LOWER CRETACEOUS MICROPALEONTOLOGICAL ASSEMBLAGES FROM THE URGONIAN-TYPE CARBONATES OF THE VĂLANI UNIT (NORTHERN APUSENI MOUNTAINS, ROMANIA)

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Abstract. This study reports a diverse micropaleontological assemblage preserved within a Lower Cretaceous Urgonian-type carbonate sequence near the village of Sohodol in Bihor County, part of the Vălani Unit of the Codru Nappe System (northwestern Romania). The assemblage comprises a variety of benthic foraminifers (particularly orbitolinids), calcareous algae (mainly Dasycladales), and many problematic microfossils. Such assemblages are important for biostratigraphy and for placing the studied deposits within the broader regional geological framework. Also, it will support future studies concerning the sedimentological characteristics, biostratigraphy, and the paleogeographical interpretation of the poorly known Lower Cretaceous carbonates of the Vălani Unit.

Keywords: Carbonate platforms, microfacies, orbitolinid foraminifers, green algae, Barremian–Aptian

INTRODUCTION

Lower Cretaceous Urgonian-type carbonates are relatively well preserved in the Romanian Carpathians and northern Dobrogea (Bucur, 2008). In the Pădurea Craiului Mountains, most of these deposits are tectonically related to the Bihor Unit and have been comprehensively studied in the last decades (Bucur & Cociuba, 1996; Bucur, 1999, 2000, 2008; Cociuba, 2000; Bucur et al., 2008, 2010, and references therein). The other Urgonian-type deposits from the Pădurea Craiului Mountains belong to a different tectonic unit; namely the Vălani Unit (see Patrulius, 1971), but information concerning their compositional features is very scarce.

Sedimentary deposits of the Vălani Unit crop out over limited areas in the southern part of the Pădurea Craiului Mountains (northern Apuseni Mountains), especially in the Roșia–Sohodol area (Bihor County). The Vălani Unit represents the lowermost structural unit within the Codru Nappe System (Patrulius, 1971), which, together with the Bihor Unit and the Biharia Nappe System, forms the thrust-sheet architecture of the northern Apuseni Mountains (Ianovici et al., 1976). Unlike the Triassic deposits - particularly those of the Middle–Upper Triassic - which were the subject of several detailed studies (e.g., the Roșia Limestone - Patrulius et al., 1976), the Lower Cretaceous limestones with Urgonian-type facies within the Vălani Unit are practically unknown from a micropaleontological and microfacies perspective. The rare sedimentological and paleontological data concerning these carbonate deposits were published by Patrulius (1971) or briefly described in the synthesis volume *Geology of the Apuseni Mountains* (Ianovici et al., 1976).

The Jurassic and Cretaceous successions of the Vălani Unit display strong similarities to equivalent deposits in the Bihor Unit, suggesting that during this interval both domains experienced comparable sedimentary environments. In contrast, the Triassic succession of the Vălani Unit aligns more closely with that of the Codru Nappe System, being dominated by deep-water deposits (e.g. the dark, conodont/filament bearing Ladinian–Norian carbonates - Patrulius et al., 1976). This differs markedly from the Middle-Upper Triassic deposits of the Bihor Unit, which are characterized mainly by shallow-water deposits (Ianovici et al., 1971).

For these reasons, our study focused on documenting the associated microfossil communities and the dominant facies types within the Urgonian-type shallow-water limestones near Sohodol, with the aim of establishing the age of the deposits, interpreting the depositional environments, and comparing them with coeval deposits from the Romanian Carpathians.

REMARKS ON THE CRETACEOUS FORMATIONS OF THE PĂDUREA CRAIULUI MOUNTAINS

As previously mentioned, the Lower Cretaceous deposits of the Pădurea Craiului Mountains belong to two different tectonic units, namely the Bihor Unit (primary) and the Vălani Unit of the complex Codru Nappe System. From the previous studies on the Cretaceous deposits of the Vălani Unit, it was noted that, from both petrographical and paleontological perspective, they display numerous similarities to the coeval facies of the Bihor Unit (Patrulius in Ianovici et al., 1976).

According to various authors (Patrulius in Ianovici et al., 1976; Dragastan et al., 1986, 1988; Bucur & Cociuba, 1996; Bucur, 1999, 2000; Cociuba, 2000, and references therein), the Lower Cretaceous deposits of the Bihor Unit encompass several distinct lithostratigraphic units. The

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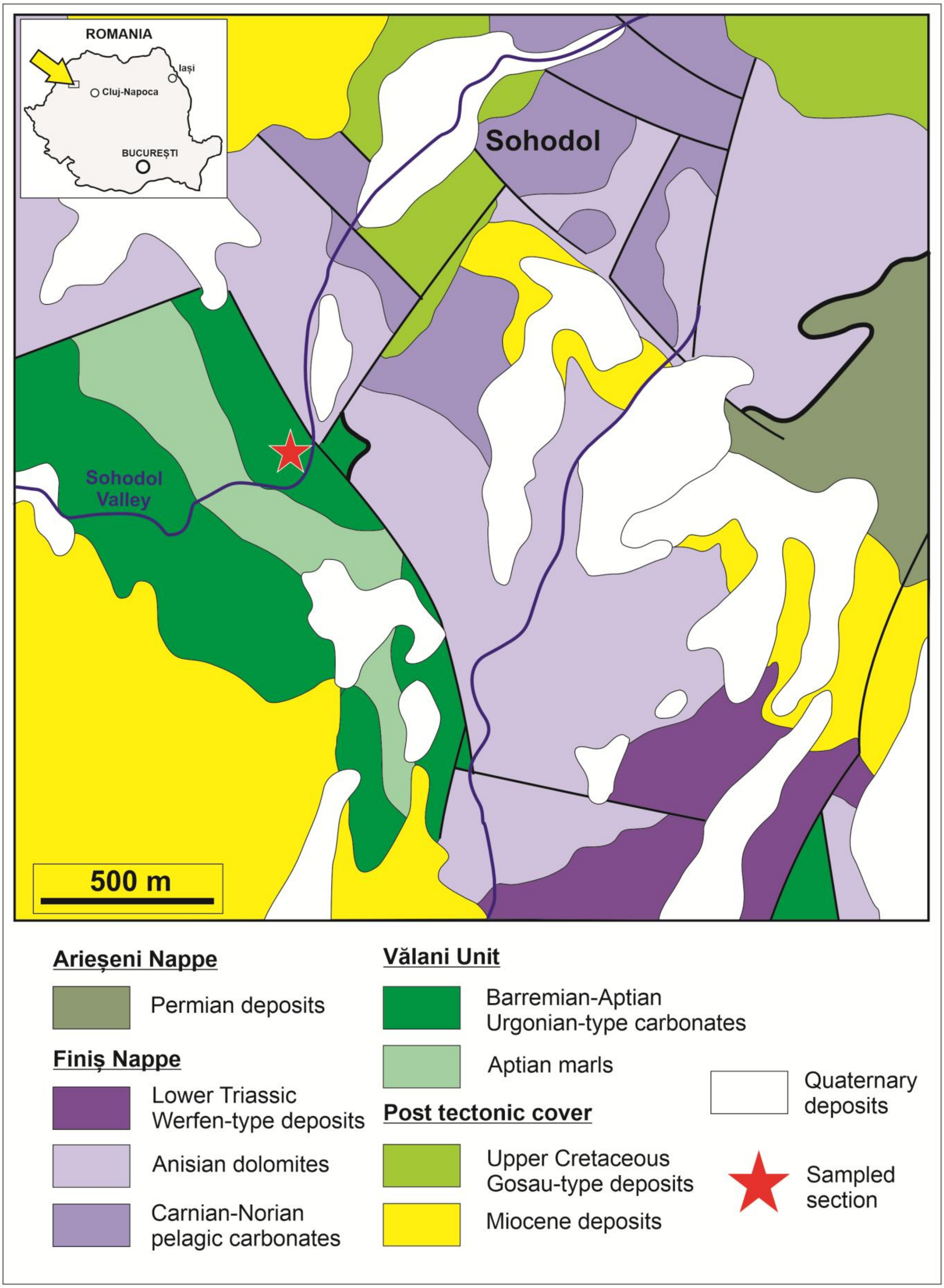

Fig. 1. Geological map of the studied area (based on Patrulius et al., 1983).

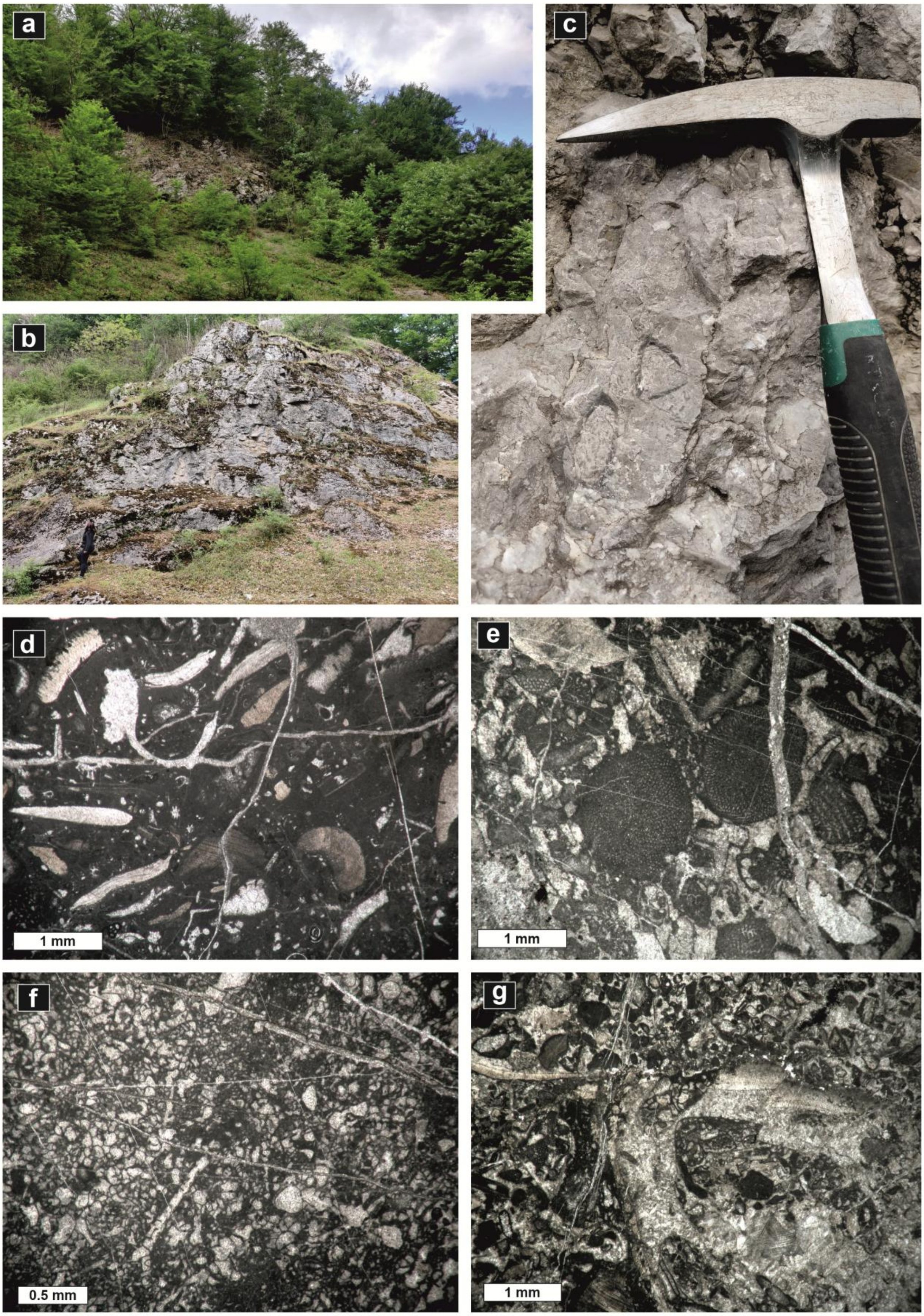

Fig. 2. Field pictures and the main microfacies types from the Lower Cretaceous carbonate section from Sohodol area. **a.** - Field picture of the upper part of the section. **b.** - Middle part of the section. **c. -** Bioclastic carbonates with rudist fragments from the lower part of the sampled section. **d.** - Bioclastic wackestone/packstone (MFT1) with numerous benthic foraminifera and calcareous algae. **e.** - Bacinellid bindstone (MFT3). **f.** - Bioclastic grainstone with orbitolinids (MFT2). **g.** - Coarse bioclastic grainstone/rudstone (MFT4) with rudist fragments and orbitolinids.

Blid Formation (Berriasian–Barremian) with Berriasian–Hauterivian lacustrine to brackish limestones of its Dobrești Member is overlain by Barremian marine bioclastic limestones with numerous rudists of its Coposeni Member (= "lower pachyodont limestone"). The Ecleja Formation (Barremian–early Aptian) consists mainly of marls and a set of lower Aptian limestones in its middle to upper part (Valea Bobdei Member = "middle pachyodont limestone"). The Valea Măgurii Formation, consisting of lower Aptian (upper Bedoulian) carbonates rests directly on the Ecleja Formation. It is also an equivalent of the "middle pachyodont limestone". The Vârciorog Formation (late Aptian–middle Albian) unconformably overlies the Valea Măgurii carbonates. This formation includes glauconitic sandstones and conglomerates with limestone intercalations. Laterally, rudist-bearing limestones, bacinellid carbonates, and coral bioconstructions develop (Subpiatra Limestone Member = "upper pachyodont limestone").

Concerning the Vălani Unit, the thickness of the Lower Cretaceous sedimentary sequence is more reduced compared to that of the Bihor Unit and, according with Patrulius in Ianovici et al. (1976), it comprises deposits comparable with the previously mentioned lithostratigraphic units of the Bihor Unit. They are represented by Barremian limestones developed in Urgonian-type facies with rudists, foraminifers, and algae ("lower pachyodont limestone" = Coposeni Member). Ecleja marls with orbitolinids and lower Aptian rudist bearing carbonates of the Valea Bobdei Member and Valea Măgurii Formation (= "middle pachyodont limestone"), and an upper Aptian–Albian detrital formation similar to parts of the Vârciorog Formation of the Bihor Unit.

MATERIAL

Seventy thin sections were examined for this study, made from carbonate samples collected from an outcrop located in the southern area of Sohodol village (Figs. 1; 2a-c). The microfacies classification, description, and interpretation follows Dunham (1962), Embry & Klovan (1971), and Flügel (2010, and references therein).

RESULTS

Main microfacies types

Based on the existing textural and compositional differences between the studied samples, the following dominant microfacies types were distinguished: bioclastic wackestone/packstone (MFT1) with benthic foraminifera and calcareous algae (Fig. 2d); bioclastic grainstone with orbitolinids (MFT2) (Fig. 2e); bacinellid bindstone (MFT3) (Fig. 2f), and coarse bioclastic grainstone/rudstone (MFT4) with rudist fragments, orbitolinids, and rare fragments of sponges and corals (Fig. 2g). The vertical stacking of these facies in the studied outcrop is presented in Figure 3.

Microfossil assemblages

The micropaleontological assemblages within the analyzed carbonates is remarkably diverse, with most of the identified species being documented for the first time in the Cretaceous sedimentary deposits of the Vălani Unit. The determined microfossils belong to several biotic groups including benthic foraminifers (orbitolinids, cuneolinids, charentiids, debarinids, pfenderinids, coskinolinids, nezzazatinids, kaminskiids, and miliolids, calcareous green algae (mainly Dasycladales) and microproblematic organisms.

Concerning the foraminiferal assemblage, the most abundant are the orbitolinid foraminifers. They are represented by numerous specimens from the *Montseciella-Rectodictyoconus* lineage (cf. Schroeder et al., 2010) from which the species *Montseciella arabica* (Henson) (Fig. 4a-c) could be determined. It is noteworthy that both *Montseciella arabica* and *Rectodictyoconus giganteus* Schroeder are relatively similar, but according to Schroeder et al. (2010), the primitive megalospheric embryo in *Montseciella* is located at the start of a crude initial spire, and in a central position in the tip of the test in *Rectodictyoconus*, being more complex with a few short partitions. Therefore, we do not exclude the possibility that some of the present orbitolinids belonging to the *Montseciella-Rectodictyoconus* group that lack the embryonic apparatus (Fig. 4d-l) could belong to *Rectodictyoconus giganteus*. Other orbitolinids are represented by *Palorbitolina lenticularis* (Blumenbach) (Fig. 4m-r), *Orbitolinopsis buccifer* Arnaud-Vanneau & Thieuloy (Fig. 5a-e, g), *Orbitolinopsis* sp. (Fig. 5f, h, i), and *Paracoskinolina maynci* (Chevalier) (Fig. 5j-k). The identified cuneolinid foraminifers include *Vercorsella scarsellai* (De Castro) (Fig. 5l-o), *V. camposaurii* (Sartoni & Crescenti) (Fig. 5p), *V.* sp. (Fig. 5q-r), *Sabaudia* cf. *capitata* Arnaud-Vanneau (Fig. 6a, d), and *S. minuta* (Hofker) (Fig. 6b-c, e-f). Other benthic foraminifers comprise: *Charentia cuvillieri* Neumann (Fig. 6g-j), *Debarina hahounerensis* Fourcade, Raoult & Vila (Fig. 6k-l, n), ?*Ovalveolina* sp. (Fig. 6m, o), *Pseudolituonella gavonensis* Foury (Fig. 6p), *Bulbobaculites felixi* Pleș, Bucur & Săsăran (Fig. 7a-b), *Derventina filipescui* Neagu (Fig. 7c-h), *Dobrogelina* cf. *cartusiana* Arnaud-Vanneau (Fig. 7i), *Nezzazatinella* cf. *macoveii* Neagu (Fig. 7i-q), *Glomospira* cf. *urgoniana* Arnaud-Vanneau (Fig. 8a-d, *Coscinoconus* sp. (Fig. 8e), *Haplophragmoides* sp. (Fig. 8f), *Melathrokerion* (Fig. 8g), and *Novalesia* sp. (Fig. 8h). Remaining undetermined foraminiferal species or genera are illustrated in Figure 8i-m.

The calcareous algae assemblage consists of several *Salpingoporella* species including *S. pygmaea* (Gümbel) (Fig. 9a-d), *S. muehlbergii* (Lorenz) (Fig. 9e-f), *S. popgrigorei* Bucur (with its quadrangular aspect of the laterals in middle-deep tangential section – Fig. 9g), and S. *polygonalis* Sokač (Fig. 9h), *S.* sp. (Fig. 9i), *Clypeina* sp. (Fig. 9j), *Biokoviella robusta* (Sokač) (Fig. 9k),

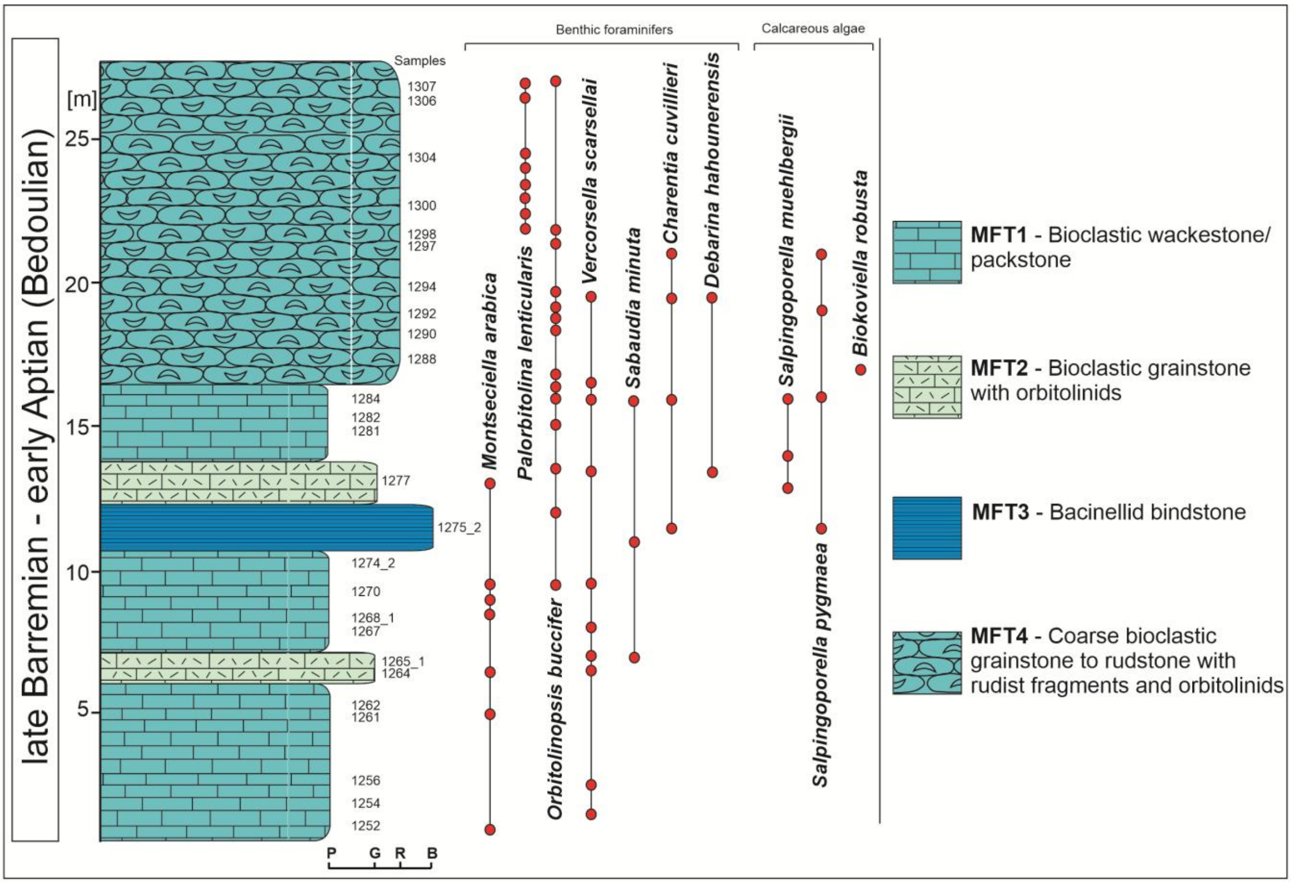

Fig. 3. Sampled section from Sohodol area with the vertical stacking of the main facies types and their associated microfossils (benthic foraminifera, Dasycladales).

Terquemella sp. (Fig. 9l), *Neomeris* sp. (Fig. 10a-d), *Triploporella loducai* Barattolo, Bucur, Țibuleac & Girardi (cf. Barattolo et al., 2025) (Fig. 10e), *Griphoporella* sp. (Fig. 10f), *Marinella lugeoni* Pfender (Fig. 10h), and elianellacean algae (Fig. 10i).

Microproblematic organisms are represented by *Carpathoporella* specimens (Fig. 10g), bacinellid meshworks (Fig. 11a-f), *Lithocodium aggregatum* Elliott (Fig. 11g-j) and *Lithocodium*-like microstructures. In addition, various amounts of microbially induced micritic microstructures are noticeable (Fig. 11k-l). Regarding *Carpathoporella*, although it was traditionally interpreted as algal remains, Schlagintweit & Gawlick (2009), based on well-preserved Aptian material from Albania, concluded that *Carpathoporella* may also represents micro-skeletal debris of colonial octocorals. The bacinellid meshworks display microtextural features closely comparable to those forming the cortices of numerous bacinellid oncoids from the upper Aptian–middle Albian Subpiatră Limestone (Bihor Unit), which Pleș et al. (2025) recently interpreted as microstructures likely produced by endolithic marine fungi. Concerning *Lithocodium*, Schlagintweit et al. (2010) revealed that *L. aggregatum* sensu Elliott (1956) represents a peculiar microorganism with a complex polyphase ontogeny. In addition to the *L. aggregatum* specimens, the studied material also contains *Lithocodium*-like microstructures, which most likely represent excavated galleries produced by entobian sponges within microbial crusts.

INTERPRETATIONS

Depositional environments

The bioclastic wackestone/packstone (MFT1) indicates a predominantly internal, shallow-water setting of a carbonate platform, characterized by moderate hydrodynamics and occasional restrictive episodes (as demonstrated by the development of the bacinellid bindstone facies - MFT3) (Tucker & Wright, 1990; Flügel, 2010). The compositional and structural features of the bioclastic grainstone facies with orbitolinids and skeletal fragments (MFT2) suggest a transition toward more open-platform environments, as well as episodes of increased hydrodynamic energy. The main bioclasts in MFT4 (rare fragments of encrusting sponges or corals) suggests the presence of small bioherms within the Lower Cretaceous carbonate platform of the Vălani Unit.

Age of the deposits

The present microfossil assemblages (Figs. 4–11), especially the benthic foraminifers and calcareous green algae, represent a typical Urgonian-type association. Most of the present species (e, g, foraminifers - *Charentia cuvillieri, Montseciella*/*Rectodictyoconus*, *Orbitolinopsis buccifer, Palorbitolina lenticularis*, and algae - *Biokoviella robusta, Salpingoporella pygmaea,* etc.) were

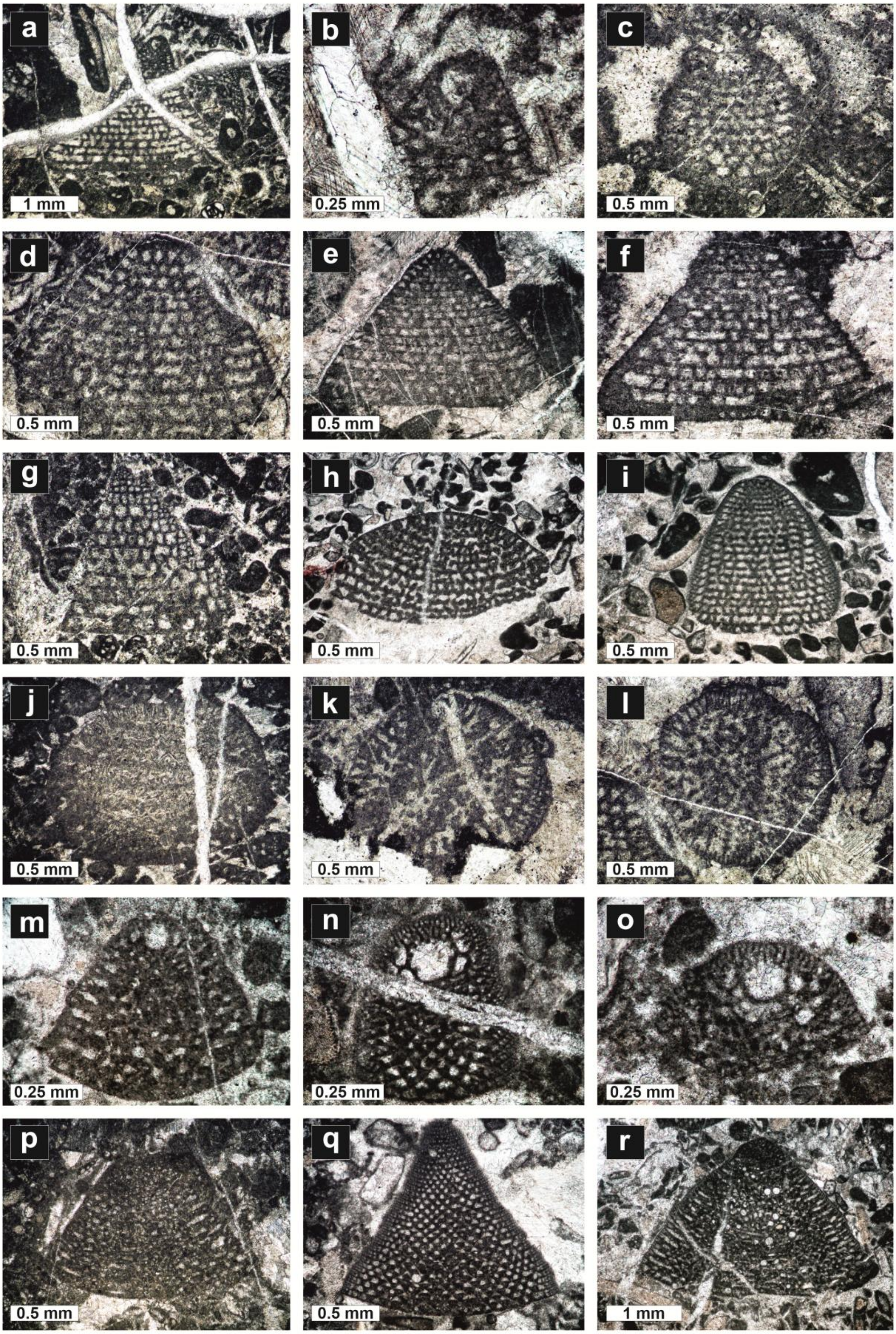

Fig. 4. Main species of foraminifers from the sampled section. **a-c.** - *Montseciella arabica* (Henson). **d-l.** - Orbitolinids from the *Rectodictyoconus*/*Montseciella* group. **m-r.** - *Palorbitolina lenticularis* (Blumenbach). Thin sections: 1252 (**a-b**), 1261_4 (**c**), 1261_1 (**d-f, l**), 1270 (**g**), 1277_1 (**h**), 1277_3 (**i**), 1264 (**j**), 1252 (**k**), 1298 (**m-n, q**), 1306 (**o**), 1296 (**p**), 1300 (**r**).

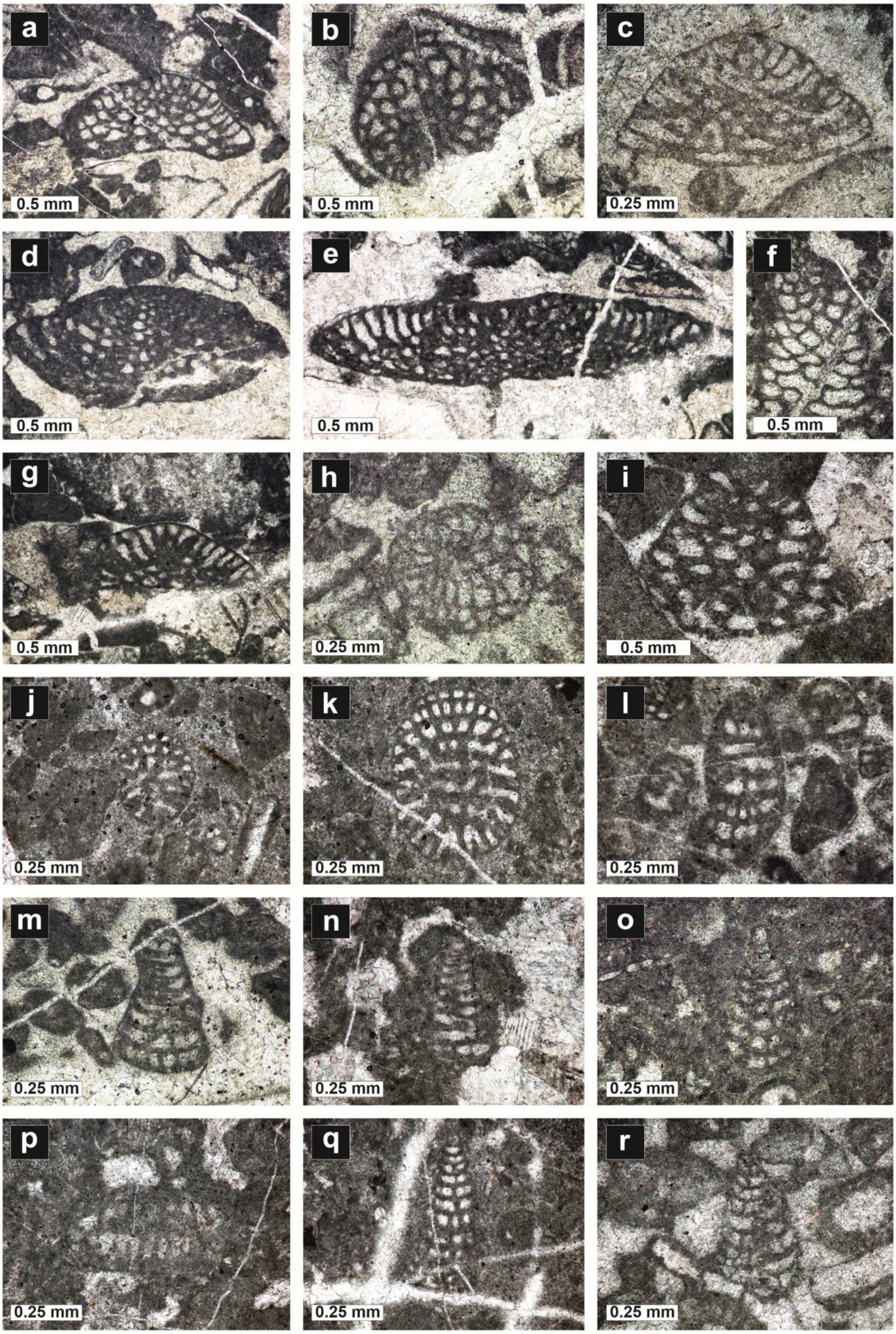

Fig 5. Main species of foraminifers from the sampled section. **a-e, g.** - *Orbitolinopsis buccifer* Arnaud-Vanneau & Thieuloy. **f, h, i.** - *Orbitolinopsis* sp. **j-k.** - *Paracoskinolina maynci* (Chevalier). **l-o.** - *Vercorsella scarsellai* (De Castro). **p.** - *Vercorsella camposaurii* (Sartoni & Crescenti). **q-r.** - *Vercorsella* sp. Thin sections: 1289_4 (**a**), 1289 (**b-f**, **h**), 1294_2 (**g**), 1294_3 (**i**).

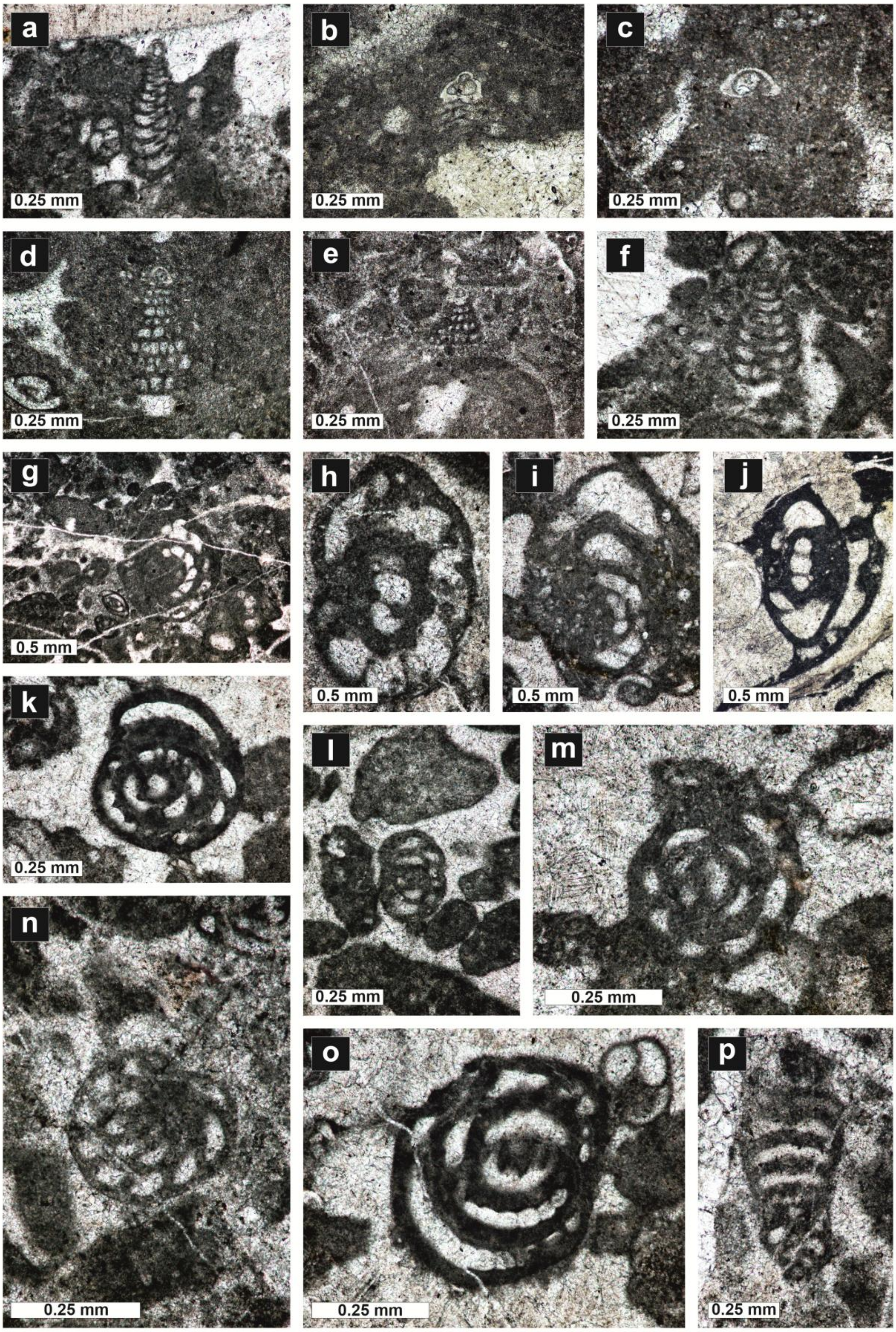

Fig. 6. Main species of foraminifers from the sampled section. **a, d.** - *Sabaudia* cf. *capitata* Arnaud-Vanneau. **b-c**, **e-f.** - *Sabaudia minuta* (Hofker). **g-j.** - *Charentia cuvillieri* Neumann. **k-l, n.** - *Debarina hahounerensis* Fourcade, Raoult & Vila. **m, o.** – ?*Ovalveolina* sp., **p.** - *Pseudolituonella gavonensis* Foury. Thin sections: 1279 (**a, f**), 1283 (**b-c**), 1273 (**d**), 1265 (**e**), 1274_2 (**g**), 1293 (**h**), 1290 (**i-k, n-o**), 1278 (**l**), 1261_3 (**m**).

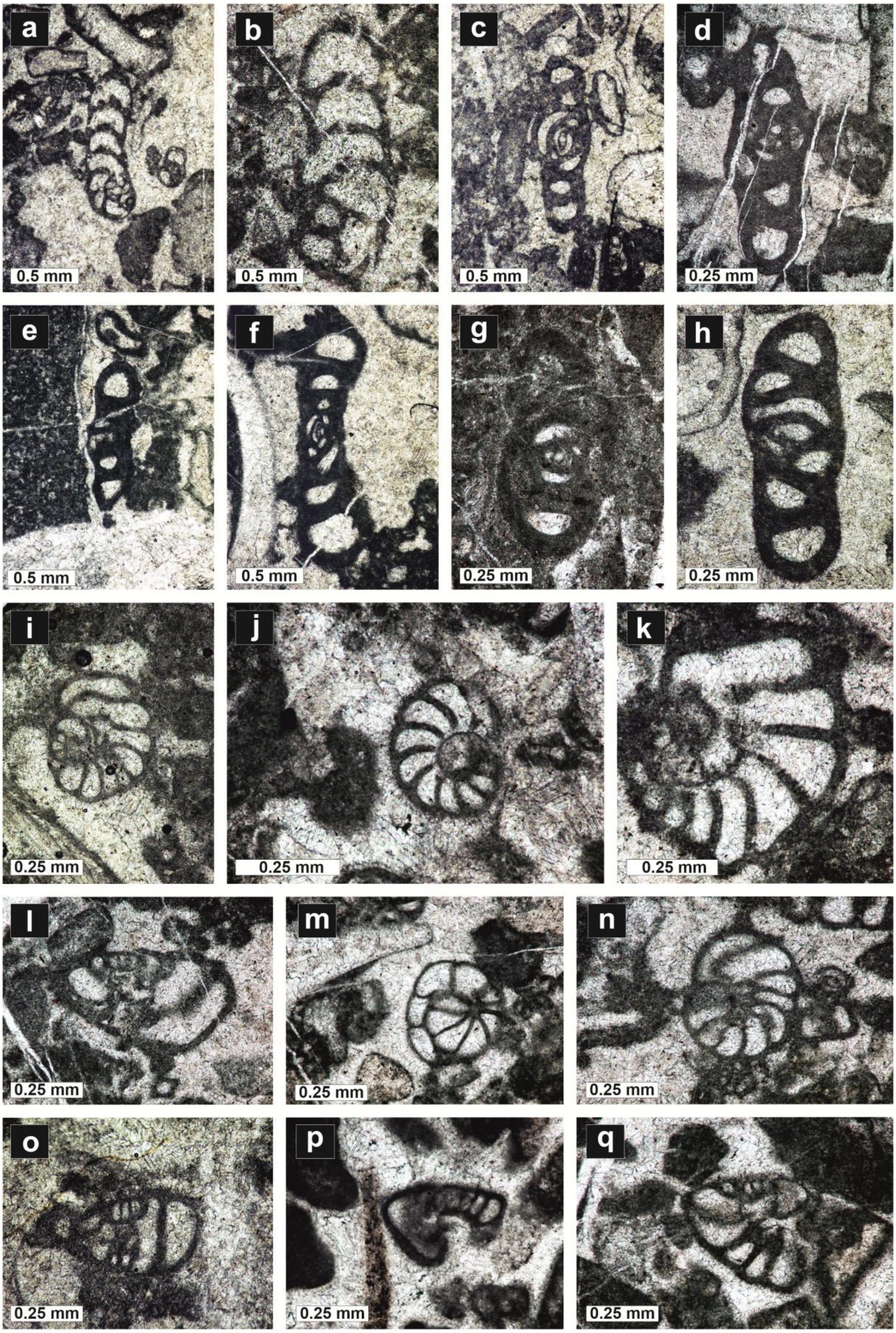

Fig. 7. Main species of foraminifers from the sampled section. **a-b.** - *Bulbobaculites felixi* Pleş, Bucur & Săsăran. **c-h.** - *Derventina filipescui* Neagu. **i.** - *Dobrogelina* cf. *cartusiana* Arnaud-Vanneau. **j-q.** - *Nezzazatinella* cf. *macoveii* Neagu. Thin sections: 1289 (**a-c, h, k-m**), 1263_2 (**e**), 1290 (**f**), 1263 (**i**), 1251 (**j**), 1290 (**n**), 1291 (**o-q**).

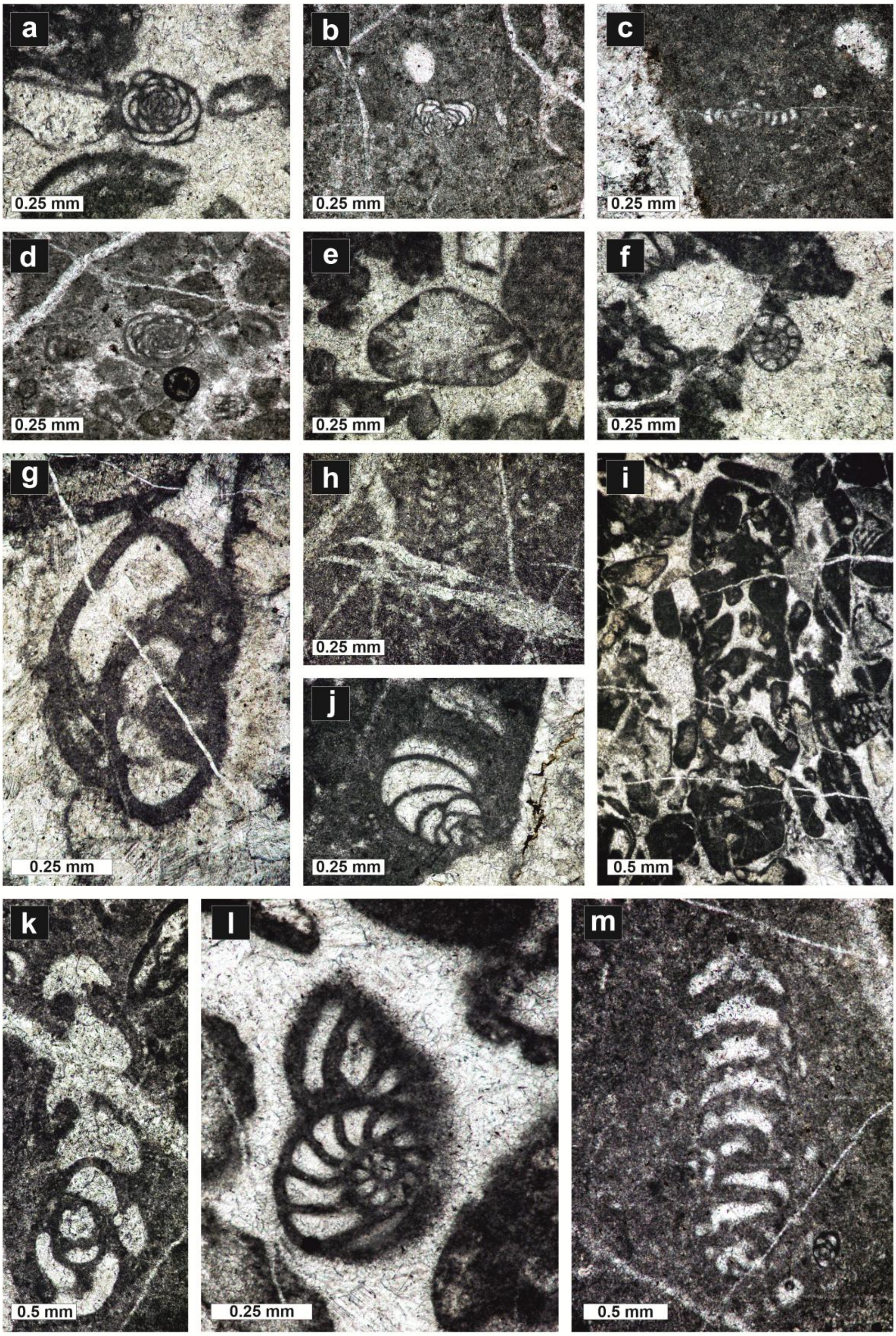

Fig. 8. Main species of foraminifers from the sampled section. **a-d. -** *Glomospira* cf. *urgoniana* Arnaud-Vanneau. **e.** - *Coscinoconus* sp., **f.** - *Haplophragmoides* sp. **g. -** *Melathrokerion* sp. **h.** - *Novalesia* sp. **i.** - Undetermined foraminifer with coarse granular wall (?alveolar). **j.** - Undetermined foraminifer. **k.** - Kaminskiid foraminifer. **l.** - ?*Mayncina* sp. **m. -** Undetermined foraminifer. Thin sections: 1289 (**a**), 1268_2 (**b**), 1282 (**c**), 1261_2 (**d**), 1278 (**e**), 1263 (**f**), 1261_1 (**g**), 1260 (**h**), 1291 (**I, l**), 1284 (**j**), 1272 (**k**), 1273 (**m**).

commonly reported from upper Barremian–lower Aptian carbonates of the Western Tethys realm (Arnaud-Vanneau, 1980; Bucur, 1981, 1992, 1994, 1999, 2007; Dragastan, 1980; Granier & Deloffre, 1993; Sokač, 1996; Clavel et al., 2009, 2013; Masse & Fenerci-Masse, 2013; Granier et al., 2013; Pleș et al., 2017; Bucur et al., 2008, 2012, 2013, 2019, and references therein). Among these, the orbitolinid foraminifers represent the most biostratigraphically important taxa.

Monseciella arabica (Fig. 4a-c) is known from the late Barremian–earliest Aptian (Bedoulian) (Schroeder & Cherchi, 1979; Baud et al., 1994; Schroeder et al., 2010; Schlagintweit & Rashidi, 2022, and literature within). *Rectodictyoconus giganteus* is an orbitolinid species restricted to the Early Cretaceous (Schroeder et al., 2002; Schroeder et al., 2010). Its stratigraphic range is early Aptian (Bedoulian) according to Schroeder et al. (2010), or early Aptian (Bedoulian)–earliest late Aptian (Gargasian) according to Schlagintweit et al. (2012) and Schlagintweit & Rashidi (2022). *Paracoskinolina maynci* (Fig. 5j-k) and *Orbitolinopsis buccifer* (Fig. 5a-e, g) have a relatively broader stratigraphic range. *Paracoskinolina maynci* is known from the latest Hauterivian to early Aptian (cf. Clavel et al., 2013), but commonly found in late Barremian–early Aptian carbonates (Granier et al., 2013; Yazdi-Moghadam et al., 2017). *Orbitolinopsis buccifer* has a stratigraphic range spanning from the early Barremian up to the early Aptian, but commonly reported from the late Barremian–earliest Aptian (Clavel et al., 2013). According to Schroeder et al. (2010) and Granier et al. (2013), the biostratigraphic range of *Palorbitolina lenticularis* (Fig. 4m-r) extends from the latest early Barremian to the latest early Aptian (Bedoulian). The other foraminifers and calcareous algae identified are common in the late Barremian–early Aptian interval from the Carpathians and other regions of the Tethys realm (Bucur et al., 2008).

In conclusion, based on the present microfossil assemblages, especially the orbitolinids (e. g. *Montseciella arabica* and possible *Rectodictyoconus giganteus*), the age of the studied section from the Vălani Unit is late Barremian–early Aptian (Bedoulian).

COMPARISONS WITH COEVAL DEPOSITS FROM THE ROMANIAN CARPATHIANS

As previously mentioned, the analyzed carbonates share many compositional semblances with coeval carbonates from the Bihor Unit. Similar microfossil assemblages were reported by Bucur (2000, 2008) and Bucur et al. (2008) from the Valea Bobdei Limestone and Valea Măgurii Limestone. However, as a distinctive feature, the presence of *Rectodictyoconus giganteu*s was not yet reported in the Urgonian-type carbonates of the Bihor Unit. According to Bucur (2000), the Valea Bobdei Limestone member (Ecleja Formation) may contain *Palaeodictyoconus arabicus* (=*Montseciela arabica*), but better specimens are needed to be found for a clear confirmation.

In the Eastern Carpathians, Urgonian-type carbonates occur in several regions marked in Figure 12. The Rarău Syncline represents one of the regions where Lower Cretaceous shallow-water carbonates containing calcareous green algae and orbitolinids occur.

The Hăghimaș Massif (Fig. 12) represents another region from the Romanian Carpathians where Urgonian-type carbonates are known to crop out in some areas (cf. Dragastan, 1975, 1980; Bucur & Săsăran, 2011; Bucur, 2008, 2014). The microfossil assemblage of the Lower Cretaceous Bicaz Valley deposits is comparable (mainly in terms of the foraminiferal association) with the present microfossils from the Vălani Unit.

Another area of the Eastern Carpathians with Urgonian-type carbonates is the Perșani Mountains (Fig. 12). Similar Barremian–Aptian carbonates with those described in the frame of this study were studied by Dragastan (1975, 1980), Bucur et al. (2008) and Marian & Bucur (2012). Even if many foraminifers and algae species presented by these authors are also present in the samples from the Vălani Unit, the Urgonian-type carbonates of the Perșani Mountains contain *Mesorbitolina texana* (Roemer) (cf. Marian & Bucur, 2012), an orbitolinid species that is restricted to the latest Aptian–middle Albian interval (Schroeder et al., 2010). This finding suggests that the development of the Urgonian-type carbonates from the Perșani Mountains starts in the late Barremian up to the late Aptian.

In the Southern Carpathians, the Dâmbovicioara Zone (Fig. 12) represents a well-known area for studying Urgonian-type carbonates. In this region, such deposits are well constrained biostratigraphically because they mainly crop out between ammonite-bearing sequences (cf. Patrulius, 1969). One of such examples is the Barremian–lower Aptian (Bedoulian) deposits of the Valea Muierii Member.

The Urgonian-type carbonates from the Buila-Vânturarița Massif (Fig. 12) crop out in limited areas across the massif transgressively overlying the Kimmeridgian–Valanginian limestones that form the main part of the massif (Pleș et al., 2016).

In Vâlcan Mountains of the Southern Carpathians (Fig. 12), Barremian–Aptian, Urgonian-type carbonates belong to the Izverna Formation (Pop & Bucur, 2001; Michetiuc et al., 2008).

In the Pui-Bănița zone of the Southern Carpathians (Fig. 12), Urgonian-type carbonates occur only as limestone clasts/blocks of various sizes within Upper Cretaceous (Cenomanian) conglomerates and breccias (cf. Pleș et al., 2019).

Lastly, the Urgonian-type limestones from the Reșița-Moldova Nouă zone (Fig. 12) are included in the Valea Nerei and Valea Minișului Formations (cf. Bucur 1994, 2008). The present samples from the Vălani unit best resemble with those included in the Aptian (Bedoulian-

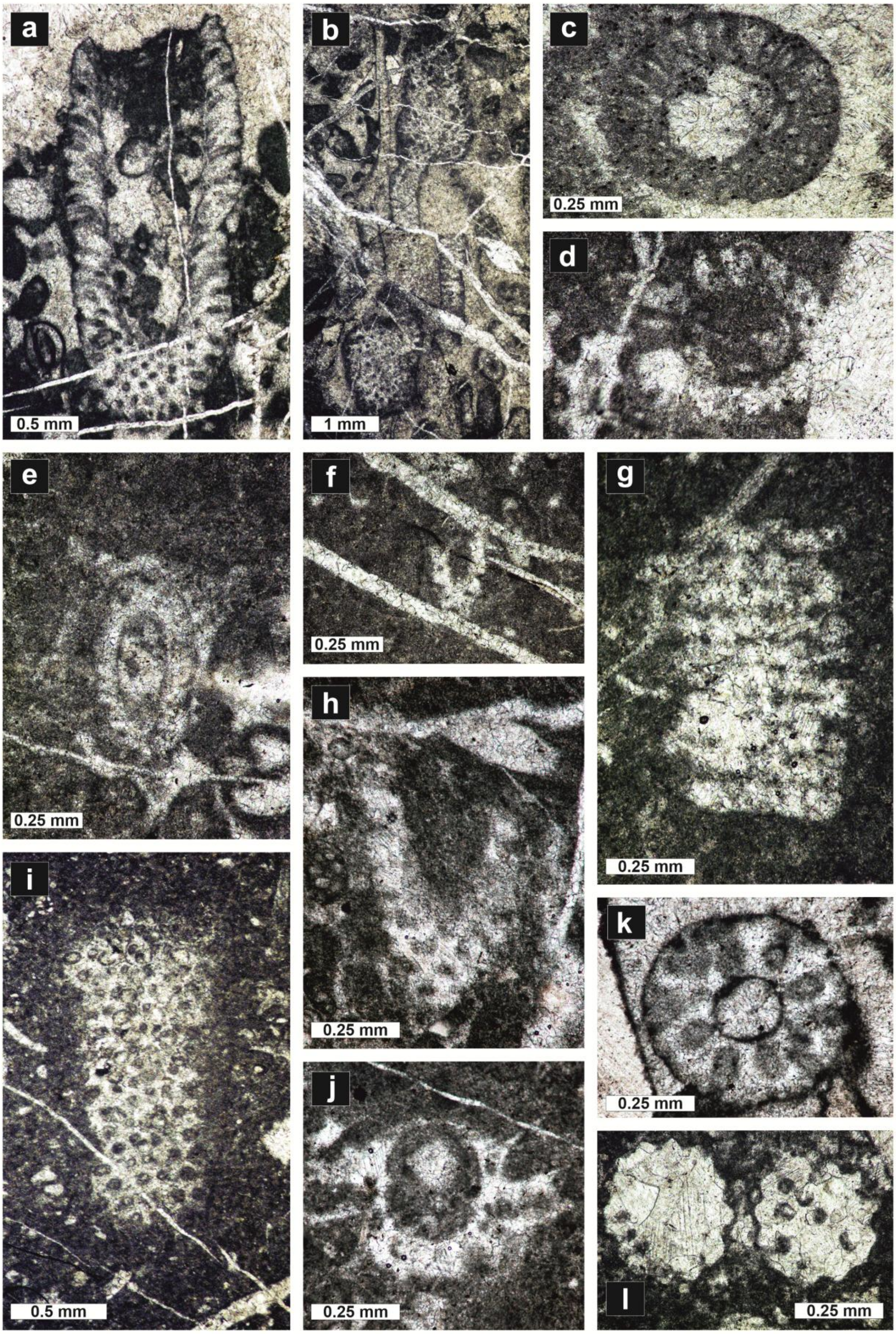

Fig. 9. Main species of calcareous algae from the sampled section. **a-d.** - *Salpingoporella pygmaea* (Gümbel). **e-f.** - *Salpingoporella muehlbergii* (Lorenz). **g.** - *Salpingoporella popgrigorei* Bucur. **h.** - *Salpingoporella polygonalis* Sokač. **i.** - *Salpingoporella* sp. **j.** - *Clypeina* sp. **k.** - *Biokoviella robusta* (Sokač). **l.** - *Terquemella* sp. Thin sections: 1289 (**a**), 1293 (**b**), 1274_1 (**c**), 1283 (**d, f, i**), 1279 (**e, g, j**), 1267_2 (**h**), 1285_1 (**k**), 1282 (**l**).

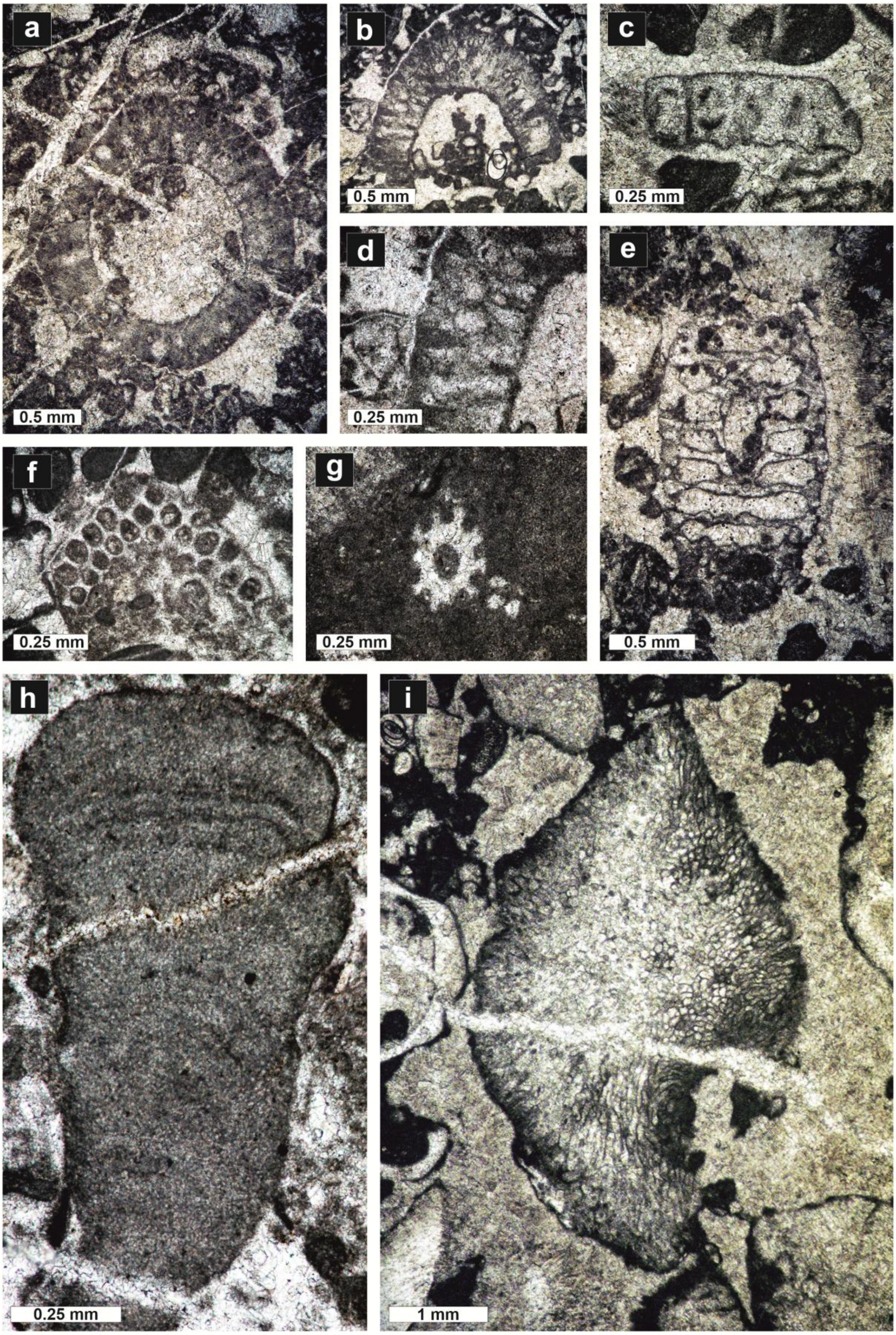

Fig. 10. Main species of calcareous algae and microproblematic organisms from the sampled section. **a-d. -** *Neomeris* sp. **e. -** *Triploporella loducai*. **f. -** *Griphoporella* sp. **g. -** *Carpathoporella* sp. **h. -** *Marinella lugeoni* Pfender. **i.** - Undetermined red algae (Elianellaceae, cf. "*Solenopora*"). Thin sections: 1298 (**a-b, d**), 1277 (**c**), 1263_2 (**e**), 1307 (**f**), 1283 (**g**), 1305 (**h**), 1290 (**i**).

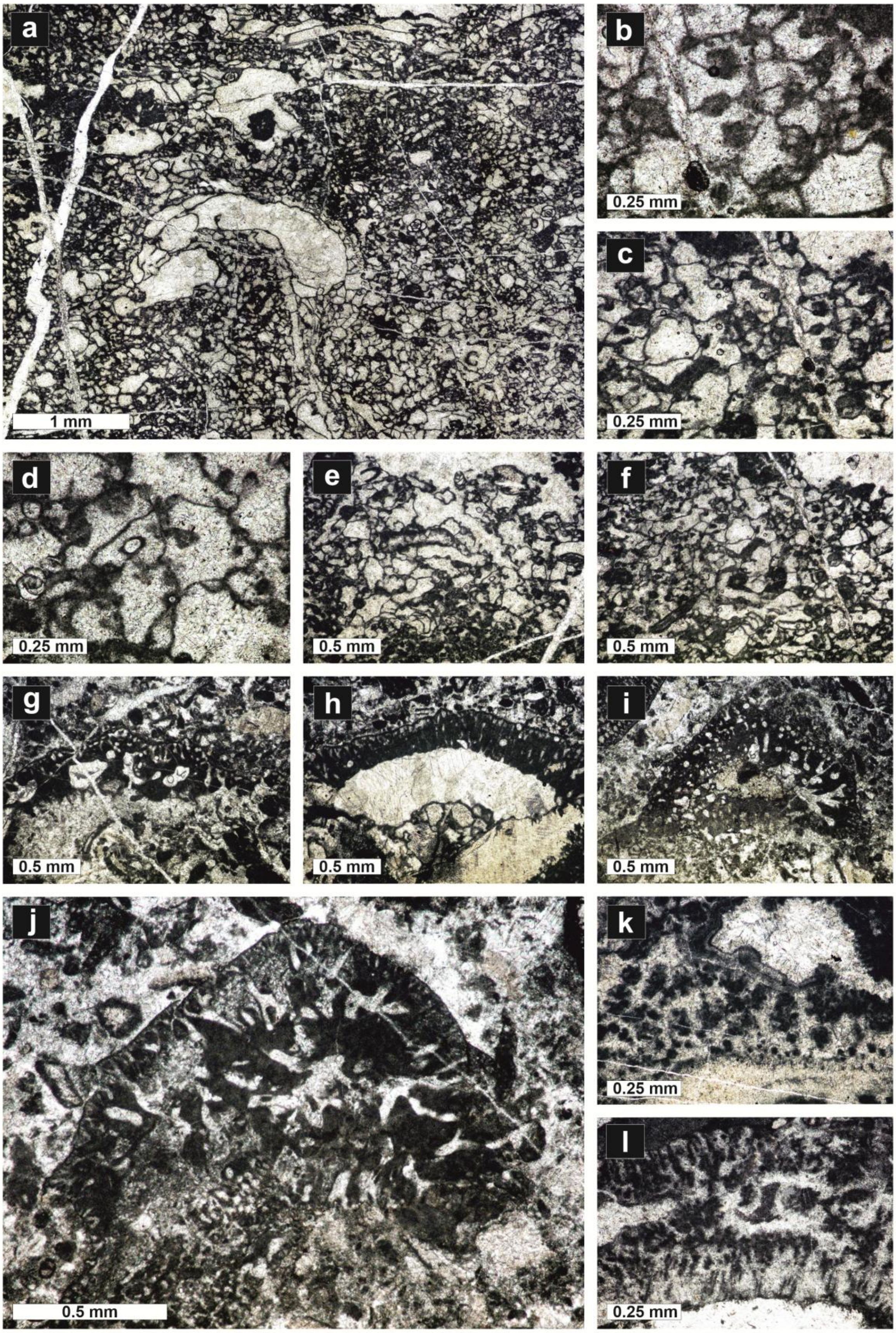

Fig. 11. Microproblematic organisms from the sampled section. **a-f. -** Bacinellid structures. Notice in (**b, c, e**) the pseudomicelar development of the bacinellid threads with micritic, bell-shaped microbodies that resemble reproductive chambers of many marine fungi. **g-j. -** *Lithocodium aggregatum* Elliott. **k-l.** - Microbially induced micritic microstructures. Thin sections: 1275_2 (**a**), 1263 (**b-f**), 1297 (**g-i**), 1301 (**j**).

Gargasian) Valea Minișului Formation. Bucur (2008) presented an inventory of the micropaleontological assemblages from this litostratigraphic unit, some of these species (e.g. *Paracoskinolina maynci*, *Sabaudia minuta*, *Neomeris cretacea*) being found also by us in the present material. Explanations in terms of formations, tectonic units, microfossil content and paleogeographic location are given in Table 1.

Additionally, the studied succession presents similarities with other locations from the Tethyan Realm such as the Adriatic Carbonate Platform (Sokač 1996), the French-Swiss Jura (Clavel et al., 2009), SE France (Granier et al., 2013; Masse & Fenerci-Masse 2013) or Iran (Yazdi-Moghadam et al., 2017).

CONCLUDING REMARKS

The analyzed carbonates are comparable with some of the coeval deposits of the Romanian Carpathians (e. g. Rarău syncline, Dâmbovicioara zone, or the Reșița-Moldova Nouă zone). Compared to the Cretaceous deposits of the adjacent structural units (Bihor and Finiș) from the Pădurea Craiului Mountains, the lower Aptian deposits from the Sohodol area show microfacies similarities (and partly micropaleontological affinities) with coeval deposits of the Bihor Unit. More specifically, with the Valea Bobdei limestone member (within the Ecleja Formation) and the Valea Măgurii Formation. Therefore, these two domains (Bihor and Vălani) shared a similar sedimentary evolution. At the same time, the small micropaleontological differences recorded between the Lower Cretaceous deposits of the Vălani and Bihor units, together with the clear contrasts between their Triassic and Jurassic facies, suggest that the depositional domain of the Vălani Unit probably occupied a slightly southern position compared to that of the Bihor Unit.

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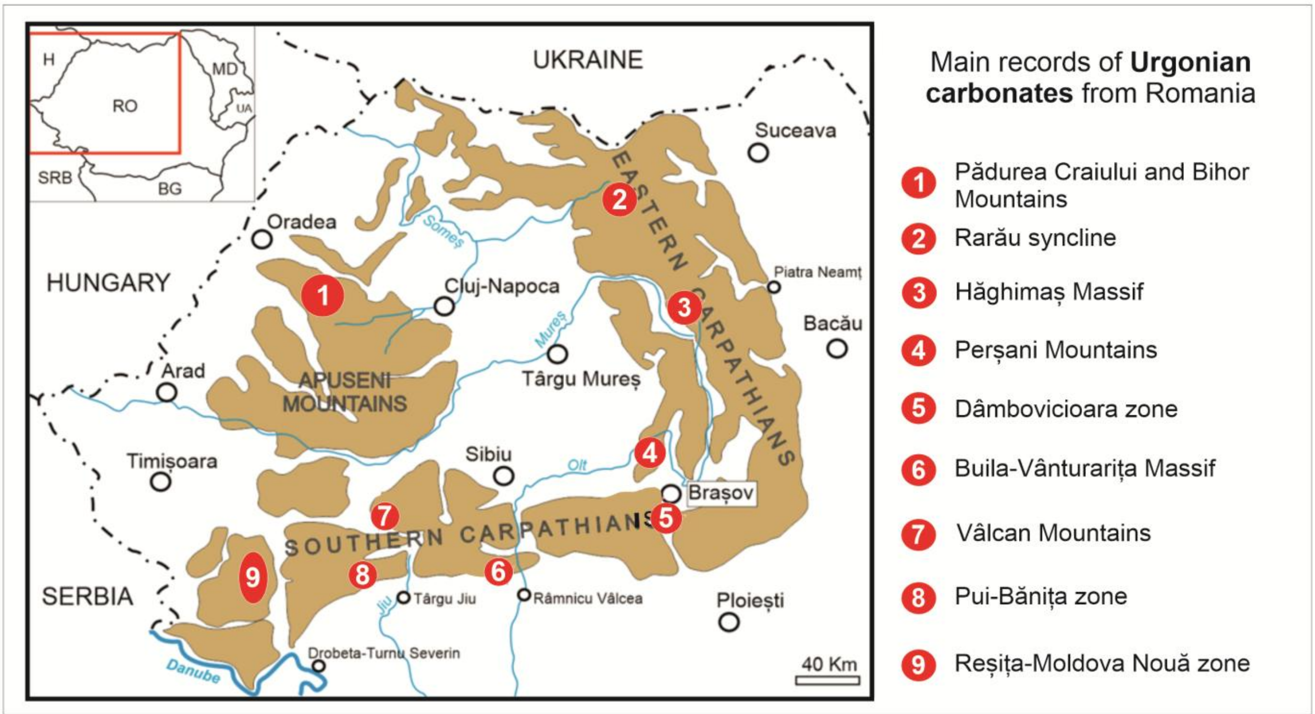

Fig. 12. Main records of Urgonian-type carbonates from the Romanian Carpathians.

Table 1. Comparison between the studied deposits and other Urgonian-type limestones from the Romanian Carpathians

Formation/ Members	Tectonic Unit	Age	Common taxa	Paleogeog-raphy	References
Valea Bobdei, Valea Măgurii	Bihor Unit, Inner Dacides	early Aptian	*Glomospira urgoniana, Pseudolituonella gavonensis, Sabaudia minuta, Vercorsella* sp., *Salpingoporella muehlbergii*	Western Tethys Realm	Bucur (2000, 2008) Bucur et al. (2008)
-	Rarău Syncline, Transylvanian Nappe	early Aptian	*Charentia cuvillieri, Dobrogelina* sp., *Meandrospira* sp., *Montseciella arabica*, *Palorbitolina lenticularis*, *Rectodictyoconus giganteus*, *Neomeris cretacea*, *Salpingoporella pygmaea*, *Salpingoporella* sp.		Bucur (2008), Pleş et al. (2017)
-	Bicaz Valley, Transylvanian Nappe	late Barremian – early Aptian	*Charentia cuvilieri*, *Dobrogelina* sp., *Melathrokerion praesigali, Montseciella arabica*, *Neotrocholina fribourgensis*, *Griphoporella cretacea Neomeris* sp., *Salpingoporella pygmaea*, *Suppiluliumaella elliotti*, *Terquemella* sp., *Carpathoporella* sp.		Bucur & Săsăran (2011)
Valea Muierii	Dâmbovicioara Zone, Median Dacides	Barremian – early Aptian (Bedoulian)	*Charentia cuvillieri, Montseciella arabica, Orbitolinopsis buccifer, Palorbitolina lenticularis,Vercorsella scarsellai, V. camposaurii, Neomeris cretacea, Salpingoporella pygmaea, S. muehlbergii*		Bucur (2008), Bucur et al. (2011)
Izverna	Vâlcan Mountains, Marginal Dacides	Barremian–Aptian	*Montseciella arabica*, *Moulladella jourdanensis, Melathrokerion* sp., *Neotrocholina friburgensis*, *Sabaudia minuta*, *Neomeris cretacea*, *Salpingoporella exilis*, *S. patruliusi*, *S. muehlbergii*, *Terquemella* sp.		Pop & Bucur (2001) Michetiuc et al. (2008)
-	Pui-Bănița Zone	late Barremian–early Aptian	*Montseciella arabica*, *Paracoskinolina maynci*		Pleş et al. (2019)
Valea Nerei, Valea Minișului	Reșița-Moldova Nouă Zone	Aptian (Bedoulian– Gargasian)	*Paracoskinolina maynci*, *Sabaudia minuta*, *Neomeris cretacea*		Bucur (2008)

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