

## A REVISION OF TAXACEAE REMAINS OF THE LATE MIOCENE FOSSIL FLORA FROM CHIUZBAIA, MARAMUREȘ COUNTY, ROMANIA

**Gheorghe MACOVEI**

*Tech Univ Cluj Napoca, North Univ Center Baia Mare, 62/A Dr. Victor Babeș Street, 430083 Baia Mare, Romania;  
ubm\_macovei@yahoo.com*

**Abstract:** New genera and new species of fossil flora for Romania and Europe were described at Chiuzbaia. Among paleofloristical novelties, the remains of *Taxaceae* – determined by Givulescu and Olos with name of *Taxus inopinata* sp. nov. – can be found. Recent studies permitted the comparison between some micromorphological features of *Taxaceae* fossils leaves and the modern *Taxus baccata*. The data presented in this paper proves the presence of *Taxus* remains, which has affinities with modern *Taxus baccata*. Given this aspect, I consider that the adequate name for these leaves remains is *Taxus* sp. aff. *T. baccata* L., 1753. This species is representative for Upper Miocene with some micromorphological features slightly different than modern *T. baccata* L. that defines an ancestral form of the modern species. These are the only Miocene remains of *Taxus* from Romania.

**Key words:** *taxaceae*, macromorphology, micromorphology, Late Miocene, Chiuzbaia, Romania.

### 1. INTRODUCTION

The fossils plants site is situated in the North-West of Romania (Maramureș County), near the city of Baia Mare (Fig. 1).

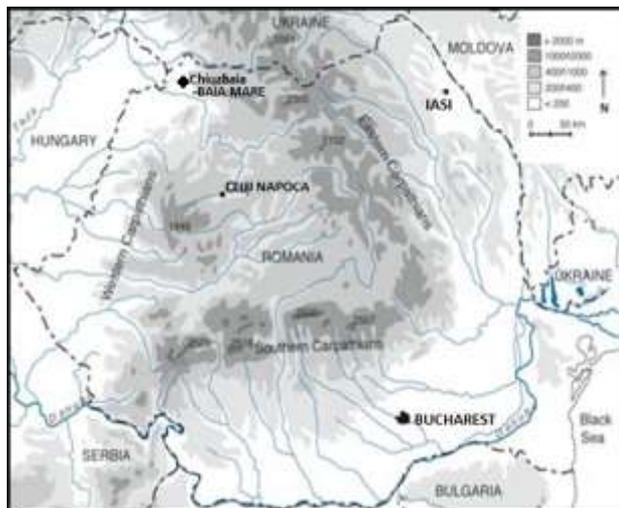


Figure 1. Location of Chiuzbaia on the map of Romania.

The deposit of fossil plants is located north from Chiuzbaia village, on the southern flank of Igniș Mountain, at 800m altitude. The region consists of lava flow, necks and volcanic breccias. Above the lava flows and under the upper volcanic

breccias, appears intercalations made up of an alternation of finer or rougher tuffs and more or less compacted or even diatomite - slightly affected by thermic contact metamorphism - which contains an impressive number of fossil plants. (Givulescu 1990, describes the following fossils points marked with the letters A, B, C, E, E1, G, H and F).

The fossil flora from Chiuzbaia can be included between the Sarmatian fossil flora from Felsőtárkány and Pannonian fossil flora from Tiszapalkonya and Dozmat from Hungary (10.9-10.1 M.a. based on the K/Ar age, Macovei 2011). The number of species is very large, being the richest and most representative flora in Central Paratethys. New genera and new species for the Romanian and European fossil flora have been described.

Previous studies of the fossil flora from Chiuzbaia have been made by Staub (1885), Polonic & Polonic (1962), Givulescu & Olos (1973), Givulescu (1975, 1990), Givulescu & Macovei (1995), Macovei & Gudasz (1996, 1998), Macovei & Givulescu (2006) and Macovei (2011).

For the samples storage places the following abbreviations were used: MMBM-Museum of Mineralogy, Baia Mare; PLBB-Paleontology Laboratory of the University “Babeș-Bolyai” Cluj Napoca.

## 2. SYSTEMATICS

### *Taxaceae*

*Taxus* sp. aff. *T. baccata* L., 1753, Figs. 2 and 3.

1973 *Taxus inopinata* sp. nov. Givulescu & Olos, p.32, pl. 11, figs.1-6; pl.13, fig.1, pl. 15, figs. 5., 11 and 12.

1975 *Taxus inopinata* Givulescu, p.27, pl.15, figs. 1 and 2.

1990 *Taxus inopinata* Givulescu, p.29, pl. 5, fig.14, pl.24, figs.1-2, pl.26, fig.2.

#### 2.1. Materials

MMBM: sample 0967 G; PLBB: 15917 (microscope sample).

#### 2.2. Description

*Macromorphology.* Lamina has the linear shape, with the acute apex, the acute base and the entire margin. Petiole is absent. The venation is Hyphodromous type with the midrib clearly visible and right. Biometry (Fig. 2): length – 19 mm, width – 1.8 mm, l/w – 10.55, surface 0.52 cm<sup>2</sup> nannophyll.



Figure 2. *Taxus* sp. aff. *T. baccata* L.

*Micromorphology.* Adaxial epidermis is composed of rectangular cells, short, almost quadratic, with poorly rounded edges, disposed in straight parallel rows. The cell walls are straight and thickened (Fig. 3). Abaxial epidermis has rows of cells with stomata alternating rows of cells without stomata. On the rows without stomata, the cells are square in shape, with straight walls and round edges. On the rows with stomata, the cells are rectangular in shape. Stomata disposed in rows, unequally spaced out, having 4-5 annexed cells of variable shape. The adaxial epidermis sizes: length 32-64 μm, width 22-27 μm. Stomata sizes: length 36 μm, width 36-45 μm.



(scale 30 μm)

Figure 3. *Taxus* sp. aff. *T. baccata* L. (adaxial epidermis).

### 3. REMARKS

Unfortunately, Miocene fossil leaves of *Taxus* are rare, reason why the possibilities of determination by comparison are quite limited. Just as noticed by Givulescu & Olos (1973) the comparisons of morpho-anatomical features were not satisfactory at that time. Based on available data, the authors believed that the modern *Taxus baccata* L. can be brought into discussion, but the comparison between the two species shows that they are not identical, and on this consideration the leaves remains received the name of *Taxus inopinata* sp. nov. More recent data (Corneanu et al., 2004) shows a comparison between some micromorphological features of *Taxus* fossils leaves and the modern *Taxus baccata*. The abaxial epidermis, of modern species made of rows of cells with stomata alternating with rows of cells without stomata, has similar features to the species from Miocene. Within the variability limits for the size of the epidermal cells and the stomata length underlines the affinity between the two species (Table 1).

Table 1. Comparative features of micromorphological dates

Species		<i>Taxus baccata</i> L. Corneanu et al., 2004	<i>Taxus inopinata</i> G. Givulescu 1975
Analysed feature		Limit of variability	Limits of variability
Adaxial epidermis	Cell length (µm)	27.5 – 82.5	32 - 64
	Cell width (µm)	21.3 – 37.5	22 - 27
Abaxial epidermis	Cell length (µm)	55.0 – 107.	-
	Cell width (µm)	17.5 - 30.0	-
Stomata length (µm)		32.5 – 40.0	36

This analysis shows the existence of two genetic mechanisms involved in the speciation and evolution process, represented by the polyploidy phenomenon and gene amplification (Corneanu et al., 2004).

In the same context I also mention the description of *Taxus schornii* leaves found in a Middle Miocene deposit of N Idaho (SUA) are similar in anatomical features to the modern *T. brevifolia* (Kvaček & Rember 2000, 2007).

This discovery indicates that differences in numbers of stomata rows for North American species had been established by the Miocene, lending support to the idea that present day *Taxus* species were established by the end of the Tertiary Period (Spjut 2007).

As it results from my analysis the *Taxus* remains has affinities with modern *Taxus baccata*. Based on this certainty it's best to consider that the adequate name for these leaves remains is *Taxus sp. aff. T. baccata* L., 1753. This species is representative for Upper Miocene with some micromorphological features slightly different than the modern *T. baccata* L., defining an ancestral form of the modern species (Figs. 2 and 3).

#### 4. MODERN EQUIVALENTS

*Taxus baccata* is a large shrub or tree up to 20 m in height that grows on rocky walls in the northern and middle Europe, as well as in humid mountain forests. Also vegetates in and around the Mediterranean region, Algeria, Minor Asia and even in Caucasus. It prefers shady places and moisture.

*Taxus baccata* is the longest-living plant in Europe.

#### 5. ECOLOGY

This species is arctotertiary, temperate element. Most probably is a component of mesophytic forests.

#### 6. OCCURRENCE

These are the only Miocene remains of *Taxus* from Romania. In Europe, Miocene remains of *Taxus* were described in NW of Bohemia, Czech Republic (Kvaček 1984).

#### 7. CONCLUSION

New data on morpho-anatomical features have permitted the opportunity to revise the remains of taxaceae from the fossil flora at Chiuzbaia.

The revised name is *Taxus sp. aff. T. baccata* L., 1753.

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