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IDENTIFICATION OF FOSSIL TRUNKS FROM BÜKKÁBRÁNY NEWLY INSTALLED IN THE VISITOR CENTRE OF THE IPOLYTARNÓC FOSSILS NATURE RESERVE (NOVOHRAD – NÓGRÁD GEOPARK) IN NORTHERN HUNGARY

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Abstract

GRYC, V., SAKALA, J.: *Identification of fossil trunks from Bükkábrány newly installed in the Visitor Centre of the Ipolytarnóc Fossils Nature Reserve (Novohrad – Nógrád Geopark) in Northern Hungary.* Acta univ. agric. et silvic. Mendel. Brun., 2010, LVIII, No. 5, pp. 117–122

The Late Miocene forest was discovered in the opencast lignite mine of Bükkábrány which is situated in the foothills of the Bükk Mountains (NE Hungary). Sixteen stumps were exposed upright in 2007 at their original position. Five stumps were installed in the Ipolytarnóc Fossils Nature Reserve. They are identified in the present paper. The wood of one fossil trunk (No. 1) has been identified as *Glyptostroboxylon rudolphii*, which represents the wood of *Glyptostrobus*. Its main microscopic features are: visible growth rings, gradual transition between early- and late wood, rather small opposite bordered pits in 1–2 loosely spaced vertical rows with infrequent crassulae, uniseriate rays formed of procumbent cells without ray tracheids, 1–3 "glyptostroboid" cross-field pits per field and resin canals absent. The four remaining stumps (Nos. 2–5) have been identified as *Taxodioxylon germanicum*. Their main microscopic features are: growth rings, abrupt transition between early- and late wood, opposite bordered pits in 1–3 regular vertical rows with frequent crassulae, uniseriate rays formed of procumbent cells without ray tracheids, 1–3 taxodioid cross-field pits per field arranged mostly in one horizontal row, axial parenchyma both in early and late wood (diffuse arrangement) with smooth transverse end walls and resin canals absent. This species most probably represents the wood of *Sequoia*.

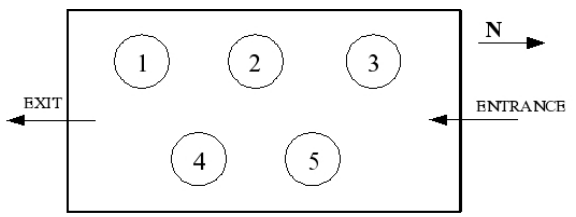
Glyptostroboxylon, *Taxodioxylon*, Late Miocene, xylite, Hungary

The Early Miocene fossil location of Ipolytarnóc is very famous thanks to the presence of numerous fossils and imprints such as shark teeth, fossil wood, leaf impressions and footprints (e.g., Hably, 1985; Erdei *et al.*, 2007; Szarvas, 2007; for exact dating see Pálfy *et al.*, 2007). The most remarkable fossil there is a giant silicified tree trunk, originally 46 meters long?, which was discovered in 1836 and described later by Tuzson (1901). This conifer, known today as *Pinuxylon tarnocziense* (Tuzson) Greguss, is together with a layer full of vertebrate footprints the main attraction of the nature reserve. A modern Visitor Centre was built recently near the main entrance to the Ipolytarnóc Fossils Nature Reserve. In front of the Visitor Centre, five huge xylitic stumps were installed and covered with a wooden house (Fig. 1). The stumps represent the rest of the sixteen stumps, which were originally exposed in 2007 in the Bükkábrány opencast lignite mine at the depth of 60 m. Four stumps are preserved in the Herman Ottó Museum in Miskolc. The xylotomical observations made by Dolezych in Erdei *et al.* (2009) on the material collected directly from the Bükkábrány mine show that there are two types: *Taxodioxylon germanicum* which may be related to modern *Sequoia* and *Glyptostroboxylon* sp. related most probably to *Glyptostrobus*. The stumps installed in Ipolytarnóc are not identified thus the aim of the presented paper is to find out to which of these two types they belong.

1: *Stump No. 3 and Sakala family as scale (August 2009)*

MATERIAL AND METHODS

The five stumps with basal portions of trunks are installed in the wooden house in two horizontal rows divided by a pathway. Therefore, when seen from above they look like "the Olympic rings" and can be numbered as you can see on the Fig. 2, the wood samples are then numbered with prefix "Bü" as "Bükkábrány". The stumps were sampled by the second author during his visit to the Ipolytarnóc Fossils Nature Reserve in August 2009, benefiting greatly from the hospitality of Imre Szarvas. The samples were later prepared as thin sections (boiled in water to become softer, then cut with razor blades and mounted in glycerine jelly) and observed by a light microscope Leica DMLS (Vavrčík and Gryc, 2004). The anatomical descriptions were made in accordance with the IAWA standard for softwood (IAWA Committee, 2004).



2: *Position of five trunks in the wooden house, entrance is from the area in front of the Visitor Centre (N points roughly to the north); circles are not proportional to the diameter of the stems*

RESULTS

Cupressaceae s. l.

Taxodioxylon Hartig

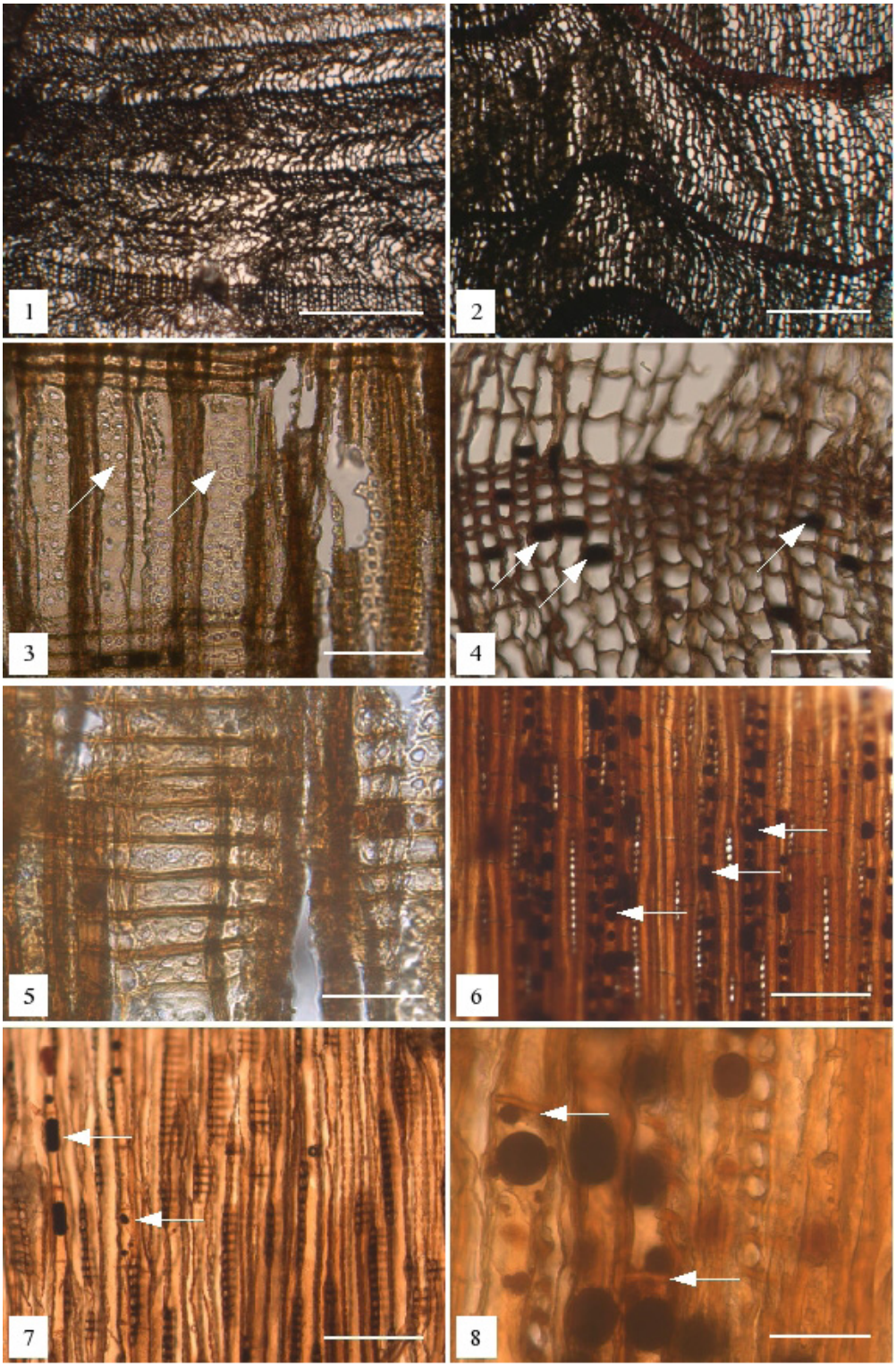
Taxodioxylon germanicum (Greguss) Van der Burgh

(Microscopic observation – see Fig. 3)

2009 *Taxodioxylon germanicum* (Greguss) Van der Burgh; Dolezych in Erdei *et al.*, p. 73, pl. 2, figs. 18, pl. 3, figs. 1–6.

Samples Nos. Bü 2–5

Microscopic description: Wood: coniferous. – Growth rings: present; abrupt transition between early wood and late wood, wavy ring boundaries caused by buttressed form of trunks. – Tracheids: polygonal in cross section, radial diameter of early wood tracheids 44–56–76 µm, radial diameter of late wood tracheids 7–16–30 µm; cell wall thickness of early wood tracheids 1.5–2–2.5 µm, cell wall thickness of late wood tracheids 4.5–5.5–6.5 µm. – Bordered pits: opposite, circular, frequently in 1–3 ver-



3: *Microscopic observation of trunks 3 and 4 – Taxodioxylon germanicum*
1 – TS, sample Bü 03, abrupt transition between early and late wood, scale bar 500 µm.
2 – TS, sample Bü 04, abrupt transition between early and late wood, scale bar 500 µm.
3 – RLS, sample Bü 03, bi- to triseriate bordered pits in radial wall of tracheids with frequent crassulae (white arrows), scale bar 100 µm.
4 – TS, sample Bü 04, diffuse axial parenchyma (white arrows), scale bar 100 µm.
5 – RLS, sample Bü 03, taxodioid cross-field pits, scale bar 50 µm.
6 – TLS, sample Bü 04, axial parenchyma with dark resin substance (white arrows), scale bar 200 µm.
7 – TLS, sample Bü 03, axial parenchyma with dark resin substance (white arrows), scale bar 200 µm.
8 – TLS, sample Bü 04, smooth transverse end walls of axial parenchyma cells (white arrows), scale bar 50 µm.

tical rows in radial tracheid walls, crassulae often present, diameter of the bordered pits up to14 µm (early wood tracheids). – Ray: uniseriate, formed of procumbent parenchyma cells, without ray tracheids, up to 15 (20) cells high (medium height) with smooth end walls of ray parenchyma; 1–3 taxodioid cross-field pits per field, arranged mostly in one horizontal row (in marginal cells up to 6 cross-field pits in 2 horizontal rows). – Axial parenchyma: present in early and late wood (diffuse arrangement), sometimes in short tangential bands with smooth transverse end walls, often with dark resin substance. – Resin canals: absent.

Glyptostroboxylon Conwentz emend. Dolezych & Van der Burgh

Glyptostroboxylon rudolphii Dolezych & Van der Burgh

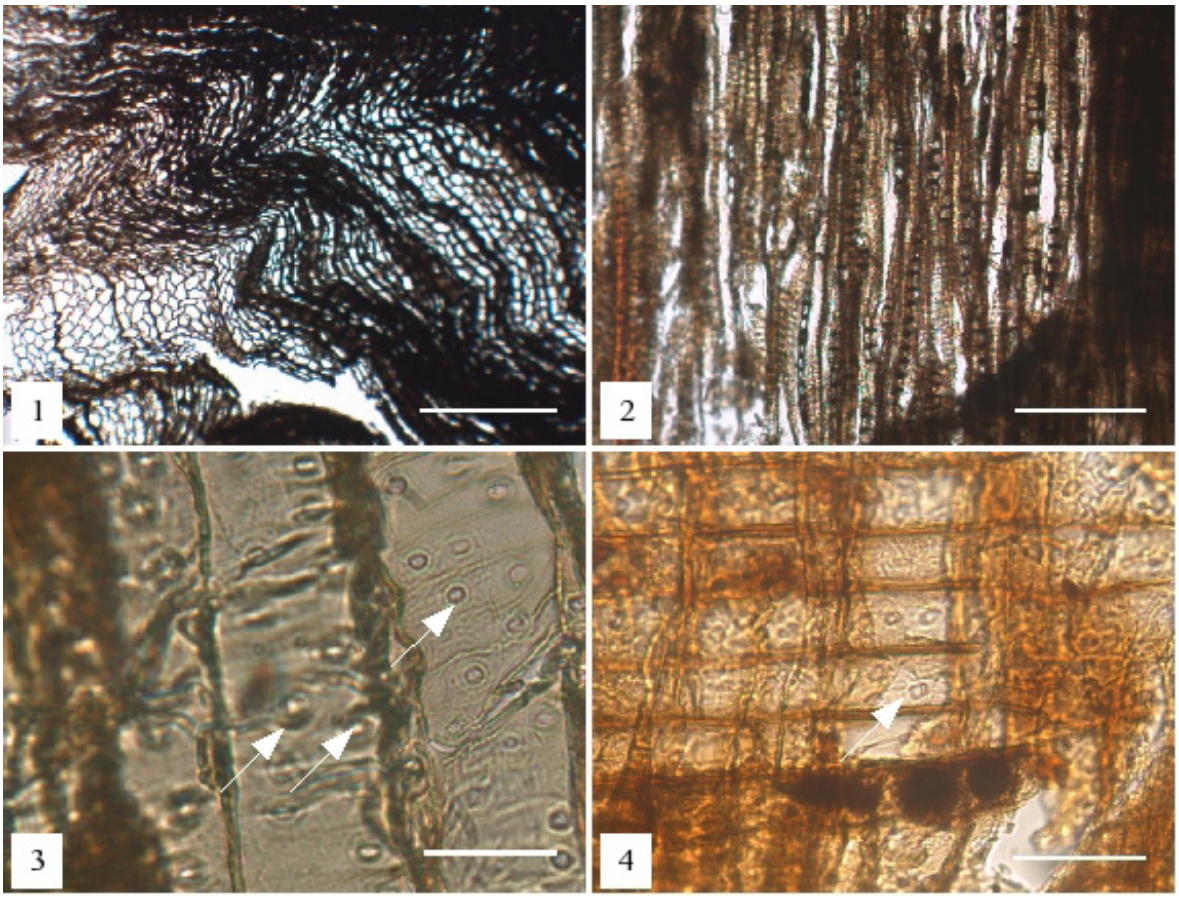
(Microscopic observation – see Fig. 4)

2004 *Glyptostroboxylon rudolphii* Dolezych & Van der Burgh; Dolezych & Van der Burgh, p. 409, text-figs. 6–7, pl. 2, figs. 1–9, pl. 3, figs. 1–5.

2009 *Glyptostroboxylon* sp.; Dolezych in Erdei *et al.*, p. 75, pl. 3, figs. 7, 8, pl. 4, figs. 1, 2.

Sample No. Bü 1

Microscopic description: Wood: coniferous. – Growth rings: present; gradual transition between early wood and late wood, wavy ring boundaries caused by buttressed form of trunks. – Tracheids: polygonal in cross section. – Bordered pits: opposite, circular, rather small, loosely spaced in 1–2 (less commonly 3) vertical rows in radial tracheid walls, crassulae present for biseriate bordered pits, diameter of the bordered pits up to 12 µm (early wood tracheids). – Ray: uniseriate formed of procumbent parenchyma cells, without ray tracheids, up to 15 cells high (medium height) with smooth end walls of ray parenchyma; 1–3 "glyptostroboid" (= taxodioid with very narrow borders approaching almost pinoid) cross-field pits per field, sometimes also taxodioid or rare cupressoid. – Axial parenchyma: present, type of transverse end walls unknown, often with dark resin substance. – Resin canals: absent.



4: *Microscopic observation of trunk 1 – Glyptostroboxylon rudolphii*
1 – TS, gradual transition between early and late wood, scale bar 500 µm.
2 – TLS, uniseriate rays, scale bar 200 µm.
3 – RLS, uni- and biseriate bordered pits (white arrows) in radial wall of tracheids, scale bar 50 µm.
4 – RLS, "glyptostroboid" or cupressoid (white arrow) cross-field pits, scale bar 50 µm.

DISCUSSION

All fossil woods included in the first group (samples no. Bü 2–5) are characterized by abrupt transition between early wood and late wood, quite small mostly biseriate bordered pits with common crassulae and predominance of taxodioid cross-field pits arranged mainly in one horizontal row. This perfectly fits the description of *Taxodioxylon germanicum* given by Dolezych in Erdei *et al.* (2009: 73); therefore, there is no any doubt that they both represent this species.

On the other hand, the wood from trunk No. 1 is slightly different: the transition between early wood and late wood is gradual, bordered pits are smaller and irregularly spaced with infrequent crassulae and finally, cross-field pits are mainly glyptostroboid and not arranged in horizontal rows. This sample surely corresponds to *Glyptostroboxylon* sp. as described by Dolezych in Erdei *et al.* (2009: 75). Moreover, our fossil wood, mainly its radial section fits *Glyptostroboxylon rudolphii* as described originally by Dolezych and Van der Burgh (2004). We then propose 1) to denominate our fossil wood as *Glyptostroboxylon rudolphii* and 2) to include into synonymy the original material described by Dolezych in Erdei *et al.* (2009) as *Glyptostroboxylon* sp. based on its great overall similarity.

CONCLUSIONS

Our new xylotomical analyses clearly show that there is only one fossil trunk (no. 1) from Bükkábrány among those newly installed in the Ipolytarnóc Fossils Nature Reserve which represents the wood of *Glyptostrobus*, more specifically morphospecies *Glyptostroboxylon rudolphii*. The four remaining stumps (nos. 2–5) can be all denominated as *Taxodioxylon germanicum*, which most probably represents the wood of *Sequoia*.

SOUHRN

Identifikace fosilních kmenů z lokality Bükkábrány, nyní uložených v přírodní paleontologické rezervaci v Ipolytarnóci v severním Maďarsku

Práce se zabývá mikroskopickou analýzou a identifikací fragmentů kmenů, které byly nalezeny v lignitovém lomu u obce Bükkábrány (Maďarsko) v hloubce 60 m a posléze byly přemístěny do přírodní paleontologické rezervace v Ipolytarnóci v severním Maďarsku. Zbytky kmenů pocházejí z období třetihor – mladší miocén.

Celkem bylo analyzováno pět kmenů, které se nacházejí pod dřevěným přístřeškem u vstupu do návštěvnického centra. Kmeny byly označeny čísly 1 až 5 a jejich pozice je znázorněna na obrázku 2. Z mikroskopické analýzy vyplývá, že v kolekci jsou zastoupena dřeva rodu *Glyptostroboxylon* (kmen s označením 1) a *Taxodioxylon* (kmeny 2–5).

Glyptostroboxylon byl charakterizován následujícími znaky: dřevo jehličnaté, letokruhy zřetelné, středně ostrý přechod mezi jarním a letním dřevem v rámci letokruhu; menší dvojtečky na stěnách tracheid v jednořadém nebo párovém uspořádání, volně rozmístěny na radiální stěně; dřeňové paprsky jednovrstevné, homocelulární, glyptostroboidní typ ztenčenin v křížovém poli; axiální parenchym přítomen; pryskyřičné kanálky nepřítomny. Vzorek kmene (č. 1) byl identifikován jako morfodruh *Glyptostroboxylon rudolphii* představující dřevo jehličnanu *Glyptostrobus*.

U kmenů 2–5 (rod *Taxodioxylon*) byly pozorovány následující mikroskopické znaky: dřevo jehličnaté, letokruhy zřetelné, ostrý přechod mezi jarními a letními tracheidami v letokruhu; 1 až 3 dvojtečky v horizontálních řadách na radiálních stěnách tracheid, krasuly často přítomny; dřeňové paprsky jednovrstevné, homocelulární, 1–3 ztenčeniny v křížovém poli (taxodioidní typ); axiální parenchym přítomen v jarním i letním dřevě, typ difúzní, popř. tvořící krátké tangenciální skupinky); pryskyřičné kanálky nepřítomny. Na základě pozorovaných znaků se lze domnívat, že se jedná o morfodruh *Taxodioxylon germanicum* představující pravděpodobně dřevo jehličnanu *Sequoia*.

Glyptostroboxylon, *Taxodioxylon*, mladší miocén, xylit, Maďarsko

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