *Ptychophylloceras* ? *diphyllum* (D'ORB.), *Lytoceras* aff. *richei* SAYN, *L.* aff. *subfimbriatum* (D'ORB.) aff. *liebigi* (OPPEL) ZITTEL, *Himantoceras* cf. *trinodosum* THIEULOY, *Criosarasinella* cf. *furcillata* THIEULOY, *C. heterocostata* (MANDOV), *Sabbaiceras stefanescui* AVRAM & GRĂDINARU, *Rodighieroites cardulus* COMPANY, *R.* ? *lamberti* (SAYN), *Duvalia dilatata dilatata* (BL.), *D.* cf. *dilatata binervioides* STOYANOVA-VERGILOVA, *Duvalia* n.sp.aff. *D. dilatata* (BL.), *D. hybrida* (DUV.-JOUVE), *D.* aff. *emericii* (RASPAIL).

Many other phylloceratids and smooth lytoceratids were also yielded by the same lower layer, but they are, unfortunately, unidentifiable. Moreover, owing to the frequent interruptions of sedimentation and to multiple intraformational reworkings, most part of the cephalopod individuals are fragmented; as a consequence, large parts of the species were identified with caution.

Besides, some yellowish marly limestones preserved as intraformational pebbles included in the lower layer, which microfacially are bioclastic wackestones, contain *Tintinnopsella carpathica* (MURG. & FIL.) and *Stomiosphaera echinata*, and also foraminifers and ostracods.

Lastly, most part of the brachiopod species described by GRĂDINARU & BĂRBULESCU (1989) comes from the same lower layer (a), namely: *Monticlarella remesi* NEKVASILOVA, *Lacunosella moutoniana* (D'ORBIGNY), *Nucleata* cf. *planulata* (ZEJSZNER), *Nucleata* sp. ex gr. *N. euthimi* (PICTET), *Nucleata* sp., *Mouto-*

nithyris moutoniana (D'ORBIGNY), *Lamellaerhynchia* sp. As the ammonite fauna of this layer is wholly Upper Valanginian, then the age of the associated brachiopod fauna is similar.

The light-coloured marly limestone of the upper layer (b) offered the following ammonite species: *Hypophylloceras* aff. *perlobatum* (SAYN), *Haploceras (Neolissoceras) grasianum* (D'ORB.). *H. (N.) desmoceratoides* WIEDMANN, *Neocomites (Teschenites)* cf. *muretensis* BREISTROFFER, *N. (T.)* sp.aff. *N. (T.) flucticulus* THIEULOY, *Olcostephanus catulloi* (RODIGHIERO), *Subastieria inordinata* (TZANKOV), *Eleniceras transsylvanicum* (JEKELIUS), *Eleniceras* sp.aff. *E. spiniger* (V. KOENEN), *Lamellaptychus didayi* (COQUAND), *Duvalia dilatata dilatata* (BL.), *D. dilatata binervioides* STOYANOVA-VERGILOVA, *D. binervia* (RASPAIL), *D. binervia* n.ssp., *D. hybrida* (DUVAL-JOUVE).

Other unidentifiable ammonites were collected from the upper layer, too. Some belemnites, brachiopods and gastropods are also present.

The succeeding marly sequences are by far poorer in faunal elements; nevertheless, the cephalopod species recorded by VÎLCEANU (1960) and by SEMAKA (1967) in this sequence, in the Codlea town area, and revised by PATRULIUS (1969), argue for its Hauterivian and Barremian age (see above).

4. Biostratigraphy

The cephalopod species recorded by us in the basal part of the Braşov Formation, in the "Piatra Mare" quarry, led us to accept a latest Early Valanginian–Late Valanginian age (up to the *Trinodosum* Zone) for the ferruginous-limestone layer (a), and a Late Valanginian age for the marly limestone (b).

By the way, from all the species listed here above, *Kilianella* sp., even fragmented but displaying most of the ribs simple and gently tuberculated as in *Kilianella pexiptycha* UHLIG group, indicates the top of Early Valanginian. Some other species, such as *Paquiericeras (Julianites) mourrei, Subastieria balkanica, S. inordinata, Karakaschiceras biassalense* and *Rodighieroites* ? *lamberti* are known from the Upper Valanginian *Verrucosum* Zone, as follows: *Paquiericeras (Julianites) mourrei* was recognised until now exclusively within the *Verrucosum* Zone, while the other representatives of the subgenus *Julianites* range in Valanginian from the *Pertransiens* to the *Verrucosum* Zones, in south-eastern France (THIEULOY, 1977); both species of *Subastieria* were recorded in the *Verrucosum* Zone from Bulgaria (DIMITROVA, 1967), unfortunately without any knowledge, at least until now, about their range in the classical sections of the Valanginian; even originally discussed as a Hauterivian species, *Karakaschiceras biassalense* range was recently limited to the middle *Campylotoxus* Zone-*Verrucosum* Zone (COMPANY, 1987); and finally, the appartenance of *Rodighieroites* ? *lamberti* to the ammonite assemblage of the *Verrucosum* Zone was pointed out even by SAYN (1907).

Beside *Himantoceras trinodosum* (the index species of the Upper Valanginian *Trinodosum* Zone), some other species, such as *Haploceras (Neolissoceras) desmoceratoides, Sarasinella sakalavensis, Criosarasinella furcillata, Rodighieroites cardulus* and *Eleniceras transsylvanicum* are indicative of the *Pachydicranus* Zone (sensu COMPANY, 1987 = *Trinodosum* + *Callidiscus* Zones, sensu THIEULOY, 1973), *Haploceras (Neolissoceras) desmoceratoides* and *Rodighieroites cardulus* are known in the lower part of this zone (COMPANY, 1987), *Criosarasinella furcillata* characterises the top of the *Trinodosum* Zone (THIEULOY, 1977), and *Eleniceras transsylvanicum* is developed in the latest Valanginian (*Callidiscus* Zone) both in south-east France and in Dîmbovicioara region, Romania (THIEULOY, 1977).

At last, some of the species listed from the basal layer of the Braşov Formation, namely: *Oosterella vilanovae, Eleniceras spiniger, Criosarasinella heterocostata, Neocomites (Teschenites) muretensis* and *N. (T.) flucticulus* arise in the latest Valanginian *Pachydicranus* Zone and are also present in the Early Hauterivian of Spain, France, Germany and Bulgaria (MANDOV, 1976; THIEULOY, 1977; COMPANY, 1987).

Taking into account all these data, it may be inferred that the condensed ferruginous limestone (a) is latest Early Valanginian–Late Valanginian (up to the *Trinodosum* Zone), and the marly limestone (b) is latest Valanginian in age, considering this stage as THIEULOY (1973) defined it. This fact is very important for the reappraisal of the Valanginian range of some taxa until now considered as arising in the Hauterivian, namely: *Crioceratites* ex gr. *andersoni* (SARKAR), *Jeanthieuloyites nodosus* (MANDOV), *Olcostephanus catulloi* (RODIGHIERO), *Eleniceras tchechitevi* BRESKOVSKI, *Duvalia binervia* (RASPAIL).

5. Paleobiogeographic Interpretations

Some new taxa, recognised in the ammonite assemblage of the basal ferruginous limestone (a) of the Braşov Formation, namely the Carpathian species of the genus *Jeanthieuloyites*, allow to conclude upon the faunal loans between the Tethyan and Boreal Realms at the earliest Late Valanginian time span.

Even originally described as a representative of the family Olcostephanidae in the South-African area (COOPER, 1981), the genus *Jeanthieuloyites* is highly confirmed in the Tethyan Late Valanginian, by many yet undescribed species recorded in south-east France (L. BULOT, oral communication) and in the Carpathians (see here below). From among these species, of the most interest is *Jeanthieuloyites keyserlingiformis* n.sp., of which mature shape and ornamentation show a certain relationship with the boreal genus *Polyptychites.*

As the genus *Jeanthieuloyites* appears in the Carpathians simultaneously with the sea-level rising in the early Late Valanginian, it seems that *J. keyserlingiformis*, which we consider the most conservative species of the genus, reveals the boreal source of the whole taxon, as a radiation of a true *Polyptychites* branch immigrated into the Tethyan Realm.

This assertion comes to round the picture of the faunal exchange between the two realms at the beginning of the Late Valanginian and also, to contenance the assumption that the most probable immigration way of this taxon was the Polish gate between the Polish subbasin of the Central European Basin and the Carpathian trough, over the Meta-Carpathian Arch (see KUTEK et al., 1987). Moreover, it seems that the faunal migration in this area was bidirectional and not unidirectional as assumed by the authors cited here above.

On the other hand, this bidirectional migration could bring some faunal mutations, such as the branching of the Hauterivian genus *Spitidiscus* from the Valanginian genus *Jeanthieuloyites*, the ontogenetic evolution of which proterogenetically a *Spitidiscus*-like young stage developed. Another possible illustration of this phenomenon could be the here presumed origin of the Hauterivian Boreal

genus *Distoloceras* from the Valanginian Tethyan genus *Sabbaiceras*, both having in common the same type of ornamentation in all their ontogenetic stages and also, the suture line; but this assumption still needs to be checked up by finding the uppermost Valanginian–lowermost Hauterivian link between these two genera, of which the presence in the Boreal province is more probable, as a consequence of the early Late Valanginian faunal migration.

The sea-level changes in the late Early Valanginian produced partly similar depositional discontinuities in both the Meta-Carpathian Arch area (Tomaszow syncline) and the eastern end of the South Carpathian Getic Nappe. This refers to the main, in both these regions, the erosional gap between the Early Valanginian (in places even the Late Jurassic) and the earliest Late Valanginian (*Verrucosum* Zone). This gap was followed by a transgression which resulted in the last region in the low rate sedimentation in the Late Valanginian, with at least two other shorter breaks in sedimentation producing hard-grounded sea bottoms at the top of the *Trinodosum* Zone and the top (?) of the *Callidiscus* Zone. The last two discontinuities were probably related to the first tectonic movements of the Getic Nappe over the Carpathian flysch depositional area.

6. Systematic Paleontology

Suborder: Phylloceratina ARKELL, 1950
Family: Phylloceratidae ZITTEL, 1884
Genus *Hypophylloceras* SALFELD, 1924

Type species: *Phylloceras onoense* STANTON, 1895; Aptian, California.

Hypophylloceras aff. *perlobatum* (SAYN)

(Pl. 1, Figs. 1, 2; Pl. 2, Fig. 1; Pl. 3, Figs. 1,2)

Type reference*): *Phylloceras serum* OPPEL var. *perlobata* SAYN, 1907, p. 7, Pl. I, Figs. 6–8.

Other references: *Phylloceras serum* var. *perlobata* SAYN, GIGNOUX in KILIAN et al., 1920, p. 92; *Hypophylloceras perlobatum* SAYN, WIEDMANN, 1967, p. 16.

Material: 8 more or less incomplete individuals, septate at least up to a diameter of 80 mm (see Pl. 3, Fig. 1). 7 of them yielded by the ferruginous limestone (a) and only one from the overlying marly limestone (b).

Description: High-oval section with large-rounded subparallel sides and rounded ventrum; relatively large, with steep wall umbilicus; simple, dense, fine and gently sinuous lirae, seen on the outer half of the sides, accompanied at a diameter of 65–75 mm by shallow lateral sinuous ridges, deeper near the umbilical margin and smoothing on the outer half of the sides; suture typical of *Hypophylloceras*, with a short median lobus, tetraphylloid but gently spatulate first lateral saddle, and 5 phylloid second-lateral.

Measurements:

	Ø	U	H	W	W/H
Pl. 3, Fig. 1	[74]	5.3 (0.07)	42.7 (0.57)	26.2 (0.35)	0.61
Pl. 1, Fig. 2	39.5	3.7 (0.09)	22.2 (0.56)	14 (0.35)	0.63
	41	3.4 (0.08)	22.7 (0.55)	13.8 (0.34)	0.60
	38.5	2.3 (0.06)	22.1 (0.57)	13 (0.34)	0.60

*) For practical reasons (to avoid the reiteration of identical transcription by different authors of the genus and species name) the authors propose the here adopted pattern of synonymies.

Remarks: The here described species is closely related to *Hypophylloceras perlobatum* (SAYN) by its suture and whorl section, but it displays a slower whorl height growing, more sinuous ribbing and ridged adult periumbilical area (similarly to the mature examples of *Ph. serum* OPPEL, in JOLY, 1976).

Occurrence: Valanginian in south-east France (Valanginian–Barremian by GIGNOUX in KILIAN et al., 1920, and WIEDMANN, 1964).

Genus: *Ptychophylloceras* SPATH, 1927

Type species: *Phylloceras Feddeni* WAAGEN, 1875; Barremian, France.

Ptychophylloceras? *diphyllum* (D'ORBIGNY)

(Pl. 1, Fig. 3; Pl. 3, Figs. 3a, 3b)

Type reference: *Ammonites diphyllus* D'ORBIGNY, 1841, p. 181, Pl. 55, Figs. 1–3.

Other references: *Phylloceras semisulcatum* D'ORBIGNY, SAYN 1907, p. 11 (partim); GIGNOUX in KILIAN et al., 1920, p. 94 (partim).

Material: One nucleus, yielded by the ferruginous limestone (a).

Description: High-oval whorl section, with convexe sides, convergent to the relatively narrow venter, beginning from approximately 1/3 of the sides height, and very steep umbilical wall. Umbilicus deep and narrow. Whorl surface completely smooth. Suture, poorly preserved, with the median lobus shorter than the first lateral one, and with tetraphylloid first lateral saddle.

Measurements:

Ø	U	H	W	W/H
26.6	3 (0.11)	15 (0.56)	12.4 (0.46)	0.80

Remarks: We consider here *Ammonites diphyllus* D'ORBIGNY as a valid species, and not as a variety of *Ammonites semisulcatus* D'ORBIGNY (as SAYN, 1907, and GIGNOUX in KILIAN et al., 1920, did) by its continuous and not sulcate periumbilical area. On the other hand, its suture-line obviously differs from that of the typical *Ptychophylloceras* by the tetraphylloid first lateral saddle and, on this ground, its belonging to this genus is questionable.

Occurrence: Early Neocomian in France.

Suborder: Lytoceratina HYATT, 1889
Family: Lytoceratidae NEUMAYR, 1875
Genus: *Lytoceras* SUESS, 1865

Type species: *Ammonites fimbriatus* SOWERBY, 1817; Early Jurassic, England.

Lytoceras aff. *richei* SAYN

(Pl. 1, Fig. 4; Pl. 3, Fig. 4)

Type reference: *Lytoceras Richei* SAYN, 1901, p. 3, Pl. II, Fig. 1.

Other references: *Lytoceras Richei* SAYN, GIGNOUX in KILIAN et al., 1920, pp. 107–108.

Material: 3, more or less incomplete phragmocones, all of them yielded by the ferruginous limestone (a).

Description: Whorls almost circular (gently depressed), with a swift growing (H/h = 20/11 = 1,8). Relatively dense, seen only in umbilicus, rather proverse to the mid-sides, then radial, crinkled and calibrate ribs. Suture-line rather ascendant, typical of a lytoceratid type.

Measurements:

	Ø	U	H	W	W/H
Pl. 3, Fig. 4	46.3	12 (0.26)	20.7 (0.45)	21.4 (0.49)	1.03
	26.3	9.1 (0.34)	11.4 (0.44)	12.6 (0.49)	1.1
	25.7	8.4 (0.35)	10.9 (0.43)	12.2 (0.48)	1.1

Remarks: A complete identification of the here described specimens with *Lytoceras richei* SAYN is hindered only by their gently depressed whorl section. But they are clearly related by ornamentation to the *Lytoceras sutile* (OPPEL in ZITTEL) group, as GIGNOUX (in KILIAN et al., 1920) observed for the *Lytoceras richei* type.

Occurrence: Valanginian in south-east France.

Lytoceras aff. *subfimbriatum* (D'ORBIGNY)

(Pl. 3, Figs. 5, 6a,b)

Type reference: *Ammonites subfimbriatus* D'ORBIGNY, 1841, p. 121, Pl. 35, Figs. 1–4.

Other references: *Ammonites subfimbriatus* D'ORBIGNY, PICTET & LORIOL, 1858, p. 13, Pl. 11, Figs. 1–4; PICTET, 1868, ? Pl. 12, Fig. 2, ? Pl. 37, Fig. 4. *Lytoceras subfimbriatum* D'ORBIGNY, UHLIG, 1883, p. 189, Pl. V, Fig. 11; SIMIONESCU, 1898, p. 56; SARASIN & SCHÖNDELMAYER, 1901, p. 16, Pl. II, Fig. 3; RODIGHIERO, 1919, p. 75, Pl. VIII(I), Fig. 7. *Eulytoceras subfimbriatum* (D'ORBIGNY), DIMITROVA, 1967, p. 27, Pl. X, Fig. 1.

Material: 6 fragmentary specimens yielded by the basal ferruginous limestone (a). They complete each other to realise the first and second stages of the *Lytoceras subfimbriatum* ornamentation, as figured by UHLIG (1883). But their depressed whorl sections (W/H= 0.113–0.116) relate them to the *Lytoceras liebigi* (OPPEL in ZITTEL) group.

Measurements:

	Ø	U	H	W	W/H
	48.9	21.5 (0.41)	15.4 (0.31)	16.7 (0.34)	1.08

Occurrence: *Lytoceras subfimbriatum* is mainly a Hauterivian species, recorded along the Tethyan Realm from France, Switzerland, Italy, Austria, Romania, Bulgaria; *Lytoceras liebigi* is also known in the Tithonian–?Early Aptian interval of the Alpine area.

Family: Crioceratitidae WRIGHT, 1952
Genus: *Himantoceras* THIEULOY, 1964

Type species: *Himantoceras trinodosum* THIEULOY, 1964; Late Valanginian, France.

Himantoceras cf. *trinodosum* THIEULOY

(Pl. 1, Fig. 5; Pl. 2, Fig. 4; Pl. 3, Fig. 8)

Type reference: *Himantoceras trinodosum* THIEULOY, 1964, p. 206, Pl. VIII, Figs. 1a,b, Text-Fig. 2 A.

Other references: *Himantoceras trinodosum* THIEULOY, MANDOV, 1976, p. 144, Pl. I, Fig. 2; THIEULOY (in BUSNARDO et al., 1979), p. 49, Pl. 3, Figs. 10, 11; COMPANY, 1987, p. 92, Pl. 1, Fig. 11.

Material: One fragmentary (but mature) individual, recorded in the ferruginous limestone (a).

Description: Open crioceratic coiled whorl, with elliptical-subquadrate section; trituberculate, stronger primary ribs, separated by large intervals covered by 10–11 simple, transverse, intercalatory ribs. Suture line of crioceratic type.

Occurrence: Upper Valanginian *Trinodosum* Zone in France, Spain, Bulgaria.

Genus: *Crioceratites* LEVEILLÉ, 1837

Type species: *Crioceratites Duvali* LEVEILLÉ, 1837; Hauterivian, France.

Crioceratites aff. *andersoni* (SARKAR)

(Pl. 1, Fig. 8; Pl. 2, Fig. 5; Pl. 3, Figs. 7a,b)

Type reference: *Crioceratites andersoni* SARKAR, 1955, p. 46, Pl. IV, Fig. 23, Text-Fig. 7 A.

Material: Two fragmentary specimens, of which one (figured) preserves the beginning of the body-chamber; both of them yielded by the ferruginous limestone (a).

Description: Whorls not touching, with sub-trapezium shaped section. They are ornate with gently sigmoidal, trituberculate primary, and 2–5 unequal intercalatory ribs; lateral tubercles, situated on the external third of the sides, appear episodically, umbilical tubercles progressively strengthen towards the end of the phragmocone and on the body chamber, gathering the first intercalatory to the trituberculate rib; external tubercles are stronger in the youth (smaller individual), where 2 of the 5 intercalatories also bear external tubercles. In the young stage the trituberculate ribs are progressively stronger towards the external tubercle. Ventral area smooth. Suture line of crioceratic type (the figured one is shortened longitudinally because of the gerontism).

Remarks: The above described specimens are very near to, but not identical with *Crioceratites andersoni* (SARKAR), by their sigmoidal ribbing, by the longeval stage with supplementary external tubercles and by the progressive reinforcement towards the external margin of the primary ribs in the youth.

Occurrence: *Crioceratites andersoni* has been known until now in the Hauterivian beds from France and Bulgaria. The specimens here presented are the first typical *Crioceratites* recorded in the latest Valanginian, age controlled by the presence in the overlying layer (marly limestone – b) of *Eleniceras transsylvanicum* (JEKELIUS) and *Neocomites (Teschenites)* aff. *fluctuculus* THIEULOY.

Family: Ptychoceratidae MEEK, 1876
Genus: *Euptychoceras* BREISTROFFER, 1952

Type species: *Ptychoceras Meyrati* OOSTER, 1860; Hauterivian, Switzerland.

Euptychoceras sp. cf. *E. teschenense* [(HOH.) UHLIG]

(Pl. 3, Fig. 9)

Material: 4 fragmentary phragmocones of various sizes, recorded in both the basal ferruginous limestone (a) (three of them) and the marly limestone (b).

Description: When not crushed, these individuals are subcircular or even circular in section, completely smooth in youth, but displaying 2 lateral transverse folds on the sides of the largest one (figured). Suture line with trifid saddles.

Remarks: Because of their poor preservation, the doubtful belonging of the above described specimens is grounded only on their folded sides in mature stage.

Occurrence: *Euptychoceras teschenense* was recorded in the Valanginian deposits, in the Western Carpathians (Obere Tešin Schichten).

Suborder: Ammonitina HYATT, 1889
Family: Haploceratidae ZITTEL, 1884
Genus: *Haploceras* ZITTEL, 1870

Type species: *Ammonites elimatus* OPPEL in ZITTEL, 1870; Tithonian, Czechoslovakia.

Subgenus: *Neolissoceras* SPATH, 1923

Type species: *Ammonites Grasianus* D'ORBIGNY, 1841; Valanginian, France.

Haploceras (Neolissoceras) grasianum (D'ORBIGNY)

(Pl. 1, Fig. 6; Pl. 2, Fig. 2; Pl. 3, Figs. 10, 11)

Type reference: *Ammonites Grasianus* D'ORBIGNY, 1841, p. 141, Pl. 44, Figs. 1, 2.

Other references: *Ammonites Grasianus* D'ORBIGNY, PICTET & CAMPICHE, 1858, p. 357; PICTET, 1867, p. 74, Pl. 13, Fig. 1. *Haploceras Grasianum* D'ORBIGNY, UHLIG, 1882, p. 393; SARASIN & SCHÖNDELMAYER, 1901, p. 21. *Haploceras Grasi* D'ORBIGNY, SIMIONESCU, 1898, p. 67. *Haploceras (Lissoceras) Grasi* D'ORBIGNY, KARAKASCH, 1907, p. 55. *Haploceras (Lissoceras) neocomiense* JEKELIUS, 1915, p. 118, Pl. 9, Figs. 1, 2. *Haploceras grasianum* ORBIGNY, DRUSHCHITS & KUDRJAVCHEV, 1960, p. 268, Pl. XIII, Fig. 6, Text-Fig. 73. *Haploceras subgrasianum* DRUSHCHITS & KUDRJAVCHEV, 1960, p. 268, Pl. XIII, Figs. 4, 5, Text-Fig. 74. *Neolissoceras grasianum* (D'ORBIGNY), FÜLOP, 1964, Pl. XIII, Fig. 2, Pl. XVII, Fig. 3, Pl. XXI, Fig. 3; DIMITROVA, 1967, p. 85, Pl. XLII, Fig. 2. *Haploceras (Neolissoceras) grasianum* (D'ORBIGNY), WIEDMANN, 1966, Pl. 1, Fig. 2; WIEDMANN & DIENI 1968, p. 107, Pl. 10, Fig. 2; PATRULIUS & AVRAM, 1976, p. 167, Pl. III, Figs. 2, 3; MANDOV, 1976, p. 68, Pl. X, Figs. 1, 2; COMPANY, 1987, p. 97, Pl. 2, Figs. 1–9, Pl. 18 Fig. 1. *Haploceras (Neolissoceras) subgrasianum* (DRUSHCHITS), DURAJ, FILAK & VAŠIČEK, 1990, p. 61, Pl. I, Fig. 6.

Material: 25 individuals of various sizes, yielded by both the (a) ferruginous and (b) marly limestone.
All are characterised by the funnel-shape of the umbilicus and by the almost rectangular whorl section, with parallel sides. The quite variable shell-proportions encourage the relaying of JEKELIUS'(1915) and DRUSHCHITS' (in DRUSHCHITS & KUDRJAVCHEV, 1960) species in a single taxon (see synonymy).

Measurements:

	Ø	U	H	W	W/H
Pl. 3, Fig. 10	82.3	15.2 (0.24)	27.8 (0.44)	18.2 (0.29)	0.65
	54.2	12.2 (0.22)	24.6 (0.45)	16.3 (0.30)	0.66
	54	10.8 (0.20)	25.7 (0.48)	17.3 (0.32)	0.67
	30.6	5.5 (0.18)	15.5 (0.50)	11.2 (0.36)	0.70

Occurrence: Berriasian–Late Valanginian from Spain to Crimea, North Africa and Mid-Orient (Israel); Early Barremian (?) in Crimea (under *H. subgrasianum* DRUSHCHITS).

Haploceras (Neolissoceras) desmoceratoides WIEDMANN

(Pl. 1, Fig. 7; Pl. 2, Fig. 3; Pl. 3, Figs. 12a,b)

Type reference: *Haploceras (Neolissoceras) desmoceratoides* WIEDMANN, 1966, p. 64, Pl. 1, Fig. 3.

Other references: *Haploceras (Neolissoceras) desmoceratoides* WIEDMANN, MANDOV, 1976, p. 68, Pl. X, Fig. 3; COMPANY, 1987, p. 100, Pl. 3, Figs. 5–8, Pl. 18, Fig. 3.

Material: 2 individuals, from which the largest one, incomplete, was yielded by the ferruginous limestone (a), and the other, crushed, proceeds from the marly limestone (b).
The former specimen displays a high-oval whorl section, with large-rounded sides and ventrum, and with steep, rounded umbilical wall. Both specimens show relatively large umbilicus and smaller whorl height than in *Haploceras (Neolissoceras) grasianum* (D'ORBIGNY).

Occurrence: Late Valanginian in Spain and in Bulgaria.

Family: Holcodiscidae, SPATH, 1924
Genus: *Jeanthieuloyites* COOPER, 1981

Type species: *Rogersites quinquestriatus* BESAIRIE, 1936; Late Valanginian, Madagascar.

As THIEULOY et al. (1990) pointed out, the genus *Jeanthieuloyites* is nearer by its ornamentation to the family Holcodiscidae representatives than to the Olcostephanidae, in which it was included by COOPER (1981). This point of view is also supported by the suture line of its representatives in Carpathians, described here below, which is of the *Spitidiscus* type by the shorter median lobus than the first lateral one, by the descendant auxiliaries and also, by generally shorter longitudinal elements (lobes and saddles) than in such olcostephanids as *Polyptychites* (to compare the Pl. 2, Figs. 11 and 12 in this paper, with the figures 456/3 c and 557/2 c, in MOORE, 1957).

As accepted here, the genus includes, beside the type species and the already known species *Jeanthieuloyites nodosus* (MANDOV), at least three new species; *J. keyserlingiformis, J. trapezoidalis* and *Jeanthieuloyites* n.sp.ind., described here below, all of them characterised by their *Polyptychites*-like pattern of ribbing, including the presence of periumbilical nodes, and by constrictions up to the mature growing stage. All these species were recorded in the basal ferruginous limestone (a), surely Valanginian in age; thus, they are probably coming from a Boreal immigrant into the Tethyan realm of the genus *Polyptychites*, and seem to be the ancestors of the true Hauterivian Holcodiscidae. Thus, through the genus *Jeanthieuloyites*, the family Holcodiscidae originated more probably in Olcostephanidae than in Desmoceratidae asserted by KILIAN (1907–1913) and WRIGHT (1955).

Jeanthieuloyites nodosus (MANDOV)

(Pl. 1, Fig. 14; Pl. 2, Figs. 12, 13;
Pl. 4, Figs. 1a,b, 2; Text-Fig. 2/2a,2b)

Type reference: *Spitidiscus nodosus* MANDOV, 1976, p. 99, Pl. XX, Fig. 1, Pl. XXI, Fig. 1.

Other references: *Polyptychites Meneghinii* DE ZIGNO, RODIGHIERO, 1919, Pl. X, Fig. 4 (only). ? *Spitidiscus meneghinii* [(DE ZIGNO) RODIGHIERO], MANDOV, 1976, p. 85, Pl. XXII, Fig. 2. *Spitidiscus nodosus* MANDOV, VAŠIČEK & MICHALIK, 1986, p. 472, Pl. V, Fig. 3.

Material: 3 septate specimens, all of them recorded in the ferruginous limestone (a).

Description: Semi-involute whorls (involution = 3/5), with gently depressed rounded-trapezium shaped section. Six prorsiradiate, almost straight (gently concave at mid-sides) deep constrictions, bordered by normal-sized ribs, from which that adapically disposed rises into a ridge on the ventral area. The primary ribs come in bunches of 2 or 3, from blunt, better seen on the end of the phragmocone, umbilical tubercles, and divide irregularly and repeatedly on the sides. There are 12–14 ribs at the periphery on an interspace between two consecutive constrictions; they are parallel with the adapically situated constriction, and oblique on the adorally disposed one.

Measurements:

	Ø	U	H	W	W/H
Pl. 4, Fig. 1	62.5	15.6 (0.25)	28.6 (0.45)	30.8 (0.49)	1.07
	45.2	11.1 (0.24)	21.5 (0.47)	22.3 (0.49)	1.04
Pl. 4, Fig. 2	56.5	15.2 (0.27)	25 (0.44)	[27 (0.48)]	

Remarks: The generic framework of *"Spitidiscus" nodosus* was originally questionable because of its periumbilical nodes, a feature unproper to the genus *Spitidiscus*, but characteristic of the genus *Jeanthieuloyites*.

Occurrence: *„Spitidiscus" nodosus* was cited from the Early Hauterivian (*Meneghini-Criptoceras* Zone of MANDOV, 1976 = *Radiatus* + *Loryi* Zones, sensu THIEULOY, 1973), from Bulgaria and in the earliest Hauterivian of Czechoslovakia (West Carpathians). Its presence below the *Eleniceras transsylvanicum* (JEK.) occurrence is here announced for the first time.

Jeanthieuloyites keyserlingiformis n.sp.

(Pl. 1, Fig. 13; Pl. 2, Fig. 11; Pl. 4, Figs. 3a,b,c; Text-Fig. 2/1)

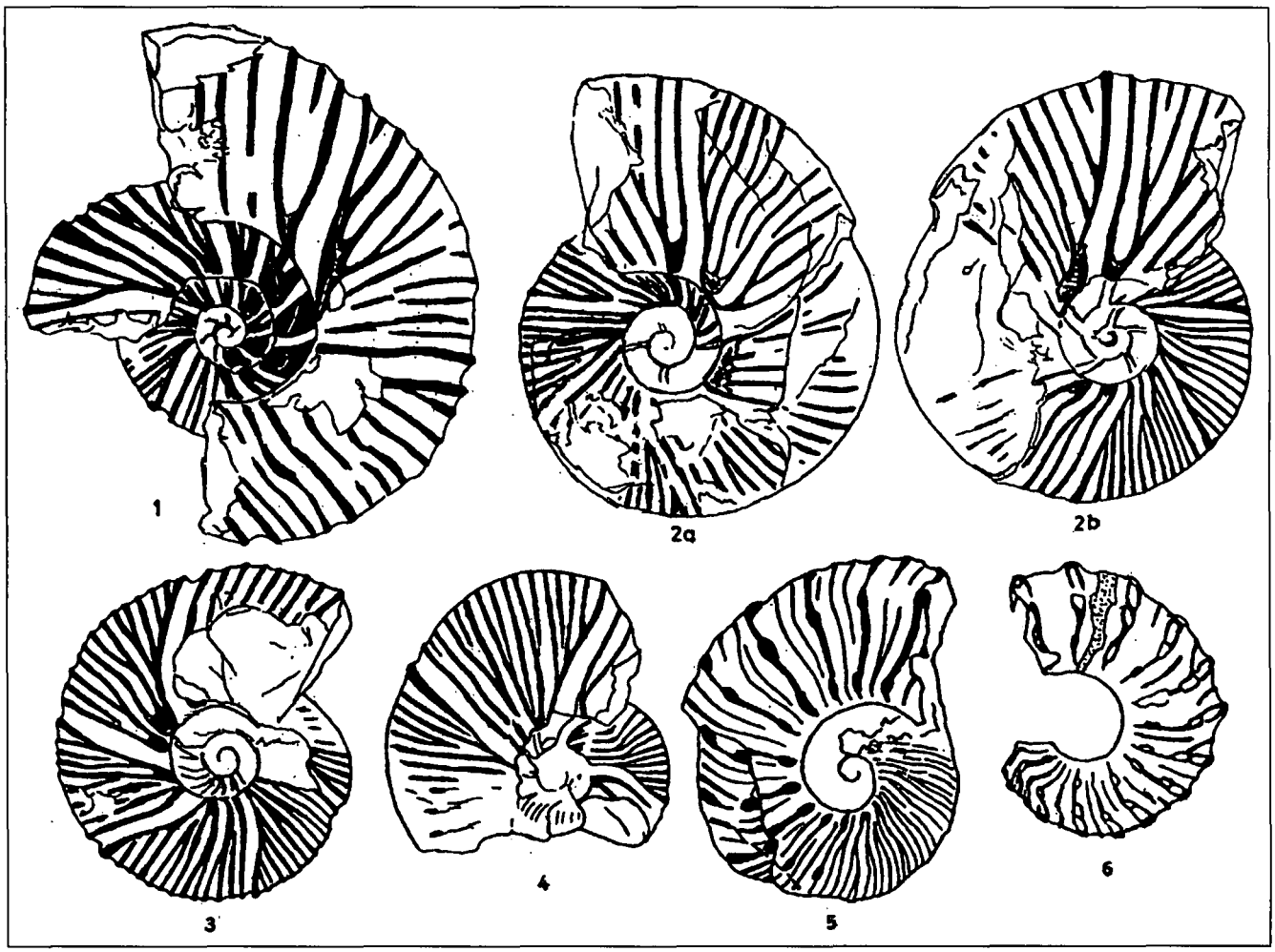
Holotypus: The figured specimen, preserved in the repository of the University of Bucharest, no. 00613.

Derivatio nominis: From the almost identical ornamentation pattern of the species, with that of *Polyptychites keyserlingi* NEUMAYR & UHLIG.

Stratum typicum: The basal ferruginous limestone (a) of the Braşov Formation, Late Valanginian in age.

Locus typicus: SW of the Codlea town "Piatra Mare" quarry, Inner Carpathian Belt, Romania.

Material: Only the holotype.



Text-Fig. 2.
Lateral ornamentation of some holcodiscid and neocomitid species recorded in the basal ferruginous limestone of the Braşov formation.
1 = *Jeanthieuloyites keyserlingiformis* n.sp., holotype; 2a, 2b = *Jeanthieuloyites nodosus* (MANDOV); 3 = *Jeanthieuloyites trapezoidalis* n.sp.; 4 = *Jeanthieuloyites* n.sp.ind.; 5 = *Sabbaiceras stefanescui* AVRAM & GRĂDINARU, holotype; 6 = *Rodighieroites* ? *lamberti* (SAYN).

Description: The holotype is a gerontic specimen, with crowded last suturelines. It is medium-sized, completely septate to the maximum diameter of 73,2 mm, with wide, covered 1/2, depressed-oval in section whorls, displaying continuously rounded sides from the ventrum towards the very steep umbilical wall. Up to the diameter of 63 mm, its ornamentation resembles *Spitidiscus* by six deep, almost straight, prorsiradiate constrictions per whorl, and by the ribbing parallel to the previous constriction and oblique to the next one. But these ribs rise in bunches of 2–4 from the periumbilical swellings; they are strong, calibrate, almost straight and prorsiradiate, generally divided at the mid-sides, almost 15 in number on each interspace between constrictions. The last observed constrictions are still straight, very wide, deep, bordered by two ribs from which the adapically situated one is higher and sharper, especially on the venter. On the mature half of the last whorl (as preserved) two periumbilical swellings evolve in true sharp, triangle-shaped nodes, from which the ribs rise in bunches of two; part of them are divided once or twice on the sides, resulting in a *Polyptychites*-like pattern. There are 1–16 ribs on the periphery, between two consecutive constrictions.

Measurements:

	Ø	U	H	W	W/H
	73.2	25.1 (0.34)	28 (0.38)	42.8 (0.58)	1.52

Occurrence: Late Valanginian, below the range of *Eleniceras transsylvanicum* (JEK.) and *Neocomites (Teschenites)* aff. *flucticulus* THIEULOY.

Jeanthieuloyites trapezoidalis n.sp.

(Pl. 1, Fig. 15; Pl. 2, Fig. 14; Pl. 4, Figs. 4a,b; Text-Fig. 2/3)

Holotypus: The specimen figured in Pl. 4, Fig. 4, preserved in the University of Bucharest repository, no. 00615.

Derivatio nominis: From its trapeze-shaped section of the mature whorls.

Stratum typicum: The basal ferruginous limestone (a) of the Braşov Formation, Late Valanginian in age.

Locus typicus: The "Piatra Mare" quarry, SW of the Codlea town, Inner Carpathian Belt, Romania.

Material: A middle sized young phragmocone, with growing interspaces between the last constrictions (the holotype).

Description: Subquadrate (trapeze-shaped) whorl section, gently depressed (W/H = 1,2), with wide rounded venter and high, sloped umbilical wall. Umbilicus deep and rather narrow (U = 0.25). Last whorl covered by 7, almost straight, prorsiradiate, wide and deep constrictions, each of them bordered by two ribs, from which the adapically situated one progressively sharpens toward the siphuncle area; between two consecutive constrictions 5 umbilical, gently prorsiradiate costae rise in bunches of 2 or 3 from two periumbilical swellings or even blunt nodes and, part of them, bifurcate/polyfurcate in a constant succession: first bunch of two primary ribs = simple first rib bordering adorally the precedent constriction + (backward situated) trifurcate second rib; second bunch of three primary ribs = simple first rib + bifurcate second rib + polyfurcate third one, which borders adapically the next constriction. Lengthwards the siphuncle, all the ribs diminish, especially at a diameter of 37–43 mm.

Measurements:

	Ø	U	H	W	W/H
	48.6	11.8 (0.24)	22.5 (0.46)	27.6 (0.56)	1.22
	37.3	10 (0.26)	17 (0.46)	20.7 (0.55)	1.22

Remarks: By the shape of its whorl section *Jeanthieuloyites trapezoidalis* n.sp. is related to *"Holcodiscus" subquadratus* ZWIERZYCKI, from which it is different by the depressed whorls, wider umbilicus and the presence of umbilical swellings/nodes. The last features range it through the typical representatives of the genus *Jeanthieuloyites*, as a new species.

Occurrence: Late Valanginian, like in *Jeanthieuloyites keyserlingiformis* n.sp.

Jeanthieuloyites n.sp.ind.

(Pl. 1, Fig. 16; Pl. 4, Figs. 5, 6a,b; Text-Fig. 2/4)

Material: 2 septate individuals, the largest of them (mature, with equally spaced out last sutures) post-depositionally deformed; both of them recorded in the basal ferruginous limestone (a) (no. 00616 in the University of Bucharest repository).

Description: Wide, depressed whorls, with almost semicircular, gently depressed, whorl section, umbilical wall vertical and deep, middle-sized umbilicus. Ornamentation very different in youth from the mature stage by ribbing density. In both young and mature stages every whorl bears almost 4–5 straight, wide, prorsiradiate and angular on the venter constrictions; each of them is bordered by larger than ordinary ribs, from which that adapically situated rises in a ridge on the ventral side. The interspaces between two consecutive constrictions are covered in youth by 6–7 primary ribs starting in poorly defined bunches from periumbilical swellings, and irregularly divided into thin, equal, almost 20 in number on the periphery secondaries. The mature interspaces between constrictions bear true periumbilical nodes, from which the primary ribs start in bunches of 2 or 3, part of them branching repeatedly on the sides; thus, at 7 primaries correspond 16 secondary ribs on the ventrum. Suture line, poorly preserved, is comparable with that of *Jeanthieuloyites trapezoidalis* n.sp.

Measurements:

	Ø	U	H	W	W/H
Pl. 4, Fig. 5	40	[12 (0.30)]	16.5 (0.41)	[23 (0.57)]	1.4
Pl. 4, Fig. 6	24.4	5.7 (0.23)	10.5 (0.43)	15 (0.61)	1.4
	18.8	4.2 (0.22)	8.4 (0.44)	11.9 (0.63)	1.4

Remarks: The species here described is partly comparable, by its general shape and thin ribbing on inner whorls, to *Jeanthieuloyites quinquestriatus* (BESAIRIE). But this species displays narrower umbilicus and fewer depressed whorl section, as can be estimated to the specimen figured by THIEULOY et al. (1990).

Family: Oosterellidae BREISTROFFER, 1940
Genus: *Oosterella* KILIAN, 1911

Type species: *Ammonites cultratus* D'ORBIGNY, 1841; Early Hauterivian, France.

Oosterella vilanovae (NICKLÈS)

(Pl. 5, Figs. 5a,b)

Type reference: *Mortoniceras Vilanovae* NICKLÈS, 1892, p. 192, Pl. VII, Fig. 7, Pl. VIII, Fig. 3.

Other references: *Mortoniceras Vidali* NICKLÈS, 1892, p. 196, Pl. VII, Fig. 10, Pl. VIII, Fig. 7. *Mortoniceras Stevenini* NICKLÈS, 1894, p. 55, Pl. V, Fig. 11. *Oosterella Vidali* (NICKLÈS), MEMMI, 1970, p. 148, Pl. VIIIb, Fig. 5. *Oosterella vilanovae* (NICKLÈS), COMPANY, 1987, p. 193, Pl. 13, Fig. 18, Pl. 19, Fig. 27.

Material: One incomplete (about 1/4 of a whorl) specimen, yielded by the ferruginous limestone (a).

Description: Trapezium-rounded compressed whorl section (W/H=12,7/13,6 mm), with tabular-shouldered keeled ventrum, gently convex, convergent sides, and vertical umbilical wall. Shell covered (on the preserved fragment) by 5 primary ribs, which are almost rectiradiate, gently sinous, tuberculate at the umbilical and ventrolateral margins, with 3–4 intercalatories in between; the last ones are simple, variably longer and shorter or, in places, biplicate from the umbilical bullae. All the ribs stop on the ventrolateral shoulder at the boundary of the ventral smooth bands bordering the entire (smooth), sharp keel.

Remarks: By its ribbing, the here described individual is very near to both *"Mortoniceras" Vilanovae* and *"M." Vidali* NICKLÈS. On this ground we consider these two morphotypes as a single species, as BASSE & DURAND-DELGA (1953) and COMPANY (1982) already have.

Occurrence: Late Valanginian in Spain; Early Hauterivian in Tunisia.

Family: Olcostephanidae HAUG, 1910
Subfamily: Platylenticeratinae CASEY, 1973
Genus: *Paquiericeras* SAYN, 1901

Type species: *Paquiericeras paradoxum* SAYN, 1901; Valanginian, France.

Subgenus: *Julianites* THIEULOY, 1977

Type species: *Paquiericeras (Julianites) undulatum* THIEULOY, 1977; Late Valanginian, France.

Paquiericeras (Julianites) cf. *mourrei* VERMEULEN

(Pl. 2, Fig. 15; Pl. 5, Fig. 6)

Type reference: *Paquiericeras mourrei* VERMEULEN, 1972, p. 43, Pl. II, Figs. 1–5 (holotype), 6–10.

Other references: *Paquiericeras (Julianites) mourrei* VERMEULEN, THIEULOY, 1977, p. 409, Pl. 2, Figs. 7, 8, Pl. 6, Figs. 1, 2.

Material: A fragmentary phragmocone (some 1/4 of a whorl), yielded by the basal ferruginous limestone (a).

Description: Large umbilicate shell (restored U/Ø = some 0.35), with very compressed, keeled, ogive-shaped whorl section, having very flat, gently convergent towards the ventrum sides, and vertical umbilical wall. Keel smooth (entire). Ornamentation composed of 7 (on the preserved fragment) flat, gently rursiradiate, wide-sinuous cuneiform simple ribs, developed on the sides and bearing small tubercles on the umbilical edge (those observed only in places). Suture line very near to those figured by THIEULOY (1977).

Remarks: Even very near to *Paquiericeras (Julianites) mourrei*, the here described individual is different in having a smooth keel and longer ribs on the sides. But it is by far the largest individual of the species figured in the literature, the mature stage of which has been unknown until now.

Occurence: Late Valanginian (*Verrucosum* Zone) in southeast France.

Subfamily: Olcostephaninae HAUG, 1910
Genus: *Olcostephanus* NEUMAYR, 1875

Type species: *Ammonites astierianus* D'ORBIGNY, 1841; Late Valanginian, France.

Olcostephanus catulloi (RODIGHIERO)

(Pl. 1, Fig. 18; Pl. 4, Figs. 9, 10a,b)

Type reference: *Astieria Catulloi* RODIGHIERO, 1919, p. 83, Pl. IX(II), Fig. 9.

Other references: *Astieria Sayni* KILIAN, SARASIN & SCHÖNDELMAYER, 1901, p. 38, Pl. IV, Figs. 2, 3. *Astieria Astieri* D'ORBIGNY, BAUMBERGER, 1907, p. 26, Text-Fig. 106. *Astieria catulloi* RODIGHIERO, TZANKOV, 1942, p. 21, Pl. III, Figs. 1, 2. *Olcostephanus (O.) catulloi* (RODIGHIERO), DIMITROVA, 1967, p. 91, Pl. XLIII, Fig. 6; MANDOV, 1976, p. 70, Pl. XI, Fig. 4. *Olcostephanus (O.) sayni* (KILIAN), MANDOV, 1976, Pl. XI, Fig. 3.

Material: 2 phragmocones, of which the smallest one was yielded by the ferruginous limestone (a), and the largest one was recorded in the marly limestone (b).

Description: The largest individual shows the oval-subrectangular, gently depressed mature whorl section and subtriangle-rounded shaped younger one, at the beginning of the last whorl, with a vertical, high umbilical wall, shouldered umbilical and continuously-rounded ventrolateral margins. Ornamentation consists of 24 short, tuberculate, gently concave primary ribs, developed from the outer half of the umbilical wall up to the base of the sides, from which start bundles of 4–5 slightly prorsiradiate simple (not divided) secondaries; besides, 1–2 simple, free intercalatories cover the interspace between two consecutive bundles of secondary ribs. On the periphery, some 120 gently convexe, equal ribs cross the siphuncle area, at a diameter of 55 mm. The smallest individual is different from the former only by its rounded (deformed) whorl section and by the smaller number of ribs on the ventral area/tuberculate primaries (85/20) at a diameter of almost 25 mm.

Measurements:

	Ø	U	H	W	W/H
Pl. 4, Fig. 10	54	17.4 (0.32)	21 (0.39)	27 (0.50)	1.28
Pl. 4, Fig. 9	24.8	7.6 (0.30)	11.1 (0.44)	14 (0.56)	1.26

Remarks: No significant difference is observed between the holotype and our specimens of *Olcostephanus catulloi*.

Occurence: *Olcostephanus catulloi* was recorded in the Lower Hauterivian deposits of Italy, Switzerland, Bulgaria. But its existence in the Late Valanginian, like in *Olcostephanus sayni* (KILIAN), seems to be certain according to the data we achieved.

Genus: *Subastieria* SPATH, 1923

Type species: *Olcostephanus (Astieria) sulcosus* PAVLOW, 1892; Hauterivian, England.

Subastieria cf. *balkanica* (TZANKOV)

(Pl. 1, Fig. 17; Pl. 5, Figs. 3a,b)

Type reference: *Rogersites balkanicus* TZANKOV, 1942, p. 203, Pl. IX; Figs. 4, 5 (non Fig. 6, cf. DIMITROVA, 1967).

Other references: ?*Ammonites Astierianus* D'ORBIGNY var., PICTET, 1863, Pl. 18, Figs. 3a, 3 b. *Subastieria balkanica* (TZANKOV), DIMITROVA, 1967, p. 96, Pl. XLVI, Figs. 3, 3a, Pl. XLVII, Figs. 4, 4 a.

Material: A phragmocone, yielded by the basal ferruginous limestone (a).

Description: Large umbilicate, with coronate whorl section. Last whorl preserved bears 2 wide, deep, prorsiradiate constrictions, adapically marked by a very strong, oblique rib; they are gently convex on the sides, and cross the venter marking a large curve forward. Ornamentation made up of 19 short, triangle shaped, sharply tuberculate umbilical ribs, developed on the outer half of the large-rounded umbilical wall, up to the umbilical rounded edge, and of almost 80 secondary ribs, starting in bunches of 5–6 from the umbilical tubercles. The last 3 ribs fall obliquely on the following constriction.

Measurements:

	Ø	U	H	W	W/H
	26	9.3 (0.35)	10.2 (0.39)	14.8 (0.59)	1.45

Remarks: By its whorl section, *"Rogersites" balkanicus* TZANKOV is a *Subastieria* species, as considered also by DIMITROVA (1967). The here described specimen is very near to TZANKOV's species by ornamentation, except the denser primary ribs (19 instead of 15–17) and the presence of only 2 constrictions on a whorl. On the other hand, *Ammonites Astierianus* D'ORBIGNY in PICTET (1863, Pl. 18, Fig. 3), even compared by KILIAN with *Spiticeras groteanus* (OPPEL), seems to be conspecific with *Subastieria balkanica* (Tz.).

Occurrence: *Subastieria balkanica* is known in the Late Valanginian (*Verrucosum* Zone) from Bulgaria.

Subastieria inordinata (TZANKOV)

(Pl. 1, Fig. 19; Pl. 5, Figs. 1a,b, 2)

Type reference: *Rogersites inordinatus* TZANKOV, 1942, p. 197, Pl. X, Figs. 1–2 (lectotype chosen by DIMITROVA, 1967), 3–5.

Other references: *Olcostephanus (Rogersites) inordinatus* (TZANKOV), DIMITROVA, 1967, p. 96, Pl. XLVII, Figs. 1a,b (lectotype).

Material: Three septate (incomplete) individuals, from which two (the figured ones) come from the ferruginous limestone (a) and the third one from the overlying marly limestone (b).

Description: As the lectotype and the other TZANKOV's syntypes are small nuclei, the here discussed specimens come to complete the meaning of this species. The smallest individual, figured on Pl. 5, Fig. 2), shows the inner stages comparable with the lectotype, up to a diameter of 28 mm. It is to notice at this diameter the evolution to a less coronate (higher) whorl section, and to a denser ribbing (from 2–3 to 3–4 secondary ribs). The largest individuals, up to a diameter of 38 mm, preserve the constant number of tubercled primary ribs (16 on the last whorl) and the constant number of the prorsiradiate constrictions (3), but the whorl section is rather higher and the secondary ribs are gently denser and thinner than those of the lectotype; besides, 1–2 intercalatories appear between the bundles of secondaries (the ratio between secondary + intercalatory ribs / primary ribs is 86–87/16, instead of 70/16 at the lectotype).

Measurements:

	Ø	U	H	W	W/H
Pl. 5, Fig. 1	39	10.4 (0.26)	15.8 (0.40)	[24.8 (0.63)]	
Pl. 5, Fig. 2	22.2	5.6 (0.25)	9.3 (0.41)	[14.6 (0.65)]	

Remarks: TZANKOV (1942) and DIMITROVA (1967) compared the Bulgarian immature individuals with PICTET & CAMPICHE's (1861–1864) mature specimen figured as *Astieria Astieriana* on Pl. LXIII, Fig. 2. Even if similar in the shell proportions and whorl section to the here described mature individuals, the PICTET & CAMPICHE's specimen is apart by missing any constriction, by denser primary ribs (19 on the last whorl), and fewer secondaries/intercalatories (almost 70 instead of 86–97). But, in our oppinion, the adult *Subastieria inordinata* (TZANKOV) is represented by the Romanian and not by the Swiss mature specimen.

Occurrence: *Subastieria inordinata* was recorded in the Late Valanginian (*Verrucosum* Zone) of Bulgaria.

Family: Neocomitidae SALFELD, 1921
Subfamily: Neocomitinae SPATH, 1924
Genus: *Kilianella* UHLIG, 1905

Type species: *Hoplites pexiptychus* UHLIG, 1882; Valanginian, Austria.

Kilianella sp.

(Pl. 5, Figs. 4a,b)

A small fragment, yielded by the ferruginous limestone (a) displays some features of *Kilianella*, such as rarely bifurcate, sinuous ribbing, in places starting from minute periumbilical tubercles and (all of them) sharpened on the ventral shoulder, and also the tabulate, smooth ventral area.

But it is too fragmentary for a specific identification, even resembling part of the lateral ornamentation of *Kilianella pexiptycha* UHLIG. Its presence in the assemblage here described is important as an indication for the latest Early Valanginian age of the basal part of the Braşov Formation.

Genus: *Neocomites* UHLIG, 1905

Type species: *Ammonites neocomiensis* D'ORBIGNY, 1841; Valanginian, France.

Subgenus: *Teschenites* THIEULOY, 1971

Type species: *Neocomites (Teschenites) neocomiensiformis* (UHLIG); Valanginian, Czechoslovakia.

Neocomites (Teschenites) cf. *muretensis* (BREISTROFFER)

(Pl. 5, Figs. 7a,b)

Type reference: *Leopoldia* (?) *muretensis* BREISTROFFER, 1935, p. 141 (= *Hoplites* sp., in DOUVILLÉ, 1906, p. 208, Pl. XIII, Figs. 4a, 4 b).

Material: A mature phragmocone, recorded in the marly limestone (b).

Description: The incomplete specimen we have preserves the holotype's features at the beginning of the last whorl: high-oval whorl section (with rounded ventral area, gently convex parallel sides and vertical umbilical wall), middle-sized umbilicus, sinuous ribs starting in pairs from the minute periumbilical tubercles, and smoothing lengthways the siphuncle. From the diameter of 34 mm, the ribs cross the ventrum, become falcoid and start from true periumbilical tubercles. Finally, on the mature 1/4 of the last whorl, the tuberculate ribs and a part of the intercalatories irregularly bifurcate at various heights on the sides.

Measurements:

Ø	U	H	W	W/H
57	15.5 (0.27)	27.6 (0.48)	–	

Remarks: The here presented individual is very similar at the same diameter to the holotype; the mature ornamentation is also like that of *Neocomites (Teschenites)* n. sp.aff. *muretensis* figured by THIEULOY (1977) in Pl. 6, Fig. 5, from which it is different only by the stronger umbilical tubercles.

Occurrence: Late Valanginian (*Verrucosum* Zone) in Spain; very near specimens (*Neocomites (Teschenites)* n. sp.aff. *muretensis*, in THIEULOY, 1977) were also recorded in the Early Hauterivian of France (*Radiatus* Zone).

Neocomites (Teschenites) sp.aff. *N. (T.) fluticulus* THIEULOY

(Pl. 5, Figs. 6a,b)

Material: A single, partly deformed and partly smoothened postdepositionally specimen, recorded in the marly limestone (b).

Description: The younger half-whorl preserved is gently pressed, with high-subquadrate whorl section and a dense, prorsiradiate ribbing, more sinuous on the left side, composed of almost 14 single or divided near the umbilicus from small tubercles primary ribs, and of 2–3 unequal intercalatories on each interspace between the primaries. There are almost 40 ribs on the periphery, which sharpen on the ventrolateral shoulder (primaries stronger than intercalatories), near a smooth ventral band. The larger half-whorl, unseptate, is wider in section, with flat, almost smooth (smoothened ?) sides, but preserves, beside flattened, unclear ribbing, sharp small periumbilical tubercles and oblique clavi on the ventrolateral shoulder (in a ratio of 17/6–7 on a quarter of the last whorl), which border the ventral smooth band.

Measurements:

Ø	U	H	W	W/H
73	33.6 (0.46)	18.5 (0.25)	25 (0.34)	1.35
46.5	22.4 (0.48)	10 (0.21)	[8.9 (0.20)]	

Remarks: Even deformed, this individual is near to *Neocomites (Teschenites) fluticulus* by its ribbing density, smooth ventral area up to the largest diameter and the smoothed sides of the body chamber. This last feature is more complete than in THIEULOY's (1977) paratype on Pl. 3, Fig. 9, resembling adult *Leopoldia*, but neither the inner whorls ornamentation nor the oblique ventrolateral clavi in the mature stage entitle such an identification.

Occurrence: *Neocomites (Teschenites) fluticulus* THIEULOY was recorded in the latest Valanginian and Early Hauterivian, in south-east France.

Genus: *Eleniceras* BRESKOVSKI, 1967

Type species: *Eleniceras stevrecense* BRESKOVSKI, 1967; Hauterivian, Bulgaria.

Eleniceras transsylvanicum (JEKELIUS)

(Pl. 6, Figs. 1, 2)

Type reference: *Hoplites transsylvanicus* JEKELIUS, 1915, p. 121, Pl. IX, Figs. 6, 7 (lectotype established by PATRULIUS, 1969), 8.

Other references: *Lyticoceras transsylvanicum* (JEKELIUS), PATRULIUS, 1969, Pl. VI, Figs. 3–5 (re-figured JEKELIUS' type specimens). *Neocomites (Teschenites) transsylvanicus* (JEKELIUS), MANDOV, 1976, p. 75, Pl. XII, Fig. 6. *Eleniceras transsylvanicum* (JEKELIUS), THIEULOY, 1977, p. 106, Pl. 4, Fig. 5.

Material: 4 individuals of very various size, all recorded in the marly limestone (b).

Description: The two smaller individuals (one of them figured in Pl. 6, Fig. 2) preserve the *Neocomites*-like young stage, with sinuous ribs starting in pairs from small tubercles near the umbilical edge, in places branching once more on the sides, and all of them sharpening near the siphonal smooth area. At this stage, the whorl section is subquadrangular, with shouldered both the umbilical and ventrolateral margins, gently convex sides and tabular ventrum. The first constriction is seen at a diameter of some 40–45 mm, where the ribs gradually become stronger and more distant.

The third individual, also figured, is almost identical with the largest JEKELIUS' (1915) syntype. It preserves the beginning of the body chamber on a fifth of the last whorl. On the end of the phragmocone and the preserved part of the body chamber 5 rectiradiate constrictions on a half-whorl are observed; they are progressively larger towards the aperture, bordered by 2 progressively stronger ribs, from which that disposed adapically bears three tubercles, the lateral one being sharper than the blunt umbilical and than almost unobservable ventrolateral ones.

Finally, the fourth specimen begins at a diameter of 80 cm to lose the tubercles, then to lose the ribbing and, later, to smoothen progressively its constrictions, beginning from the external area towards the base of the sides.

Measurements:

	Ø	U	H	W	W/H
Pl. 6, Fig. 2	42.6	12.8 (0.30)	17.9 (0.42)	-	
	47.8	13.6 (0.28)	21.8 (0.45)	18 (0.37)	0.82
Pl. 6, Fig. 1	62.7	18 (0.29)	26.5 (0.42)	-	
	114.7	43.5 (0.37)	42 (0.36)	34 (0.30)	0.81

Remarks: *Eleniceras transsylvanicum* is very near to *E. stevrecense* BRESKOVSKI, but the latter is denser ribbed in youth, and both the ribs bordering the constrictions are trituberculate.

Occurrence: JEKELIUS' type specimens come, as does our material, from the lower part of the "Braşov Marls", but in the Braşov town area, where no good succession can be observed nowadays. The stratigraphical position

of this species below the Lower Hauterivian beds with *Leopoldia leopoldina* (D'ORBIGNY) was emphasised in the Dîmbovicioara region (PATRULIUS & AVRAM, 1976) and in south-east France (THIEULOY, 1977).

Eleniceras cf. *tchechitevi* BRESKOVSKI

(Pl. 5, Figs. 7a,b)

Type reference: *Eleniceras tchechitevi* BRESKOVSKI, 1967, p. 50, Pl. II, Fig. 1, and Pl. III, Figs. 2, 3 (holotype), Pl. I, Fig. 2 (?), Pl. III, Fig. 1 (?), Pl. IV, Fig. 1, Pl. V, Fig. I.

Other references: *Hoplites tauricus* EICHWALD, KARAKASCH, 1907, p. 90, Pl. XIV, Fig. 2. *Pseudothurmannia spinigera* KOENEN, FÜLÖP, 1958, Pl. V, Fig. 1. *Balearites tauricus* EICHWALD, DRUSHCHITS & KUDRJAVCHEV, 1960, p. 291, Pl. XXXIII, Fig. 1. *Eleniceras spiniger* (KOENEN), MANDOV, 1976, p. 77, Pl. XV, Fig. 1. *Eleniceras* sp. 2, MANDOV, 1976, p. 79, Pl. XVIII, Fig. 3. *Eleniceras tchechitevi* BRESKOVSKI, THIEULOY, 1977, p. 105, Pl. 1, Fig. 4, Pl. 4, Figs. 2–4.

Material: One phragmentary phragmocone, yielded by the ferruginous limestone (a).

Description: High-oval whorl section, shouldered at the umbilical and ventrolateral margins, with tabulate ventrum, subparallel, gently convergent on their outer half-sides, and vertical umbilical wall. Umbilicus relatively large. Last but one whorl (at a diameter of almost 30 mm) is covered by dense, thin, sinuous ribs, starting in bunches of 2–3 from minute umbilical tubercles.

At the beginning of the last half-whorl preserved (up to a diameter of some 55 mm), the ribbing is less dense, and the first constrictions could be already observed. At the mature end of the last whorl, the constrictions become progressively shallow, the ribs bordering them adapically strengthen and get three tubercles (the outer one being the largest), while 3–4 single or (rarely) divided, more or less sinuous intercalatories cover the interspace in between; at this stage, all the ribs sharpen and stop on the ventrolateral shoulder, at the boundary of the smooth ventral area.

Measurements:

Ø	U	H	W	W/H
85.3	31.6 (0.37)	30 (0.35)	24.8 (0.29)	0.32

Remarks: The only significant difference between our specimen and the type of *Eleniceras tchechitevi* is the lower H/Ø ratio, which can be explained by worse conservation of the latter.

Occurrence: *Eleniceras tchechitevi* type was recorded in the Early Hauterivian *Radiatus* Zone from Bulgaria. Its presence below the bed with *Eleniceras transsylvanicum* (JEKELIUS) is here pointed out for the first time.

Eleniceras sp.aff. *E. spiniger* (v. KOENEN)

(Pl. 5, Figs. 8a,b,c)

Material: two very fragmentary individuals, recorded in the ferruginous (a) and the marly (b) limestones.

The Neocomites-like ribbed stage is visible on the individual figured in Pl. 5, Fig. 8 c, but the constricted stage, trituberculate on the single ribs adapically bordering the constrictions, appears on both our individuals.

Even resembling *Eleniceras spiniger* by the general evolution of their ornamentation, the specimens under discussion are apart by their deeper constrictions, and bituberculate intercalatory ribs, with small umbilical and ventrolateral tubercles.

Occurrence: *Eleniceras spiniger* is known in the Early Hauterivian from Germany and Bulgaria; THIEULOY (1977) recognised it in the Late Valanginian (*Callidiscus* Zone) from south-east France, too.

Genus: *Sarasinella* UHLIG, 1905

Type species: *Sarasinella ambigua* UHLIG, 1901; Valanginian, Czechoslovakia.

Sarasinella cf. *sakalavense* (BESAIRIE)

(Pl. 1, Fig. 9; Pl. 2, Fig. 6; Pl. 6, Figs. 8a,b)

Type reference: *Hoplitoides sakalavensis* BESAIRIE, 1936, p. 142, Pl. XIV, Figs. 15, 16 (holotype). *Sarasinella sakalavensis* BESAIRIE, COLLIGNON, 1962, p. 49, Fig. 878 (refigured holotype).

Material: A fragmentary phragmocone (a third of a medium-sized individual), yielded by the ferruginous limestone (a).

Description: Trapezium-shaped, compressed whorl section, with tabulate ventrum, gently convexe convergent sides, shouldered ventrolateral and umbilical margins and high, sloped umbilical wall.

The small part of the last but one whorl still preserved (at a diameter of some 30 mm) is covered by 5 slightly prorsiradiate, straight primary ribs, each of them bearing at least sharp periumbilical and blunt lateral tubercles, and by at least one intercalatory rib on each interspace.

The last third of the shell (up to a maximum diameter of 67 mm) bears very similar primary ribs (but with small periumbilical and strong lateral and ventrolateral tubercles), and 1–2 unequal, in places branching intercalatories, all of them stopped in a small, sharp tubercle near the siphonal smooth band. All the ribs are strongly bent forward on the sides, between the lateral and ventrolateral tubercles.

The suture line is very denticulate, with a short median lobe, with rather broad and almost symmetrical first lateral one and with descending auxiliaries, of *Sarasinella*-type.

Measurements (restored):

Ø	U	H	W	W/H
[167]	22.4 (0.33)	26.8 (0.40)	23.2 (0.34)	0.86

Remarks: Even fragmentary, the here described specimen is very comparable to the *Sarasinella varians* (UHLIG) group, nearer to *S. sakalavense* (BESAIRIE) by the small number of intercalatory ribs and the ribbing projected on the external third of the sides.

Occurrence: Late Valanginian in Madagascar.

Genus: *Criosarasinella* THIEULOY, 1977

Type species: *Criosarasinella furcillata* THIEULOY, 1977; latest Valanginian, France.

Criosarasinella cf. *furcillata* THIEULOY

(Pl. 6, Figs. 4a,b)

Type reference: *Criosarasinella furcillata* THIEULOY, 1977, p. 109, Pl. 1, Fig. 5, and Pl. 5, Figs. 3 (holotype), 4, 5.

Other references: *Criosarasinella furcillata* THIEULOY, THIEULOY et al., 1990, p. 68, Pl. 2, Fig. 1.

Material: A third of a medium-sized phragmocone, recorded in the ferruginous limestone (a).

Description: High trapezium-shaped whorl section, with tabulate ventrum, flat and convergent sides, and vertical umbilical wall. Ornamentation with very dense ribbing on the periphery of the fragmentary last but one whorl (Fig. 4 b), composed on the last, also fragmentary, whorl of 10, gently sinuous, thin primary ribs which start from the umbilical minute tubercles and sharpen on the ventrolateral shoulder, near the smooth ventral band. They branch at various heights on the sides; moreover, some irregular long and short intercalatories, partly divided near the ventrolateral edge can be seen, so that 29–30 almost equal ribs are counted on the periphery.

Measurements:

Ø	U	H	W	W/H
[91]	32 (0.36)	35 (0.38)	21 (0.23)	0.60

Remarks: Although resembling very much *Criosarasinella furcillata* THIEULOY, the here described specimen presents fewer branching on the periphery secondary ribs, at a size significantly larger than the final size of the holotype.

Occurrence: Late Valanginian (top of the *Trinodosum* Zone) in France.

Criosarasinella heterocostata (MANDOV)

(Pl. 2, Fig. 7; Pl. 6, Figs. 5a,b)

Type reference: *Crioceratites (C.) majoricensis heterocostatus* MANDOV, 1976, p. 57, Pl. V, Figs. 1 (holotype), 3.

Other references: *Criosarasinella heterocostata* (MANDOV), THIEULOY, 1977, p. 111, Pl. 5, Fig. 8.

Material: A half-whorl of a gerontic individual, yielded by the ferruginous limestone (a).

Description: This individual is broken, and preserves the end of the phragmocone and the beginning of the body chamber. Its whorl section is high-oval, with subparallel (gently convergent) sides, large-rounded ventral area, shouldered ventrolateral and umbilical margins, and steep, rather low, umbilical wall. Its ribbing is rectiradiate, simple or branching from small periumbilical tubercles; some of the ribs are typically divided quite near the ventrolateral edge. All the ribs sharpen on the ventrolateral shoulder and stop at the margin of the smooth siphonal band.

Measurements:

Ø	U	H	W	W/H
0.65	31 (0.47)	25.5 (0.33)	17.2 (0.27)	0.67

Remarks: By its here described features, the Romanian individual is situated between the uncoiled holotype of the species and the relatively narrow umbilicate THIEULOY's figured specimen.

Occurrence: Early Hauterivian in Bulgaria; Late Valanginian in France.

Genus: *Rodighieroites* COMPANY, 1987

Type species: *Rodighieroites cardulus* COMPANY, 1987; Late Valanginian, Spain.

Rodighieroites cardulus COMPANY

(Pl. 1, Fig. 12; Pl. 2, Fig. 9; Pl. 6, Figs. 6a,b)

Type reference: *Rodighieroites cardulus* COMPANY, 1987, p. 160, Pl. 12, Figs. 11 (holotype) and 12.

Other references: ? *Crioceras Roemeri* NEUMAYR & UHLIG, RODIGHIERO, 1919, p. 115, Pl. XIII, Fig. 8. *Crioceratites Emerici* LEVEILLÉ, RODIGHIERO, 1919, Pl. XII, Fig. 10. *Rodighieroites cardulus* COMPANY, THIEULOY et al., 1990, p. 69, Pl. 2, Figs. 2, 3.

Material: 3, more or less fragmentary individuals, all of them yielded by the ferruginous limestone (a).

Description: The most complete (figured) specimen preserves a large part of the last whorl, still septate, and only a third of the last but one whorl, only in contact. Its whorl section is constantly octogonal, with gently convergent sides and high, steep, umbilical wall. The ribbing is made up of almost 14 rectiradiate, trituberculate primary ribs on a whorl, and of 2, then 3 intercalatories on each interspace between the primaries. The primary ribs are strong, straight, progressively wider to the periphery, and bear lateral and ventrolateral tubercles larger than the umbilical ones; the intercalatory ribs are more sinuous, in places bifurcate, and bear sharp, small, lateral and external tubercles, the latter bordering a narrow smooth siphonal band. Between the lateral and ventrolateral tubercles, all the ribs diminish and are strongly projected. Suture line is of a neocomitid type.

Measurements:

Ø	U	H	W	W/H
81,2	33.1 (0.40)	28.5 (0.35)	29.8 (0.37)	1.04

Remarks: Even if still immature, the largest of our specimens is larger than the *Rodighieroites cardulus* holotype. Thus, some features, such as the bifurcate and the sinuous, strongly projected intercalatories, appear only on our figured individual.

Occurrence: Latest Valanginian in Spain and southeast France; "Neocomian" undefined in southern Alps.

Rodighieroites? lamberti (SAYN)

(Pl. 1, Fig. 10; Pl. 2, Fig. 8; Pl. 6, Figs. 7a,b; Text-Fig. 2/6)

Type reference: *Acanthodiscus Lamberti* SAYN, 1907, p. 39, Pl. IV, Fig. 11.

Other references: *Rodighieroites lamberti* (SAYN), COMPANY, 1987, pp. 159, 160; THIEULOY et al., 1990, p. 69.

Material: A single, incomplete (3/4 of a whorl) and immature phragmocone, recorded in the basal ferruginous limestone (a).

Description: Octogonal whorl section, with parallel sides and steep, high umbilical wall. Medium-sized, deep, umbilicus. Younger part of the preserved cast covered by rare, strong, gently prorsiradiate trituberculate ribs, with 1 or, rarely, 2 simple and projected intercalatories in between, then progressively the intercalatory ribs disappear. As a very typical feature, between the lateral and ventrolateral tubercles, the primary ribs are divided into two, looped secondaries.

Measurements:

Ø	U	H	W	W/H
35.3	11.1 (0.31)	14.5 (0.41)	15 (0.42)	1.03

Remarks: Although our specimen is different by more distant primary ribs and by earlier smoothing of secondaries/intercalatories, it stands very near to the holotype of *"Acanthodiscus" lamberti* SAYN. But the presence of looped ribbing, which lacks in true *Rodighieroites*, makes questionable the generic appartenance of this species adopted in the recent literature.

Occurrence: *Rodighieroites ? lamberti* is Late Valanginian in age (*Verrucosum* Zone) in south-east France.

Genus: *Sabbaiceras* AVRAM & GRĂDINARU

Type species: *Sabbaiceras stefanescui* AVRAM & GRĂDINARU (1993); Late Valanginian, Romania. This new species, defined on the basis of the paleontological material from the "Piatra Mare" quarry, is characterised as follows: *Neocomites* like in youth, but coarser ribbed, with compressed-octogonal whorl section and trituberculate primary ribs, beside a few single or divided intercalatories and some secondary ribs branching from the lateral tubercles, in mature stage; all the intercalatory and secondary ribs sharpen in small ventrolateral tubercles alongside a smooth ventral band; no constriction is seen in any stage of growing; suture line of *Neocomites neocomiensis* (D'ORBIGNY) type.

Remarks: This genus, devoted to the great Romanian geologist and paleontologist SABBA STEFĂNESCU, first professor of Paleontology at the University of Bucharest (between 1905–1929), groups some Late Valanginian neocomitid species, of which the best known is *"Neocomites" beaumugnensis* SAYN; another probable member of this group is *Eleniceras tchechitevi* BRESKOVSKI in THIEULOY (1977), in which mature stage lacks the true constrictions.

The most similar to the genus *Sabbaiceras* by the ontogenetic evolution is the Hauterivian Boreal genus *Distoloceras* (HYATT, 1900), which is yet different by having fewer dense ribbing on inner whorls, the ribs starting in bunches of three (dominant) from the larger than in true *Neocomites* periumbilical tubercles, and no bifurcate primary ribs from the lateral tubercles in mature stage. Moreover, not any Upper Valanginian and/or Lower Hauterivian taxa can, until now, be considered the link between the two genera: the Upper Valanginian Boreal genus *Varlheideites* (RAWSON & KEMPER, 1987) is more probably related with the Upper Valanginian Tethyan genus *Eristavites* (NIKOLOV, 1966) than to the genus *Sabbaiceras*.

The Upper Valanginian–Lower Hauterivian Tethyan genus *Eleniceras* is also very similar to *Sabbaiceras* in young stages, and bears trituberculate ribs in mature stage, but these latter accompany deep and broad constrictions which lack in *Sabbaiceras*.

Finally, the genus *Sabbaiceras* is comparable to the Upper Valanginian genus *Rodighieroites*, of which loose whorls, very short *Neocomites*-like stage and mature stage displaying trituberculate intercalatory ribs are very distinctive features.

Sabbaiceras stefanescui AVRAM & GRĂDINARU

(Pl. 1, Fig. 11; Pl. 2, Fig. 10; Pl. 6, Fig. 3; Text-Fig. 2/5)

Type reference: *Sabbaiceras stefanescui* AVRAM & GRĂDINARU (1993).

Other reference: *Neocomites beaumugnensis* SAYN, COMPANY, 1987, p. 134, Pl. 11, Figs. 2–4, Pl. 19, Fig. 7

Material: Only the holotype (preserved in the University of Bucharest repository, no. 00634), a mature but not gerontic phragmocone, recorded in the ferruginous limestone (a).

Description: The holotype is a mature individual (with constantly spaced last sutures). Its whorls, rounding a middle-sized umbilicus, are compressed, with high-oval in youth, and high-octogonal shaped in maturity whorl section. The *Neocomites*-like ornamentation changes at a diameter of 30 mm, where the first small lateral tubercle appears at 2/3 of the whorl height. Then, the primary ribs strengthen progressively, as the lateral and outer tubercles do; in places, a secondary rib branches forward from the lateral tubercle. On the mature half of the last whorl, 1 or 2 intercalatory ribs rise from the umbilical shoulder and immediately below the middle of the sides, respectively, on every interspace between two primaries. All the secondary and intercalatory ribs bear a minute ventrolateral tubercle alongside a smooth ventral band. There are 10 periumbilical primary ribs and 29 ribs in all, at the periphery, on the last half-whorl. Suture line is similar to that of *Neocomites neocomiensis* (D'ORBIGNY).

Measurements:

	Ø	U	H	W	W/H
	45	13.8 (0.30)	19 (0.42)	[18.2 (0.43)]	

Remarks: *Sabbaiceras stefanescui* is very near to *S. beaumugnense* (SAYN) by its young ontogenetic stages (the *Neocomites*-like first one, and a second, with bifurcate from the lateral tubercle primary ribs); but it is apart in having stronger differentiate primary and intercalatory ribs, fewer sinuous and denser mature ornamentation; on this ground, the individuals described and figured by COMPANY (1987) as *Neocomites beaumugnensis* SAYN seem to belong to our species.

The mature stage of *Sabbaiceras stefanescui* is also very near to that of *Rodighieroites belimelensis* (MANDOV), but these species are very different in youth, as the genera *Sabbaiceras* and *Rodighieroites* are.

Occurrence: Even the holotype is poorer precised Late Valanginian in age (biozonal condensed assemblage), the Spanish members of the species point to the early Late Valanginian age (*Verrucosum* Zone).

Subfamily: Endemoceratinae SCHINDEWOLF, 1966

Genus: *Karakaschiceras* THIEULOY, 1971

Type species: *Hoplites biassalensis* KARAKASCH, 1890; Valanginian, Ukraina (Crimea).

Karakaschiceras cf. *biassalense* (KARAKASCH)

(Pl. 6, Figs. 9a,b)

Type reference: *Hoplites biassalensis* KARAKASCH, 1890, p. 8, Pl. I, Figs. 4, 5

Other references: *Hoplites biassalensis* KARAKASCH, BAUMBERGER, 1906, p. 48, Pl. 10, Figs. 1–4; KARAKASCH, 1907, p. 81, Pl. X, Fig. 9, Pl. XI, Fig. 3, Pl. XII, Fig. 2, Pl. XXIV, Fig. 28, Pl. XXVI, Figs. 4, 10. *Leopoldia biassalensis* KARAKASCH, DRUSHCHITS & KUDRJAVCHEV, 1960, p. 285, Pl. XXIX, Fig. 1, ? Pl. XXVIII, Fig. 4; COLLIGNON, 1962, p. 52, Pl. CXCIV, Fig. 888, non p. 94, Pl. CCXIII, Fig. 93 (= *Saynella* sp.); DIMITROVA, 1967, p. 125, Pl. LXII, Fig. 1. *Sarasinella quadristrangulata* SAYN, COLLIGNON, 1962,

Pl. CXCIII, Fig. 880, Pl. CXCIV, Fig. 886. *Karakaschiceras biassalensis* (KARAKASCH), MANDOV, 1976, p. 82, Pl. XXI, Fig. 3; KEMPER et al., 1981, p. 283, Pl. 40, Figs. 1, 3; COMPANY, 1987, p. 148, Pl. 12, Figs. 4–8, Pl. 19, Fig. 10. *Karakaschiceras* cf. *biassalense* (KARAKASCH), AVRAM et al., 1988, p. 12, Pl. III, Fig. 1a, b.

Material: 1/4 of a septate whorl, recorded in the ferruginous limestone (a).

Description: This fragmentary whorl, of almost 60 mm in diameter, preserves the high, tabulate whorl section, with subparallel lower half of the sides and convergent their upper part, umbilical edge and almost vertical umbilical wall. Lateral ornamentation like in mature stage of the holotype, and of the specimen figured by COMPANY (1987) in the Pl. 12, Fig. 5.

Occurrence: Latest Early Valanginian (*Verrucosum* Zone) in Spain, south-east France, Switzerland, Romania, Bulgaria, Ukraina (Crimea).

Aptychi

Lamellaptychus didayi (COQUAND)

(Pl. 7, Figs. 1, 2)

References: *Lamellaptychus didayi* (COQUAND), TRAUTH, 1938, p. 198, Pl. IX, Figs. 6, 7, Pl. XIV, Figs. 3, 4; GASIOROWSKI, 1962a, p. 258; GASIOROWSKI, 1962b, p. 108, Pl. VIII, Fig. 9; STEFANOV, 1961, p. 216, Pl. II, Figs. 1–7; AVRAM, 1976, p. 58, Pl. X, Fig. 11.

Material: Two pieces, from which the smallest more complete than the largest one, yielded by the marly limestone (b).

Remarks: No significant differences are to be noted between these specimens and those figured and described by Trauth and Gasiorowski.

Occurrence: Tithonian? – Berriasian – Hauterivian interval within the Tethys, from Spain to south Ukraina (Crimea).

Subclass: Coleoidea BATHER, 1888

Between the very frequent in the condensed basal layers of the Braşov Formation belemnitids, belonging to the genera: *Hibolites, Curtohibolites, Pseudobelus, Duvalia*, the last is the only genus-group which we focused on.

Family: Duvaliidae PAVLOW, 1914
Genus: *Duvalia* BAYLE & ZEILLER, 1878

Type species: *Belemnites Latus* BLAINVILLE, 1827; Valanginian, France.

Duvalia dilatata dilatata (BLAINVILLE)

(Pl. 7, Figs. 3a,b, 4a,b)

Type reference: *Belemnites dilatatus* BLAINVILLE, 1827, p. 99, Pl. 3, Fig. 13, Pl. 5, Fig. 18.

Other references: *Belemnites dilatatus* BL., QUENSTEDT, 1849, p. 448, Pl. 30, Figs. 1, 3, 6, 7 (non Figs. 2, 4, 5, 8). *Duvalia dilatata* (BL.), STOYANOVA-VERGILOVA, 1970, p. 54, Pl. XXVII, Fig. 9, Pl. XXIX, Figs. 1–5, Pl. XXXII, Figs. 5, 6; COMBEMOREL, 1973, p. 142, Pl. 2, Fig. 10, Pl. 3, Figs. 1–5; COMBEMOREL (in BUSNARDO et al.), 1979, p. 72, Fig. 19.

Material: 14 entire individuals and 6 more or less fragmentary ones, 6 of them yielded by the ferruginous basal limestone (a) and the other from the overlying marly limestone (b).

Measurements*):

H max. [mm]	W max. [mm]	Ic	R [mm]	Pa [mm]	Id_1 (R/H max.)	Id_2 (Pa/H max.)
31.5	13	2.4	86	58	2.7	1.8
25.7	12.2	2.1	76	47	2.9	1.8
20.3	10.2	2.0	59.3	41.6	2.9	2.0
15.5	7.1	2.1	42	?	2.7	–

Description: Middle sized, laterally very compressed and apically rounded, high-oval or even lense-like in cross-section rostrum, with subparallel lateral and dorsal/ventral sides. Only one specimen (the second on the table with measurements) is gently narrower at the level of its protoconch, and displays shallow peri-alveolar constrictions. The dorsal channel is as long as the alveole itself.

Occurrence: Valanginian (rare), Hauterivian (frequent) and Early Barremian from Spain and northern Africa, through France, Germany, Switzerland, Jugoslavia, Bulgaria, up to southern Ukraina (Crimea).

Duvalia cf. *dilatata binervioides* STOYANOVA-VERGILOVA

(Pl. 7, Figs. 6a,b, 7a,b)

Type reference: *Duvalia dilatata binervioides* STOYANOVA-VERGILOVA, 1965, p. 194, Pl. VI, Figs. 3–5 (= STOYANOVA-VERGILOVA, 1970, Pl. XXX, Figs. 3–5, Pl. XXXIII, Fig. 7).

Other references: *Duvalia dilatata binervioides* STOYANOVA-VERGILOVA, COMBEMOREL, 1973, p. 114, Pl. 3, Figs. 6, 7.

Material: 18 incomplete individuals, recorded in both the basal ferruginous (a) and the marly (b) limestones.

Measurements*):

H max. [mm]	W max. [mm]	Ic	H max. [mm]	W max. [mm]	Ic
18	9.7	1.85	15.3	8.2	1.86
17.4	8.5	2	15.2	7.6	2
17.3	8.8	1.93	15.2	8	1.90
17.2	8.7	1.96	15	8.8	1.70
17	8.5	2.0	15	8	1.88
16.2	8.5	1.88	14.7	7.9	1.86
16	8.3	1.94	13.9	7.3	1.90
15.6	8.7	1.8	13	6.8	1.89
15.4	8.4	1.81	12.9	6.8	1.89

Description and remarks: Lanced in shape, with rather wide, almost equal dorsal and ventral sides, and sharp, almost central settled apical end; well preserved lateral lines.

The here discussed specimens show intermediate features between *Duvalia dilatata binervioides* STOYANOVA-VERGILOVA and the true *D. binervia* (RASPAIL), including also their indices of compression which are smaller than the typical for the former species, but higher than of the latter one.

*) As proposed by STOYANOVA-VERGILOVA (1965, 1970), H max. = maximum height of the rostrum; W max. = maximum width of the rostrum; Ic = index of compression (H max./W max.); R = rostrum length; Pa = postalveolar length of the rostrum; Id = index of dilatation.

Occurrence: Hauterivian in Bulgaria; Late Valanginian and Early Hauterivian in France.

Duvalia n.sp.aff. *D. dilatata* (BLAINVILLE)

(Pl. 7, Figs. 5a,b)

Material: A single specimen, well preserved, recorded in the ferruginous limestone (a).

Measurements:

H max. [mm]	W max. [mm]	Ic	R [mm]	Pa [mm]	Id_1 (R/H max.)	Id_2 (Pa/H max.)
22.8	10.7	2.1	63.4	31	2.7	1.3

Description: Medium-sized, compressed rostrum, with almost parallel lateral sides and dorsum/ventrum, at least up to the beginning of its alveole. Very long (almost 1/2 of the whole length) alveolar area, outlined by 2 peri-alveolar constrictions and by the adoral retraction of the ventral side. Dorsal channel as long as half of the alveolar part. Apical end sharp and short. Cross-section oval in the post-alveolar half of the rostrum and almost rhombus-shaped in the alveolar part.

Remarks: Even if close to *Duvalia dilatata* (BL.) by its proportions (and also to *D. dilatata majoriana* ST.-VERG. by the alveolar length), the here described specimen is apart by its peri-alveolar constrictions, its retracted towards the post-alveolar end of the ventral sides, the rhombus-shaped alveolar cross-section and the sharp apical end; the last three features it has in common with the Lower Barremian species *Duvalia gagrica* SCHWETZOFF (in STOYANOVA-VERGILOVA, 1970, p. 58, Pl. XXXI, Figs. 3a, 3 b) from which it differs especially by the laterally very compressed post-alveolar half of the rostrum.

Occurrence: Late Valanginian in Codlea area, Romania.

Duvalia binervia (RASPAIL)

(Pl. 7, Figs. 13a,b, 14a,b)

References: *Belemnites dilatatus* BLAINVILLE, D'ORBIGNY, 1841, p. 39, Pl. 2, Figs. 9–19. *Duvalia binervia* (RASPAIL), STOYANOVA-VERGILOVA, 1970, p. 53, Pl. XXVII, Figs. 1–3, Pl. XXXIII, Figs. 10, 11; ALI-ZADE, 1972, p. 131, Pl. II, Figs. 6, 9, 10, 13 (non Figs. 11, 12); COMBEMOREL, 1973, p. 147, Pl. 4, Fig. 1; COMBEMOREL (in BUSNARDO et al.), 1979, p. 72, Fig. 20.

Material: 1 entire and 13 more or less fragmentary individuals, all recorded in the marly limestone (b).

Measurements:

H max. [mm]	W max. [mm]	Ic	R [mm]	Pa [mm]	Id_1 (R/H max.)	Id_2 (Pa/H max.)
14.4	9.2	1.56	74.4	55	5.16	3.8
21.5	12.7	1.67				
18.9	11.2	1.68				
18	9.9	1.81				
16.2	10	1.62				
16.2	9.5	1.70				
15.7	9.4	1.67				
15.6	9.8	1.68				
15.2	8.8	1.72				
14.1	8.5	1.66				
12.5	8.1	1.54				
12.2	7.6	1.60				
11.8	7.4	1.60				
11.3	7	1.61				

Description: The only entire specimen shows a rhombus-shaped cross section at the alveolar end, then oval (at half-length), then subquadrate (near the apical retraction of the sides); alveolar area is marked by shallow constrictions, lateral lines are observed on, up to half-length of the rostrum, the sharp apical end is closer to the dorsal side.

All the other individuals preserve only the lance-shaped apical half, displaying the lateral lines and the more or less sharp, uncentred apical end.

Remarks: We accepted here a large variability of *Duvalia binervia*, as already interpreted by STOYANOVA-VERGILOVA (1970), namely, as including individuals with slender half-length of the rostrum, and also individuals with subparallel dorsal and ventral sides.

Occurrence: Hauterivian and Barremian from Switzerland, Bulgaria, Georgia, Azerbaijan.

Duvalia binervia (RASPAIL) n.ssp. ?

(Pl. 7, Figs. 8a,b, 9a,b)

Material: 4 fragmentary guards, all coming from the marly limestone (b).

Measurements:

H max. [mm]	W max. [mm]	Ic	R [mm]	Pa [mm]	Id_1 (R/H max.)	Id_2 (Pa/H max.)
16.4	9.6	1.70				
15.4	8.9	1.73				
14.8	8.9	1.66				
14.4	9.3	1.55				

Description: Lancet-shaped and laterally compressed guards, with sharp apical end closer to the flat (or even gently depressed near the apical retraction) dorsal side, like in *Pseudoduvalia*. Cross-section subrectangular, with convex ventral side. Lateral lines seen only on two of them.

Remarks: Except the dorsal depression, the here described individuals are very close to the specimen of *Duvalia binervia* which exceeds in the same layer. Therefore, we considered this feature as a character of a new subspecies, the complete definition of which can not be achieved owing to the fragmentary material we have.

Occurrence: Late Valanginian in the Codlea town area, Romania.

Duvalia hybrida (DUVAL JOUVE)

(Pl. 7, Figs. 10a,b, 11a,b)

References: *Duvalia hybrida* (DUVAL-JOUVE), STOYANOVA-VERGILOVA, 1970, p. 54, Pl. XXX, Fig. 7, Pl. XXXIII, Fig. 9; COMBEMOREL, 1973, p. 148, Pl. 4, Figs. 2, 3.

Material: 2 guards, almost complete but very different in size, recorded in the ferruginous limestone (a) and the marly limestone (b), respectively.

Measurements:

H max. [mm]	W max. [mm]	Ic	R [mm]	Pa [mm]	Id_1 (R/H max.)	Id_2 (Pa/H max.)
16.2	9.9	1.63	(82)	62	–	3.83
11.6	7	1.65	43	28	3.7	2.41

Description: Rhombus-like alveolar, and almost rectangular compressed post-alveolar cross-section; lateral sides subparallel in both these guards, but parallel dorsal/ventral sides of the larger one, and convergent towards the apex these sides of the smaller guard. The apical end, seen on the largest specimen, is sharp,

closer to the ventral side. Lateral lines are preserved up to the alveolar area on the smaller guard, and unobservable in the larger one.

Remarks: The individuals here described are framed into the individual variation of *Duvalia hybrida*, as accepted by COMBEMOREL (1973).

Occurrence: Early Valanginian–Early Hauterivian in south-east France; Hauterivian in Bulgaria.

Duvalia aff. *emerici* (RASPAIL)

Pl. 7, Figs. 12a, 12b

References: *Belemnites dilatatus* BLAINVILLE, D'ORBIGNY, 1841, Pl. 2, Figs. 22, 23, Pl. 3, Figs. 1–3 (only); QUENSTEDT, 1849, p. 448, Pl. 30, Fig. 2 (only). *Duvalia emerici* (RASPAIL), STOYANOVA-VERGILOVA, 1970, p. 52, Pl. XXVIII, Figs. 1, 2; COMBEMOREL, 1973, p. 139, Pl. 2, Figs. 1–7; COMBEMOREL (in BUSNARDO et al.), 1979, p. 71, Fig. 17.

Material: A small, almost complete guard, preserving the end of its alveolar, and the entire post-alveolar parts, yielded by the ferruginous limestone (a).

Measurements:

H max. [mm]	W max. [mm]	Ic	R [mm]	Pa [mm]	Id_1 (R/H max.)	Id_2 (Pa/H max.)
12.8	6.6	1.92	(26.3)	20.3	(2.0)	1.6

Description: Guard laterally compressed, displaying a blunt, lopsided apex, well developed dorsal swelling (disposed nearer to the apical area than in the typical individuals), and carenate dorsal and ventral sides at the alveolar end of the guard; lateral lines almost unnoticeable.

Remarks: The here described specimen is close to *Duvalia emerici* (RASPAIL) by its compressed guard, with dorsal swelling; it also reminds of *D. rafaeli* STOYANOVA-VERGILOVA by the dorsally and ventrally carenate alveolar part.

Occurrence: *Duvalia emerici* is known as a Valanginian species in Spain, France, Germany, Bulgaria. Our specimen is also Late Valanginian in age.

Plate 1

Whorl sections of some ammonite species
identified in the basal part of the Braşov Formation in the "Piatra Mare" quarry.

Figs. 1,2: ***Hypophylloceras* aff. *perlobatum* (SAYN).**
(Plate 3, Figs.1 and 2) at a diameter of 74 mm and 56 mm, respectively.

Fig. 3: ***Ptychophylloceras ? diphyllum* (D'ORBIGNY).**
(Pl. 3, Fig. 3) at a diameter of 27 mm.

Fig. 4: ***Lytoceras* aff. *richei* SAYN.**
(Pl. 3, Fig. 4) at a diameter of 43,6 mm.

Fig. 5: ***Himantoceras* cf. *trinodosum* THIEULOY.**
(Pl. 3, Fig. 8) at a whorl height of 18,2 mm.

Fig. 6: ***Haploceras (Neolissoceras) grasianum* (D'ORBIGNY).**
(Pl. 3, Fig. 10) at a diameter of 59 mm.

Fig. 7: ***Haploceras (Neolissoceras) desmoceratoides* WIEDMANN.**
(Pl. 3, Fig. 12).

Fig. 8: ***Crioceratites* aff. *andersoni* (SARKAR).**
(Pl. 3, Fig. 7) at a diameter of some 50 mm.

Fig. 9: ***Sarasinella* cf. *sakalavense* (BESAIRIE).**
(Pl. 6, Fig. 8) at a diameter of some 64 mm.

Fig. 10: ***Rodighieroites* cf. *lamberti* (SAYN).**
(Pl. 6, Fig. 7) at a diameter of 38 mm.

Fig. 11: ***Sabbaiceras stefanescui* AVRAM & GRĂDINARU; holotype.**
(Pl. 6, Fig. 3) at a diameter of 46 mm.

Fig. 12: ***Rodighieroites cardulus* COMPANY.**
(Pl. 6, Fig. 6) at a diameter of 81 mm.

Fig. 13: ***Jeanthieuloyites keyserlingiformis* n.sp.; holotype.**
(Pl. 4, Fig. 3) at a diameter of 72 mm.

Fig. 14: ***Jeanthieuloyites nodosus* (MANDOV).**
(Pl. 4, Fig. 1) at a diameter of 62,5.

Fig. 15: ***Jeanthieuloyites trapezoidalis* n.sp.; holotype.**
(Pl. 4, Fig. 4) at a diameter of 49 mm.

Fig. 16: ***Jeanthieuloyites* n.sp.ind.**
(Pl. 4, Fig. 5) at a diameter of 40 mm.

Fig. 17: ***Subastieria* cf. *balkanica* (TZANKOV).**
(Pl. 5, Fig. 3).

Fig. 18: ***Olcostephanus catulloi* (RODIGHIERO).**
(Pl. 4, Fig. 9).

Fig. 19: ***Subastieria inordinata* (TZANKOV).**
(Pl. 5, Fig. 1).

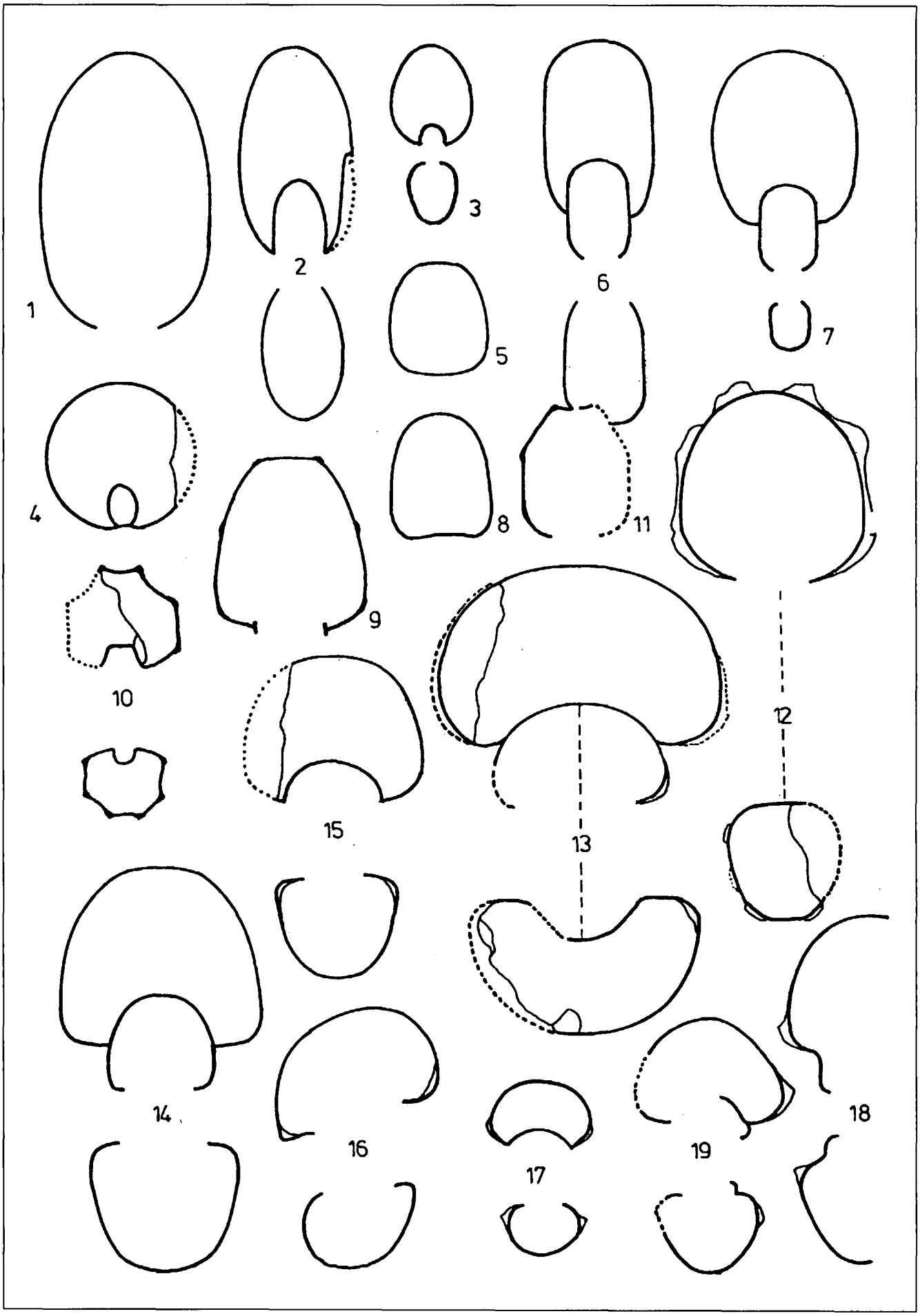


Plate 2

Suture lines of the ammonites
identified in the basal part of the Braşov formation in the "Piatra Mare" quarry.

Fig. 1: ***Hypophylloceras* aff. *perlobatum* (SAYN).**
Suture of the specimen figured on Pl. 3, Fig. 2, at a diameter of 50 mm.

Fig. 2: ***Haploceras (Neolissoceras) grasianum* (D'ORBIGNY).**
Suture of the specimen figured in Pl. 3, Fig. 10 at a diameter of 47 mm.

Fig. 3: ***Haploceras (Neolissoceras) desmoceratoides* WIEDMANN.**
Suture of the specimen figured on Pl. 3, Fig. 12.

Fig. 4: ***Himantoceras* cf. *trinodosum* THIEULOY.**
Suture line of the specimen figured on Pl. 3, Fig. 8, at a whorl height of 18,8 mm.

Fig. 5: ***Crioceratites* aff. *andersoni* (SARKAR).**
The last suture line of the specimen figured on Pl. 3, Fig. 7, at a whorl height of 17,3 mm.

Fig. 6: ***Sarasinella* cf. *sakalavense* (BESAIRIE).**
Suture line of the specimen figured on Pl. 6, Fig. 8, at a whorl-height of 24 mm.

Fig. 7: ***Criosarasinella heterocostata* (MANDOV).**
Suture line of the specimen figured on Pl. 6, Fig. 5 at a whorl-height of 19,5 mm.

Fig. 8: ***Rodighieroites? lamberti* (SAYN).**
Suture line of the specimen figured on Pl. 6, Fig. 7 at a diameter of 32 mm.

Fig. 9: ***Rodighieroites cardulus* COMPANY.**
Suture line of the specimen figured on Pl. 6, Fig. 6, at a diameter of 79 mm.

Fig. 10: ***Sabbaiceras stefanescui* AVRAM & GRĂDINARU.**
Suture line of the holotype (Pl. 6 Fig. 3) at a diameter of 45 mm.

Fig. 11: ***Jeanthieuloyites keyserlingiformis* n.sp.**
Suture line of the holotype (Pl. 4, Fig. 3) at a diameter of 65 mm (H = 25 mm).

Fig. 12: ***Jeanthieuloyites nodosus* (MANDOV).**
Suture line of the specimen figured on Pl. 4, Fig. 1, at a diameter of 55 mm.

Fig. 13: ***Jeanthieuloyites nodosus* (MANDOV).**
Suture line of the specimen figured on Pl. 4, Fig. 2, at a diameter of 50.5 mm.

Fig. 14: ***Jeanthieuloyites trapezoidalis* n.sp.**
Suture line of the holotype (Pl. 4, Fig. 4) at a diameter of 47 mm (H = 30 mm).

Fig. 15: ***Paquiericeras (Julianites)* cf. *mourrei* VERMEULEN.**
Suture line of the specimen figured on Pl. 4, Fig. 8, at a whorl-height of 19 mm.

The millimetric scale is drawn at the base of the plate.

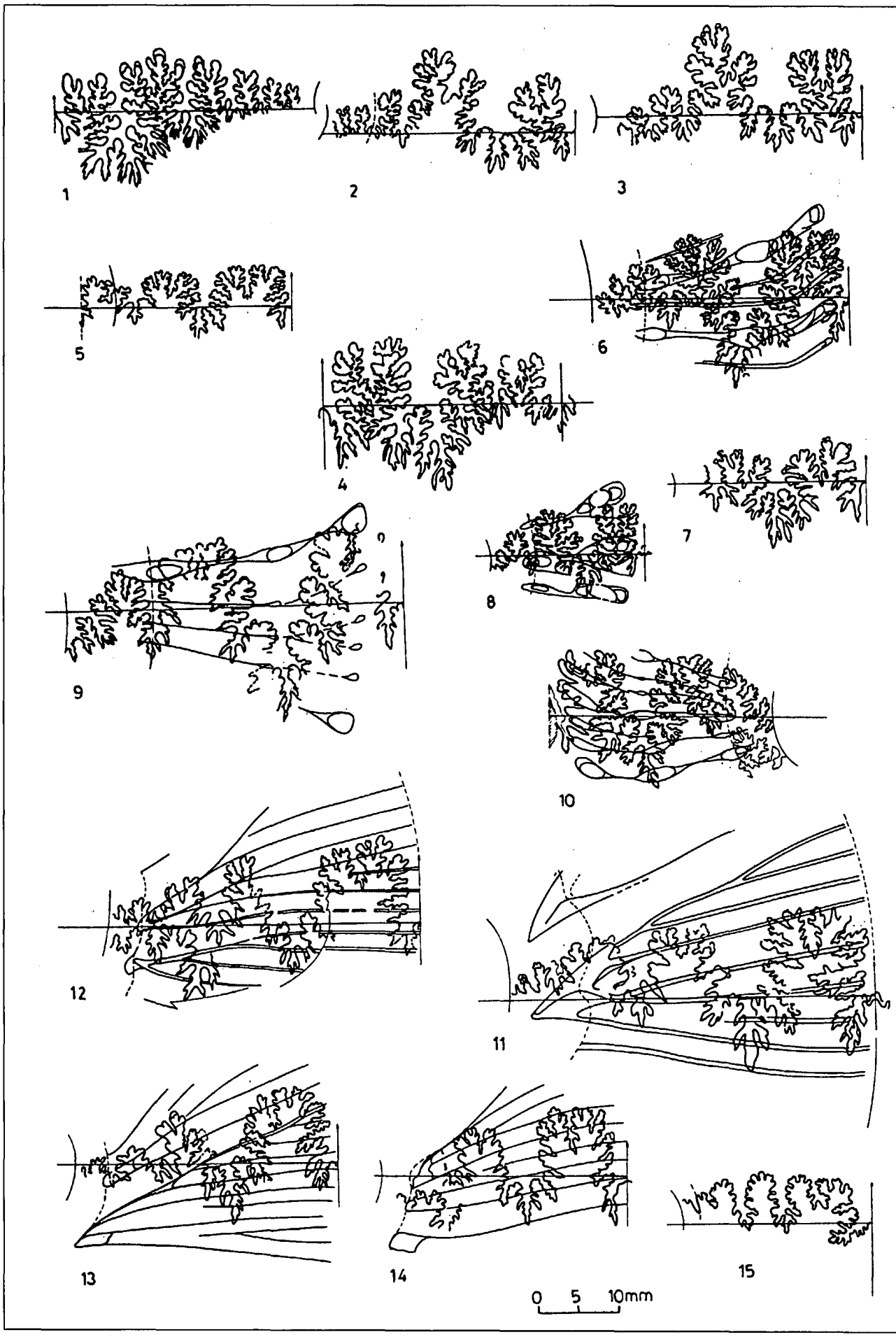


Plate 3

Figs. 1, 2: ***Hypophylloceras* aff. *perlobatus* (SAYN).**
University of Bucharest, Laboratory of Geology, Coll. GRĂDINARU, repository, no. 00601.

Figs. 3a, 3b: ***Ptychophylloceras* ? *diphyllum* (D'ORBIGNY).**
Same repository, no. 00603.

Figs. 4a, 4b: ***Lytoceras* aff. *richei* SAYN.**
Same repository, no. 00604.

Figs. 5, 6a, 6b: ***Lytoceras* aff. *subfimbriatum* (D'ORBIGNY).**
Same repository, no. 00605.

Figs. 7a, 7b: ***Crioceratites* aff. *andersoni* (SARKAR).**
Same repository, no. 00606.

Fig. 8: ***Himantoceras* cf. *trinodosum* THIEULOY.**
Same repository, no. 00607.

Fig. 9: ***Euptychoceras* sp. cf. *E. teschenense* [(HOH.) UHLIG)].**
Same repository, no. 00608.

Figs. 10, 11: ***Haploceras (Neolissoceras) grasianum* (D'ORBIGNY).**
Same repository, no. 00609.

Figs. 12a, 12b: ***Haploceras (Neolissoceras) desmoceratoides* WIEDMANN.**
Same repository, no. 00611.

All the specimens are figured in natural size; all come from the basal ferruginous limestone (a) of the Braşov Formation.

Plate 4

Figs. 1a, 1b, 2: ***Jeanthieuloyites nodosus* (MANDOV).**
University of Bucharest, Laboratory of Geology, Coll. GRĂDINARU, repository, no. 00614.

Figs. 3a, 3b, 3c: ***Jeanthieuloyites keyserlingiformis* n.sp., holotype.**
Same repository, no. 00613.

Figs. 4a, 4b, 4c: ***Jeanthieuloyites trapezoidalis* n.sp., holotype.**
Same repository, no. 00615.

Figs. 5, 6a, 6b: ***Jeanthieuloyites* n.sp.**
Same repository, no. 00616.

Figs. 7a, 7b: ***Oosterella vilanovae* (NICKLÈS).**
Same repository, no. 00617.

Figs. 8a, 8b: ***Paquiericeras (Julianites)* cf. *mourrei* VERMEULEN.**
Same repository, no. 00618.

Figs. 9, 10a, 10b: ***Olcostephanus catulloi* (RODIGHIERO).**
Same repository, no. 00619 and 00620, respectively.

All the specimens are figured in natural size; all come from the basal ferruginous limestone (a) except that from Fig. 10, which was recorded in the overlying marly limestone (b), of the Braşov Formation.

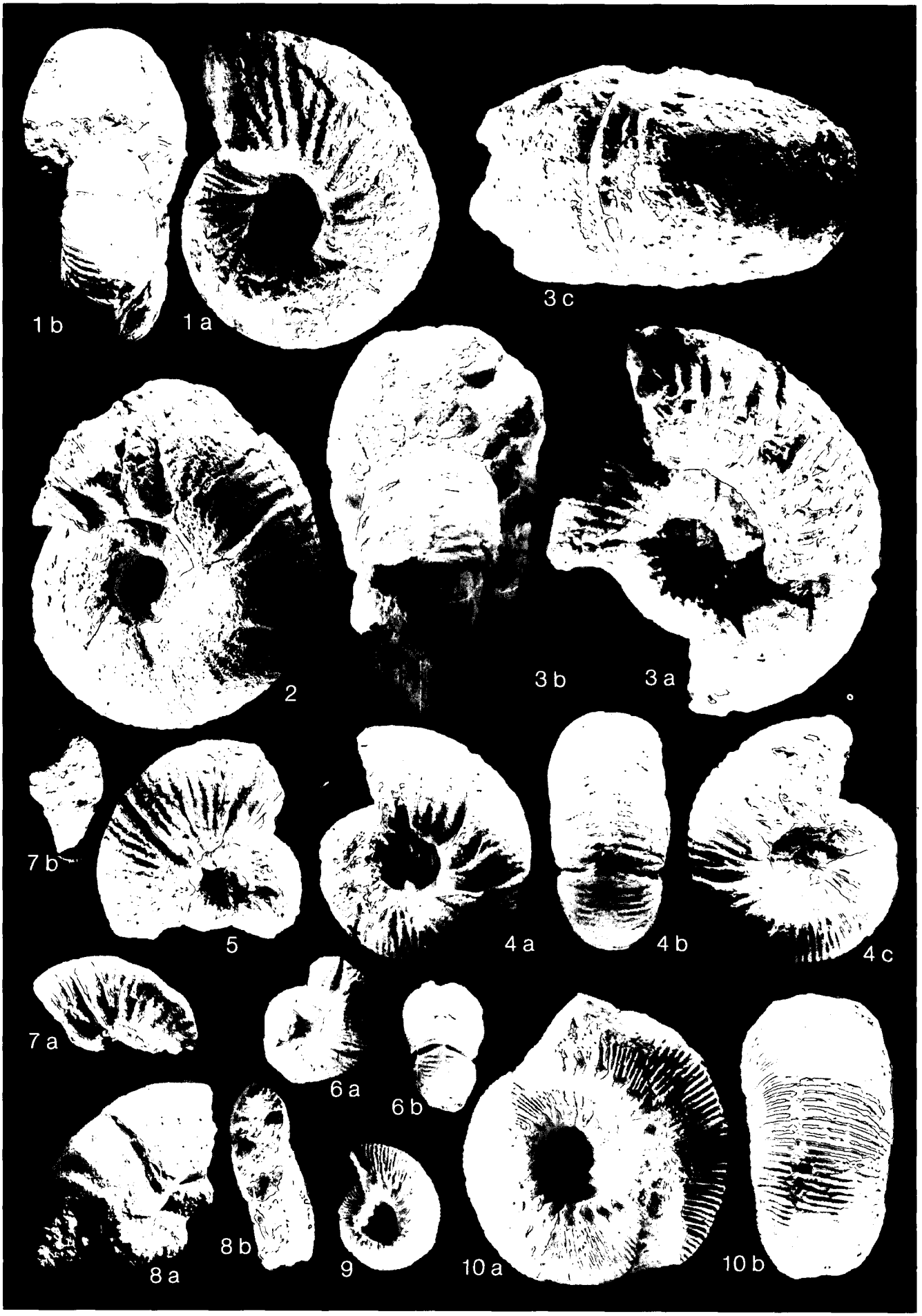


Plate 5

Figs. 1a, 1b, 2: ***Subastieria inordinata*** **(TZANKOV).**
University of Bucharest, Laboratory of Geology, Coll. GRĂDINARU, repository, no. 00622.

Figs. 3a, 3b: ***Subastieria balkanica*** **(TZANKOV).**
Same repository, no. 00621.

Figs. 4a, 4b: ***Kilianella*** **sp.**
Same repository, no. 00624.

Figs. 5a, 5b: ***Neocomites (Teschenites)*** **cf.** ***muretensis*** **THIEULOY.**
Same repository, no. 00625.

Figs. 6a, 6b: ***Neocomites (Teschenites)*** **sp.aff.** ***N. (T.) flucticulus*** **THIEULOY.**
Same repository, no. 00626.

Figs. 7a, 7b: ***Eleniceras*** **cf.** ***tchechitevi*** **BRESKOVSKI.**
Same repository, no. 00628.

Figs. 8a, 8b, 8c: ***Eleniceras*** **sp.aff.** ***spiniger*** **(v. KOENEN).**
8c = right side of the last but one whorl of the same specimen.
Same repository, no. 00629.

All the specimens are figured in natural size; except those from Figs. 5 and 6, which were yielded by the marly limestone (b) layer, all the others come from the basal ferruginous limestone (a) of the Braşov Formation.

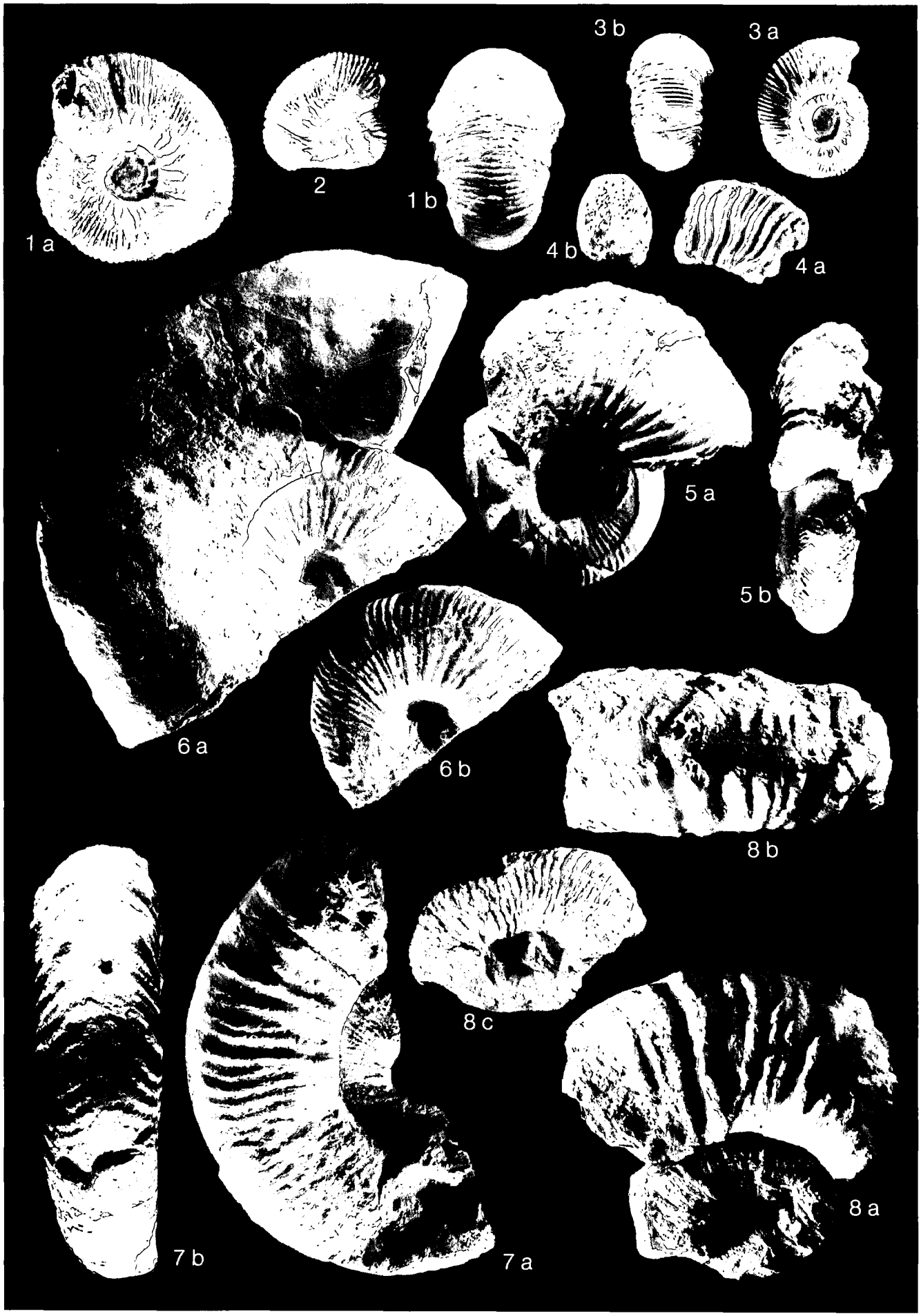


Plate 6

Figs. 1, 2: ***Eleniceras transsylvanicum*** **(JEKELIUS).**
University of Bucharest, Laboratory of Geology, Coll. GRĂDINARU, repository, no. 00627.

Fig. 3: ***Sabbaiceras stefanescui*** **AVRAM & GRADINARU.**
Holotype.
Same repository, no. 00634.

Figs. 4a, 4b: ***Criosarasinella*** **cf.** ***furcillata*** **THIEULOY.**
Same repository, no. 00632.
4b = the fragmentary last but one whorl.

Figs. 5a, 5b: ***Criosarasinella heterocostata*** **(MANDOV).**
Same repository, no. 00633.

Figs. 6a, 6b: ***Rodighieroites cardulus*** **COMPANY.**
Same repository, no. 00635.

Figs. 7a, 7b: ***Rodighieroites ? lamberti*** **(SAYN).**
Same repository, no. 00636.

Figs. 8a, 8b: ***Sarasinella*** **cf.** ***sakalavense*** **(BESAIRIE).**
Same repository, no. 00631.

Figs. 9a, 9b: ***Karakaschiceras*** **cf.** ***biassalense*** **(KARAKASCH).**
Same repository, no. 00646.

All the specimens are figured in natural size; all come from the basal ferruginous limestone (a) of the Braşov formation, except those from the Figs. 1 and 2, which were yielded by the overlying marly limestone (b).

Plate 7

Figs. 1, 2: ***Lamellaptychus didayi*** **(COQUAND).**
University of Bucharest, Laboratory of Geology, Coll. GRĂDINARU, repository, no. 00637.

Figs. 3a, 3b, 4a, 4b: ***Duvalia dilatata dilatata*** **(BL.).**
Same repository, no. 00637.

Figs. 5a, 5b: ***Duvalia*** **n. sp. aff.** ***D. dilatata*** **(BL.).**
Same repository, no. 00641.

Figs. 6a, 6b, 7a, 7b: ***Duvalia dilatata binervioides*** **STOYANOVA-VERGILOVA.**
Same repository, no. 00640.

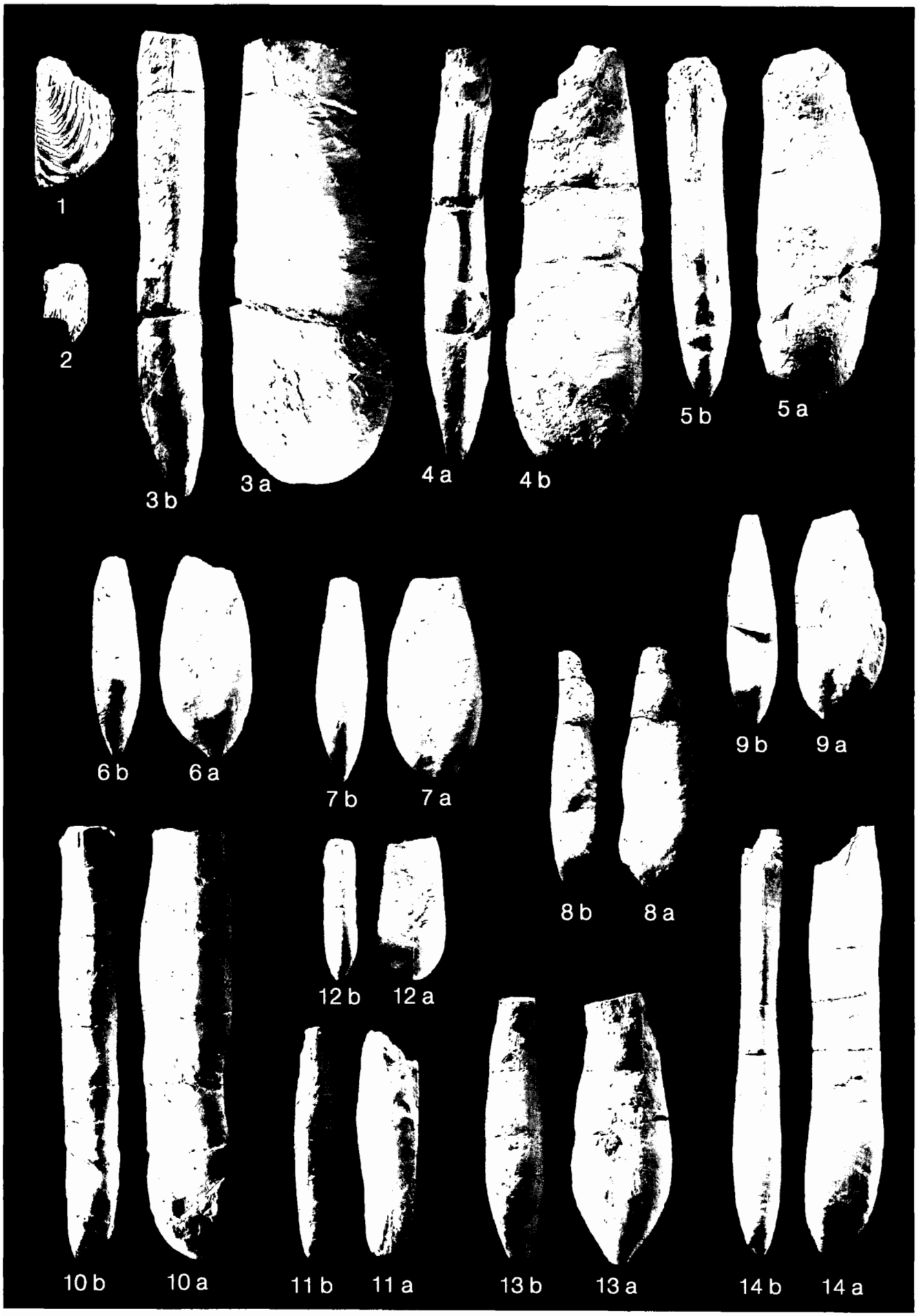
Figs. 8a, 8b, 9a, 9b: ***Duvalia binervia*** **(RASPAIL) n.ssp.?**
Same repository, no. 00643.

Figs. 10a, 10b, 11a, 11b: ***Duvalia hybrida*** **(DUVAL-JOUVE).**
Same repository, no. 00644.

Figs. 12a, 12b: ***Duvalia*** **aff.** ***emerici*** **(RASPAIL).**
Same repository, no. 00645.

Figs. 13a, 13b, 14a, 14b: ***Duvalia binervia*** **(RASPAIL).**
Same repository, no. 00642.

All the specimens are figured in natural size; all were yielded by the marly limestone (b), except those figured in Figs. 5, 11, and 12 which come from the basal ferruginous limestone (a) of the Braşov Formation.



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