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A WALNUT FROM THE DEJ TUFF (MIDDLE MIOCENE) AT TIOCU DE JOS (CLUJ DISTRICT)

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Abstract: A walnut preserved into the Dej Tuff (Middle Miocene) at Tiocu de Jos (Cluj district) not far form Gherla town, was collected during a survey carried on for the opening of a new open pit. Although its preservation is not an outstanding one, the few characters available suggest that it could belong to the *Juglans* genus. This kind of fossils is extremely rare in these rocks, this walnut being the first one ever mentioned in the Dej Tuff.

Key words: Romania, Basin of Transylvania, Middle Miocene, Early Badenian, macroflora, walnut.

Introduction

The last sedimentary basin, which evolved on the actual Transylvanian Depression area, started its activities since the Middle Miocene, once with the Badenian marine transgression, in Moravian. As a consequence, over a very heteroclite lithological basement, on can follow the Dej Formation [7], the first Badenian lithostratigraphic unit, belonging more exactly to the Moravian (Early Badenian, NN 5) [5]. Into this formation, over a discontinuous conglomerate member (Ciceu-Giurgeşti Member), one can find the so-called "Dej Tuff Complex", for the first time described in the second half of the 19th century by Pošepny [8]. It refers to a dominating acid volcanic event, which erected a pile of rhio-dacitic rocks. These volcanic activities had continued even after the Dej Tuff deposition along the whole Badenian [4]. These volcanic tuffs are excellent correlation markers in the boreholes drilled for gas in the Basin of Transylvania.

The Dej Formation bears a lot of fossils belonging to invertebrate and even vertebrate fauna. On the opposite, these rocks are practically devoid of macroflora [2].

Some time ago, from the Dej Tuff cropping out at Tiocu de Jos, not far from Gherla and Dej towns (Fig. 1), a walnut fragment was collected. This fossil makes the object of the following description.

Geological setting

Clichici & Niţă-Pion [1] described a succession comprising three main levels belonging to the Dej Formation exposed at Tiocu de Jos:

- lower (6-8 m), with plankton foraminifers-bearing marls and sand;
- middle (4-14 m) with coarse tuffs;
- upper (about 30 m) with fine tuffs.

Not very long time ago, a geological survey started in order to open there a new open pit, for mining the Dej Tuff. It confirmed the previous observations and allowed to collect some fossils originating from tuff. By far, among them the most interesting one is a walnut fragment. The walnut fragment was found in the coarse tuff, *i.e* the middle level of the succession previously mentioned (Fig. 2). This rock is greenish, with vacuolar texture, showing some fossil plant concentrations, poorly preserved.

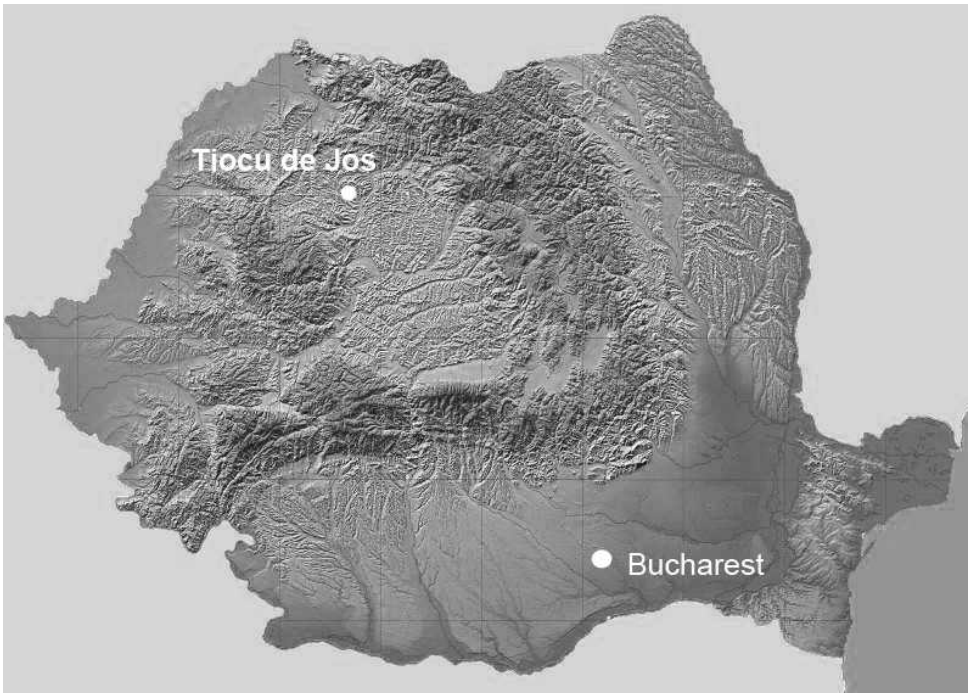

Fig. 1: Location of Tiocu de Jos

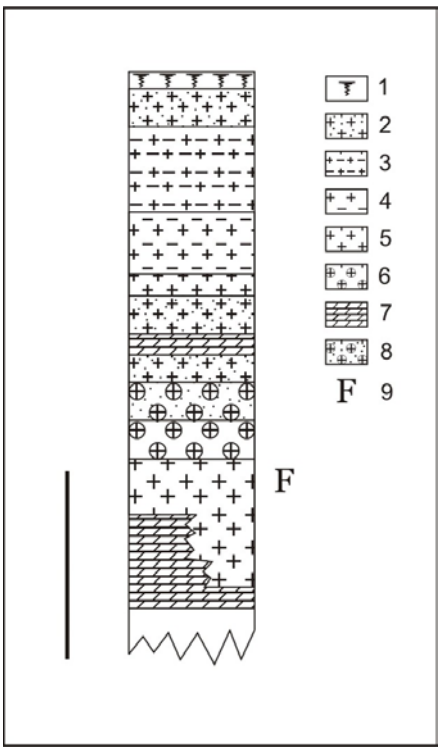

Fig. 2: Lithologic logg of the Dej Tuff exposed at Tiocu de Jos (Cluj district; according [1], modified): 1 – soil; 2 – fine Dej Tuff; 3 – tuffaceous sand marl with or without tuff interbedded; 4 – tuffaceous clay; 5 – coarse Dej Tuff; 6 – mean-coarse tuff; 7 – marl; 8 – sandy mean-coarse tuff; 9 – walnut site. Scale bar: 4 m

Description

The tuff block available for study bears only a half of the walnut: the other half was lost during the rock extraction (Fig. 3). The organic matter was completely substituted by minerals. The color of the fossil is light brown, contrasting with the greenish color of the rock. In its distal

side, the walnut shell is damaged: before burial, the shell had been broken and the sediment penetrated into the fruit.

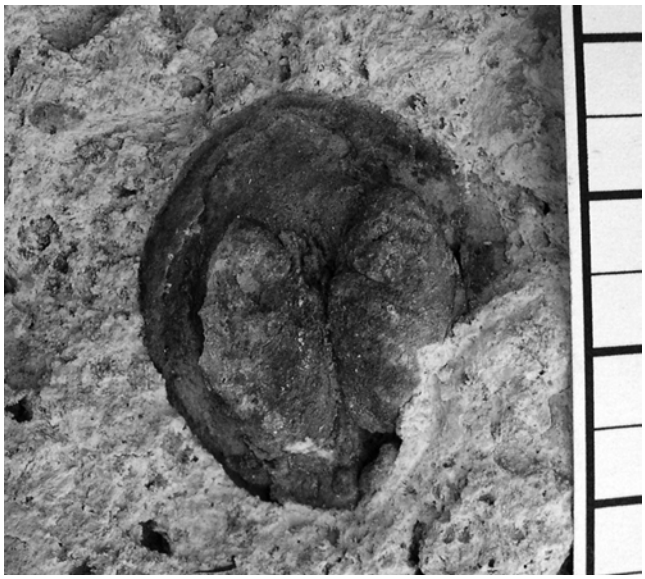

Fig. 3: The *Juglans* walnut found at Tiocu de Jos (Cluj district)

The walnut shell section shows an oval outline, with its largest width in its middle part. The apex is short and acuminate. The exocarpe is not fossilized. The endocarpe is poorly preserved. On its surface one cannot observe its ornamentation, due to the rock close adherence. It is relatively thick. The two seed casts (16 x 7.5 mm) with reniform shapes were located in loges interconnected toward their upper part.

Dimensions: L – 28 mm; W – 24.5 mm.

Discussion

Walnuts are uncommon fossils in the Middle Miocene sediments from Transylvania. However, such fossils are not completely missing: from the salt rock lying just above the Dej Formation (*i.e.* the Ocna Dej Formation) Tuzson [9] mentioned *Juglans palaeoragia* TUZSON 1912 at Turda, and Givulescu & Mârza [3] described a walnut half shell originating from the salt mine from Praid, assigned to *Juglans*, Rhysocaryon section.

The fossil we have on hand doesn't allow a fair assignation, due to its bad preservation. However, it keeps enough characters for an allocation to *Juglans* genus.

This walnut probably reached the Badenian marine realm from Tioc area carried by the river streams from the neighboring land. The fruit was mature when it was carried into the marine basin, that explaining the absence of the exocarpe.

The presence of *Juglans* in the Dej Tuff is in accordance to the Lower Badenian climate reconstructions from the other regions from Transylvania, mentioning a warm subtropical environment, with some tropical relict influences [6].

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REFERENCES

1. Clichici, O., Niţă, P.P., 1991, Lithostratigraphic approaches to the Dej Tuff Complex through drillings in the area: South-Dej-Cornești-Tioc; Pâglișa. In: Mârza, I., (ed.), *The volcanic tuffs from the Transylvanian Basin*, Cluj-Napoca: 349-355.
2. Givulescu, R., 1991, Les plantes fossiles des tufs volcaniques de Roumanie. In: Mârza, I., (ed.), *The volcanic tuffs from the Transylvanian Basin*, Cluj-Napoca: 63-66.
3. Givulescu, R., Mârza, I., 1999, Sur la présence d'une noix de *Juglans* dans le massif de sel de Praid, dép. de Harghita, Roumanie, *Révue Roumaine de Géologie*, **43**, Bucureşti: 63-64.
4. Mârza, I., Mészáros, N., 1991, Les tuffs volcaniques de Transylvanie: historique, valeur théorique et pratique dans le développement de la géologie transylvaine. In: Mârza, I., (ed.), *The volcanic tuffs from the Transylvanian Basin*, Cluj-Napoca: 11-21.
5. Mészáros, N., Nicorici, E., Ianoliu, C., 1991, Le nannoplacton et la microfaune du Complexe du Tuf de Dej de la région Cluj-Napoca. In: Mârza, I., (ed.), *The volcanic tuffs from the Transylvanian Basin*, Cluj-Napoca, 73-81.
6. Petrescu, I., 2003, *Palinologia Terțiarului*, Editura Carpatica, Cluj-Napoca, 248 p.
7. Popescu, Gh., 1970, Planktonic foraminiferal Zonation in the Dej Tuff Complex, *Révue Roumaine de Géologie, Géophysique, Géographie, Série Géologie*, **14**, 2, Bucureşti: 189-203.
8. Pošepny, Fr., 1867, Schichtung des Siebenbürgischen Steisalzes, *Verhandlungen der kaiserlich-königlichen Geologischen Reichsanstalt*, **7,** Wien: 134-135.
9. Tuzson, J., 1912, Adatok Magyarorszag fossilis florajahoz, *A Magyar Kiraly Földtani Intezet Evkonyve*, **XXI,** Budapest: 207-234.

ASUPRA PREZENȚEI UNEI NUCI ÎN TUFUL DE DEJ (MIOCEN MEDIU) DE LA TIOCU DE JOS (JUD. CLUJ)

(Rezumat)

Ultimul dintre bazinele sedimentare care a evoluat în aria actualei Depresiuni a Transilvaniei a devenit funcțional în Miocenul mediu, începând cu transgresiunea badeniană (Moravian). În consecință, deasupra unui fundament heteroclit ca litologie, se dispune discordant Formațiunea de Dej în cadrul căreia, peste un nivel conglomeratic bazal se găsește cantonat așa-numitul „Complex al Tufului de Dej" semnalat încă din secolul al XIX^{lea} de Pošepny [8]. Acesta semnifică un episod cineritic acid, dominant rio-dacitic. De altfel, vulcanismul s-a demonstrat manifest şi subsecvent Tufului de Dej, pe întreg parcursul Badenianului şi chiar ulterior, în Sarmațian.

În general, macroflora fosilă cunoscută din tufurile miocene din Transilvania este extrem de rară, iar în Tuful de Dej este practic inexistentă [2]. Din acest considerent, orice astfel de element adițional devine important îndeosebi pentru reconstituirile paleoambientale ale ariilor emerse învecinate bazinului miocen al Transilvaniei. Cu prilejul lucrărilor de deschidere a unei noi cariere pentru exploatarea Tufului de Dej, localizată la Tiocu de Jos, nu departe de Gherla, a fost descoperită o jumătate de nucă fosilizată în tuf (cea de a doua jumătate s-a pierdut cu prilejul lucrărilor de derocare).

Nuca fosilă conservă endocarpul şi cotiledoanele seminței aflate în interior, păstrate sub formă de mulaje. Judecând după elementele anatomice conservate, nuca în discuție poate fi atribuită genului *Juglans*. O astfel de prezență nu este deloc surpinzătoare, o astfel de nucă fiind semnalată din sarea badeniană de la Praid [3], secvență care se dispune imediat deasupra Complexului Tufului de Dej şi care revine Wielicianului (Badenian mediu).

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