NEW MAASTRICHTIAN MICROVERTEBRATES FROM THE RUSCA MONTANĂ BASIN (ROMANIA)

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Abstract. Known since the beginning of the 20th century for their abundant and diverse paleofloristic content, the Maastrichtian deposits of the Rusca Montană Basin yielded no vertebrate fossils until recently, when sauropod, ornithopod, theropod, chelonian, crocodylian and multituberculate remains have been discovered in floodplain fines and river channel sandstones cropping out in the eastern part of the basin. This paper presents additional fossils from a potentially new site within the same area, belonging to taxa and metataxa previously unknown in the Rusca Montană Basin. The fossil assemblage includes anurans, albanerpetontids, lizards, ziphodont crocodylians, additional small theropods, eggshells, freshwater gastropods and angiosperm fructifications. The faunal and sedimentological data suggest that the fossil assemblage is largely autochthonous, and thus reflects the composition of a wetland, poorly drained distal floodplain paleo-ecosystem.

Keywords: microvertebrates, Maastrichtian, Rusca Montană Basin.

Rezumat. Noi microvertebrate maastrichtiene din Bazinul Rusca Montană (România). Cunoscute încă de la începutul secolului al 20-lea datorită unui conţinut paleofloristic bogat şi divers, depozitele maastrichtiene ale Bazinului Rusca Montană nu au furnizat vertebrate fosile până recent, când resturi ale unor sauropode, ornithopode, theropode, chelonieni, crocodilieni şi multituberculate au fost descoperite în depozite fine de câmpie inundabilă şi gresii de canal fluviatil care aflorează în partea de est a bazinului. Această lucrare prezintă o asociaţie de fosile provenind dintr-un sit potenţial nou din aceeaşi zonă, fosile ce reprezintă taxoni şi metataxoni anterior necunoscuţi din Bazinul Rusca Montană. Asociaţia fosilă include anure, albanerpetontide, crocodili ziphodonţi, şopârle, noi taxoni de theropode, coji de ouă, gastropode de apă dulce şi fructificaţii de angiosperme. Datele faunistice şi de sedimentologie sugerează o asociaţie fosilă autohtonă, ce reflectă compoziţia unui paleo-ecosistem umed, de câmpie inundabilă distală, slab drenată.

Cuvinte cheie: microvertebrate, Maastrichtian, Bazinul Rusca Montană.

INTRODUCTION

Placed in the southwestern part of the Poiana Ruscă Mountains, the Rusca Montană Basin represents an intra-mountainous depression bounded by the Bistra Valley to the south and the Neogene Caransebeş Basin to the southwest. The basin formed after the Austrian and "Laramidian" tectogeneses, as a depression lying between the Getic and Supragetic Nappes, both of which cover the Danubian Units (STRUTINSKI & HANN, 1986).

The oldest sedimentary units covering the metamorphic basement are Lower Jurassic marine conglomerates, followed by Middle and Upper Jurassic reef limestones (CANTUNIARI, 1937; DINCĂ, 1977; MAMULEA, 1955). During the Cretaceous, sea level changes led to the deposition of alternating marine and continental sediments: Albian? bauxites, followed by a marine succession with Cenomanian conglomerates and sandstones, Turonian-Coniacian sandy marls and marls, topped by Santonian-Campanian flysch deposits, and finally Maastrichtian continental, detritic and volcaniclastic deposits (CANTUNIARI, 1937; DINCĂ, 1977; MAMULEA, 1955). The sedimentary succession reaches a little more than 2,000 m in thickness, much of which is represented by the Maastrichtian molasse deposits.

Although no formal lithostratigraphic units have yet been described from the Rusca Montană Basin, the Maastrichtian deposits appear under two distinct lithologies. Coarse deposits represented by red, purple, and sometimes grey conglomerates and sandstones occur in the western part of the basin. These are made up of metamorphic and limestone clasts reworked from the underlying basement or older sedimentary deposits, and are bonded in calcareous cementum (DINCĂ, 1977; DUŞA, 1974, 1987; GRIGORESCU, 1992). Mixed tuffaceous and fine-grained detritic deposits occur in the eastern part of the basin, being crossed by Banatitic volcanic intrusions and hosting a few coal lenses (BIŢOIANU, 1970; DINCĂ, 1977; DUŞA, 1970, 1974, 1987; DUŞA & BĂRILĂ, 1973; GRIGORESCU, 1992; NOPCSA, 1905; MAMULEA, 1955). The Maastrichtian age of the later deposits has been based on their rich fossil macroflora (GIVULESCU, 1966, 1968; PETRESCU & DUŞA, 1970, 1980, 1985; SCHAFARZIK, 1906; TUZSON, 1913) and palynological content (ANTONESCU et al., 1983). Despite their similarity in lithology, flora and palynomorphs to contemporaneous deposits from the neighbouring Haţeg Basin (ANTONESCU et al., 1983; DINCĂ et al., 1972; GRIGORESCU, 1992; NOPCSA, 1905), no vertebrate remains have been discovered in over one century of geological research in the Maastrichtian of the Rusca Montană Basin.

The first vertebrates have been reported only recently (CODREA et al., 2009, in press; FEIGI et al., 2010) from the eastern part of the basin, near Lunca Cernii de Sus, from red fine-grained floodplain mudstones and coarser, gray, river channel sandstones. The specimens described are taxonomically diverse, belonging to sauropods (a probable titanosaur), ornithopods, theropods (indeterminate velociraptorines), crocodylians, chelonians, and multituberculate mammals, an assemblage reminiscent of that already known from the Maastrichtian deposits of the Haţeg Basin (e.g. GRIGORESCU, 2010: Table 1). Besides these micro- and macrovertebrate remains, the presence of minute plant seeds and amber-like grains was also mentioned.

MATERIAL AND METHODS

Several outcropping red and gray-blue coloured fine-grained beds have been identified during a field survey along Fărcădeana Brook, a small left-side tributary of Negoiu Creek, within the inhabited area of Negoiu village, Hunedoara County (Fig. 1). About 70 kg of matrix has been sampled from three such beds (one red and two gray-blue in colour) to test for possible microvertebrate remains. The sampled overbank deposits are discontinuous and occur at various heights on the slopes from the brook base, which is gently dipping approximately from northwest to southeast. Since the different beds cannot be followed along the valley, the construction of a synthetic geological log is extremely difficult. The samples have been screen-washed using 2 mm and 0.71 mm mesh size sieves, following the procedure of sediment processing first used for Cretaceous microvertebrates in Romania by GRIGORESCU et al. (1985). The resulting material was sorted under a Zeiss-Stemi binocular microscope. The sample collected from the red-coloured mudstone was not fossiliferous; only a few gastropod opercula were found in one of the gray-blue mudstone samples, but the other yielded numerous small gastropods (opercula and shells), fruits, and microvertebrate remains, a remarkable assemblage described herein. The most representative specimens have been photographed using a Cannon EOS 1000D digital camera mounted on a Zeiss Stemi 2000-C microscope.

RESULTS AND DISCUSSIONS

The microvertebrate-bearing bed that produced the fossil remains consists of about 2 m of massive gray-blue muscovite-rich mudstone, slightly coarser, sandy, in its upper third, being unconformably covered by a well-sorted conglomerate, composed of sub-rounded, mainly quartzitic grains (2.5-5 cm in diameter), along with rare, similarly-sized micaschist clasts. Minute pyrite crystals and coal fragments also occur in the mudstone bed.

Although it is difficult to compare the location of the first Maastrichtian vertebrate fossil site from the Rusca Montană Basin (CODREA et al., 2009, in press; FEIGI et al., 2010) to that of the site described here, the marked lithological differences between the fossiliferous deposits (red fine-grained overbank and gray channel sandstones for the site located "near Lunca Cernii de Sus", respectively gray-blue overbank mudstones for the Fărcădeana Brook site, presented in this paper) suggest that the two fossil assemblages come different sedimentary bodies, representing distinct environments of the same fluvial system. Taking into account that the two sites also appear to sample different vertebrate groups (pending the discovery of further fossils), the differences in lithology and taxonomic composition are potential arguments supporting the idea that the fossil assemblage described herein comes from a different location ("site") than the one described by Codrea and co-workers.

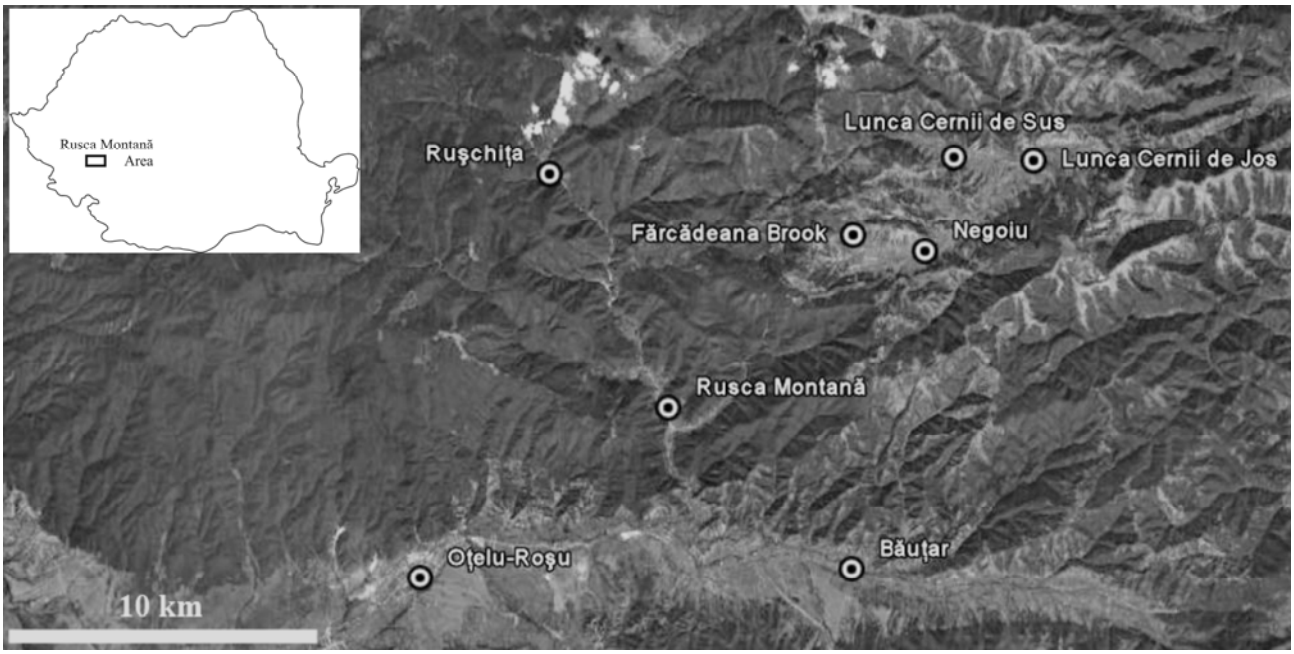

Figure 1. Location of the fossiliferous site from Fărcădeana Brook valley, Negoiu Village, Hunedoara County. Inset showing the location of the Rusca Montană area in Western Romania (Base map taken from Google Earth).
Figura 1. Amplasarea sitului fosilifer de pe valea Pârâului Fărcădeana, satul Negoiu, Judeţul Hunedoara. În medalion este ilustrată localizarea zonei Rusca Montană în partea de vest a României (Harta de bază preluată din Google Earth).

The anurans are the best represented group of microvertebrates recovered so far. Most of the specimens found are not diagnostic at a lower taxonomic level; these include a globular humeral ball (FGGUB v.548, Fig. 2b), typical anuran tibiofibular fragments (FGGUB v.551, Fig. 2a), and a fragmentary vertebra (FGGUB v.560). The tibiofibulae have the tibial and fibular components of similar size, wider at the epiphyses and narrowing to the diaphysis of the element. Distinct

sulci separate these components on both the anterior and posterior face of the tibiofibula, the former being more conspicuous. The only anuran remains determinable at specific level include a prearticulary and an ilium, both incomplete. A small left ilium fragment (FGGUB v.550, Fig 2e) preserves the anterior part of the acetabular region, and the posterior part of the iliac crest. In lateral view, the acetabular region is fairly deep, bordered by a well-marked acetabular rim, prominent anteroventrally projecting beyond the ventral margin of the bone. Even if only a small posterior part of the iliac crest is preserved, this structure seems to have been rather tall. These features are not sufficient to positively assign v.550 to a certain taxon; nevertheless, they are reminiscent of those seen in ilia of *Paralatonia transylvanica* (VENCZEL & CSIKI, 2003), a common taxon in the Maastrichtian floodplain deposits of the Haţeg Basin, and also mentioned from the Transylvanian Basin at Oarda de Jos (JIPA et al., 2010). Three fragments of a large left prearticulary (FGGUB v.549, Fig. 2c-d) have also been recovered. The largest of the three fragments preserves the area of the paracoronoid crest. The Meckelian groove is constricted at the level of the paracoronoid crest, being nevertheless well developed along all three fragments. The lingually-projecting coronoid process has a concave dorsal surface. All these features are mentioned in the initial description of *Paralatonia*, supporting the referral of v.549 to this taxon.

The amphibians are also represented by a small dentary fragment, preserving the base of three thin cylindrical subpleurodont teeth, broken at the level of the dental parapet (FGGUB v.557, Fig. 2f). The Meckelian groove is closed; three oval foramina are present on the smooth labial side of the dentary. These features are typical for albanerpetontid lissamphibians (GARDNER, 2000), also present in the coeval deposits of the Haţeg (FOLIE & CODREA, 2005; GRIGORESCU et al., 1999) and the Transylvanian (CODREA et al., 2010a, 2010c; JIPA et al., 2010) basins, where they were referred to the genus *Albanerpeton* (ESTES & HOFFSTETTER, 1976).

Three crocodilian teeth have been recovered, belonging to two dental morphotypes. One of these (FGGUB v.555, Fig. 2g) has an equilateral triangle outline, is strongly labiolingually compressed and has a bulging, thicker central part, on the lingual face. One of the edges is broken, but the other bears a serrated carina, with large, subequal denticles, slightly decreasing in size from the tip to the base of the tooth, while concomitantly increasing in frequency. Two other teeth, also bearing serrated carinae, are subconical, taller than wide when compared to the first morphotype, apically recurved both distally and lingually. The tips of both teeth are blunt, slightly worn; the wear facets are mesio-labially facing, longitudinally elongate ovals, reminiscent of those seen in teeth with comparable morphology from the Haţeg Basin. In FGGUB v.554 (Figs. 2h-i) the denticles decrease in size from the apex to the base. FGGUB v.556 (Figs. 2j-k) is smaller and has a lanceolate outline; it preserves part of the cylindrical root, and shows a slight constriction at the base of the crown. Similar dental morphotypes have been referred to the ziphodont crocodilian *Doratodon* (SEELEY, 1881), a terrestrial predator quite common in the Maastrichtian deposits of the Haţeg Basin (GRIGORESCU et al., 1999; MARTIN et al., 2006; VASILE & CSIKI, 2010) and in southwestern Transylvania (CODREA et al., 2010a, 2010b, 2010c; JIPA et al., 2010). The former morphotype was probably restricted to the distal part of the jaw, while the latter occupied a more anterior position.

Theropods are also represented by two isolated teeth with distinctive morphologies. One of these (FGGUB v.552, Figs. 2m-n) is subconical, long and narrow, labiolingually compressed and only slightly recurved mesodistally, bearing two unequal carinae. The mesial carena is smaller, migrated lingually, and bears no denticles; it slowly diminishes towards the base of the crown where it ends in a small constriction. The distal carena is more conspicuous and bears clearly separated denticles, which decrease apically. The denticles are low and wide, with rounded tips, their axis being inclined toward the tooth apex. Faint longitudinal wrinkles are noticeable on both the lingual and the labial side. These features are similar to those described in the "*Richardoestesia*" morphotype (CURRIE et al., 1990), belonging to a small theropod dinosaur, a morphotype also reported from the microvertebrate assemblages of the Haţeg Basin (CODREA et al., 2002; VASILE & CSIKI, 2010). The second theropod tooth morphotype is represented by a recurved, labiolingually compressed tooth, markedly "D"-shaped in cross-section with asymmetrical lingual and labial sides (FGGUB v.553, Figs. 2o-p). The lingual side is flattened and shows a central concavity enclosed by the unserrated, lingually projecting rim-like edges. The concavity is crossed by three longitudinal ridges, which divide it into four narrow and long depressions. The largest of the three ridges connects the tooth apex to the middle of its base. The remaining two ridges are shorter and fade towards the base and apex of the crown; the posterior ridge is more conspicuous than the anterior one. The convex labial side is also crossed by four longitudinal ridges separated by shallow depressions. Of these, the most prominent ridge is placed medially, equally distanced from the edges, with two smaller posterior, and one anterior ridge. This morphotype is similar to teeth assigned to *Paronychodon* (COPE, 1876) (e.g., SANKEY, 2008); only one single specimen of this taxon has been reported so far from Romania, from the Maastrichtian site of Toteşti-baraj (CODREA et al., 2002).

The lizards are represented by two fragmentary vertebrae, preserving only the centrum. These are procoelous and massive, ending in condyles slightly larger in diameter than the centrum itself. No haemal keel is present, the ventral side of the centrae being transversely convex and smooth. FGGUB v.559 (Fig. 2l) is longer and has a pair of foramina piercing the floor of the neural canal, placed near the midline of the centrum at about mid-length. FGGUB v.558 is thicker dorso-ventrally when compared to its length, and has four foramina on the ventral surface, asymmetrically placed in the right and left halves. The two foramina on the left side are small, and placed in a row lateral to the sagittal midline of the centrum. On the right side, one large foramen is placed near the midline, at about mid-length, while the second one, of approximately the same size, is migrated laterally and anteriorly. Similar foramina, placed in a similar irregular pattern, have been reported from the Haţeg Basin in vertebrae assigned to *Bicuspidon hatzegiensis* (FOLIE & CODREA, 2005); nevertheless, the presence of this feature is probably not sufficient to support the presence of the same taxon in Rusca Montană.

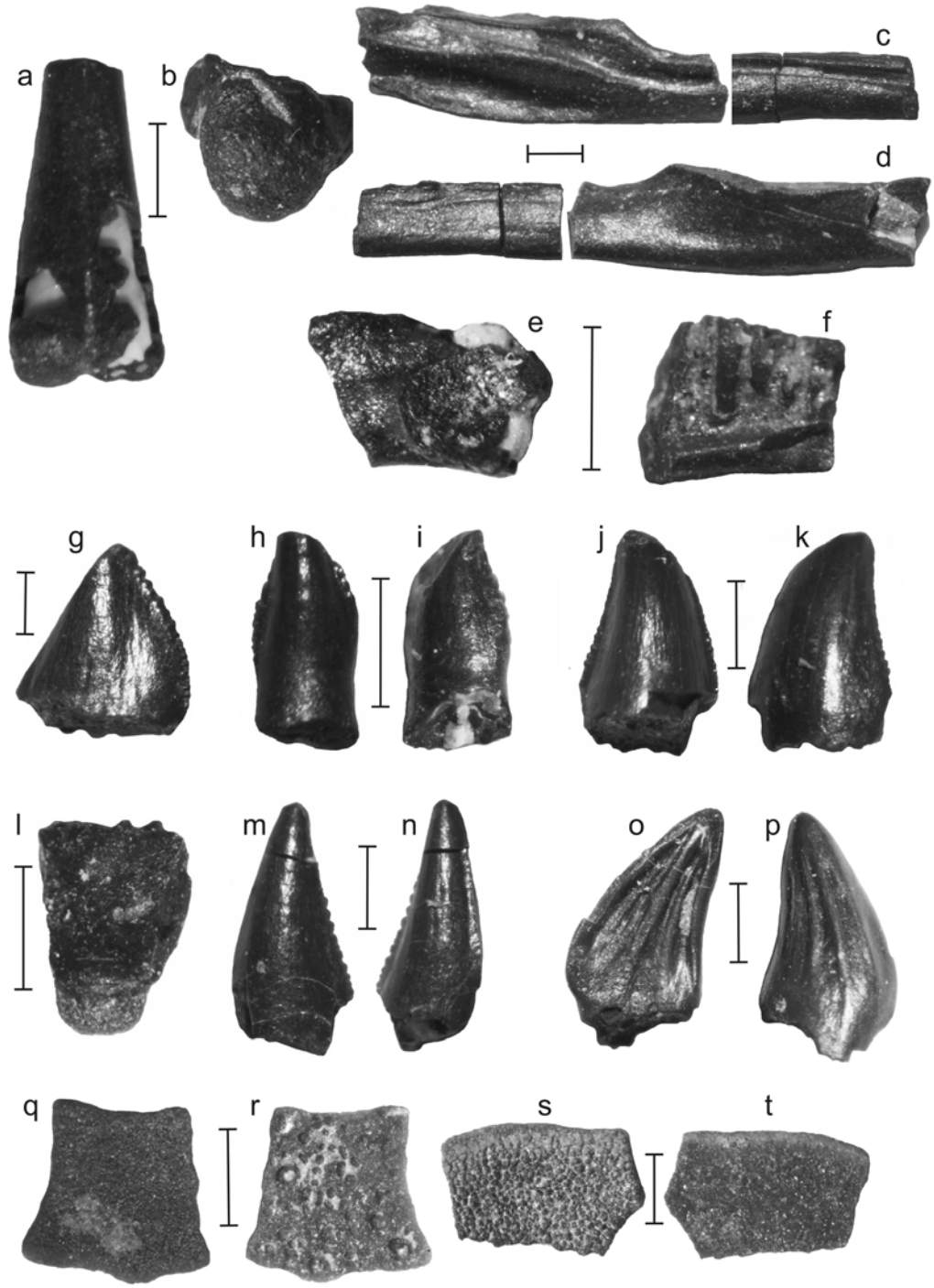

Figure 2. Microvertebrate fossil remains from Negoiu. a: FGGUB v.551 – Anuran tibiofibula fragment, anterior view; b: FGGUB v.548 – Anuran humeral proximal fragment; c-d: FGGUB v.549 – *Paralatonia transylvanica* left prearticulary fragment, lingual and labial view; e: FGGUB v.550 – ?*Paralatonia transylvanica* left ilium fragment, lateral view; f: FGGUB v.557 – Albanerpetontid left dentary fragment, lingual view; g: FGGUB v.555 – *Doratodon* posterior tooth, lingual view; h-i: FGGUB v.556 – *Doratodon* anterior tooth, lingual and labial view; j.-k: FGGUB v.554 – *Doratodon* anterior tooth, lingual and labial view; l: FGGUB v.559 – Partial lizard vertebra, ventral view; m.-n: FGGUB v.552 – "*Richardoestesia"* morphotype, labial and lingual view; o.-p: FGGUB v.553 – "*Paronychodon"* morphotype, lingual and labial view; q-r: FGGUB v.562 – Geckonoid eggshell fragment, inner and outer view; s-t: FGGUB v.563 – Indeterminate eggshell fragment, outer and inner view. Scale bars: 1 mm.

Figura 2. Resturi de microvertebrate fosile de la Negoiu. a: FGGUB v.551 – Fragment de tibiofibulă de anure, vedere anterioară; b: FGGUB v.548 – Fragment proximal humerus de anure; c-d: FGGUB v.549 – *Paralatonia transylvanica*, fragment de prearticular stâng, vedere lingual şi labială; e: FGGUB v.550 - ?*Paralatonia transylvanica* fragment de ilion stâng, vedere laterală; f: FGGUB v.557 – Albanerpetontid, fragment de dentar stâng în vedere lingual; g: FGGUB v.555 – *Doratodon*, dinte posterior, vedere lingual; h-i: FGGUB v.556 – *Doratodon*, dinte anterior, vedere lingual şi labială; j-k: FGGUB v.554 – *Doratodon*, dinte anterior, vedere lingual şi labială; l: FGGUB v.559 – Vertebră parţială de şopârlă, vedere ventrală; m-n: FGGUB v.552 – Morfotipul "*Richardoestesia"*, vedere labial şi lingual; o-p: FGGUB v.553 – Morfotipul "*Paronychodon"*, vedere lingual şi labială; q-r: FGGUB v.562 – Fragment de coajă de ou de tip geckonoid, vedere internă şi externă; s-t: FGGUB v.563 – Fragment nedeterminat de coajă de ou, vedere externă şi internă. Scara grafică: 1 mm.

Two eggshell types have been recovered, represented by small, 2-5 mm long and wide fragments. The first morphotype, about 0.17 mm thick, bears a distinctive pattern of craters and small tubercles of various sizes on the outer surface (FGGUB v.562, Figs. 2q-r). The inner surface is smooth, the ends of the composing calcitic prisms being tightly packed. The dispersituberculate pattern from the outer surface of these eggshells is consistent with that seen in the geckonoid eggshell morphotype (MIKHAILOV, 1991). Eggshells of this type have been reported from Maastrichtian deposits of both the Haţeg (e.g. CODREA et al., 2002; CSIKI et al., 2008) and Transylvanian (CODREA et al., 2010a, b, c; JIPA et al., 2010) basins. The second morphotype is represented by slightly thicker (0.37-0.44 mm) eggshells with a prismatic structure producing a smooth inner surface and an outer surface uniformly covered by small, sub-equal, tightly packed tubercles (FGGUB v.563, Figs. 2s-t). A more detailed analysis is needed to thoroughly assess the affinities of these eggshells; thin eggshell fragments different from the geckonoid morphotype have also been mentioned from the Haţeg Basin (e.g. CODREA et al., 2002; CSIKI et al., 2008), but their presumed theropod origin is yet to be supported.

The most abundant fossils from the site are the gastropods, most of these similar to morphotypes reported previously from the Haţeg Basin by PANĂ et al. (2001); although several of the gastropods were mentioned as new taxa in that preliminary paper, no formal description of them is available, and thus they will be referred herein to as morphotypes, and not nominal taxa.

The largest part of the gastropod fossils from Negoiu consists of circular opercula (Figs. 3a-b), identical to the ones commonly encountered in many sites of the Haţeg Basin, and considered to belong to cyclophorids (PANĂ et al., 2001). The terrestrial cyclophorids are also represented by *Ischurosoma filholi* (Fig. 3c) and *Ajkaia* cf. *gregaria* (Fig. 3d); these are associated with fragmentary remains that suggest the presence of helicids (*Helicella*; Fig. 3e). On the other hand, the aquatic taxa appear to be represented by the lymneids *Lymnaea* (Fig. 3f) and *Physa* (Fig. 3g), as well as the planorbids *Planorbis planorbis* (Fig. 3h) and the "*Palaeoanisis septemgiratus*" morphotype (Figs. 3i-j).

The co-occurrence of terrestrial and aquatic gastropods within the same assemblage was already noted in several sites of the Haţeg Basin (PANĂ et al., 2001), and was used to suggest a mixed assemblage with parautochthonous terrestrial taxa (cyclophorids, helicids) washed into the depositional area from the surrounding land, along with largely autochthonous aquatic taxa characteristic for small-sized stagnant water bodies (planorbids, lymneids). The abundance of gastropod opercula, representing the most resistant part of the shell, is consistent with this idea, as the robust opercula might have been transported into the depressionary setting much easily, i.e. in larger numbers and better preservation state, than the more fragile shells.

A fairly large number of minute angiosperm fructifications have been extracted from the sample yielding the microvertebrate and gastropod remains. Most of them show morphologies similar to fruits reported from the Budurone microvertebrate fossil site, in the Haţeg Basin (MAY LINDFORS et al., 2010), considered to represent new taxa, but not yet described formally. One of the morphological types recovered from Negoiu (Fig. 4a) is similar to Taxon A of MAY LINDFORS et al. (2010: Fig. 2a), an ellipsoidal fruit probably related to the Normapolles group, similar to the Normapolles genus *Antiquocarya*. Other specimens are either capsular (Figs. 4b-d) or drupaceous (Figs. 4e-g) indehiscent fruits. Two different morphotypes of capsular, five-locular fruits are also similar to the ones mentioned from Budurone. One of them is ovoid (Fig. 4b) and the other circular (Figs. 4c-d); these have been referred to the Ericales (Taxon 10 and Taxon 11 of MAY LINDFORS et al., 2010), a common taxon in the European Upper Cretaceous. The drupaceous fruits are unilocular, one of the morphs found in Negoiu being reminiscent of those from Budurone (Fig. 4e). A further morphotype, represented by simple ovoidal structures (Fig. 4h), is also recorded in the Budurone fossil assemblage, but its affinities remain unclear. The present carpoflora confirms the presence of angiosperms belonging to the Normapolles group, documented previously by palynological studies from the Rusca Montană Basin (ANTONESCU et al., 1983), and augments the previously known floral list based mainly on leaf impressions (e.g. GIVULESCU 1966, 1968; PETRESCU & DUŞA, 1970, 1980, 1985; TUZSON, 1913). This mesofloral assemblage is similar in size and abundance of the taxa to other Late Cretaceous floras from Europe. Endozoochory has been postulated as an important dispersal mechanism in Late Cretaceous angiosperms with drupaceous fruits (ERIKSSON et al., 2010), a possible vector for such dispersal in the Rusca Montană Basin being the multituberculate mammals, already reported by CODREA et al. (2009, in press).

CONCLUSIONS

This paper represents the first record of several non-mammalian microvertebrates - anurans, albanerpetontids, lizards, the ziphosuchian *Doratodon*, the theropods "*Paronychodon*" and "*Richardoestesia*" -, along with fragmentary eggshells, gastropods, and plant mesofossils, from the Maastrichtian deposits of the Rusca Montană Basin. These finds add to the previously reported fossil taxa (CODREA et al., 2009, in press; FEIGI et al., 2010; PETRESCU & DUŞA, 1985), thus expanding the previously known taxon list (Table 1) and contribute to the reconstruction of the biodiversity of the Romanian Maastrichtian ecosystems, while also extending the known palaeogeographical distribution range of these taxa. The presence of similar microvertebrates, gastropods and plant mesofossils in the Maastrichtian assemblages from the Haţeg and Rusca Montană basins lends further support for a synchronous sedimentation, and coeval ecosystems, in the two neighbouring areas, already suggested by lithological, palynological and paleofloristic data. More than that, the identification of similar assemblages in different sites spread over the Haţeg, Rusca Montană and Transylvanian basins could suggest a biostratigraphical importance for some of the microvertebrates, gastropods and mesofloristic taxa in the Romanian Maastrichtian.

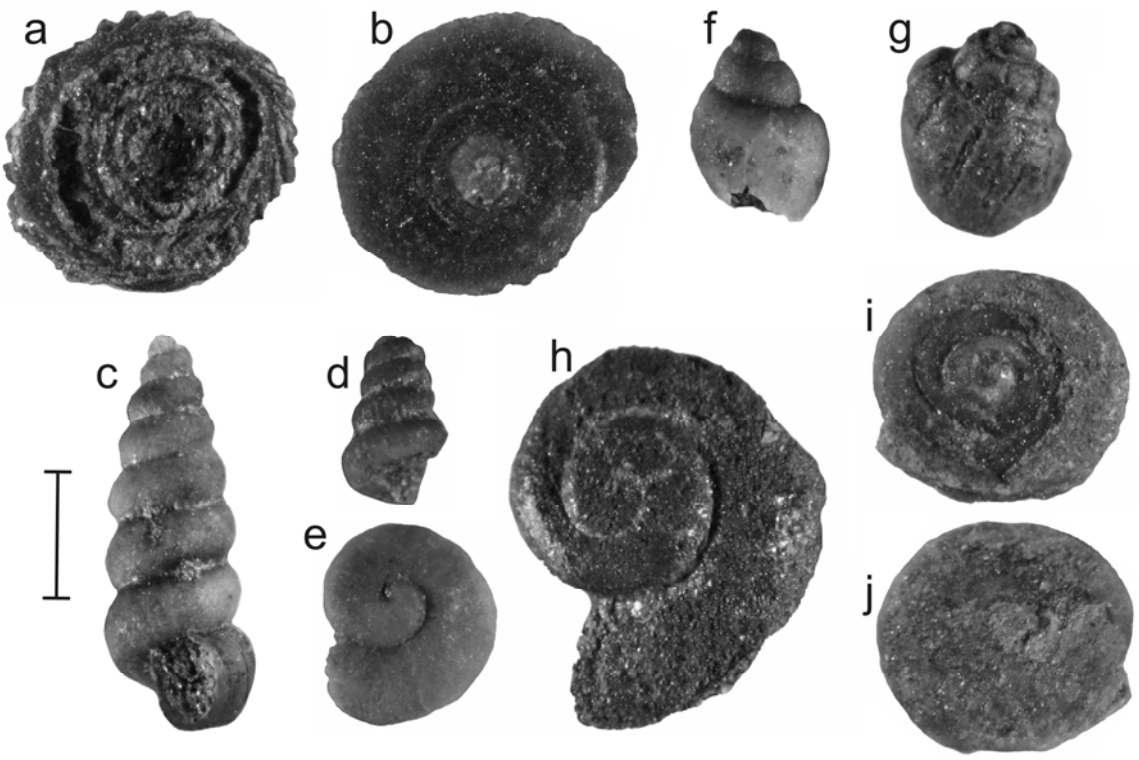

Figure 3. Fossil gastropods from Negoiu (uncatalogued specimens). Fam. Cyclophoridae: a, b - Cyclophorid operculae; c - *Ischurosoma filholi*; d - *Ajkaia* cf. *gregaria*; Fam. Helicidae: e - *Helicella* sp.; Fam. Lymnaeidae: f - *Lymnaea* sp.; g - *Physa* sp.; Fam. Planorbidae: h - *Planorbis planorbis*; i, j - "*Palaeoanisis septemgiratus*". Scale bar: 1 mm.

Figura 3. Gastropode fosile de la Negoiu (specimene neînregistrate). Fam. Cyclophoridae: a, b - Operculi de cyclophoride; c - *Ischurosoma filholi*; d - *Ajkaia* cf. *gregaria*; Fam. Helicidae: e - *Helicella* sp.; Fam. Lymnaeidae: f - *Lymnaea* sp.; g - *Physa* sp.; Fam. Planorbidae: h - *Planorbis planorbis*; i, j - "*Palaeoanisis septemgiratus*". Scara grafică: 1 mm.

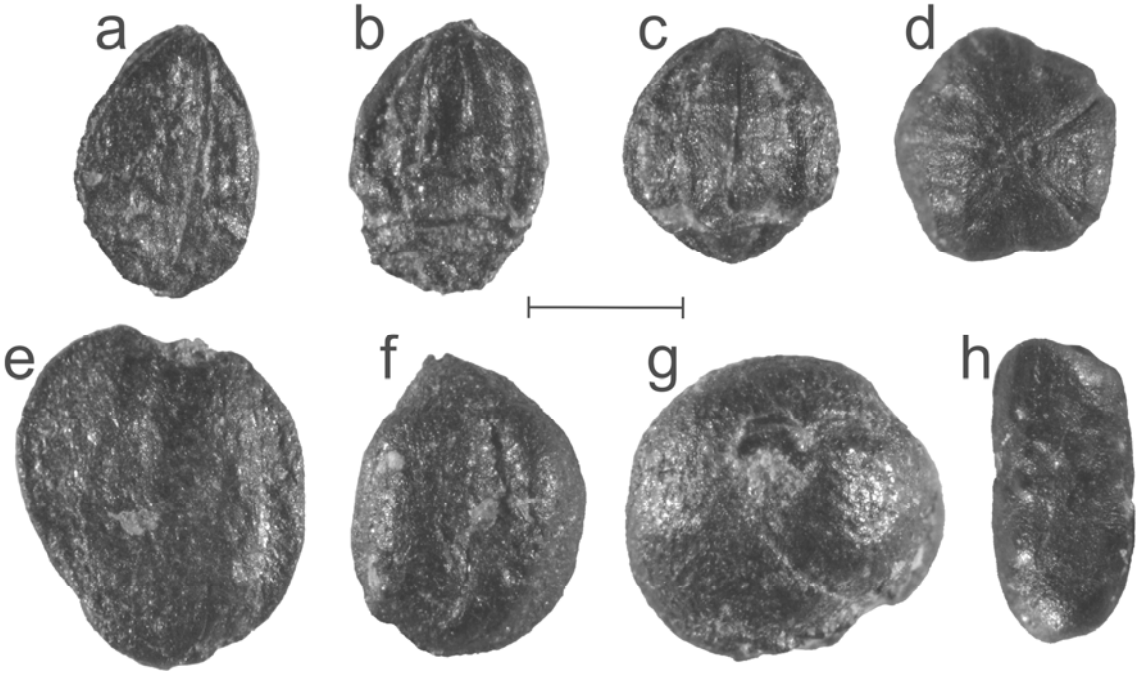

Figure 4. Fossil angiosperm fructifications from Negoiu (uncatalogued specimens). a: Indehiscent fruit related to the Normapolles group; b-d: Five-locular capsules related to Ericales; e-g: Indeterminate drupaceous fruits; h: Ovoidal morphotype of unclear affinities. Scale bar: 1 mm.

Figura 4. Fructificaţii fosile de angiosperme de la Negoiu (specimene neînregistrate). a: Fruct indehiscent apropiat de grupul Normapolles; b-d: Capsule pentaloculare apropiate de ericale; e-g: Fructe drupacee nedeterminate; h: Morfotip ovoidal cu afinităţi neclare. Scara grafică: 1 mm.

Table 1. List of the Maastrichtian vertebrate taxa (including eggshells) from the Rusca Montană Basin, based on finds from Negoiu, Fărcădeana Brook (this paper) and near Lunca Cernii de Sus (CODREA et al., 2009, in press; FEIGI et al., 2010).
Tabel 1. Lista vertebratelor (inclusiv coji de ouă) maastrichtiene din Bazinul Rusca Montană, pe baza descoperirilor de la Negoiu, Pârâul Fărcădeana (lucrarea de faţă) şi din apropiere de Lunca Cernii de Sus (CODREA et al., 2009, in press; FEIGI et al., 2010).

Taxa/Morphotypes	Location	Element
AMFIBIA		
Allocaudata		
Albanerpetontidae		
?*Albanerpeton*	Negoiu, Fărcădeana Brook	dentary fragment
Anura		
Discoglossidae		
Paralatonia transylvanica	Negoiu, Fărcădeana Brook	ilium, prearticulary
REPTILIA		
Chelonia		
Cryptodira		
?*Kallokibotion bajazidi*	near Lunca Cernii de Sus	carapace fragments
Lepidosauria		
Sauria indet.	Negoiu, Fărcădeana Brook	2 vertebrae
Archosauria		
?Eusuchia (?*Allodaposuchus*)	near Lunca Cernii de Sus	ilium, ischium, pubis, 2 caudal vertebrae
Ziphosuchia		
Doratodon	Negoiu, Fărcădeana Brook	3 isolated teeth
Dinosauria		
Theropoda		
Theropoda indet.	near Lunca Cernii de Sus	isolated tooth
Velociraptorinae indet.	near Lunca Cernii de Sus	3 isolated teeth
„*Richardoestesia*”	Negoiu, Fărcădeana Brook	tooth
„*Paronychodon*”	Negoiu, Fărcădeana Brook	tooth
Sauropoda		
Titanosauridae indet.	near Lunca Cernii de Sus	caudal vertebra
Ornithopoda		
Zalmoxes	near Lunca Cernii de Sus	2 teeth, caudal vertebra
MAMMALIA		
Multituberculata		
Cimolodonta		
Kogaionidae indet.	near Lunca Cernii de Sus	2 teeth (P2, p4)
VETROVATA		
Geckonoid morphotype	Negoiu, Fărcădeana Brook	eggshell fragments
Indeterminate morphotype	Negoiu, Fărcădeana Brook	eggshell fragments

The sediment yielding the microvertebrates, gastropods and fruits described herein is gray-blue, a colour indicative for a poorly oxygenated depositional environment, as is the presence of coal fragments and pyrite crystals (e.g., WHITE et al., 1990; HAMILTON-TAYLOR & DAVISON, 1995). Together with the fine-grained sediments, they suggest that sedimentation took place in a poorly-drained floodplain, with ponds and marshy areas (e.g., WRIGHT et al., 2000). The preservation of fragile fossil structures, such as the thin calcitic eggshell fragments and gastropod shells, alongside buoyant and therefore easily transportable structures like small-sized fruits, suggests that they did not undergo a significant amount of transport, another argument supporting the hypothesis of a hydrodynamically quiet, poorly drained floodplain environment.

Many features of the depositional environment and fossil record from the newly reported Negoiu site are similar to those described in the Budurone microvertebrate fossil site from the Haţeg Basin (CSIKI et al., 2008), and lend further support to the identification of the depositional setting as a poorly drained, water-logged area, inhabited by the semi-aquatic invertivore vertebrates and freshwater gastropods, the top of the local food chain being represented by small theropods like *Richardoestesia*, or by ambush-preying terrestrial crocodiles (*Doratodon*), feeding on the semi-aquatic (anurans, albanerpetontid) or terrestrial (lizards) taxa that either lived in this area or visited it for feeding or drinking. The additional terrestrial gastropod remains and the eggshell fragments were washed into the site from the surrounding emergent areas, while the angiosperm fruits suggest the presence of a thick canopy surrounding the water body.

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