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The Latest Cretaceous fauna with dinosaurs and mammals from the Haţeg Basin — A historical overview

Dan Grigorescu

Department of Geology and Geophysics, University of Bucharest, 1 Bălcescu Blvd., RO-010041 Bucharest, Romania

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ABSTRACT

Research on the uppermost Cretaceous continental deposits with dinosaur remains from the Haţeg Basin has behind it a history of more than 110 years. The first studies were by Franz Nopcsa (1877–1933) who published between 1897 and 1929 a series of notes and papers on this fauna, including five monographs dedicated to the Haţeg dinosaurs. Nopcsa described 10 vertebrate taxa, including dinosaurs, crocodilians and turtles, from the Haţeg Basin, out of which 6 are still valid. He recognized the primitiveness and the small size of most of the taxa from the Haţeg palaeofauna, characters that he related to the isolated island environment within which this fauna lived for a long time span.

After Nopcsa, systematic research on the Haţeg fauna was interrupted for many decades, being resumed after 1977 when D. Grigorescu, leading a small group of students in Geology started to explore the deposits outcropping along the Sibişel valley, near Sânpetru village, from where Nopcsa made most of his collection of fossil bones. Since then the fieldwork continued every summer until now, numerous remains of dinosaurs, crocodiles and turtles being unearthed. The list of the Maastrichtian fauna from Haţeg currently includes 56 taxa from all vertebrate classes. More than half of the recorded taxa were discovered in micropalaeontological samples through screen-washing. The most spectacular discoveries made after 1977 include a large variety of small theropods, several sites with dinosaur egg clutches, one of these also yielding hatchling remains, one of the largest pterosaurs in the world, representing a new genus and species, *Hatzegopteryx thambema*, and several taxa of multituberculate mammals.

Studies of the Haţeg fauna were not restricted to systematic palaeontology, but also covered all the fields that contribute together to an accurate reconstruction of the environment within which the Maastrichtian fauna existed. This overview includes a list of contributors to the actual knowledge on the Haţeg fauna, during the last 30 years, divided by fields of scientific interest.

1. Introduction

Although the fossil bones of dinosaurs from the Haţeg Basin were not mentioned in a scientific publication before the last years of the 19th century, undoubtedly they were known many centuries before, at least to the local villagers who walked along the river terraces or on the hilly slopes of the region. The bones were naturally unearthed after the snow melt during the spring or following the summer rains and remained exposed close to their host rock or transported by streams far away into the river channels. Neither the villagers, nor anybody in the world knew at that time that the bones belonged to dinosaurs but, because their resemblance to the bones of known animals was obvious, the theological conviction that they were remains of biblical giants became standard. Thirty years ago, when the author of this review started palaeontological research in the Haţeg Basin, he met a few old villagers who still held on to this belief.

"Haţeg Country", as the Haţeg Basin is generally known, following the name given by geographers to regions encircled by mountains, is a region with pregnant identity in the history and culture of Romania. Here the first Roman capital of the conquered Dacia was settled and centuries after the Roman period, during Medieval times, several churches and monasteries were built from stones and bricks. The remains of many of these places of faith are preserved in this area, making "Haţeg Country" the region of Romania with the highest density of Medieval holy places.

2. The beginning (1897–1933)

The first record of fossil vertebrates from strata that afterwards became known as the "uppermost Cretaceous dinosaur-bearing deposits of the Haţeg Basin" goes back to 1897, the year when two papers were published, one by Gyula Halaváts in Budapest (Halaváts, 1897), and another by Franz Nopcsa (Fig. 1) in Vienna (Nopcsa, 1897).

At that time Halaváts, born in 1853, was already an experienced geologist, employee of the Geological Institute in Budapest and undertaking

E-mail address: dangrig84@yahoo.com.

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Fig. 1. Portrait of Franz Nopcsa; drawing by F. Márton, 1926 (from Fözy, 2000).

geological mapping in Banat and Transylvania. He described the lithology of the clastic deposits with fossil bones and freshwater molluscs from the Sibişel and Strei valleys, assigning them to the Aquitanian, based on their facial similarities with the coal deposits from the Petroşani Basin, east of Haţeg. In assigning this age, Halaváts ignored the vertebrate remains that he collected, but could not determine properly. Afterwards, the fossil bones were examined by the Austrian palaeontologist Gustav Arthaber who recognized among them a lower jaw and tooth of "an *Iguanodon*-like animal", and vertebral centra of an "apparently small, pterosaur-like animal" (Nopcsa, 1899, p. 332). On this basis, three years later Halaváts corrected his opinion, giving a Middle Cretaceous age to the non-marine deposits of the Haţeg Basin (Halaváts, 1900).

Contrary to Halaváts, in 1897, when his first paper was published, Ferenc (Franz) Nopcsa was only 20 years old; in that year he became a student in Geology at Vienna University, after graduation from the Theresianum secondary school in Vienna.

However, in spite of his young age and presumed lack of geological experience, Nopcsa already had a good knowledge of the geology and palaeontological content of the continental deposits from Haţeg, as well as on the anatomy of dinosaurs. All of these were achieved in only two years of restless studies in the field, museums and libraries, following the accidental discovery of some fossil bones on the family estate at Sânpetru (Fig. 2) made in 1895 by his sister Ilona. These bones incited the young Nopcsa to search the area intensively; as result, before the autumn of the same year, when he had to return to the Theresianum, he collected new bones, including an incomplete articulated skull, were collected by himself. This was undoubtedly the starting point in Nopcsa's remarkable palaeontological career dedicated to dinosaurs and other fossil reptiles.

He had to study the bones by himself from the beginning, because, contrary to his expectations, nobody in Vienna could help him to determine them. The renowned professor of Geology Eduard Suess, to whom Nopcsa showed the bones he brought to Vienna, was excited by the discovery and planned systematic searches in the region, which never took place (Tasnádi-Kubacska, 1945). Neither could Suess help the young Nopcsa in describing the bones; instead, he advised him to study them by himself. It was exactly what Nopcsa did. Still a secondary school student, Nopcsa started an intensive scientific documentation focused on the comparative osteology of dinosaurs and reptiles in general. The efforts were tremendous and, as he mentioned in his diary, "(T)he exhausting work threw me into a sickly condition, but at the end of the year (*i.e.* 1896) my first manuscript was finished" (Tasnádi-Kubacska, 1945, p. 24).

In 1897 Nopcsa became a student of Vienna University, having Suess and his assistants, Gustav Arthaber and Othenio Abel, among his professors and scientific advisors. Abel in particular, only two years older, and one of the founders of the emerging new science of palaeobiology, was solicited, the palaeobiology of dinosaurs becoming one of the favourite areas of interest for Nopcsa.

In spite of the fact that no one could help Nopcsa in describing the bones and he had to do this by himself, Vienna, with its cultural and scientific background, represented a very favourable place to support Nopcsa's endeavour. In addition to the mentioned reputed professors of the University, Vienna had impressive museums which hosted major collections in all the fields of Natural Sciences, as well as impressive libraries. In Vienna, Nopcsa read through the publications of the great dinosaur specialists of the time, such as Othniel C. Marsh and Edward D. Cope, the two combatants in the "Bone War" or "The Great Dinosaur Rush" as their competition in collecting dinosaur bones from quarries in the Wild West, is known (e.g., Colbert, 1984), or, of the European researchers, Harry Seeley (the author of the twofold division of the dinosaurs into Saurischia and Ornithischia; Seeley, 1887) or Louis Dollo, another co-founder of the field of palaeobiology, who studied the *Iguanodon* remains from Bernissart, Belgium (Dollo, 1883).

The studies continued "day and night, on work-days as well as on holidays" (Tasnádi-Kubacska, 1945, p. 24). The studies in the laboratory and the libraries of Vienna were followed during the summer holidays by field prospecting in the Haţeg Basin, but also in other neighbouring regions where deposits with dinosaur remains crop out (Nopcsa, 1905a). The knowledge he acquired in only two years, by his great efforts motivated by increasing interest in geology and dinosaurs, allowed Nopcsa to present in 1897 his first note on the dinosaur-bearing deposits from the Haţeg Basin. In this first note Nopcsa (1897) introduced the name of "Szentpéterfalva (*Sânpetru*) sandstone", as a lithostratigraphic unit referred to the *Danian* (at that time included as the uppermost stage in the Cretaceous); this endeavour demonstrates that the author knew the fossiliferous deposits on a regional scale, but chose to select Sânpetru as the type-locality for the dinosaur-bearing deposits of the Haţeg Basin. The name remained the reference lithostratigraphic unit for the dinosaur-bearing deposits from the Haţeg Basin for many decades. In the same paper, contrary to Halaváts, Nopcsa referred correctly the deposits to Upper Cretaceous, based on their fossil vertebrate content.

Two years later, again at a meeting of the Academy of Natural Sciences in Vienna, Nopcsa presented the detailed description of the skull discovered by him in 1895, assigning it to a new dinosaur taxon — *Limnosaurus transsylvanicus* (Nopcsa, 1900). The paper, presented in June 1899 and published in 1900, represents his first work dedicated to the systematic description of dinosaurs from the Haţeg Basin, in a series of five monographs published under the heading "Dinosaurierreste aus Siebenbürgen" ("Dinosaur remains from Transylvania"), the others following from 1902 to 1929 (Nopcsa, 1902a, 1904, 1928a,b, 1929).

Fig. 2. Nopcsa's family castle in Săcel, near the fossiliferous sites from the Sibişel Valley (from Hála, 1993).

Limnosaurus transsylvanicus is the first taxon described by Nopcsa from the latest Cretaceous Haţeg fauna. He considered *Limnosaurus* to be a hadrosaur showing some primitive characters of the "iguanodontids", but also other, derived ones, in its skull anatomy.

Besides *Limnosaurus*, Nopcsa mentioned the presence of other ornithopod taxa: *Camptosaurus inkeyi* (*nomen nudum*, fide Csiki, 2005) and two different species of *Mochlodon*, as well as of some undetermined chelonians and crocodilians. In the same paper Nopcsa described the main taphonomic feature of the skeletal remains from the Haţeg Basin, that of being usually associated in "fossiliferous pockets". He mentioned such a "pocket" from which he excavated over 80 bones, without exhausting it; the bones included partial skull, teeth, vertebrae, and limb and girdle bones.

Continuing excavations on this bonebed increased the number of identifiable bones to 185, besides numerous fragments, as Nopcsa mentioned in his third monograph (Nopcsa, 1904; see below). Based on their lithology and fossil content, the deposits were interpreted as having a freshwater origin.

The second monograph, published in 1902, was dedicated to the skull remains of *Mochlodon*, presented as one of the commonest dinosaurs in the area (Nopcsa, 1902a). Contrary to his first opinion expressed in 1900, when he regarded *Mochlodon* as being represented in the fauna by two different species, now he recognized only one species: *Mochlodon suessi*, described previously by Bunzel (1871) and later by Seeley (1881) from the Upper Cretaceous Gosau beds from Wiener-Neustadt in Austria. Based on the skull elements, Nopcsa considered *Mochlodon* as a very primitive ornithopod, closely related to *Hypsilophodon* from the Lower Cretaceous (Wealden) of England, as well as to *Rhabdodon* from the Upper Cretaceous of France.

In a short note published in the same year, Nopcsa (1902b) presented a first faunal list of the assemblage, which includes *Mochlodon*, *Limnosaurus* (whose generic name he corrected to *Telmatosaurus* in a short note from 1903, due to the preoccupied status of *Limnosaurus*; Nopcsa, 1903), as well as stegosaurids (in fact nodosaurid ankylosaurs, as corrected in his subsequent papers), sauropods, chelonians, crocodiles and pterosaurs.

In the third monograph of the series "Dinosaurierreste aus Siebenburgen" (Nopcsa, 1904) he continued the description of the skull morphology of *Mochlodon*, based on new discoveries coming from different "fossiliferous pockets" along the Sibişel valley, near Sânpetru, as well as from a new fossiliferous locality placed outside the Haţeg Basin, at some 50 km to the northeast of Haţeg, near Alvincz (Vinţu de Jos). In this publication, Nopcsa supported the primitive character of *Mochlodon* based on a more detailed comparison of the skull bones between different ornithopod genera. In the introduction to this study Nopcsa (1904) mentioned, besides the commonest dinosaurs in the fossil assemblage (*Mochlodon* and *Telmatosaurus*), the presence of three undetermined sauropods (among which *Titanosaurus*), of two problematic "Acanthopholoididae" (i.e., ankylosaurs), of two chelonians, as well as remains of pterosaurs and crocodilians. The fact that both large and small carnivore dinosaurs appear to be missing "among such a large quantity of herbivorous animals" (Nopcsa, 1904, p. 230) was regarded as an artefact of preservation and also due to the preliminary state of knowledge, predicting that "with time the remains of theropod dinosaurs will come to be known at Szentpéterfalva" (Nopcsa, 1904, p. 230) and that the new discoveries he expected will lead to a significant increase of the taxonomic diversity.

In 1905, after graduation from Vienna University, Nopcsa published one of the most extensive papers, a synthesis on the "Geology of the region between Gyulafehérvár *(Alba Iulia)*, Déva, Ruszkabánya (*Rusca Montană*) and the Romanian border" (Nopcsa, 1905a). It includes an overview on the stratigraphic and tectonic studies done by previous geologists on different formations occurring in the region, together with his own data on the Mesozoic and Tertiary deposits. On the attached geological map of the Haţeg Basin and neighbouring regions, the Danian is figured over a large area (much larger than considered later), extending from Bucova, in the western most part of the Haţeg Basin, to Pui and further eastward to Băniţa. All the deposits extending over this large area were referred to the "Sânpetru sandstone", interpreted as a lacustrine facies which grades laterally into a volcano-sedimentary facies, with volcanic tuffs interbedded within the terrigenous strata, covering the western part of the basin, namely the area encircled by the localities of Răchitova, Ciula Mică, Densuş and Stei. The conglomerates with a red matrix, cropping out along the northern slope of the Retezat Mountains, south of Clopotiva, Râu de Mori, Nucşoara, although lacking fossil vertebrate remains, were also referred to the Danian based on their lithofacial similarity to the "red beds" facies from areas lying northeast of the Haţeg Basin, among which Vinţ, Vurpăr and Râpa Roşie (Red Precipice) near Sebeş-Alba, from where Nopcsa collected few dinosaur remains (Nopcsa, 1904, 1905a). Based on their similar vertebrate assemblages and lithological features, the "Sânpetru sandstone" was also regarded as chronostratigraphically equivalent to the volcano-sedimentary deposits of the Rusca Montană Basin lying to the west of the Haţeg Basin, as well as to the "red beds" with dinosaur remains in the east of

it. The correlation was extended to include the basal part of the "Lower Colorful Clays" (Palaeocene–Lower Eocene), a unit distributed along the western and northwestern margins of the Transylvanian Basin (see Codrea et al., 2010-this issue).

Concerning the stratigraphic contact between the Danian freshwater deposits and the underlying Upper Cretaceous marine deposits Nopcsa noticed that, despite the fact that this contact is marked by an unconformity in most areas of the Haţeg Basin, in the Pui-Galaţi zone a continuous transition from the Upper Campanian marine deposits to the non-marine "Sânpetru sandstone" can be observed.

Also noteworthy are the taphonomic observations Nopcsa made on a large number of fossiliferous sites, among which the most important (by the sheer number of fossil remains they provided) are Sânpetru, Săcel, Sântămăria-Orlea, Densuş and Vălioara.

Based on the most intensively studied deposits from the Sibişel valley at Sânpetru (Fig. 3), Nopcsa (1905a) showed that within a "fossiliferous pocket" skeletal remains, which are disarticulated but frequently representing partial skeletons, and entire bones occur together with sharp-edged, obviously transported bone fragments; the elements are unsorted by size and the remains of several taxa represented by different ontogenetic stages are commonly associated (see Csiki et al., 2010-this issue). Nopcsa also noticed the preferential association of bone concentrations with clayey levels hosting limestone concretions, which, as shown more recently, correspond to fossil soils (Grigorescu, 1983a,b; Therrien, 2006).

The death of the animals and the disarticulation of the skeletons were considered to be a by-product of crocodilian feeding, and not of catastrophic flooding events, as was reported in several other cases of bone accumulations in continental deposits. This conclusion was already developed in more details in one of his previous papers (Nopcsa, 1902b).

The fourth paper of the "Dinosaurierreste aus Siebenbürgen" series was published more than twenty years after the third (Nopcsa, 1928a,b). It was devoted to the description of the vertebral morphology of *Mochlodon* and *Telmatosaurus*, following the previous detailed accounts of their skull morphology. In the meantime, the names of both dinosaurs were changed to *Rhabdodon* and to *Orthomerus*, respectively, based on their resemblances with *Rhabdodon priscum* from the Upper Cretaceous of France and *Orthomerus dolloi* from the Maastrichtian of Belgium (Nopcsa, 1915, 1923).

The long gap between issuing the third and fourth monographs on the Transylvanian dinosaurs did not meant neither cessation of Nopcsa's fieldwork, nor of his studies on the Transylvanian dinosaurs. He continued to do collecting in the Haţeg Basin, at least until the beginning of the First World War, but following his graduation from the University of Vienna in 1904, Nopcsa made extensive travels across much of Europe to visit palaeontological museums and to meet fellow scientists. After 1905, Albania became a special place of interest in his travels. This country, which he visited first in 1899, was becoming a lifelong subject of researches and studies in various fields, paralleling his palaeontological studies on dinosaurs and other reptiles. Nopcsa's interest in Albania started with geology, as the country covers a small, but interesting part of the southern Dinaridic–Hellenidic orogenic chains, with magnificent exposures of rocks and structures that at that time were not properly studied. In 1905 he published in Vienna a paper on the "Geology of North Albania" including a geological map (Nopcsa, 1905b).

Subsequently, until the end of his life in 1933, more than 40 papers devoted to Albania were published by Nopcsa not only on the geology, but also on the geography, history, culture and ethnology of this region. Accordingly, after 1905 Nopcsa's palaeontological works

Fig. 3. Lithological sequence of the fossiliferous sites near Sânpetru, the type-locality of Nopcsa's "Sânpetru sandstone", from where most of the specimens he collected came.

alternated with those on Albania, as documented by his scientific production: for some time periods the number of papers on palaeontological subjects exceeded those on Albania (e.g., between 1914–1918 and 1923–1926), while in other periods the ratio was reversed (e.g., between 1906–1913 and 1919–1922) (Tasnádi-Kubacska, 1945; Hála, 1993).

Collecting of bones on his family estate in the area of the Haţeg Basin continued until the beginning of the First World War. In his fieldtrips Nopcsa was now accompanied by Elmas Doda Bajazid, whom Nopcsa met in Albania and convinced to become his secretary, a function that he accomplished up to their coincident death in 1933 (Tasnádi-Kubacska, 1945). Bajazid also searched the fossiliferous beds by himself; his most important discovery seems to be that of the remains, including a skull fragment, of the nodosaurid ankylosaur *Struthiosaurus transylvanicus* which was briefly described by Nopcsa (1915) as a new species, followed by a detailed treatment in his fifth and last monograph dedicated to the Transylvanian dinosaurs (Nopcsa, 1929).

Besides Nopcsa's own field prospecting, collection of fossil bones became a habit for the countrymen living on the baronial estate, who, as was recalled by the old villagers to the present author in the late 1970s, used to gather the bones that during springtime were eroded out the rocks after the snow melt, and to bring them to the Nopcsa castle.

On the occasion of his visit to Haţeg in the summer of 1906, at Franz Nopcsa's invitation, Arthur Smith Woodward, then Head of the Department of Palaeontology in the British Museum of Natural History in London, also took part in prospecting along the Sibişel valley (see Lady A. Smith Woodward, *Transylvania* — Travel notes; Archives of the BMNH — Palaeontological Library, pp. 182–187).

Lady A. Smith Woodward, who accompanied her husband during this visit to Haţeg described that after coming back from the field the two scientists used to patch the bone fragments they collected. The same source also suggests that at that time Nopcsa was very much concerned with finalizing the geological map of Albania, "a tremendous piece of work" that "was nearly ready for publication in the autumn" (i.e., the revised version of the first map from 1905; Lady A. Smith Woodward, *Transylvania* — Travel notes; Archives of the BMNH — Palaeontological Library, p. 184).

On the occasion of her visit in Haţeg, Lady A. Smith Woodward described, with amazing details, the customs at the Nopcsa family castle in Săcel. She gave special attention to the clothes worn at festivities by local peasants, which contrasted in their simple association of only two colours, black and white, with the extravagant wear of Franz Nopcsa: "gold brocade tunic and a dolman lined with sable skins along over one shoulder white buckskin breeches, high shining black boots with gold embroidered tops, sword belt, sword, tunic buttons, all gleaming with glittering gems and a fur cap with a high egret plume in front" (Lady A. Smith Woodward, *Transylvania* — Travel notes; Archives of the BMNH — Palaeontological Library, p. 185).

Nopcsa's links with A. Smith Woodward and the British Museum of Natural History were particularly tight, and most of his palaeontological collection made before 1910 were sold to the BMNH. From this collection C. W. Andrews described *Elopteryx nopcsai* as a new species of birds, close to cormorants (Andrews, 1913). Part of the skeletal remains described by Andrews were later reinterpreted as belonging to two new species of owls (Harrison and Walker, 1975), but their avian status as well as of that of the entire original *Elopteryx* material was contested by Elzanowski (1983) and Paul (1988), the last author assigning it to theropod dinosaurs, closely related to troodontids.

Nopcsa elaborated the first synthesis on the Danian fauna from the Haţeg Basin in 1915 (Nopcsa, 1915). The material upon which he based his review included, besides his own collections, those of O. Kadic, a geologist with the Geological Institute in Budapest, from the Vălioara area in the northwestern part of the Haţeg Basin. The faunal list included five genera of dinosaurs: the hadrosaur *Orthomerus* (formerly described by Nopcsa as *Limnosaurus* and *Telmatosaurus*), the iguanodontid *Rhabdodon* (previously assigned to *Mochlodon*), the ankylosaur *Struthiosaurus*, the sauropod *Titanosaurus* and the theropod *Megalosaurus*. The list was completed by crocodilians, turtles, pterosaurs and birds, but in all these cases the taxonomic status remained uncertain. In this paper the sauropod remains, firstly mentioned in 1904 and presumed to represent three taxa, are described and assigned to only one taxon, as *Titanosaurus dacus*. Later these remains were reviewed by F. Huene, who studied before the titanosaurid sauropods from South America and India. Huene (1932) concluded that the titanosaurid material from Haţeg belongs to a new genus which he named *Magyarosaurus* and recognized at least two species: *M. dacus* and *M. transylvanicus*, not excluding the presence of a third one.

In the 1915 paper Nopcsa addressed a series of palaeobiological aspects as well: the presence of sexual dimorphism, related to the two species of "*Mochlodon*" (*Rhabdodon*) described before, the primitiveness of the Haţeg dinosaurs in spite of their late chronostratigraphic position, and their small size in comparison with their relatives from other regions, the largest representative of the assemblage being *Titanosaurus dacus* for whom Nopcsa estimated a puny length of only 5–6 m. The reduced size and primitiveness of the Haţeg dinosaurs was related by Nopcsa to the isolated island conditions in which they lived for a long time (see Benton et al., 2010-this issue), which produced their degeneration, a phenomenon proved by the pathology of bones, but also explained by the "disorder in nutrition" caused by the climatic deterioration occurring in the region at the end of Cretaceous. The extinction of the Haţeg dinosaurs was regarded as a consequence of a number of factors, which started with mountain uplift and enlargement of the terrestrial areas, followed by warming and increased aridity of the climate, which determined the replacement of the rich and widely developed marshy vegetation by a dry-adapted one, to which the dentition of the herbivorous species was not adapted.

The palaeobiological ideas expressed in his 1915 paper, more speculative than factually documented, Nopcsa developed further in a paper published in the Quarterly Journal of the Geological Society of London (Nopcsa 1923). Besides the description of the five dinosaur taxa mentioned in the previous monograph, this time with more considerations on their origin and evolution, Nopcsa included the description of a new turtle, *Kallokibotion*. In his paper he compared the Haţeg dinosaurs with others from the Upper Cretaceous of Austria, France, Belgium and England, highlighting the primitiveness of the Transylvanian dinosaurs which more closely resemble different Late Jurassic–Early Cretaceous taxa than their contemporaneous dinosaur assemblages. Nopcsa associated the primitiveness of the Haţeg dinosaurs with their relatively small size and low taxonomic diversity, all these aspects being interpreted as consequences of the island condition in which they lived, following the tectonic movements affecting the Carpathian orogenic belt at the end of the Cretaceous. In a larger paper dedicated to "The influence of geological and climatological factors on the distribution of non-marine fossil reptiles and Stegocephalia" published posthumously in 1934, also in the Quarterly Journal of the Geological Society of London, Nopcsa interpreted in a Wegenerian perspective the primitive aspect of the Late Cretaceous Transylvanian assemblage as related "to the separation of Europe from the rest of the world by an epicontinental sea during the period ranging from Cenomanian to the beginning of the Tertiary" (Nopcsa, 1934, p. 88).

In spite of the many years of fossil collecting and study, Nopcsa was aware that the dinosaur-bearing fauna from Haţeg were still far from being deeply known and interpreted: "…the Transylvanian fauna, well known in consequence of the vast amount of collecting that has been in progress for twenty-five years, turns out to be in reality nothing else than the poor remains of an older and richer but less-known fauna" (Nopcsa, 1923, p. 108–109).

The detailed study of the vertebral columns of *Rhabdodon* and *Orthomerus*, based on the Haţeg material, now in the collections of

BMNH was issued afterwards (Nopcsa, 1928a,b). The study represents the 4th monograph in the series devoted to the "Dinosaur remains from Transylvania". It includes new arguments in favour of sexual dimorphism of the two dinosaurs.

In a note paper from 1928 Nopcsa revised the taxonomy of the crocodilians from the Upper Cretaceous deposits of Haţeg, assigning the remains he previously described as *Crocodilus affuvelensis* (a taxon known from Southern France), to the new genus *Allodaposuchus* (Nopcsa, 1928b). Nopcsa explained the derived character of this crocodilian contrasting the faunal assemblage otherwise dominated by primitive dinosaurs and turtles, by its swimming abilities which allowed it to colonize different islands.

Nopcsa's last paper on the vertebrate fauna from the Upper Cretaceous of the Haţeg Basin was his fifth monograph in the series "*Dinosaurreste aus Siebenbürgen*" dedicated to the description of the ankylosaurid *Struthiosaurus transylvanicus* (Nopcsa, 1929). *Struthiosaurus* was regarded as a primitive nodosaurid, inhabitant of dry, savanna-type regions, quite different from the more humid environments bordering lakes and marshes that he considered were inhabited by the other ornithischians from the assemblage, *Orthomerus* and *Rhabdodon*.

2.1. Nopcsa's main contributions

Nopcsa's contribution to knowledge of the latest Cretaceous vertebrate fauna with dinosaurs from Haţeg and other regions of Transylvania is outstanding, with many of his conclusions, whether in the fields of systematic palaeontology or palaeobiology still being accepted today. With the advantage of being native and, together with his family, owner of the land on which fossils were found, Franz Nopcsa enhanced the value of these assets through tremendous work and extraordinary intelligence. The quantity and, especially, the quality of the scientific publications he completed before reaching the age of 30, some of them published during his university studies in Vienna, are astonishing.

Nopcsa was equally an excellent taxonomist and an extraordinary palaeobiologist, who knew, like nobody else, how to interpret the physiology and, in general, the biology of the extinct animals from their skeletal remains. The role of the environment, including the changes induced by tectonic movements, in the evolution and geographic dispersal of animals were also convincingly demonstrated in most cases.

In an essay to synthesize Nopcsa's contributions to the knowledge on the geology and palaeontology of the Upper Cretaceous continental deposits from the Haţeg Basin, Grigorescu (2005) summarized the following aspects, grouped on specific domains:

1. Systematic Palaeontology: description of 9 species of dinosaurs and other fossil reptiles, out of which 6 were confirmed by the subsequent revisions;
2. Chronostratigraphy and Geologic mapping: dating the continental fossiliferous deposits as Danian, at that time considered the uppermost stage of the Cretaceous; first detailed geological map of the Haţeg Basin and the neighbouring regions, with the Upper Cretaceous marine deposits clearly delimited from the overlaying continental deposits with dinosaur remains, the latter being described under the generic name of "Sânpetru sandstone";
3. Evolution: recognition of the primitiveness of most of the taxa from the Haţeg palaeofauna, stressing that in spite of their chronostratigraphic position at the end of the Upper Cretaceous, many of them much closely related to Late Jurassic and Early Cretaceous taxa;
4. Palaeobiology: besides their primitiveness, many species from the Haţeg palaeofauna were much smaller than their closest relatives from other regions of Europe. Both the primitiveness and the small size were explained by Nopcsa by the isolated condition, on an island, in which the dinosaurs and their other co-habitants lived for a long span of time; this biological phenomenon, common for large animals living in small and medium-sized islands is known as "island dwarfing".

3. The gap in systematic studies (1934–1977)

During Nopcsa's life few other researchers studied the Upper Cretaceous continental deposits from Haţeg. Among them one should mention Schafarzik (1909) who described freshwater gastropods from Densuş, and O. Kadic, who assembled a collection of dinosaur bones from the Vălioara area for the Geological Institute in Budapest (Kadic, 1916), studied afterwards by Nopcsa. The only detailed study from this period is that of F. Laufer who, at the request of the Romanian Geological Institute, made a geological survey the Haţeg Basin, the conclusions of which he published in 1925 (Laufer, 1925). Regarding the dinosaur-bearing deposits, for which Laufer accepted the Danian age suggested by Nopcsa, he recognized two distinct lithofacies in stratigraphic superposition: a lower one with volcanic tuffs (in which he discovered plant remains of tropical origin), outcropping in the Densuş–Răchitova region, and an upper, fluvial–lacustrine facies having a larger areal distribution.

From the viewpoint of geological researches in the Haţeg Basin, the period following the death of Nopcsa (in 1933) was even worse, as practically no significant studies were undertaken for the subsequent 20 years. An exception is the geological fieldwork by A. Mamulea, whose results he published in two papers, both in 1953, one dedicated to the geology of the western part of the Haţeg Basin (the Sarmizegetusa–Răchitova region; Mamulea, 1953a), the other to the geology of the central-eastern part (Sânpetru–Pui area; Mamulea, 1953b). During his fieldwork, Mamulea collected several vertebrae and limb bones, which he assigned to *Titanosaurus dacus*. The bones were donated to the Laboratory of Palaeontology of the University of Bucharest, being studied by Z. Csiki in his Ph.D. thesis who concluded that this material belongs to one individual of *Magyarosaurus dacus*.

Mărgărit and Mărgărit (1967) contributed to our knowledge of the Haţeg palaeo-vegetation during the Late Cretaceous by describing an association of leaf impressions of ferns and angiosperms collected from the tuff levels at Densuş.

In a paper dedicated to the age of the uppermost Cretaceous continental deposits from the two neighbouring basins, Haţeg and Rusca Montană, Dincă et al. (1972) confirmed the Maastrichtian age of these deposits, based on the foraminiferal assemblages yielded by the underlying marine beds and on the recently taken decision of the International Commission of Stratigraphy regarding the position of the Danian as the basal stage of the Tertiary.

4. The studies resumed (from 1977 onward)

A new phase in the study of the dinosaur-bearing deposits from the Haţeg Basin was initiated in 1977 by D. Grigorescu who decided to restart systematic digging in the region. This fieldwork was to be continued uninterrupted up to the present, during the summers involving teams of geology students from the University of Bucharest. The excavations started on the banks of the Sibişel valley, near Sânpetru village, the area that provided most of the Nopcsa collection of dinosaur and other reptile remains. Several new "fossiliferous pockets" were identified along this valley (see Grigorescu, 2005; Csiki et al., 2010-this issue; Fig. 4) with valuable help provided by a countryman, Mr. Vulc Doenel, a native of Sânpetru, a nature lover and an extraordinary self-educated man. Close cooperation was established soon after the start of the researches with I. Groza, a recent graduate of geography from the University of Bucharest and employed by the Department of Natural History of Deva Museum. This cooperation, which lasted for 6 years until Groza left the Museum, contributed to the rapid increase of collections of fossil bones that, following the common agreement, were divided up between the two involved institutions: the Faculty of Geology of the University of

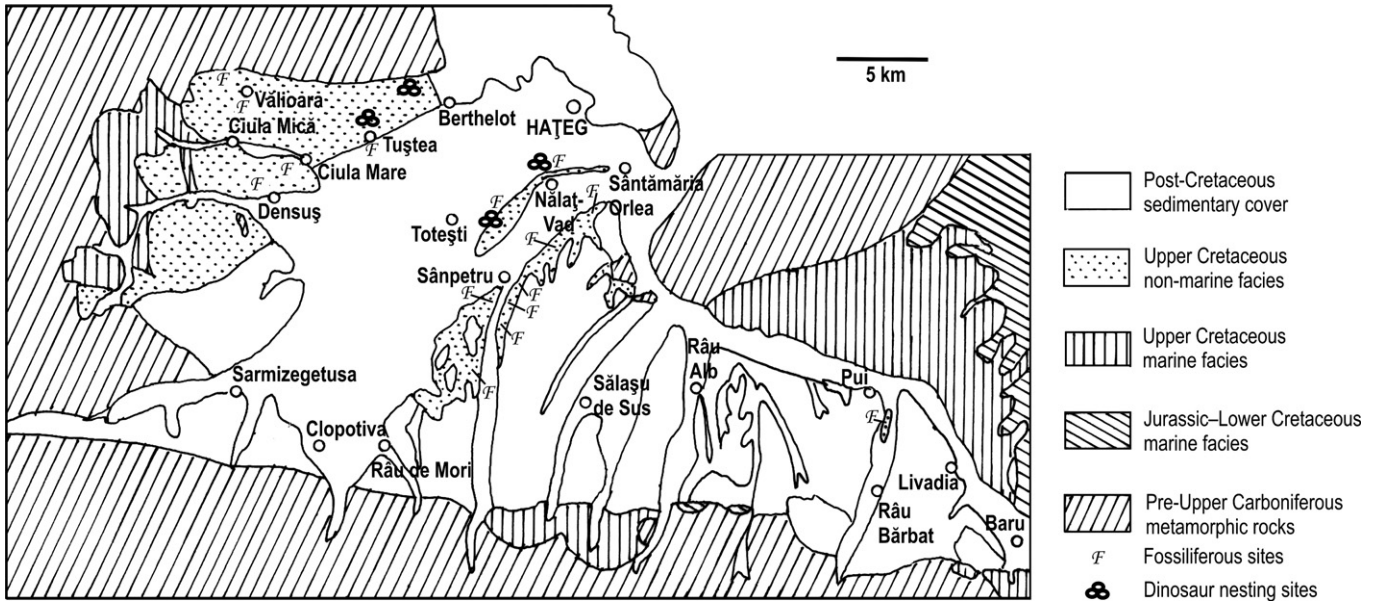

Fig. 4. Distribution of the main fossiliferous sites with dinosaur and other vertebrate remains in the Maastrichtian of the Haţeg Basin.

Bucharest, and the Museum in Deva. A result of this cooperation was also the organization of a new permanent palaeontological exhibition in Deva Museum, displaying mainly dinosaur remains from the Haţeg region. The dinosaur bones that had not existed before in the Museum of Deva became real attractions for visitors and thus the Museum increased its reputation. Groza (1983) published information on the fossiliferous sites that were excavated together and on the specimens that after discovery were deposited in the Museum of Deva.

At the University of Bucharest, the students became very interested in spending part of their summer vacations digging for dinosaurs in Haţeg. As in the United States or Canada, where volunteers compete through the year to get a place in the summer camps organized near fossiliferous sites with dinosaurs, the students from Bucharest used to enroll to participate in the upcoming campaign during the previous autumn, soon after the new university year started. Some of them were interested in studying the fossils they unearthed, continuing the work in the laboratories of the Faculty; a few of them presented their results to the scientific club of the students and published papers in student magazines (e.g., Ştiucă et al., 1982).

The renewal of the research at Haţeg coincided with the discovery, within a bauxite mine from the Apuseni Mountains, some 300 km north of Haţeg, of hundreds of disarticulated bones of dinosaurs, pterosaurs and presumed birds; the age of the deposits encasing the fossils proved to be equivalent to the Wealden, therefore at the other end of the Cretaceous. The common interest on dinosaurs approached the teams working on the two sites and soon the researchers from the Museum of Oradea who started preparing and studying the fossils (T. Jurcsák and E. Kessler), became good friends of the author. Collaboration with Kessler led to publication, first, of a few papers on Miocene birds from Dobrodgea (e.g., Grigorescu and Kessler, 1977), and, subsequently, one study on a presumed new specimen of *Elopteryx nopcsai* found near Sânpetru (Grigorescu and Kessler, 1981). In a synthesis on the Mesozoic reptiles of Romania Jurcsák (1982) mentioned a list of fossil remains from Haţeg which he found in the collections of the Laboratory of Palaeontology at the Babes-Bolyai University, Cluj-Napoca.

A real and consistent help in pursuing studies on the Haţeg dinosaurs and their associated fauna was given by a number of reputed specialists who came to Haţeg to visit the deposits yielding "the dwarf dinosaurs of Transylvania", as they had started to be nicknamed after being presented to the world public by the "Discovery" television channel. The first to come to Haţeg, soon after the fieldwork was resumed there, were Zofia Kielan-Javorowska, Halszka Osmolska and Teresa Maryanska. Z. Kielan-Jaworowska was for many years the "soul" of the "Mesozoic Terrestrial Ecosystems" symposia. She invited the author to join the group of students of this field and to participate in the 2nd symposium that was organized in Poland. On this occasion the first results of the new systematic studies in Haţeg were presented, focusing more on the lithostratigraphic, sedimentologic and taphonomic aspects than on the newly discovered palaeontological content (Grigorescu, 1983a). However, the paper announced briefly the discovery, in micropalaeontological samples, of a few teeth of small theropods and of an upper incisor, presumed to belong to a multituberculate mammal. A more detailed note on these remains, representing two groups previously unknown in the Haţeg fauna (small theropods and mammals) was presented during the next symposium on Mesozoic Terrestrial Ecosystems in Tübingen (Grigorescu, 1984a). The presence of both groups were confirmed afterwards in a spectacular fashion, especially through the use of the screen-washing method that was intensively used after 1980 and to which the discovery of 36 new taxa (65% of the total number of taxa included in the actual faunal list from the Maastrichtian of the Haţeg Basin, see Table 1) is owed. Around 10 taxa of small theropods (unfortunately, most of them documented only by isolated teeth) and possibly as many as 4 genera and 7 species of multituberculates, respectively, are included in the list of the Haţeg fauna summarized by Csiki (2005).

Among the palaeontologists who visited Haţeg after 1980 one should mention Jean-Louis Hartenberger, Jean Sudre, Eric Bufetaut, Jean Le Loeuff, Xavier Pereda Suberbiola, Jean-Louis Mazin, Philipe Taquet, David Norman, Mike Benton, Eberhart (Dino) Frey, Dave Weishampel, Jack Horner, Pascal Godefroit, Thierry Smith, and Attila Ösi. The list of foreign palaeontologists and geologists who visited Haţeg during the last two decades is significantly longer, as only two international meetings that were organized here, the IGCP Conference on Non-Marine Cretaceous of the world (IGCP 245; in 1990) and the Symposium of the European Association of Vertebrate Palaeontologists (in 2002), gathered more than 80 participants. Some of the visiting scientists were involved afterwards in fieldwork and studies (see below), while others examined the collected materials and offered valuable advice.

Largely due to the international cooperation, but also to the enthusiastic interest in the Haţeg fauna shown by some younger Romanian researchers, the faunal list of the Haţeg vertebrate assemblage increased tremendously. It now includes 56 valid taxa, covering all vertebrate classes from fishes to mammals (Table 1)

Table 1
List of the vertebrate taxa within the Maastrichtian fauna of the Haţeg Basin. After Csiki (2005).

Pisces
Acipenseriformes indet. (Grigorescu et al., 1985)
Characidae indet. (Grigorescu et al., 1985)
Lepisosteus sp. (Grigorescu et al., 1999)
Atractosteus sp.

Amphibia
Albanerpetontidae
Albanerpeton sp. (Grigorescu et al., 1999); possibly a new species of *Albanerpeton*
Albanerpeton cf. *inexpectatum* (Folie et al., 2002); possibly a new species of *Albanerpeton*
Anura
Discoglossidae indet. (Folie et al., 2002)
Eodiscoglossus sp. (Folie and Codrea, 2005)
Paradiscoglossus sp. (Folie and Codrea, 2005), possibly synonymous with *Paralatonia*
Hatzegobatrachus grigorescui (Venczel and Csiki, 2003)
Paralatonia transylvanica (Venczel and Csiki, 2003)

Reptilia
Testudinata
[a]*Kallokibotion bajazidi* (Nopcsa, 1923);
Pleurosternon sp. (Nopcsa, 1915); probably Pleurodira indet., small sized taxon (Vremir, 2004)
Cf. ?*Polysternon* (Nopcsa, 1915); described as *Pleurosternon* sp. by Mlynarski (196), large sized taxon (Vremir, 2004)

Lepidosauromorpha
Sauria
Anguimorpha indet. (Grigorescu et al., 1999)
Beckesius aff. *B. hoffstetteri* (Folie et al., 2002)
Bicuspidon hatzegiensis (Folie and Codrea, 2005)
Paraglyphanodon sp. nov. (Folie et al., 2002)
Scincomorpha indet. 1. (Grigorescu et al., 1999)
Scincomorpha indet. 2. (Codrea et al., 2002)
Serpentes
Madtsoiidae indet. (Folie and Codrea, 2005)

Archosauromorpha
Mesoeucrocodylia
Doratodon sp. (Grigorescu et al., 1999)
Mesoeucrocodylia n. g. et sp. (Martin et al., in prep.)
Crocodyliformes
[a]*Allodaposuchus precedens* (Nopcsa, 1928a,b)
Acynodon sp. (Jianu and Boekschoten, 1999, Martin et al., 2006)
Musturzabalsuchus sp. (Jianu and Boekschoten, 1999)
Pterosauria
Ornithodesmus sp. (Nopcsa, 1923)
Pteranodontidae indet. (Jianu et al., 1997)
Hatzegopteryx thambema (Buffetaut et al., 2002)

Dinosauria
Theropoda
[a]*Elopteryx nopcsai* (Andrews, 1913)
Heptasteornis andrewsi (Harrison and Walker, 1975) — probably synonymous with *E. nopcsai*; considered as Alvarezsauridae indet. (Naish and Dyke, 2004)
Bradycneme draculae (Harrison and Walker, 1975) — probably synonymous with *E. nopcsai*
Euronychodon sp. (Csiki and Grigorescu, 1998)
Paronychodon sp. (Codrea et al., 2002)
Richardoestesia sp. (Codrea et al., 2002)
cf. *Saurornitholestes* sp. (Weishampel and Jianu, 1996)
aff. *Troodon* sp. (Csiki and Grigorescu, 1998; Codrea et al., 2002; Smith et al., 2002)
Velociraptorinae indet. (Csiki and Grigorescu, 1998)
Oviraptorosauria indet.
Aves
Enantiornithes indet.
Sauropoda
[a]*Magyarosaurus dacus* (Nopcsa, 1915, Huene, 1932)
Magyarosaurus transsylvanicus (Huene, 1932) — probably synonimous with *M. dacus*
"*Magyarosaurus*" *hungaricus* (Huene, 1932) — probably new genus of titanosaur
Paludititan nalatzensis (Csiki et al., in review)

Ornitischia
Ornithopoda
Zalmoxes robustus (Weishampel et al., 2003)
Zalmoxes shqiperorum (Weishampel et al., 2003)
[a]*Telmatosaurus transsylvanicus* (Nopcsa, 1903; emend. Weishampel et al., 1993)

Ankylosauria
Ndosauridae
[a]*Struthiosaurus transylvanicus* (Nopcsa, 1905a,b)

Mammalia
Multituberculata
Barbatodon transylvanicus (Rădulescu and Samson, 1986)
Barbatodon sp. nov. (Smith et al., 2002)
Hainina sp. A (Csiki and Grigorescu, 2000)
Kogaionon ungureanui (Rădulescu and Samson, 1996)
Kogaionon sp. nov. 1 — Pui (Smith and Codrea, 2003)
Kogaionon sp. nov. 2 — Toteşti (Codrea et al., 2002)
Kogaionidae gen et sp. nov. (Csiki and Grigorescu, 2002a,b)
Theria
Theria indet. (Csiki and Grigorescu, 2001)

[a] Valid taxon described before 1977.

which gives a rather accurate view of the palaeo-biodiversity at the end of Cretaceous in the Haţeg Basin and, by extension, in the Transylvanian area. Among the most spectacular discoveries made after 1977 are those of a large variety of small theropods (e.g., Grigorescu, 1984a,b; Csiki and Grigorescu, 1998; Codrea et al., 2002; Smith et al., 2002), several sites with dinosaur egg clutches among which one provided hatchling remains as well (e.g., Grigorescu et al., 1990a,b,c, 1994; Codrea et al., 2002; Smith et al., 2002; Grigorescu and Csiki, 2008), one of the largest pterosaurs in the world, representing a new genus and species (*Hatzegopteryx thambema*; Buffetaut et al., 2001, 2002, 2003), as well as several taxa of multituberculate mammals (e.g., Rădulescu and Samson, 1986; Grigorescu and Hahn, 1987; Rădulescu and Samson, 1996; Csiki and Grigorescu, 2000; Codrea et al., 2002; Smith et al., 2002; Smith and Codrea, 2003; Csiki et al., 2005).

During the last 30 years, studies on the Haţeg fauna were not restricted to systematic palaeontology; they covered, in a multidisciplinary and interdisciplinary approach, all fields which might contribute together to an accurate reconstruction of the palaeoenvironment within which the Maastrichtian fauna has evolved. Table 2 presents a summary of the contributions, divided by fields of scientific interest, from palaeontology of the different groups of plants and animals to stable isotope analyses and palaeomagnetic data. Despite not being an exhaustive list, it gives, nevertheless, a correct view of the study directions that were pursued during the last 30 years.

5. Conclusions

In the research on the latest Cretaceous fauna from the Haţeg Basin two periods, separated by a half of a century, are distinguished.

The first period (1897–1929) was marked by the studies of Franz Nopcsa leading to the recognition of a terrestrial reptilian assemblage, including a small number of valid taxa: 5 dinosaurs — the sauropod *Magyarosaurus dacus* (Nopcsa, 1915); the small theropod *Elopteryx nopcsai* (Andrews, 1913); the iguanodontid *Rhabdodon priscum* (= *Zalmoxes robustus* and *Zalmoxes shqiperorum* (Weishampel et al., 2003); the hadrosaurid *Telmatosaurus transsylvanicus* (Nopcsa, 1903); and the ankylosaur *Struthiosaurus transylvanicus* (Nopcsa, 1915), together with one crocodilian (*Allodaposuchus precedens*; Nopcsa, 1928a,b) and one turtle (*Kallokibotion bajazidi*; Nopcsa, 1923). Problematic pterosaurs were also mentioned by Nopcsa, but without a detailed description and indications concerning their collection details.

Although small and apparently insufficient for synthesis, this assemblage allowed Nopcsa to recognize several special features shared

Table 2
Non-exhaustive list of contributions published after 1977 on the Haţeg Maastrichtian palaeo-biodiversity and palaeoenvironment.

Palaeontology	Plants, palynomorphs and palynostratigraphy		Mărgărit and Mărgărit (1967), Antonescu et al. (1983), Antonescu (1990), Van Itterbeeck et al. (2005), Csiki et al. (2008).
	Invertebrates	Freshwater gastropods	Antonescu et al. (1983), Pană et al. (2002).
	Vertebrates	Microvertebrates — Amphibians, lizards and snakes	Grigorescu et al. (1985, 1999), Venczel and Csiki (2002, 2003), Folie et al. (2002), Folie and Codrea (2003, 2005), Csiki (2005), Csiki et al. (2008).
		Synthesis on the fauna, evolution and palaeobiogeography	Buffetaut and Le Loeuff (1991), Le Loeuff (1991), Le Loeuff (2002), Weishampel et al. (1991), Jianu and Boekschoten (1999), Jianu and Weishampel (1999, 2001), Le Loeuff (1992, 2001), Csiki and Grigorescu (2002a,b), Grigorescu and Csiki (2002), Grigorescu (2003a,b), Csiki (2005), Csiki and Grigorescu (2008).
		Monographs	Gaffney and Meylan (1992), Weishampel et al. (1993), Weishampel et al. (2003).
		Sauropods	Le Loeuff (1993), Csiki (1999, 2005), Le Loeuff (2005).
		Theropods	Grigorescu (1984a,b), Weishampel and Jianu (1996), Jianu and Weishampel (1997), Csiki and Grigorescu (1997, 1998, 2003), Csiki (2005).
		Ornithopods	Weishampel et al. (1993), Weishampel et al. (1998), Pereda et al. (1999), Weishampel et al. (2003), Godefroit et al. (2009).
		Ankylosaurs	Pereda Suberbiola and Galton (1997).
		Dinosaur eggs	Grigorescu et al. (1990a), Grigorescu et al. (1994), Codrea et al. (2002), Garcia et al. (2002), Smith et al. (2002), Garcia et al. (2003), Grigorescu (2003a, 2003b), Grigorescu and Csiki (2008).
		Dinosaur hatchlings	Grigorescu et al. (1994), Grigorescu (2003a, 2003b), Grigorescu and Csiki (2006).
		Pterosaurs	Jianu et al. (1997), Buffetaut et al. (2001, 2002, 2003).
		Crocodilians	Buscalioni et al. (2001), Martin et al. (2006).
		Turtles	Gaffney and Meylan (1992), Vremir (2004).
		Multituberculate mammals	Grigorescu (1984a, 1984b), Grigorescu et al. (1985), Rădulescu and Samson (1986), Grigorescu and Hahn (1987), Rădulescu and Samson (1990, 1996), Csiki and Grigorescu (2000, 2001, 2002a,b), Codrea et al. (2002), Smith et al. (2002), Smith and Codrea (2003), Csiki (2005), Csiki et al. (2005).
Taphonomy			Grigorescu (1983a,b), Grigorescu and Csiki (2002), Csiki (2005).
Stratigraphy (lithostratigraphy, biostratigraphy)			Antonescu et al. (1983), Antonescu (1990), Grigorescu (1990), Grigorescu and Anastasiu (1990), Grigorescu et al. (1990b),c, Pop (1990), Pop et al. (1990), Grigorescu (1992), Grigorescu and Csiki (2002), Grigorescu and Melinte (2002), Melinte and Jipa (2005), Van Itterbeeck et al. (2005), Melinte and Bojar (2006).
Sedimentology, reconstruction of the palaeoenvironment			Anastasiu and Csobuka (1989), Grigorescu and Anastasiu (1990), Grigorescu (1992), Bojar et al. (2002, 2003), Van Itterbeeck et al. (2004), Bojar et al. (2005), Therrien (2005, 2006), Therrien et al. (2009).
Tectonics, palaeomagnetism			Pătraşcu et al. (1990, 1993), Willingshofer (2000), Panaiotu and Panaiotu (2002).

by most of these taxa: their primitiveness despite their high chronostratigraphic position and their small size, which he related to the insular, isolated habitat within which they lived.

The new research stage that begun in 1977, after almost half of a century gap in the systematic palaeontological studies, started with the aim of making new collections, and focused on the identification and excavation of "fossiliferous pockets" along the Sibişel Valley) which became the "classical site" for dinosaur excavations), while subsequently the researches were extended to other fossiliferous areas: Pui, Vălioara, Tuştea, as well. The searches led to the discovery of an important number of fossils, most of them referred to Nopcsa's valid taxa, but also representing several new taxa of titanosaurian sauropods (Csiki, 2005), azhdarchid pterosaurs (Buffetaut et al., 2001, 2002, 2003), crocodiles (Jianu and Boekschoten, 1999; Martin et al., 2006) and birds. Nevertheless, the largest number of new taxa was discovered through the study of micropalaeontological samples obtained through screen-washing. This method was intensively used after 1980, leading to the discovery of as many as 38 new taxa (representing around 70% of the total number of taxa known at present), including fishes, amphibians, lacertilians, crocodilians and mammals.

The new image we presently have of the Maastrichtian faunal assemblage from the Haţeg Basin allows an extension of the systematic palaeontological studies with studies concerning the palaeobiology of the fauna (focused on aspects such as the dwarf nature and the origin of the different taxa) and the palaeoenvironmental reconstructions for the end of the Cretaceous in Transylvania, based on a multidisciplinary and interdisciplinary approach. The two fields are becoming points of great interest in the study of the Haţeg fauna, as shown by several papers within this volume (e.g., Benton et al., 2010-this issue; Bojar et al., 2010-this issue).

Nowadays, the Haţeg dinosaurs and their associated fauna reach beyond the interest of scientists, and they attract continuously the interest of the larger public. To respond to the public interest, the "Haţeg Country" achieved the official status of a Geopark, the new type of protected area established under UNESCO guidelines and launched in 1998. More than 30 Geoparks are presently recognized by the UNESCO, linked together into the European Geopark Network. These geoparks contribute to increasing the visibility of different geosites as components of the natural heritage and thus help to rectify the chronic manner in which geoconservation lags behind biological conservation. The Geoparks demonstrate the role that geosites can play in enhancing the socio-economic development of a region, especially through tourism and education.

The "Haţeg Country Dinosaurs Geopark" has been a member, since 2005, of the European Geopark Network, being the first one established in Eastern Europe. It promotes, through field-based education in the fossiliferous and other geological sites from the area, the values of palaeontology and geology. For students and researchers in different domains of natural sciences, the geopark is becoming an optimal place for developing interrelated studies on biodiversity and geodiversity.

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The author takes this opportunity to thank to the hundreds of students who participated in the field research at Sânpetru or Tuştea during their summer vacations. Numerous important specimens were unearthed by students. Among these "anonymous" contributors, one gained an international reputation, as one of the few men who climbed all the highest mountain peaks, in all continents. He is Ticu Lăcătuşu, the first Romanian who reached Mount Everest. Special thanks are addressed to Mr. Doenel Vulc from Sânpetru, who guided us at the beginning of our searches in the Sibişel valley and provided valuable information on potential fossiliferous sites. I am thankful to my colleagues from the Laboratory of Palaeontology from Bucharest

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References

Anastasiu, N., Csobuka, D., 1989. Non-marine Uppermost Cretaceous deposits in the Ştei–Densuş region (Haţeg Basin): a sketch for a facial model. Revue Roumaine de Géologie, Géophysique, Géographie, Géologie 33, 43–53.

Andrews, C.W., 1913. On some bird remains from the Upper Cretaceous of Transylvania. Geological Magazine 10, 193–196.

Antonescu, E., 1990. Distribution stratigraphique du pollen d'angiospermes dans le Crétacé et le Paléocene des Carpathes Roumaines. In: Grigorescu, D., Avram, E. (Eds.), Abstracts Volume, International Meeting of the IGCP Projects 245 (Non-marine Cretaceous Correlation) and 262 (Tethyan Cretaceous Correlation). Bucharest, p. 2.

Antonescu, E., Lupu, D., Lupu, M., 1983. Correlation palinologique du Crétacé terminal du sud-est des Monts Metaliferi et des Depressions de Haţeg et de Rusca Montană. Annales de l'Institut de Géologie et Géophysique 59, 71–77.

Benton, M.J., Csiki, Z., Grigorescu, D., Redelstorff, R., Sander, P.M., Stein, K., Weishampel, D.B., 2010. Dinosaurs and the island rule: The dwarfed dinosaurs from Haţeg Island. Palaeogeography, Palaeoclimatology, Palaeoecology 293, 438–454 (this issue).

Bojar, A.-V., Grigorescu, D., Csiki, Z., 2002. Climatic record in Maastrichtian continental deposits of southern Carpathians. Berichte des Institutes für Geologie und Paläontologie, Karl-Franzens Universität Graz 6, 6–7.

Bojar, A.-V., Grigorescu, D., Csiki, Z., 2003. Isotope analysis on mineral and biogenic carbonates from the Maastrichtian continental formations of the Haţeg Basin and their significance for the paleoenvironment reconstruction. In: Codrea, V., Dica, P. (Eds.), Abstracts volume, Fourth National Symposium on Palaeontology. Cluj–Napoca, p. 10.

Bojar, A.-V., Grigorescu, D., Ottner, F., Csiki, Z., 2005. Palaeoenvironmental interpretation of dinosaur- and mammal-bearing continental Maastrichtian deposits, Haţeg basin, Romania. Geological Quarterly 49, 205–222.

Bojar, A.-V., Csiki, Z., Grigorescu, D., 2010. Stable isotope distribution in Maastrichtian vertebrates and paleosols from the Haţeg Basin, South Carpathians. Palaeogeography, Palaeoclimatology, Palaeoecology 293, 438–454 (this issue).

Buffetaut, E., Le Loeuff, J., 1991. Late Cretaceous dinosaur faunas of Europe: some correlation problems. Cretaceous Research 12, 159–176.

Buffetaut, E., Grigorescu, D., Csiki, Z., 2001. Giant pterosaurs from the Upper Cretaceous of Transsylvania (Western Romania). Strata 1, 26–28.

Buffetaut, E., Grigorescu, D., Csiki, Z., 2002. A new giant pterosaur with a robust skull from the latest Cretaceous of Romania. Naturwissenschaften 89, 180–184.

Buffetaut, E., Grigorescu, D., Csiki, Z., 2003. Giant azhdarchid pterosaurs from the terminal Cretaceous of Transylvania (western Romania). Geological Society London Special Publications 217, 91–104.

Bunzel, E., 1871. Die Reptilienfauna der Gosauformation. Abhandlungen der der Kaiserlich-Könighlichen Geologischen Reichsanstalt 5, 1–20.

Buscalioni, A.D., Ortega, F., Weishampel, D.B., Jianu, C.-M., 2001. A revision of the crocodyliform *Allodaposuchus precedens* from the Upper Cretaceous of the Haţeg Basin, Romania. Its relevance in the phylogeny of Eusuchia. Journal of Vertebrate Paleontology 21, 74–86.

Codrea, V., Smith, T., Dica, P., Folie, A., Garcia, G., Godefroit, P., Van Itterbeeck, J., 2002. Dinosaur egg nests, mammals and other vertebrates from a new Maastrichtian site of the Haţeg Basin (Romania). Comptes Rendus Palevol 1, 173–180.

Codrea, V.A., Vremir, M., Jipa, C., Godefroit, P., Csiki, Z., Smith, T., Fărcaş, C., 2010. More than just Nopcsa's Transylvanian dinosaurs: a look outside the Haţeg Basin. Palaeogeography, Palaeoclimatology, Palaeoecology 293, 391–405 (this issue).

Colbert, E.H., 1984. The Great Dinosaur Hunters and Their Discoveries. Dover Publications Inc., New York. 283 pp.

Csiki, Z., 1999. New evidence of armoured titanosaurids in the Late Cretaceous — *Magyarosaurus dacus* from the Haţeg Basin (Romania). Oryctos 2, 93–99.

Csiki, Z., 2005. Sistematica, tafonomia şi paleoecologia microvertebratelor şi dinosaurilor saurischieni din Maastrichtianul Bazinului Haţeg. Ph.D. thesis, University of Bucharest. (In Romanian).

Csiki, Z., Grigorescu, D., 1997. Small theropods of the Late Cretaceous of the Haţeg Basin (Western Romania) — an unexpected diversity at the top of the food chain. Second European workshop on vertebrate palaeontology (Espéraza – Quillan), Abstracts.

Csiki, Z., Grigorescu, D., 1998. Small theropods of the Late Cretaceous of the Haţeg Basin (Western Romania) — an unexpected diversity at the top of the food chain. Oryctos 1, 87–104.

Csiki, Z., Grigorescu, D., 2000. Teeth of multituberculate mammals from the Late Cretaceous of Romania. Acta Palaeontologica Polonica 45, 85–90.

Csiki, Z., Grigorescu, D., 2001. Fossil mammals from the Maastrichtian of the Haţeg Basin, Romania. Abstracts volume, 6th European Workshop on Vertebrate Palaeontology. Florence, p. 26.

Csiki, Z., Grigorescu, D., 2002a. Paleobiogeographical implications of the fossil mammals from the Maastrichtian of the Haţeg Basin. Acta Palaeontologica Romaniae 3, 87–96.

Csiki, Z., Grigorescu, D., 2002b. Animal–animal interactions in the Latest Cretaceous vertebrate faunas of Romania. In: Grigorescu, D., Csiki, Z. (Eds.), Abstracts volume, 7th European Workshop on Vertebrate Palaeontology. Sibiu, p. 14.

Csiki, Z., Grigorescu, D., 2003. Theropod dinosaurs of the Haţeg Basin — are they more diverse than thought? In: Codrea, V., Dica, P. (Eds.), Abstracts volume, Fourth National Symposium on Palaeontology. Cluj-Napoca, p. 17.

Csiki, Z., Grigorescu, D., 2008. The "Dinosaur Island"— new interpretation of the Haţeg Basin after 110 years. Sargetia 20, 5–26.

Csiki, Z., Grigorescu, D., Ruecklin, M., 2005. A new multituberculate specimen from the Maastrichtian of Pui, Romania and reassessment of affinities of *Barbatodon*. Acta Palaeontologica Romaniae 5, 73–86.

Csiki, Z., Ionescu, A., Grigorescu, D., 2008. The Budurone microvertebrate fossil site from the Maastrichtian of the Haţeg Basin — flora, fauna, taphonomy and paleoenvironment. Acta Palaeontologica Romaniae 6, 49–66.

Csiki, Z., Grigorescu, D., Codrea, V., Therrien, F., 2010. Taphonomic modes in the Maastrichtian continental deposits of the Haţeg Basin, Romania — Palaeoecological and palaeobiological inferences. Palaeogeography, Palaeoclimatology, Palaeoecology 293, 375–390 (this issue).

Dincă, A., Tocorjescu, M., Stilla, A., 1972. Despre vîrsta depozitelor continentale cu dinozaurieni din Bazinele Haţeg şi Rusca Montană. Dări de Seamă, Institutul de Geologie 58, 83–94.

Dollo, L., 1883. Les Iguanodons de Bernissart. Buletin Scientifique et Pédagogique de Bruxelles 3, 25–34.

Elzanowski, A., 1983. Birds in Mesozoic ecosystems. Acta Palaeontologica Polonica 28, 75–92.

Folie, A., Codrea, V., 2003. Discovery of a polyglyphanodontine lizard in the Upper Cretaceous of the Haţeg Basin (Romania). In: Codrea, V., Dica, P. (Eds.), Abstracts volume, Fourth National Symposium on Palaeontology. Cluj-Napoca, p. 19.

Folie, A., Codrea, V., 2005. New lissamphibians and squamates from the Maastrichtian of Haţeg Basin, Romania. Acta Palaeontologica Polonica 50, 57–71.

Folie, A., Codrea, V., Dica, P., Garcia, G., Godefroit, P., Smith, T., Van Itterbeeck, J., 2002. Late Cretaceous amphibians and lacertilians from Pui (Haţeg Basin, Romania). In: Grigorescu, D., Csiki, Z. (Eds.), 7th European Workshop on Vertebrate Palaeontology, Abstracts Volume and Excursions Field Guide. Sibiu, p. 16.

Főzy, I., 2000. Nopcsa báró és a Kárpát-medence dinoszauruszai. Alfadat Press, Budapest. 168 pp.

Gaffney, E.S., Meylan, P.A., 1992. The Transylvanian turtle, *Kallokibotion*, a primitive cryptodire of Cretaceous age. American Museum Novitates 3040, 1–37.

Garcia, G., Smith, T., Folie, A., Godefroit, P., Van Itterbeeck, J., Codrea, V., 2002. Parataxonomic classification of eggshells from Pui in the Haţeg Basin (Romania). In: Grigorescu, D., Csiki, Z. (Eds.), 7th European Workshop on Vertebrate Palaeontology, Abstracts Volume and Excursions Field Guide. Sibiu, p. 13.

Garcia, G., Codrea, V., Smith, T., Godefroit, P., 2003. Megaloolithid eggs from Romania. In: Codrea, V., Dica, P. (Eds.), Abstracts volume, Fourth National Symposium on Palaeontology. Cluj-Napoca, p. 21.

Godefroit, P., Codrea, V., Weishampel, D.B., 2009. Osteology of *Zalmoxes shqiperorum* (Dinosauria, Ornithopoda) based on a new specimen from the Upper Cretaceous of Nălaţ-Vad (Romania). Geodiversitas 31, 525–553.

Grigorescu, D., 1983a. A stratigraphic, taphonomic and palaeoecologic approach to a "forgotten land": the dinosaur-bearing deposits from Haţeg Basin (Transylvania-Romania). Acta Palaeontologica Polonica 28, 103–121.

Grigorescu, D., 1983b. Cadrul stratigrafic şi paleoecologic al depozitelor continentale cu dinosauri din Bazinul Haţeg. Sargetia 13, 37–47.

Grigorescu, D., 1984a. New tetrapod groups in the Maastrichtian of the Haţeg Basin: coelurosaurians and multituberculates. In: Reif, W.-E., Westphal, F. (Eds.), Short Papers, Third Symposium on Mesozoic Terrestrial Ecosystems. Attempo Verlag, Tübingen, pp. 99–104.

Grigorescu, D., 1984b. New paleontological data on the dinosaur beds from the Haţeg Basin. Special Volume, 75 years of the Laboratory of Paleontology, University of Bucharest, pp. 111–118.

Grigorescu, D., 1990. Non-marine formations connected with the Laramian tectogenesis (post-Early Maastrichtian formations in the Haţeg and Rusca Montană basins). In: Grigorescu, D., Avram, E., Pop, G., Lupu, M., Anastasiu, N., Rădan, S. (Eds.), Field Guide of the IGCP Projects 245 (Non-marine Cretaceous correlation) and 262 (Tethyan Cretaceous correlation) International Symposium. Bucharest, pp. 18–24.

Grigorescu, D., 1992. Nonmarine Cretaceous formations of Romania. In: Matter, N.J., Chen, P.-J. (Eds.), Aspects of Non-marine Cretaceous Geology. China Ocean Press, Beijing, pp. 142–164.

Grigorescu, D., 2003a. Dinosaurs of Romania. Comptes Rendus Palévol 2, 97–101.

Grigorescu, D., 2003b. The puzzle of Tustea incubation site (Upper Maastrichtian, Haţeg Basin, Romania): Hadrosaur hatchlings close to Megaloolithidae type of eggshell. Abstracts Volume, 2nd International Symposium on Dinosaur Eggs and Babies. Montpellier, p. 16.

Grigorescu, D., 2005. Rediscovery of a "forgotten land". The last three decades of research on the dinosaur-bearing deposits from the Haţeg Basin. Acta Palaeontologica Romaniae 5, 191–204.

Grigorescu, D., Anastasiu, N., 1990. Densuş-Ciula and Sînpetru formations (Late Maastrichtian–?Early Paleocene). In: Grigorescu, D., Avram, E., Pop, G., Lupu, M., Anastasiu, N., Rădan, S. (Eds.), Field Guide of the IGCP Projects 245 (Non-marine Cretaceous Correlation) and 262 (Tethyan Cretaceous Correlation) International Symposium. Bucharest, pp. 42–54.

Grigorescu, D., Csiki, Z., 2002 (eds.). Abstracts Volume and Excursions Field Guide, 7th European Workshop on Vertebrate Palaeontology, Ed. Ars Docendi, Bucharest.

Grigorescu, D., Csiki, Z., 2006. Ontogenetic development of *Telmatosaurus transsylvanicus* (Ornitischia: Hadrosauria) from the Maastrichtian of the Haţeg Basin. Hantkeniana 5, 20–26.

Grigorescu, D., Csiki, Z., 2008. A new site with megaloolithid egg remains in the Maastrichtian of the Haţeg Basin. Acta Palaeontologica Romaniae 6, 115–121.
Grigorescu, D., Hahn, G., 1987. The first multituberculate teeth from the Upper Cretaceous of Europe (Romania). Geologica et Palaeontologica 21, 237–241.
Grigorescu, D., Kessler, E., 1977. The Middle Sarmatian avian fauna of South Dobrogea. Revue Roumaine de Géologie 21, 93–108.
Grigorescu, D., Kessler, E., 1981. A new specimen of *Elopteryx nopcsai* from the dinosaurian beds of Haţeg Basin. Révue Roumaine de Géologie, Géophysique et Géographie, Géologie 24, 171–175.
Grigorescu, D., Melinte, M.C., 2002. The stratigraphy of the Upper Cretaceous marine sediments from the NW Haţeg area (South Carpathians, Romania). Acta Palaeontologica Romaniae 3, 153–160.
Grigorescu, D., Hartenberger, J.-L., Rădulescu, C., Samson, P., Sudre, J., 1985. Découverte de mammifères et dinosaures dans le Crétacé supérieur de Pui (Roumanie). Comptes Rendus de l'Academie des Sciences Paris 301, 1365–1368.
Grigorescu, D., Şeclăman, M., Norman, D.B., Weishampel, D.B., 1990a. Dinosaur eggs from Romania. Nature 346, 417.
Grigorescu, D., Anastasiu, N., Dinu, C., 1990b. The Latest Cretaceous continental formations of the Haţeg Basin: stratigraphy and sedimentology under tectonic control. In: Grigorescu, D., Avram, E. (Eds.), Abstracts Volume, International Meeting of the IGCP Projects 245 (Non-marine Cretaceous Correlation) and 262 (Tethyan Cretaceous Correlation). Bucharest, p. 12.
Grigorescu, D., Avram, E., Pop, G., Lupu, M., Anastasiu, N., Rădan, S., 1990c. Field Guide of the IGCP Projects 245 (Non-marine Cretaceous correlation) and 262 (Tethyan Cretaceous correlation) International Symposium. Bucharest. 109 pp.
Grigorescu, D., Weishampel, D.B., Norman, D.B., Şeclăman, M., Rusu, M., Baltreş, A., Teodorescu, V., 1994. Late Maastrichtian dinosaur eggs from the Haţeg Basin (Romania). In: Carpenter, K., Hirsch, K.F., Horner, J.R. (Eds.), Dinosaur Eggs and Babies. Cambridge University Press, Cambridge, pp. 75–87.
Grigorescu, D., Venczel, M., Csiki, Z., Limberea, R., 1999. New microvertebrate fossil assemblages from the Uppermost Cretaceous of the Haţeg Basin (Romania). Geologie en Mijnbouw 78, 301–314.
Groza, I., 1983. Rezultatele preliminare ale cercetărilor întreprinse de către Muzeul Judeţean Hunedoara — Deva în stratele cu dinosauri de la Sînpetru — Haţeg. Sargetia 13, 49–66.
Hála, J., 1993. Franz Baron von Nopcsa. Anmerkungen zu seiner Familie und seine Beziehungen zu Albanien. Eine Bibliographie. Geologische Bundesanstalt (Wien), Ungarische Geologische Landesanstalt (Budapest). 79 pp.
Halaváts, Gy., 1897. Adatok a Hátszegi medence földtani viszonyainak ismeretéhez. Magyar Királyi Földtani Intézet, Évi Jelentések 1896-ról, 90–95.
Halaváts, Gy., 1900. A hunyadmegyei Új-Gredistye, Lunkány, Hátszeg környékének földtani viszonyai. Magyar Királyi Földtani Intézet, Évi Jelentések 1898-ról, 96–108.
Harrison, C.J.O., Walker, C.A., 1975. The Bradycnemidae, a new family of owls from the Upper Cretaceous of Romania. Palaeontology 18, 563–570.
Huene, F., 1932. Die fossile Reptile-Ordnung Saurischia; ihre Entwicklung und Geschichte. Monographien zur Geologie und Palaeontologie 1, 1–361.
Jianu, C.-M., Boekschoten, G.J., 1999. The Haţeg area: island or outpost? In: Reumer, J.W.F., de Vos, J. (Eds.), Elephants Have a Snorkel. Deinsea Special Volume, pp. 195–199.
Jianu, C.-M., Weishampel, D.B., 1997. A new theropod dinosaur from the Haţeg Basin, western Romania, in the collection of the Geological Survey in Budapest. Sargetia 17, 239–246.
Jianu, C.-M., Weishampel, D.B., 1999. The smallest of the largest: a new look at possible dwarfing in sauropod dinosaurs. Geologie en Mijnbouw 78, 335–343.
Jianu, C.-M., Weishampel, D.B., 2001. The dinosaurs of Transylvania. Actas de las II Jornadas Internacionales sobre Paleontologia de Dinosaurios y su Entorno, Salas de los Infantes, Burgos, Spain, pp. 31–46.
Jianu, C.-M., Weishampel, D.B., Ştiucă, E., 1997. Old and new pterosaur material from the Haţeg Basin (Late Cretaceous) of western Romania and comments about pterosaur diversity in the Late Cretaceous of Europe. Second European Workshop on Vertebrate Palaeontology (Espéraza – Quillan), Abstracts.
Jurcsák, T., 1982. Occurences nouvelles des Sauriens mésozoïques de Roumanie. Vertebrata Hungarica 21, 175–184.
Kadic, O., 1916. Jelentés az 1915. évben végzett ásatásaimról. II. A valiórai dinosaurusok gyüjtése. Magyar Királyi Földtani Intézet, Évi Jelentések 1915-ről, 573–576.
Laufer, F., 1925. Contribuţiuni la studiul geologic al împrejurimilor oraşului Haţeg. Anuarul Institutului Geologic al României 10, 301–333.
Le Loeuff, J., 1991. The Campano–Maastrichtian vertebrate faunas from Southern Europe and their relationships with other faunas in the world: Palaeobiogeographical implications. Cretaceous Research 12, 93–114.
Le Loeuff, J., 1992. Les vertébrés continentaux du Crétacé supérieur d'Europe: Paléoecologie, biostratigraphie et paléobiogeographie. Ph.D thesis, Université P. et M. Curie, Paris.
Le Loeuff, J., 1993. European titanosaurids. Révue de Paléobiologie 7, 105–117.
Le Loeuff, 2001. Les dinosaures du Crétacé supérieur (Campanian–Maastrichtien) d'Europe: une histoire des découvertes. Actas de las II Jornadas de Paleontologia de Dinosaurios y su Entorno, Salas de los Infantes, Burgos, pp. 47–70.
Le Loeuff, J., 2002. Romanian Late Cretaceous dinosaurs: big dwarfs or small giants? In: 7th European Workshop on Vertebrate Palaeontology, Abstracts volume and excursions field guide, p. 59, Sibiu.
Le Loeuff, J., 2005. Romanian Late Cretaceous dinosaurs: big dwarfs or small giants? Historical Biology 17, 15–17.
Mamulea, M.A., 1953a. Cercetări geologice în partea de Vest a Bazinului Haţeg (Regiunea Sarmisegetuza-Răchitova). Dări de Seamă, Comitetul Geologic al României 37, 142–148.
Mamulea, M.A., 1953b. Studii geologice în regiunea Sânpetru-Pui (Bazinul Haţegului). Anuarul Comittului Geologic al României 25, 211–274.
Mărgărit, G., Mărgărit, M., 1967. Asupra prezenţei unor resturi de plante fosile în împrejurimile localităţii Densuş (Bazinul Haţeg). Studii cercetări de geologie geofizică geografie, Geologie 12, 471–476.
Martin, J.E., Csiki, Z., Grigorescu, D., Buffetaut, E., 2006. Late Cretaceous crocodilian diversity in Haţeg Basin, Romania. Hantkeniana 5, 31–37.
Melinte, M.C., Bojar, A.-V., 2006. Upper Cretaceous marine red beds in the Haţeg area (SW Romania). In: Csiki, Z. (Ed.), Mesozoic and Cenozoic Vertebrates and Paleoenvironments. Ars Docenti, Bucharest, pp. 89–94.
Melinte, M.C., Jipa, D., 2005. Campanian–Maastrichtian red beds in Romania: biostratigraphic and genetic significance. Cretaceous Research 26, 49–56.
Naish, D., Dyke, G.J., 2004. *Heptasteornis* was no ornithomimid, troodontid, dromaeosaurid or owl: the first alvarezsaurid (Dinosauria: Theropoda) from Europe. Neues Jahrbuch für Geologie und Paläontologie, Monatshefte 7, 385–401.
Nopcsa, F., 1897. Vorläufiger Bericht über das Auftreten von oberer Kreide im Hátszeger Thale in Siebenbürgen. Verhandlungen der Kaiserlich-Königlichen Akademie des Wissenschaften, pp. 273–274.
Nopcsa, F., 1899. Jegyzetek Hátszeg vidékének geológiájához. Földtani Közlöny 1, 332–335.
Nopcsa, F., 1900. Dinosaurierreste aus Siebenbürgen I. Schädel von *Limnosaurus transsylvanicus* nov. gen. et nov. spec. Denkschriften der königlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftlichen Klasse 68, 555–591.
Nopcsa, F., 1902a. Dinosaurierreste aus Siebenbürgen II. (Schädelreste von *Mochlodon*). Mit einem Anhange: zur Phylogenie der Ornithopodiden. Denkschriften der königlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftlichen Klasse 72, 149–175.
Nopcsa, F., 1902b. Über das Vorkommen von Dinosauriern bei Szentpéterfalva. Zeitschrift der deutschen geologischen Gesellschaft 72, 34–39.
Nopcsa, F., 1903. *Telmatosaurus*, a new name for the dinosaur *Limnosaurus*. Geological Magazine 10, 94–95.
Nopcsa, F., 1904. Dinosaurierreste aus Siebenbürgen III. Weitere Schädelreste von *Mochlodon*. Denkschriften der königlichen Akademie der Wissenschaften. Mathematisch–Naturwissenschaftliche Klasse 74, 229–263.
Nopcsa, F., 1905a. Zur Geologie der Gegend zwischen Gyulafehérvár, Déva, Ruszkabánya und der Rumänischen Landesgrenze. Mitteilungen aus dem Jahrbuche der königlich ungarischen geologischen Reichsanstalt 14, 93–279.
Nopcsa, F., 1905b. Zur Geologie von Nordalbanien. Jahrbuch der Kaiserlich–Königlichen Geologischen Reichsanstalt 55 (1), 85–152.
Nopcsa, F., 1915. Die Dinosaurier der siebenbürgischen Landesteile Ungarns. Mitteilungen aus dem Jahrbuche der königlisch ungarischen geologischen Reichsanstalt 24, 1–24.
Nopcsa, F., 1923. On the geological importance of the primitive reptilian fauna of the uppermost Cretaceous of Hungary; with a description of a new tortoise (*Kallokibotium*). Quarterly Journal of the Geological Society of London 79, 100–116.
Nopcsa, F., 1928a. Dinosaurierreste aus Siebenbürgen IV. Wirbelsaule von Rhabdodon und Orthomerus. Palaeontologia Hungarica 1, 273–304.
Nopcsa, F., 1928b. Paleontological notes on Reptilia 7. Classification of the Crocodilia. Geologica Hungarica, Series Palaeontologica 1 (1), 75–84.
Nopcsa, F., 1929. Dinosaurierreste aus Siebenbürgen V. Geologica Hungarica, Ser. Palaeontologica 4, 1–76.
Nopcsa, F., 1934. The influence of geological and climatological factors on the distribution of non-marine fossil reptiles and Stegocephalia. Quarterly Journal of the Geological Society of London 90, 76–140.
Pană, I., Grigorescu, D., Csiki, Z., Costea, C., 2002. Paleo-ecological significance of the continental gastropod assemblages from the Maastrichtian dinosaur beds of the Haţeg Basin. Acta Palaeontologica Romaniae 3, 337–343.
Panaiotu, C., Panaiotu, C., 2002. Paleomagnetic studies. In: Grigorescu, D., Csiki, Z. (Eds.), 7th European Workshop on Vertebrate Palaeontology, Abstracts Volume and Excursions Field Guide. Sibiu, p. 59.
Pătraşcu, Ş., Şeclăman, M., Panaiotu, C., 1990. Tectonic implications resulted from paleomagnetic researches on Upper Cretaceous continental deposits of the Haţeg Basin (Romania). In: Grigorescu, D., Avram, E. (Eds.), Abstracts Volume, International Meeting of the IGCP Projects 245 (Non-marine Cretaceous Correlation) and 262 (Tethyan Cretaceous Correlation). Bucharest, p. 23.
Pătraşcu, Ş., Şeclăman, M., Panaiotu, C., 1993. Tectonic implications of paleomagnetism in Upper Cretaceous deposits in the Haţeg and Rusca Montană basins (South Carpathians, Romania). Cretaceous Research 14, 255–264.
Paul, G., 1988. Predatory Dinosaurs of the World. Simon and Schuster, New York. 464 pp.
Pereda Suberbiola, X., Galton, P.M., 1997. Armoured dinosaurs from the Late Cretaceous of Transylvania. Sargetia 17, 203–217.
Pereda Suberbiola, X., Taquet, P., 1999. Restes de *Rhabdodon* (dinosaure ornithopode) de Transylvanie donnés par Nopcsa au Muséum national d'Histoire naturelle de Paris. Geodiversitas 21, 156–166.
Pop, G., 1990. Geology of the marine Cretaceous of the Haţeg area. In: Grigorescu, D., Avram, E., Pop, G., Lupu, M., Anastasiu, N., Rădan, S. (Eds.), Field Guide of the IGCP Projects 245 (Non-marine Cretaceous Correlation) and 262 (Tethyan Cretaceous Correlation) International Symposium. Bucharest, pp. 28–43.
Pop, G., Szász, L., Ion, J., Antonescu, E., 1990. Late Cretaceous deposits from the Haţeg area. In: Grigorescu, D., Avram, E. (Eds.), Abstracts Volume, International Meeting of the IGCP Projects 245 (Non-marine Cretaceous correlation) and 262 (Tethyan Cretaceous correlation). Bucharest, p. 25.
Rădulescu, C., Samson, P.-M., 1986. Précisions sur les affinites des multituberculés (Mammalia) du Crétacé supérieur de Roumanie. Comptes Rendus de l'Académie des Sciences Paris 304, 1825–1830.
Rădulescu, C., Samson, P.M., 1990. Addition to the knowledge of multituberculata of Romania. In: Grigorescu, D., Avram, E. (Eds.), Abstracts Volume, International Meeting of the IGCP Projects 245 (Non-marine Cretaceous Correlation) and 262 (Tethyan Cretaceous Correlation). Bucharest, p. 29.

Rădulescu, C., Samson, P.-M., 1996. The first multituberculate skull from the Late Cretaceous (Maastrichtian) of Europe (Haţeg Basin, Romania). Anuarul Institutului Geologic al României 69, 177–178.
Schafarzik, F., 1909. Nyíresfalva és Vaspatak környékének geologiai viszonyai Hunyad vármegyében. Magyar Királyi Földtani Intézet, Évi Jelentések 1907-röl, 69–80.
Seeley, H.G., 1881. The reptile fauna of the Gosau Formation preserved in the geological museum of the University of Vienna. With a note on the geological horizon of the fossils at Neue Welt, east of Wiener Neustadt. Quarterly Journal of the Geological Society of London 37, 620–707.
Seeley, H.G., 1887. The classification of the Dinosauria. Report of the British Association for the Advancement of Science 57, 698–699.
Smith, T., Codrea, V., 2003. New multituberculate mammals from the Late Cretaceous of Transylvania (Romania). In: Codrea, V., Dica, P. (Eds.), Abstracts volume, Fourth National Symposium on Paleontology. Cluj-Napoca, p. 51.
Smith, T., Codrea, V., Săsăran, E., Van Itterbeck, J., Bultynck, P., Csiki, Z., Dica, P., Fărcaş, C., Folie, A., Garcia, G., Godefroit, P., 2002. A new exceptional vertebrate site from the Late Cretaceous of the Haţeg Basin (Romania). Studia Universitatis Babeş-Bolyai, Geologia, Special issue 1, 321–330.
Ştiucă, E., Panaitescu, C., Simionescu, D., 1982. Depozitele continentale cu dinosaurieni din Bazinul Haţeg. Monumentele geologice ale naturii, pp. 29–35.
Tasnádi-Kubacska, A., 1945. Franz Baron Nopcsa. Verlag des Ungarischen Naturwissenschaftlichen Museums, Budapest. (English translation by Weishampel, D.B., Kerscher, O.).
Therrien, F., 2005. Paleoenvironments of the Late Cretaceous (Maastrichtian) dinosaurs of Romania: insights from fluvial deposits and paleosols of the Transylvanian and Haţeg basins. Palaeogeography, Palaeoclimatology, Palaeoecology 218, 15–56.
Therrien, F., 2006. Depositional environments and fluvial system changes in the dinosaur-bearing Sânpetru Formation (Late Cretaceous, Romania): post-orogenic sedimentation in an active extensional basin. Sedimentary Geology 192, 183–205.
Therrien, F., Zelenitsky, D.K., Weishampel, D.B., 2009. Palaeoenvironmental reconstruction of the Late Cretaceous Sânpetru Formation (Haţeg Basin, Romania) using paleosols and implications for the "disappearance" of dinosaurs. Palaeogeography, Palaeoclimatology, Palaeoecology 272, 37–52.
Van Itterbeeck, J., Săsăran, E., Codrea, V., Săsăran, L., Bultynck, P., 2004. Sedimentology of the Upper Cretaceous mammal- and dinosaur-bearing sites along the Râul Mare and Bărbat rivers, Haţeg Basin, Romania. Cretaceous Research 25, 517–530.
Van Itterbeeck, J., Markevich, V.S., Codrea, V., 2005. Palynostratigraphy of the Maastrichtian dinosaur and mammal sites of the Râul Mare and Bărbat valleys (Haţeg Basin, Romania). Geologica Carpathica 56, 137–147.
Venczel, M., Csiki, Z., 2002. Mesozoic and Neozoic anurans (Amphibia: Anura) from the Carpathian Basin. In: Grigorescu, D., Csiki, Z. (Eds.), Abstracts volume, 7th European Workshop on Vertebrate Palaeontology. Sibiu, p. 42.
Venczel, M., Csiki, Z., 2003. New discoglossid frogs from the Latest Cretaceous of Haţeg Basin (Romania). Acta Palaeontologica Polonica 48, 599–606.
Vremir, M.M., 2004. Fossil turtle finds in Romania — overview. Magyar Állami Földtani Intézet Évi Jelentése 2002-röl, 143–152.
Weishampel, D.B., Jianu, C.-M., 1996. New theropod dinosaur material from the Haţeg Basin (Late Cretaceous, Western Romania). Neues Jahrbuch für Geologie und Paläontologie Abhandlung 200, 387–404.
Weishampel, D.B., Grigorescu, D., Norman, D.B., 1991. The dinosaurs of Transylvania. National Geographic Research, Exploration 7, 196–215.
Weishampel, D.B., Norman, D.B., Grigorescu, D., 1993. *Telmatosaurus transsylvanicus* from the Late Cretaceous of Romania: the most basal hadrosaurid dinosaur. Palaeontology 36, 361–385.
Weishampel, D.B., Jianu, C.-M., Csiki, Z., Norman, D.B., 1998. *Rhabdodon*, an unusual euornithopod dinosaur from the Late Cretaceous of western Romania. Journal of Vertebrate Paleontology 18, 85A suppl.
Weishampel, D.B., Jianu, C.-M., Csiki, Z., Norman, D.B., 2003. Osteology and phylogeny of *Zalmoxes* (n. g.), an unusual euornithopod dinosaur from the latest Cretaceous of Romania. Journal of Systematic Palaeontology 1, 65–123.
Willingshofer, E., 2000. Extension in collisional orogenic belts: the Late Cretaceous evolution of the Alps and Carpathians. Ph.D. thesis, Free University, Amsterdam.