A NEW OCCURRENCE OF UPPERMOST APTIAN-ALBIAN DEPSITS IN THE SOUTHERN PART OF THE REŞIŢA–MOLDOVA NOUĂ ZONE (SOUTHERN CARPATHIANS)

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Abstract. A new occurrence of uppermost Aptian-Albian sedimentary deposits has been identified in the southern part of the Reşiţa–Moldova Nouă zone along the road connecting the Moldova Nouă and Padina Matei localities. For the first time, these deposits are cartographically represented on the geological map 1:50.000 scale. This report also includes a brief lithological and paleontological description. The uppermost Aptian-Albian deposits from this area belong to the Radimna Formation and represent a shallower facies compared to the equivalent deposits from the central compartment of the Reşita-Moldova Nouă zone.

Keywords: lithostratigraphy, geological map, Albian, Reşiţa–Moldova Nouă zone.

Résumé. Une nouvelle occurrence de dépôts sédimentaires aptien terminal-albiens a été identifiée dans la partie sud de la zone de Reşita-Moldova Nouă, le long de la route qui relie les localités de Moldava Nouă et Padina Matei. Ils sont représentés cartographiquement pour la première fois sur la carte géologique à l'échelle 1:50 000. Une brève description lithologique et le contenu paléontologique sont également fournis. L'Albien des nouvelles occurrences appartient à la Formation de Radimna et représente un faciès moins profond que celui du compartiment central de la région de Reşita–Moldova Nouă.

Mots-clés: lithostratigraphie, carte géologique, Albian, zone de Reşiţa–Moldova Nouă.

1. INTRODUCTION. GEOLOGICAL SETTING

The Reşiţa–Moldova Nouă area represents a sedimentation zone belonging to the Getic domain, located in the southwestern part of the Southern Carpathians (Fig. 1). This area features Paleozoic and Mesozoic sedimentary formations, ranging from the Carboniferous to the Albian, which form the sedimentary cover of the Getic nappe (Năstăseanu, 1964; Săndulescu, 1984; Bucur, 1997). The Triassic sedimentary deposits found in the western part of this area between Sasca and Moldova Nouă have been clasified by Săndulescu (1975) as part of a distinct tectonic unit known as the Sasca-Gornjak nappe.

The Cretaceous formations within the Reşita-Moldova Nouă zone primarily consist of carbonate rocks. The lower section, represented by Marila and Crivina formations is characterized by a "basinal" (deep water) character. This is followed by shallow water formations, specifically the Plopa and Valea Minișului formations (Bucur, 1997). The top of the Cretaceous succession is represented by glauconitic sandstones and sandy limestones attributed to the uppermost Aptian-Albian (Avram *et al.*, 1987; Bucur, 1997).

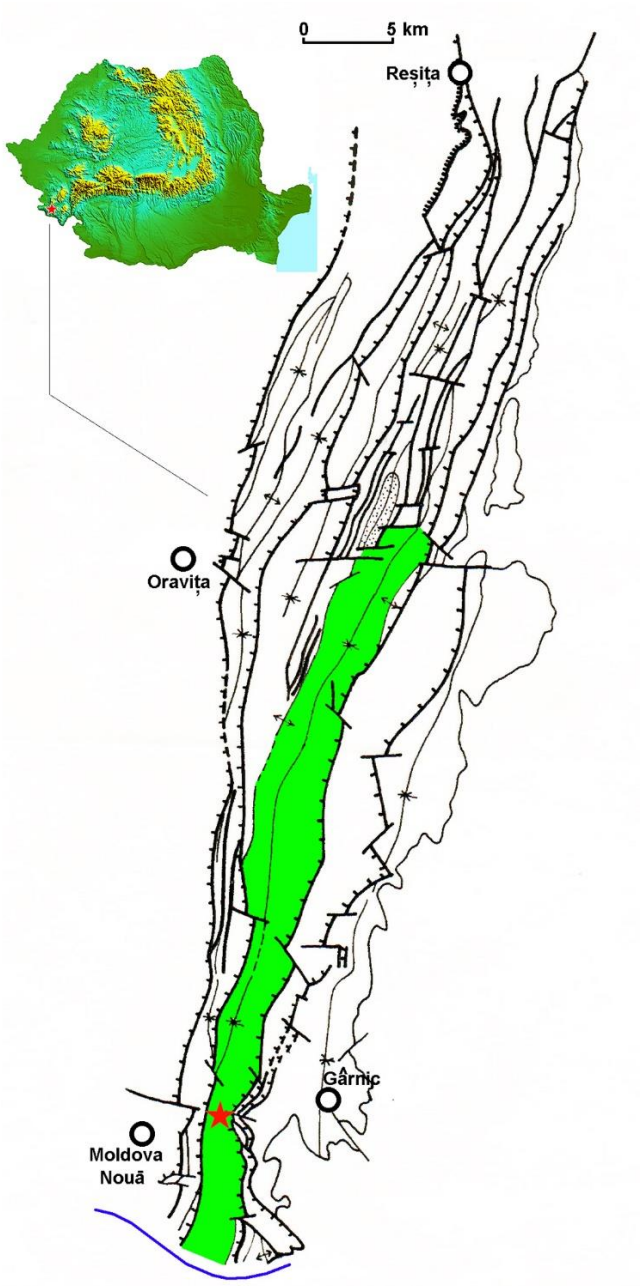

Figure 1. Tectonic sketch of the Reșița–Moldova Nouă zone with the location of the studied area within the Central Syncline (red star).

Albian sedimentary deposits have been recognized since the end of the 19th century and have been referred to as Gault, Gault-Cenomanian or Vraconian-Cenomanian (Böck, 1887; Roth-Telegd, 1906; Schreter, 1912, Macovei and Atanasiu, 1934). These deposits, which crop out between Miniş Valley and Nera Valley, were correctly identified and interpreted by Mutihac (1959) based on an ammonite fauna with *Douvileiceras mammillatum* Schlotheim, *Hamites compressus* Sowerby and *Scaphites circularis* Sowerby. This specific fauna indicates that the delivering deposits date to the Albian. Răileanu *et al.* (1964) subsequently named the sequence of Albian sandstones, the Gura Golumbului strata.

To the south of the Nera Valley, sandy-calcareous rocks assigned to the Albian-Cenomanian were described by Răileanu *et al.* (1961; 1964). These rocks mainly crop out in the Radimna Valley, but are also found in several patches further south, overlying the Aptian limestones. This formation was named Radimna Sandstone (Răileanu *et al.*, 1964). Later, Năstăseanu (1979) and Năstăseanu *et al.* (1981) reassigned these deposits to the Albian, considering them equivalent to the Gura Golumbului Sandstone. The age of the Gura Golumbului Formation was more precisely established by Avram *et al.* (1987), based on an ammonite fauna containing *Hypacanthoplites* cf. *multispinatus* (Anthula), *Hoplites* aff. *escragnolensis* Spath, *Hoplites* cf. *latesulcatus* Spath and *Cymatoceras* sp. The species *H. multispinatus* indicates that the lower glauconitic sequence of the Miniș Valley succession belongs to the Clansayesian stage. However, the presence of *H. escragnolensis* and *H. latesulcatus* suggest the lower part of the middle Albian. As such, the whole sequence was assigned to the uppermost Aptian-Albian (Avram *et al.*, 1987; Bucur, 1997).

2. THE NEW UPPERMOST APTIAN – ALBIAN OUTCROPS FROM VALEA MARE (MOLDOVA NOUĂ)

The recent reconstruction of the road between Moldova Nouă and Padina Matei, which primarily follows the course of Valea Mare, has uncovered a sequence of rocks from the southern part of the Central syncline of the Reşiţa–Moldova Nouă zone (Cărbunari syncline, cf. Răileanu *et al.*, 1961). The sedimentary succession mainly consists of carbonate rocks belonging to the Valea Minişului Formation which dates from the upper Barremian to Aptian (Bucur, 1997). Additionally, two sandstone and sandy-limestone outcrops attributed to the Radimna Formation (Fig. 2) were also identified, which have not previously been figured on the geological maps.

The first outcrop (Fig 2, sample 17133) consists of well-sorted to very well-sorted sandstones. It contains a dominant fraction of 50–60% of fine angular arenitic quartz with grain sizes ranging from 0.05 to 0.15 mm and a fraction of 30–40% of micritic carbonate fragments of the same size. This composition is completed with rarer lithic (crystalline basement fragments) and siliceous rocks fragments (Pl. 1, fig. A). The cement is of carbonatic nature.

The second outcrop (Fig. 2, samples 17137–17140) consists of a sequence of conglomerates, sandstones, and limestones that contain terrigenous material (Fig. 3). In the lower part of the sequence, the terrigenous material has rudite-sized dimensions (Fig. 3). The elements are very well rounded and mainly composed of quartz and diagenetic siliceous rocks preserving traces of the original carbonate substrate, within a limestone matrix that contains terrigenous material (Pl.1, fig. D). In the sandy limestones (Pl. 1, fig. B), arenitic-sized quartz is present in a fraction of 5–10%, with increased frequency, up to 15–20% towards the upper part of the sequence. Carbonate peloids are common, making up to 20–30% of composition. The dominant elements within the limestones with terrigenous material are the fragments of coralline red algae. The grain sizes range between 0.10–0.30 mm, although some bioclasts can exceed 0.5–1 mm. The bioclasts include bivalve fragments (notably large inoceramid fragments; Pl. 1, fig. C), echinoderm fragments, rare annelid worm tubes, and foraminifera, including rare miliolids, as well as fragments of coralline algae. The cement is granular carbonate. Among the foraminifera, there are some small-sized benthic species, likely belonging to primitive nezzazatinids (Pl. 1, figs. J–L). Red algae are represented by broken specimens (Pl. 1, figs. E–F), or sometimes well-developed thalli (Pl. 1, figs. G–I) of *Agardhiellopsis cretacea* Lemoine and *Paraphyllum primaevum* Lemoine. The two species are part of the so-called "faciès de Vimport" known from the Upper Aptian-Albian interval, providing additional evidence for assigning a Clansayesian-Albian age to the Radimna sandy limestones. However, it should be noted that both algae possess reproductive organs of the *Sporolithon* type (sori), suggesting they could be reassigned to this genus. Additionally, the Albian specimens previously assigned by Lemoine (1970) to the species *Paraphyllum primaevum* do not differ essentially from *Paraphyllum amphiroaeforme* (Rothpletz) and probably should be assigned to the latter species.

The newly identified uppermost Aptian-Albian deposits on Valea Mare (Moldova Nouă) overlie the lower Aptian limestones. Thin sections prepared from these limestone samples revealed an association of foraminifera consisting of: *Cribellopsis* sp. (Pl. 2, fig. A), *Vanneauina vercorii* (Arnaud-Vanneau) (Pl. 2, fig. B), *Orbitolinopsis buccifer* Arnaud-Vanneau & Thieuloy (Pl. 2, fig. F), *Palorbitolina lenticularis* (Blumenbach) (Pl. 2, fig. E), *Cantabriconus*? *meridionalis* Schlagintweit & Bucur (Pl. 2, fig. J), ?*Reticulinella* sp. (Pl. 2, Fig. G), *Vercorsella camposaurii* (Sartoni & Crescenti) (Pl. 2, Fig. C), *Vercorsella arenata* Arnaud-Vanneau, *Sabaudia minuta* (Hofker), *Ichnusella* sp. (Pl. 2, fig. D), *Pfenderina globosa* Foury (Pl. 2, fig. H), *Melathrokerion praesigali* (Banner), *Pseudolituonella gavonensis* Foury, *Everticyclammina* sp., *Nezzazatinella* sp., *Derventina filipescui* Neagu, *Charentia cuvillieri* Neuman, *Choffatella decipiens* Schlumberger. Calcareous algae are relatively rare and include taxa such as *Triploporella* sp. (Pl. 2, figs. K, L), *Salpingoporella muehlbergii* (Lorenz) (Pl. 2 figs. I, M), *Bakalovaella elitzae* (Bakalova), *Neomeris* sp. along with *Boueina hochstetteri* Toula, *Arabicodium sp*. and other fragments of udoteacean algae. This association indicates a lower Aptian age as discussed for instance by Bucur (1997) pertaining to the entire Reşiţa–Moldova Nouă zone.

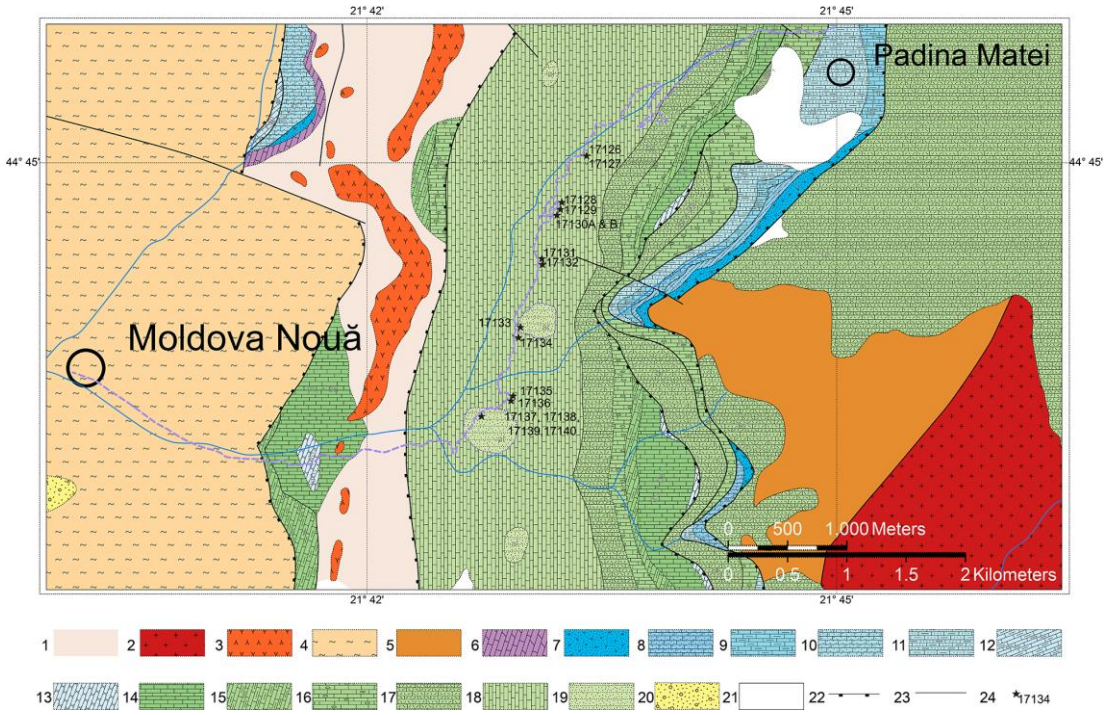

Figure 2. Geological map of the area between Moldova Nouă and Padina Matei containing the two new autcrops of uppermost Apţian-Albian deposits (marked by the samples 17133 and 17137–17140 respectivelly). 1. Contact metamorphism zone (skarn, hornfelses, contact schists); 2. Upper Paleozoic intrusions (granite, granodiorite, quartz-diorite); 3. Banatite intrusions (quartz-rich diorite and granodiorite); 4. Crystalline schists, Locva Series (chlorite schists with albite porphyroblasts and basic meta tuff intercalations); 5. Crystalline schists, Sebeş-Lotru Series (micaschists, biotite-rich paragneisses; Bizu Formation); 6. Sasca Formation, Dealul Redut, Valea Şuşara and Valea Cerbului limestones Members (upper Olenekian-Anisian); 7. Steierdorf Formation, Budinic and Valea Tereziei Members (Hettangian-Sinemurian; conglomerates, sandstones and clays); 8. Uteriş Formation (Pliensbachian-Toarcian; bituminous shales); 9. and 10. Dealul Zânei Marl Formation (Aalenian-lower Callovian); 11. Gumpina Limestone Formation (middle Callovian); 12. Valea Aninei Limestone Formation (upper Oxfordian-lower Kimmeridgian); 13. Brădet Limestone Formation (upper Kimmeridgian-lower Tithonian); 14. Marila Limestone Formation (upper Tithonian-middle Berriasian); 15. Crivina Marls Formation (upper Berriasian-upper Valanginian *pro parte*); 16. Plopa Limestone Formation, Valea Lindinei Limestone Member (uppermost Valanginian-Hauterivian); 17. Plopa Limestone Formation, Valea Nerei Limestone Member (lower Barremian); 18. Valea Minişului Formation; limestones, marly-limestones and marls (upper Barremian-middle Aptian); 19. Radimna Sandy-Limestone Formation (uppermost Aptian-Albian); 20. Neogene (not differentiated); 21. Quaternary; 22. Reverse fault; 23. Normal fault; 24. Sample location and code.

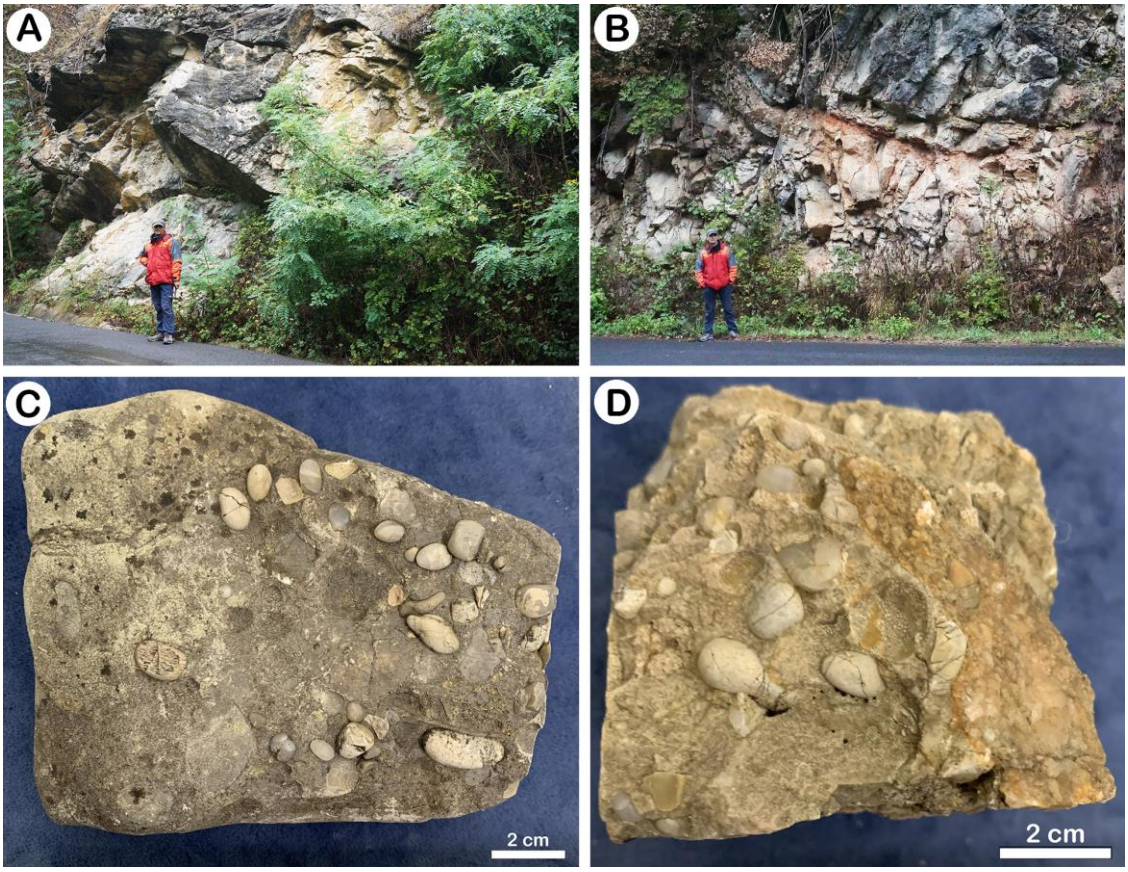

Figure 3. A, B, photographs of the two outcrops with uppermost Aptian-Albian deposits from Valea Mare; C, D, samples of conglomerates from the basal part of the succession in the second outcrop. Samples 17137 (C) and 17138 (D).

3. CONCLUSIONS

Two new occurrences of uppermost Aptian-Albian deposits have been identified in the southern part of the Reşiţa–Moldova Nouă zone. Judging by their lithological characteristics and micropaleontological content, these deposits belong to the Radimna Formation, which primarily consist of limestone with terrigenous material. The glauconitic sandstones with a flysch-like aspect that outcrop in the lower part of the uppermost Aptian-Albian succession on the Minis Valley have not been identified south of the Nera Valley. The net carbonate character and the presence of calcareous algae in the rocks of the Radimna Formation suggest a shallower sedimentation environment compared to the central compartment of the Reşiţa–Moldova Nouă zone. This observation correlates with the existence of Albian carbonate deposits rich in red algae (predominantly *Agardhiellopsis cretacea*) south of the Danube, in Serbia (I.I.B., personal observations). These may have served as a source for the abundant fragments of algal material present in the sandy limestones of Radimna Formation. It is also worth mentioning that just north of the Nera Valley, along the Ciungi creek, Albian deposits were identified (Dragastan *et al.*, 1978). In this succession the glauconitic sandstone is followed by limestone with terrigenous material, typical of the Radimna Formation, so that this area could represent a transition zone between the two formations.

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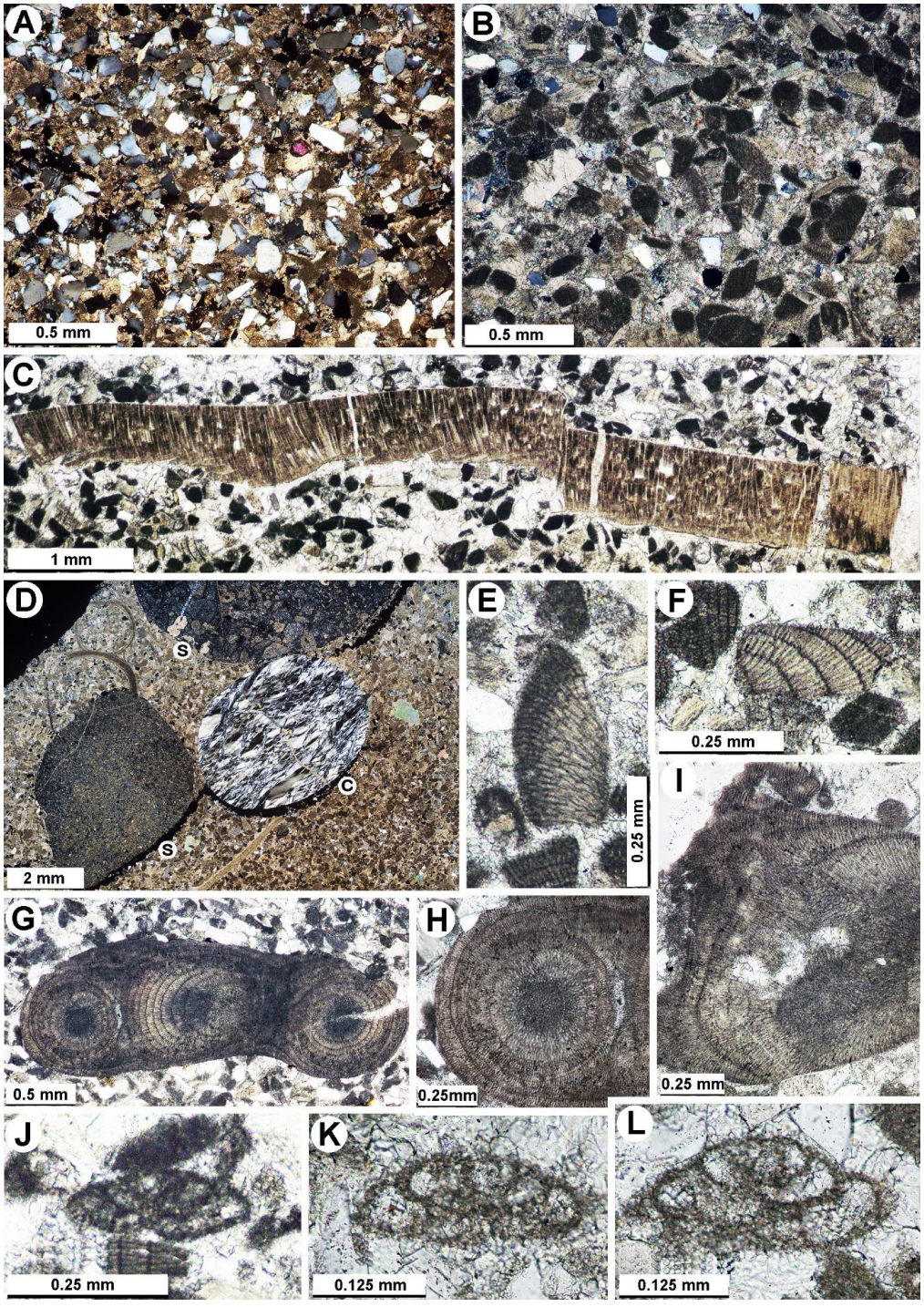

Plate 1. Lithology and microfossils from the uppermost Aptian-Albian deposits. A, B, microphotos of the sandy-limestones from the first (A) and second (B) outcrop. Polarized light, crossed nocoles; samples 1733 and 1737 respectivelly. C, inoceramid shell within the sandy-limestone of the second outcrop; sample 17137. D, microphoto of the conglomerate from the basal part of the second outcrop showing a quartzitic (c) and siliceous (s) well rounded elements and a fine arenitic sandy-limestone matrix. Polarized light, crossed nocoles; sample 17138. E, I, Red algae *Agardhiellopsis cretacea* Lemoine; sample 17137. F–H, Red algae *Paraphyllum primaevum* Lemoine; F, sample 1713; G, H, sample 17140. J–L, small benthic foraminifera probably belonging to primitive nezzazatinids; J, sample 17137; K, L, sample 17139.

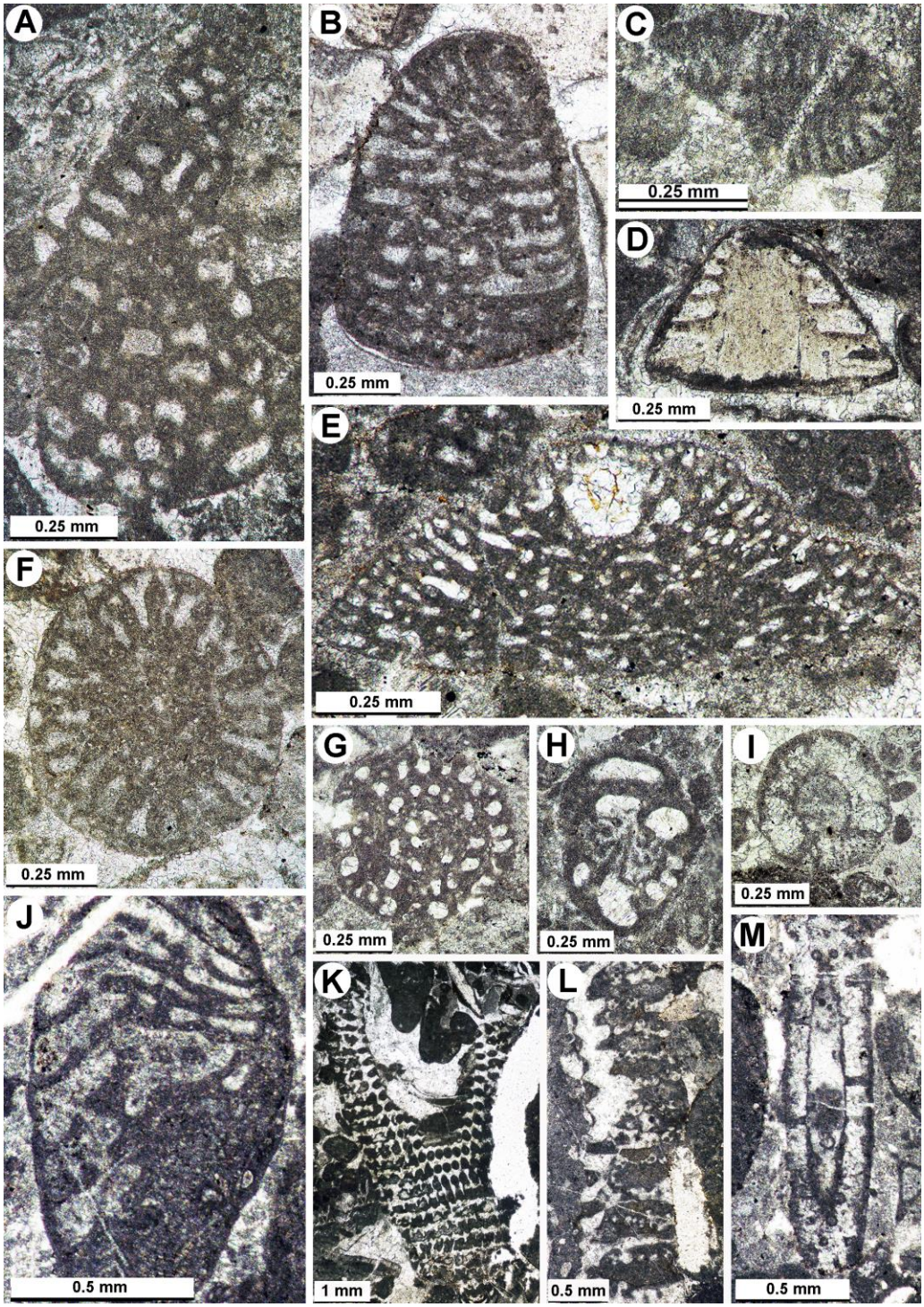

Plate 2. Foraminifera and calcareous algae from the lower Aptian limestones undelying the uppermost Aptian-Albian rocks. A, *Cribellopsis* sp., sample 17136. B, *Vanneauina vercorii* (Arnaud-Vanneau), sample 17127. C, *Vercorsella camposaurii* (Sartoni & Crescenti), sample 17136. D, *Ichnusella* sp., sample 17127. E, *Palorbitolina lenticularis* (Blumenbach), sample 17130A. F, *Orbitolinopsis buccifer* Arnaud-Vanneau & Thieyloy, sample 17127. G, ?*Reticulinella* sp., sample 17130A. H, *Pfenderina globosa* Foury, sample 17136. I, M, *Salpingoporella muehlbergii* (Lorenz), sample 17130B. J, *Cantabriconus*? *meridionalis* Schlagintweit & Bucur, sample 17130B. K, L, *Triploporella* sp., sample 17130B.