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NEW FOSSIL WOOD FROM THE LATE BADENIAN FOREST OF PRĂVĂLENI, METALLIFEROUS MTS.
(2ND PART)

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Abstract: This is the second part of the study on a new collection of fossil wood from Prăvăleni (Zarand, South Apuseni - Metalliferous Mts., Romania). Three taxa have been identified by xylotomical study of six specimens: *Populoxylon* sp. (cf. *Populus alba* L.), *Fraxinoxylon prambachense* HOFMANN, *Fraxinoxylon komlosense* GREGUSS. These new identifications argue the frequency of this kind of trees within the arboreal association of the Late Badenian Forest vegetation developed on the slopes of Tălagiu Volcano.

KEY WORDS: Late Badenian, fossil forest, petrified wood, *Populoxylon*, *Fraxinoxylon*.

I. INTRODUCTION

The volcano-sedimentary rocks seem to be the best deposits that preserve fossil wood remains by petrifying them and the Late Badenian Formation of Tălagiu (South Apuseni Mts.) is an example. In the last 50 years, a lot of fossil taxa have been identified from there by Nagy & Mârza (1967), Petrescu & Nuțu (1969-1972), Iamandei (2000, 2002), Iamandei & Iamandei (1997-2004); the previous authors also described the geological setting of this fossiliferous site.

This is second part of the paleoxylotomical study on several samples (6) from the recent collection of fossil wood made by one of the authors (Dr. Paul Țibuleac) from the Prăvăleni area, the same Late Badenian volcano-sedimentary deposits of Tălăgiu Volcano, Metalliferous Mts. In the first part, (Iamandei et al., 2003-2004) there were identified three taxa: *Sequoioxylon gypsaceum* (GOEPP.) GREGUSS 1967, *Magnolioxylon scandens* SCHÖNFELD 1958 and *Alnoxylon* sp., whose presence in the association was already known from previous quoted papers. In this paper, other three angiosperm taxa have been identified: *Populoxylon* sp. (cf. *Populus alba*), *Fraxinoxylon prambachense*

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HOFMANN 1952, *Fraxinoxylon komlosense* GREGUSS 1969; we will present their xylotomical description.

II. PALEOXYLOTOMY

Family **Salicaceae** MIRBEL
Genus ***Populoxylon*** MÄDEL-ANGELIEWA, 1968
Populoxylon sp. (cf. *Populus alba* L.)
Plate I, figs. 1-4

A. Macroscopic description

The studied material was represented by a piece of silicified wood, found in Prăvăleni area, within the volcano-sedimentary Late Badenian deposits. The sample of 12/6.5/4 cm dimensions presents a dark-gray colour, fibrous texture, annual rings, pores and fine rays, all of them suggesting a dicot. The remained material and three thin sections were deposited in GIR Collection under the inv. nos. 26,710 (representing the sample L. 23 from Ţibuleac Collection).

B. Microscopic description

The growth rings are distinct, but not too obvious, few slightly compressed ground mass cells marking them terminally. The numerous vessels of similar size are uniformly spread in the ground mass giving a diffuse-porous aspect to the wood.

In cross section, **the vessels**, appear mainly solitary and in radial or tangential pairs, rarely in radial multiples of 3 or 4. The solitary pores usually have round to oval section being thick-walled (8-12 μm the double wall). The radial/tangential diameters for the solitary pores are of 100-150/(60)90-140 μm. It is obvious that the size of the vessels is uniform (diffuse-porosity), except the terminal wood formed by 5-6 compressed cells of fibers and parenchyma, where few small vessels appear. Vessels' density is of 60-67 pores on sq. mm. The vessels have simple perforated inclined plates and numerous bordered intervascular pitting, usually alternate, slightly spaced, with a horizontal-elliptic shape of 6.5-8 μm in diameter and also a horizontal-elliptic aperture of 2-3 μm. The elements have 80-250 μm in length (or more) and their lumina sometimes bear dark granular gum remains or thin-walled tyloses.

The wood parenchyma is scarce and appears apotracheal, terminally disposed, rarely as diffuse cells, almost indiscernible.

The medullary rays are fine in cross section, being constituted from rectangular cells, radially elongate. Tangentially, the rays are mainly uniseriate, of 4-13(18) cells high (usually 5-9), often with biseriate stories, rarely typical biseriate having 6-12(17) cells in height. The ray cells are polygonal, slightly rounded, with 10-20 μm the horizontal diameter and 15-24(30) μm high. The frequency is 5-8 rays on tangential horizontal millimeter. Radially, the rays are homocellular, constituted from thin walled cells all

procumbent, the marginals slightly higher. The "cross-fields" with vessels are very characteristic, pitted with simple, circular to oval small pits of 5-6.5 μm in diameter and horizontal apertures of 1.5-2.5 μm. They are in two horizontal rows of 4-6 pits disposed, sometimes slightly irregularly. Three superposed rows of pits may appear in the marginal higher fields.

The libriform fibers have polygonal cross-section, of 12-19 μm in diameter, large lumina and moderately thick walls (2-4 μm the double wall) and they are tiny pitted longitudinally.

C. Affinities and discussions

Evaluating the xylotomical characters of the studied specimen, we recognized the very typical distribution of the vessels in cross section and specific cross-fields for the *Salicaceae*. This family comprises only three genera with very close anatomical structures: *Salix*, *Populus* and *Chosenia* (Watson & Dallwitz, 1992). By the aspect of the vessels in cross section and especially by the homogeneous (homocellular) rays, the specimen is closer to *Populus* type of wood (see Greguss, 1959).

For this reason we have attributed the studied material to the correspondent fossil genus - *Populoxylon,* created by Mädel-Angeliewa (1968). It had *P. priscum* MÄDEL-ANGELIEWA, 1968 as type-species, whose original diagnosis is also valid for the genus: diffuse-porous secondary wood with solitary vessels and in radial multiples; vessels with large simple perforated plates and numerous alternate (intervascular) pitting; uniseriate and biseriate rays, homogeneous (homocellular), with cells all procumbent, the marginals higher (not upright), occasionally square; simple pitted "cross-fields" with 2-3 horizontal rows of slightly oval pits, alternately arranged; parenchyma scarce, diffuse. Our material is very similar to the diagnosis of the type-species.

Dutrelepont et al. (1997) mentioned a specimen of *Populoxylon* sp. with particular vessels' distribution in cross section, similar to the extant species *Populus euphratica* OLIVIER. Our here described material has some xylotomic similitudes, but it is not identical.

We also used for comparison another fossil forms attributed to the same genus which show a similar structure, up to identity with the extant species *Populus tremula* L.:

- *Populoxylon* sp. (cf. *P. tremula* L.) described by Greguss (1969) from the Sarmatian of Mikfalva (Hungary);
- *Populus* sp. (*P. tremula* L.?) signaled by Nastschokin (1968) from the Quaternary from Yenisei-river basin (Russia);
- *Populoxylon tremuloides* IAMANDEI, 2002, recently described from the same zone and formation with the present material.

Taking into account the xylotomical features (general aspect of the vessel distribution in cross section, intervascular pitting and "cross-fields" pitting) result a most similarity to the extant form *Populus alba* L., a widespread species in Europe within the temperate

zone (Greguss, 1959; Scweingruber, 1990); in conclusion, our material is a specimen of *Populoxylon* sp. (cf. *Populus alba* L.).

Family **Oleaceae** HOFFMGG. & LINK
Genus *Fraxinoxylon* HOFMANN, 1952
Fraxinoxylon prambachense HOFMANN, 1952
Plate II, fig. 1-4

A. Macroscopic description

We had for study three pieces of fossil wood also found in Prăvăleni area, Metalliferous Mts., within the volcano-sedimentary Late Badenian Formation of Tă1agiu. These pieces represent silicified wood having the following sizes: 4.5/4/3 cm, 4.5/4/3 cm respectively 4.5/4/3.5 cm. All of them are light gray in colour, with fibrous texture, obvious annual rings, pores and thick rays, suggesting a dicot. The studied material (3 samples and 9 standard thin sections) is deposited in GIR Collection under the inv. nos. 26,709 26,711 and 29,715 (respectively the samples L. 22, L. 24 and L. 28 from Ţibuleac Coll.).

B. Microscopic description

The growth rings high, with distinct boundaries, show a typical ring porous structure.

In the cross section, **the vessels** are solitary or in radial multiples of 3 vessels, rarely 4. The solitary vessels usually have radial-elliptic section, but they could be also circular, or slightly polygonal. The vascular wall is thick, the simple wall being of 8-12 µm (14-18 µm the double wall). For the solitary wide pores, the radial/tangential diameters are 170-300/150-250 µm, only in the late wood appear several narrow ones (30-70/20-50 µm diameters. The density is not significant in this ring porous wood. However, within the early wood it is 11-12 vessels on sq.mm. Vertically, simple perforations appear on horizontal or inclined plates. The intervascular pitting is bordered, small, of 8-12 µm, alternate, numerous, hexagonal, touching one-another, smaller on narrow vessels of 3-5 µm. Their apertures are point-like. Some of the big vessels present wide thin-walled tyloses, but inside the narrow vessels rather thick-walled, even sclerotic tyloses can be present. Inside the lumina deposits or spherical agglomerates of dark, red granules are sometimes present. The vascular elements have 210-450-630 µm.

The wood parenchyma appears as paratracheal-vasicentric cells, forming incomplete sheaths, 1-2 seriate. It is also present as terminal wood of 3-4 cells in thickness, rarely as diffuse apotracheal parenchyma. Longitudinally, it is fusiform and disposed in strands of less then 8 upright rectangular cells, usually visible close to the vessels or terminally, in the late wood. The thin walled cell-walls are minutely pitted. Rarely, the cell lumina bear solitary crystals.

The medullary rays are fine and constituted by rectangular radial elongate cells in the cross sections. The ray trajectory is linear or slightly wavy, touching the wide vessels. Tangentially, they appear uniseriate and, mostly, biseriate, of 3-10 cells high, respectively 10-25 cells and frequently with triseriate stories; sometimes even 3-4 seriate rays may appear, of 15-30 cells high. The ray cells are round to oval or slightly polygonal, unequal in size and their mean diameter is 9-20 μm. The 2-4 seriates have uniseriate endings of 1-10 polygonal cells, slightly different that those from the ray-body. Their frequency is of 5-7 rays on tangential horizontal millimeter. Radially, the rays are homocellular, constituted from all procumbent cells, of 16-20 μm high, pitted in the "cross-fields", with vessels similarly with the vasicentric parenchyma: numerous round small pits of 3-3.5 μm, with point-like apertures, laying in 1-3 horizontal rows, alternate or slightly irregular.

The fibers, usually disposed in 1-2 radial regular rows, have polygonal cross section variably wide (12-20 μm), sometimes determining intercellular spaces. They have rounded-polygonal lumina and moderately thick walls (3-4.5 μm the double wall). Longitudinally, they are rather short, storied in the early wood and bear small bordered pits, spaced, rather irregular disposed in a vertical row.

C. Affinities and discussions

Analyzing the xylotomical features showed by our three studied specimens, we found that they are very similar to those of the extant genus *Fraxinus* from *Oleaceae* (see Greguss, 1959; Schweingruber, 1990). This family are grouping today trees, shrubs and lianes, usually cosmopolite, i.e. tropical to temperate, but not in the cold regions, and includes the following 25 genera: *Abeliophyllum*, *Chionanthus*, *Comoranthus*, *Fontanesia*, *Forestiera*, *Forsythia*, *Fraxinus*, *Haenianthus*, *Hesperelaea*, *Jasminum*, *Ligustrum*, *Linociera*, *Menodora*, *Myxopyrum*, *Nestegis*, *Noronhia*, *Noronhia*, *Notelaea*, *Nyctanthes*, *Olea*, *Osmanthus*, *Phyllyrea*, *Picconia*, *Schrebera*, *Syringa, Tessarandra* (Watson, L. & Dallwitz, M.J., 1992).

The fossil form-genus *Fraxinoxylon* has a diagnosis based on the original diagnosis of the type species named *F. prambachense* HOFMANN, 1952, considered by the author the perfect correspondent of the extant species *Fraxinus excelsior* L. It has typical ring-porous wood with large vessels in the early wood and small ones in the late wood, solitary and grouped in small radial multiples (2-4), with short vascular elements, small alternate pitting and simple perforated plates. Parenchyma is paratracheal, vertically as short rectangular to square cells. The fine rays, 1-2(-4)-seriate, up to 18 cells high, slightly heterogeneous (heterocellular), the marginals procumbent or upright (rarely). Libriform fibers are thick-walled.

This species was very similar to other forms previously described from the same place: Prambachkirchen (*Faxinoxylon sp*., Hofmann, 1939, 1944, quoted by Greguss, 1969). Our here studied material is very similar with this species, similitude concerning the shape, the size and the distribution of the structural elements.

There are few other forms of *Fraxinoxylon* of the same type, all of them coming from Central Europe and described by Hofmann, Andreanszky and Széky-Fuchs and Greguss (see Greguss, 1969). For examples, the species *Fraxinoxylon* cf. *Fraxinus excelsior* L. identified by Greguss (1969) from the Pleistocene of Pestszentlorinc (Hungary), having only short descriptions in the legend of the plates, seems to be identical with the extant species *F. excelsior*: 1-2-seriate rays, abundant parenchyma (fig. 4/PlateXCI, fig. 3/Plate XCIII) and homocellular rays (fig.4/Plate XCIII).

The species *Fraxinoxylon komlosenese* GREGUSS, 1969, described from the Sarmatian of Fuzerkomlos (Ungaria), corresponds to *Fraxinus ornus* L.; even if the description and the diagnosis given by Greguss are not very clear, it seems to be slightly different of our material.

The extant species *Fraxinus excelsior* and *F. ornus* can hardly be separated, both having fusiform rays, but with short endings respectively long endings, (1)2-4 seriate, respectively 1-3 seriate, vasicentric parenchyma versus divers parenchyma at *F. ornus*, the cross fields with numerous small simple pits in (1)2-3 superposed slightly irregular rows versus in regulary 1-2 rows. *F. ornus* also has low growth rings but *F. excelsior* has wider ones, with well developed early wood. So, it's very difficult to separate them, since these features are very fluid.

Another fossil species recently described is *Fraxinoxylon crisii* IAMANDEI, 2002, also coming from Prăvăleni area. This species presents similar features, but only uniseriate and biseriate rays vertically storied, sometimes crystalliferous and it was considered a perfect correspondent of the extant *Fraxinus americana*.

Since the studied material presents a combination of features most similar with the extant specie *F. excelsior* L. and with the species described by Hofmann, we attribute it to the fossil species *F. prambachense* HOFMANN, 1952

Fraxinoxylon komlosense GREGUSS, 1969
Plate III, fig. 1-4.

A. Macroscopic description

We had for study two pieces of fossil wood, both found in Prăvăleni area, Metalliferous Mts., within the volcano-sedimentary Late Badenian Formation of Tă1agiu. The two pieces represent silicified wood and they have 4.5/4/3 cm. respectively 4.5/4/3.5 cm sizes. Both of them have light gray colour, fibrous texture, obvious annual rings, pores and thick rays, also suggesting a dicot. The studied material is deposited in GIR Collection under the inv. nos. 26,708 and 29,713 (respectively the samples L.21 and L.26 from Ţibuleac Coll.).

B. Microscopic description

The growth rings are distinct, not too wide, with a typical ring-porous structure showing annual boundaries marked by terminal parenchyma.

The vessels are mainly solitary; they also appear as radial or tangential pairs, only rarely as 3 vessels, radially disposed. Their cross section is circular or slightly oval, having walls rather thick (6-10 μm the simple wall, 14-20 μm the double wall). The radial/tangential diameters are 250-340/140-250 μm for the large vessels, and 40-80/30-70 μm for the small ones from the late wood (ring-porosity). Even if the density is not too significant in the ring porous wood, in the early wood it is of 10-16 big vessels sq. mm. Longitudinally, exclusive simple perforations on horizontal or inclined plates appear. The vascular pitting is bordered, opposite to alternate, hexagonal, numerous, small, of 7-10 μm in diameter and small aperture of 2-3 μm. On the tails or on narrower vessels the pits are smaller (3.5-5 μm) and with point-like apertures. Sometimes, granular or globular remains can be seen inside the vessels or hyphae of fungi and sclerotic tyloses. The elements are short, of 186-620 or more.

The wood parenchyma is abundant, of paratracheal-vasicentric type, making incomplete sheaths of 1-2-3 cells wide, absent when the vessel touch rays. Longitudinally, the apotracheal parenchyma appears fusiform, in strands of 4 thin walled cells and the vasicentric has minute, opposite, numerous pitting.

The medullary rays are fine, with linear to slightly sinuous trajectory, molding and touching the big vessels. They are constituted by rectangular elongate cells, often with dark remains in the late wood. Tangentially, the rays are 1-3-seriate, the triseriates less numerous. The uniseriates have 3-17 cells high, usually 5-8, the biseriates have 6-25(35) cells in height and the triseriates have 10-23(35) cells in height. The ray cells are rectangular-rounded, slightly vertically elongate, uniformly sized. Their frequency is 8-12 rays on tangential horizontal mm. Radially, the rays are homocellular and they are constituted by all procumbent cells, of 12-18(22) μm high, with a single row of marginal upright cells of 20-24 μm. The "cross-fields" with vessels show small, round pits of 5-6 μm, numerous, in 2-3(4) horizontal rows arranged.

The fibers are polygonal in cross section, having variable size (10-20 μm) and relatively thin-walled. Vertically, they have small bordered pits, slightly irregulary disposed, usually on the radial walls.

C. Affinities and discussions

According to the combination of xylotomical features in our studied material (ring-porous structure, solitary and grouped thick-walled vessels with simple perforated horizontal plates and alternate pitting, paratracheal and terminal parenchyma and the 1-3-seriate rays) we guessed that it represent a fossil corespondent of the extant genus *Fraxinus L.* from *Oleaceae*, especially the *Fraxinus ornus*, an European-Mediterranean form (Greguss 1959, Schweingruber 1990).

Actually, few fossil forms of *Fraxinoxylon* were already described till now. A comparison can be made with the forms described by Hofmann (1952) and those of Greguss (1969).

F. prambachense HOFMANN, 1952 described from the Late Oligocene from Prambachkirchen (Austria) has many similitudes with the extant *Fraxinus excelsior L.*, almost identical with previous forms described, *Fraxinoxylon* sp., from the same place (Hofmann, 1939, 1944, quoted by Greguss, 1969). Other form described by Greguss (1969) from the Pleistocene from Pestszentlorinc (Hungary) was interpreted as *Fraxinoxylon cf. Fraxinus excelsior* L. (wrongly named *Fraxinioxylon* in the plate XX, op.cit.)

Another species, described by Greguss (1969) from the Sarmatian at Fuzerkomlos (Hungary) and named *Fraxinoxylon komlosense* GREGUSS, 1969, shows another combination of features that are most similar to *Fraxinus ornus* L. Even if it is difficult to make a xylotomical separation between the extant species of *Fraxinus*, the species *F. ornus* has some special features like the long endings of the spindle-shaped rays 2-3 seriate in the tangential section and the presence of diverse kind of parenchyma within the ground mass.

Unfortunately, the description of Greguss is very elliptical and we tried to use the photos from the plates and the caption of them, in order to complete the details. Thus, the fig. 1/PlateXC presents a reticulate parenchyma, but it is probably an error; in the figs. 1-3/Plate XCI and 1/Plate XCII on can be seen solitary pores or in short radial multiples, terminal and paratracheal parenchyma, 3-4-seriate rays, vascular pitting dense, heterocellular rays; in fig. 3/Plate XCI there are square and upright marginal cells. The diagnosis made by Greguss is not very clear.

Otherwise, from the same region of the present material from Prăvăleni area, within the same volcano-sedimentary Late Badenian Formation of Tă1agiu, we have previously described another specimen attributed to the same form species (Iamandei & Iamandei, 2006)

Taking into account the features of the present material, we can attribute the specimens here studied to the same species named *Fraxinoxylon komlosense* GREGUSS, 1969.

III. CONCLUSIONS

After the integral paleoxylotomical study (in two parts) of 11 samples of fossil wood from Ţibuleac Collection (donated to the National Geological Museum, Bucharest), six form-taxa have been identified: *Sequoioxylon gypsaceum* (GOEPP.) GREGUSS 1967, *Magnolioxylon scandens* SCHÖNFELD 1958, *Alnoxylon* sp., *Populoxylon* sp. (cf. *Populus alba* L.), *Fraxinoxylon prambachense* HOFMANN 1952, *Fraxinoxylon komlosense* GREGUSS 1969, some of them already known from other previous studies in the same geological site. The presence of these trees in the outlined forestry association is very important because it confirms their frequency within the Late Badenian Mixed Mesophytic Forest and it argue a warm temperate paleoclimate, most probably of Mediterranean type.

REFERENCES

DOUTRELEPONT H., SMITH T., DAMBLON F., SMITH R. & BEECKMAN H. (1997) - *Un bois silicifie de peuplier de la transition Paleocene-Eocene de Dormaal, Belgique*. Bull. Inst. Royal des Sci. Nat. de Belgique, Science et Terre, 67: 183-188, Bruxelles.

GREGUSS P. (1967) - *Fossil Gymnosperm woods in Hungary, from the Permian to the Pliocen.* Akádemiai Kiádo, p. 1-152, 93pl. 18 maps, 2 tab., Budapest.

GREGUSS, P. (1959) - *Holzanatomie der europäischen Laubholzer and Sträucher*. Akádemiai Kiádo, 1-330p, 307pl., 6 tab., Budapest.

GREGUSS P. (1969) - *Tertiary Angiosperm woods in Hungary*. Akádemiai Kiádo, 1-152p, 93pl., Budapest.

HOFMANN E. (1952) - *Pflanzenreste aus dem Phosphoritvorkommen, von Prambachkirchenin Oberöstereich, II Teil.* Paleontographica Abt. B, 92, 3-6: 122-138, Taf. IX-XIII, Stuttgart.

IAMANDEI S. (2000) - *Pinuxylon parryoides* (GOTHAN) KRAEUSEL emmend. VAN DER BURGH 1964*, in Prăvăleni-Ociu Area (Middle Miocene), Southern Apuseni (Metalliferous) Mts*. Studii şi Cercetări de Geologie, tom 45: 119-126, Bucureşti.

IAMANDEI S. (2002) - *Fossil woods from the Neogene of Zarand Basin (Transsylvania)*. Ph.D. Thesis, Library of Faculty of Geology and Geophysics, University of Bucharest, unpub.

IAMANDEI S. & IAMANDEI E. (1997) - *New Fossil Dicots in Pyrrhoclastics of Prăvăleni, Metalliferous Mountains*. Acta Paleontologica Romaniae, vol. I: 113-118, pl. 13.I- 13.I, Bucharest.

IAMANDEI, S. & IAMANDEI E. (2000) - *Fossil Conifer Wood from Prăvăleni - Ociu, Metalliferous Mountains*. Acta Paleontologica Romaniae, vol. II (1999): 201-212, 4 pl., Cluj-Napoca.

IAMANDEI S. & IAMANDEI E. (2002) - *New Juglandaceous Fossil Wood in the Miocene Lignoflora of Prăvăleni – Ociu (South Apuseni*). Acta Paleontologica Romaniae, vol. III (2001): 185-198, 4 pl., Iaşi.

IAMANDEI S. & IAMANDEI E. (2005) - *Fossil Salicaceae from the Badenian Petrified Forest from Prăvăleni-Ociu, South Apuseni Mts.* Rev. Roum. de Géologie, Acad. Rom., tome 49:57-61, 2pl., Bucureşti.

IAMANDEI S., IAMANDEI E. & ŢIBULEAC P. (2003-2004) - *New fossil wood from the Late Badenian Forest of Prăvăleni, Metalliferous Mts.(1st Part).* An. St. Univ. « A.I.Cuza» - Iaşi, Geologie, tom XLVIII / (2003-2005), Iaşi.

MÄDEL-ANGELIEWA E. (1968) - *Eichen und Papelholz aus der pliozane kohle im Gebiet von Baccinello (Toskana, Italien).* Geologisches Jahrbuch, band 86: 433-470, 3 Abb, 5 Taf., Hannover.

NAGY F. & MÂRZA I. (1967) - *Magnolioxylon transilvanicum sp. n. în cineritele de la Prăvăleni, Brad.* An. Univ. Buc., s. st. nat., geol.-geogr. an XVI, nr. 1: 97-102, Bucureşti.

NASTSCHOKIN V. D. (1968) - *Fossil wood from Mesozoic, Tertiary and Quaternary sediments from Central Siberia.* Nauka Publishing House, Moscow (in Russian).

PETRESCU I. & NUŢU A. (1969) *Prezenţa lui Sequoioxylon gypsaceum în miocenul din împrejurimile Bradului*. Revista Muzeelor*,* Bucureşti.

PETRESCU I. & NUŢU A. (1969a) - *Asupra unui lemn de Alnoxylon în colecţia Muzeului Deva*. Sargetia (Acta Musei Devensis), sr. Sc. Nat., vol. VI, Deva.

PETRESCU I. & NUŢU A. (1970) - *Alte tipuri de lemne din Miocenul superior de la Prăvăleni-Brad*. Sargetia (Acta Musei Devensis), sr. Sc. Nat., vol. VII, p.253-258, 4 pl., Deva.

PETRESCU I. & NUŢU A. (1972) - *Asupra unui lemn de Icacinoxylon SHILKINA în Miocenul superior de la Prăvăleni – Brad*. Sargetia (Acta Musei Devensis), sr. Sc. Nat., vol. IX: 77-79, 2pl., Deva.

SCHÖNFELD E. (1958) - *Die fossilen Holzer niederrheinischen Braunkohle.* Fortschr. Geol. Rheinld. u. Westf., 2., s. 539-548, Krefeld.

SCHWEINGRÜBER F. H. (1990) - *Anatomie europäischer Hölzer (Anatomy of European woods).* Verlag Paul Haupt, 1-765, Stuttgart.

WATSON L. & DALLWITZ M.J. (1992, onwards). *The families of flowering plants: descriptions, illustrations, identification, and information retrieval.* Version: 23rd October 2005, http://delta-intkey.com.

Caption of Plates
(graphic scale)

Plate I

Figs. 1-4: *Populoxylon* sp. (cf. *Populus alba* L.).

Fig. 1. Cross section: diffuse-porous structure, less distinct growth ring boundary;
Fig. 2. Tangential section: fine rays, short vascular elements, fibers;
Figs. 3-4. Radial section: remains of pitting on short vessels' elements, "cross fields" of homocellular rays with vessels and fibers.

Plate II

Figs. 1-4: *Fraxinoxylon prambachense* HOFMANN, 1952.

Fig. 1. Cross section: typical ring porous structure, wide growth rings, distinct boundary between late and early wood;
Fig. 2. Tangential section: fusiform 2-4 seriate rays, fusiform parenchyma;
Figs. 3-4. Radial section: "cross fields" of homocellular rays with vessels and fibers, pitted (fig 4), simple perforated plate (fig. 4).

Plate III

Figs. 1-4: *Fraxinoxylon komlosense* GREGUSS, 1969.

Fig. 1. Cross section: typical ring porous structure, narrow growth rings, distinct boundary between late and early wood;
Fig. 2. Tangential section: fusiform 1-3 seriate rays, fusiform parenchyma;
Figs. 3-4. Radial section: simple perforated plates, "cross fields" of homocellular rays with vessels and fibers.