NEW PETRIFIED WOODS FROM SOLEŞTI AREA (VASLUI COUNTY, ROMANIA)

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Abstract. New petrified woods collected from the upper Miocene (late Khersonian) of Soleşti Area, Vaslui County, were paleoxylotomically studied and identified as *Ulmoxylon scabroides* GREGUSS, *Quercoxylon bavaricum* SELMEIER. Since few petrified woods coming from this region were studied till now the scientific interest is quite real, and we expect to find at least the wood of previous described taxa based of fossil vegetative plant parts.

Key words: Khersonian, petrified wood, *Ulmoxylon, Quercoxylon*, palaeoenvironment, palaeoclimate.

Résumé. Une nouvelle collection de bois pétrifié recueillies des sédiments du Miocène supérieur (fin du Khersonian) de Soleşti région, département de Vaslui, a été étudié au microscope (paleoxylotomie) et identifiée comme bois de *Ulmoxylon scabroides* GREGUSS et de *Quercoxylon bavaricum* SELMEIER. Parce que peu de bois pétrifié provenant de cette région a été étudié jusqu'à présent, l'intérêt scientifique est bien réel, et nous nous attendons à trouver au moins le bois de taxons décrits par l'étude des parties végétatives des plantes fossiles.

Mots-clés: Khersonian, bois pétrifié, *Ulmoxylon, Quercoxylon*, paléoenvironnement, paléoclimate.

INTRODUCTION

Last years, a collection of petrified woods coming from Soleşti area, Vaslui county, now housed by the Botanical Garden "A. Fătu" from Iaşi, was studied (Iamandei *et al*., 2001a, 2008a). It came from some upper Miocene sedimentary deposits with fluvial, deltaic and lacustrine character – representing Balta-Păun Formation, of Khersonian age. One sample is kept within the stable collection and seven big trunk fragments were exposed close to the administrative building. All of them were identified as morphospecies of fossil oaks (*Quercoxylon*). Now those seven samples were moved and exposed in another location within the Botanical Garden area. Another big trunk also taken from Soleşti area, still unstudied, is exposed within Vaslui local Museum.

Givulescu's conspectus of the the Sarmatian (*lato sensu*) flora described on plant remains from the Moldavian Platform (Givulescu, 2001) comprises species of *Carpinus, Cassia, Persea, Corylus, Fagus, Fraxinus, Juglans, Parrotia, Platanus, Populus, Quercus, Rhus, Salix, Sapindus, Tilia, Ulmus, Zelkova*. In fact Givulescu revised the Khersonian flora described at Păun, by Macarovici and Paghida (1966) with *Populus, Salix, Ulmus, Zelkova, Alnus, Carpinus Laurus, Liquidambar, Parrotia, Sapindus, Platanus, Vitis, Tilia, Cassia, Cercis, Juglans* and by David (1916, 1922) and Barbu (1934) at Hârşova, a flora with *Populus, Ulmus, Carpinus, Laurus, Cassia, Fagus, Juglans, Quervus, Rhus* coming from the upper part of the Khersonian formation and not from the Bessarabian, as wrongly mentioned Givulescu, 2001 (opinion of Ionesi *et al*., 2005, p. 439).

The revision of Givulescu don't comprise the late Miocene lignotaxa described in the same area (Moldavian Platform) by Starostin & Trelea (1969, 1984), Lupu (1984), Iamandei *et al*. (2001c, 2008a) which comprise taxa as *Ulmoxylon khersonianum* (Starostin & Trelea, 1969), *Quercoxylon* *sarmaticum* Starostin & Trelea 1969, *Q. densannulatum* (Starostin & Trelea, 1984), *Q. macarovicii* (Starostin & Trelea, 1984), *Q. praefrainetto* Lupu 1984. The species of *Araucarioxylon* (*A. moldavicum*) described from similar deposits here (Boureau & Trelea, 1969), it is possible to be a wrong identification of a fossil wood of *Tetraclinoxylon* type, at least because the Araucariaceae were no more documented in the Northern Hemisphere, during Tertiary. Anyway a revision of the original material is necessary.

To it, some informal taxa more recently identified from the Volhynian of the Moldavian Platform (Ţibuleac, 1998, 2001; Ţabără & Florea, 2007; Chirilă & Ţabără, 2008, 2010) must be added: megaremains of *Taxodium,Glyptostrobus, Pinus, Magnolia, Nyssa,* Lauraceae div. sp., *Platanus*, *Illex, Cassiophyllum, Cassia, Coryllus, Betula, Carpinus, Alnus, Juglans, Carya, Engelhardtia, Quercus, Salix, Populus, Myrica, Liquidambar, Zelkova, Vitis, Acer, Fraxinus*, *Typha*, *Phragmites, Potamogeton*, a.o. or pollen of *Taxodium, Sciadopitys, Abies, Picea, Cedrus, Pinus, Tsuga* and also of *Magnolia, Illex, Carpinus, Fagus, Castanea, Quercus, Ulmus, Betula, Tilia, Juglans, Carya, Platycarya, Engelhartia, Acer, Myrica, Symplocos* and of Oleaceae, Chenopodiaceae, Typhaceae, and Cyrillaceae. The list can be extended and characterizes the late Miocene Mixed Mesophytic Forest, often favored by the developing hydrologic system behind the retreat of the Dacian Basin. The developing of the open space is also expressed by the vegetation, abundant pollen of *Artemisia* being observed.

Some identified lignotaxa from the early Sarmatian of the Moldavian Platform were also described as species of *Taxodioxylon, Sequoioxylon, Glyptostroboxylon, Cupressinoxylon, Tetraclinoxylon* (Iamandei *et al*., 2001a, b; 2005; 2006; 2008a, b, c).

The material studied in this paper was collected during a recent field trip in Soleşti area (Fig. 1) when we tried to find the place of origin of the “petrified stumps of Soleşti” previously identified by us as *Quercoxylon sarmaticum* (Starostin & Trelea, 1969). We found no big trunks but small samples of petrified wood within “Rupturi area”, and also in a new unknown location, south of Şerboteşti village, on the right bank of the valley. The sediments we found could belong to the Khersonian deltaic to fluvial-lacustrine deposits of Balta-Păun Formation from where plant remains were found also (Ionesi *et al*., 2005, p. 435, citing Jeanrenaud). The Maeotian starts with a volcanic level (so called “the Nuţasca–Ruseni cinerites”), considered by Ionesi *et al*. (2005) as related to the intense volcanic activity from the Călimani Mountains, but it is possibly to be reworked material, not synchronous (Brânzilă, M., pers. comm., 2010), the sedimentation continuing with epiclastics which also can host plant remains.

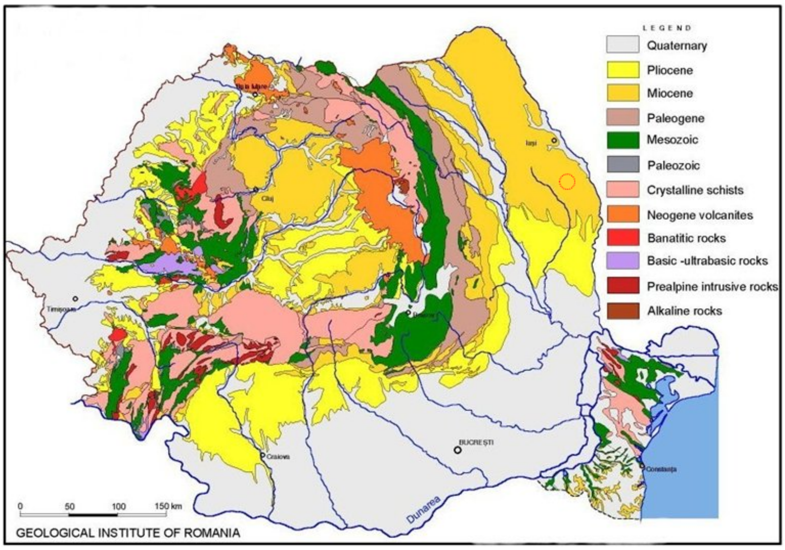

Fig. 1. – ◌ The studied area on the Romania’s geological map.

As to the methodology used in this study the palaeoxylotomical principles were followed and oriented thin sections of petrographic type were realized. They were studied under the light microscope (Nikon Eclipse E400) and digital images were captured through video-cam EverFocus-EQ250. The microscopic observations and the photos were submitted to a comparative study with extant and fossil taxa already published in the specialty literature, in order to realize the taxonomic identification. After all these, species of *Ulmoxylon* and *Quercoxylon* were identified, as follows.

PALEOXYLOTOMY

Class **Magnoliopsida**
Family **Ulmaceae** MIRB.
Genus ***Ulmoxylon*** KAISER 1879
Ulmoxylon scabroides GREGUSS 1969
Plate I fig. 1-4; Plate II, fig. 1-4. Plate III, fig. 1-4.

Macroscopic description

The studied material is represented by seven small fragments of petrified wood collected from Soleşti area, Vaslui county, Romania, more specified from Rupturii Hill, from were the trunk fragments previously described by us (Iamandei *et al*., 2001c, 2008a). Another one petrified wood fragment (2219) was collected from an outcrop on the hill south of Şerboteşti, northward of Soleşti locality. All the samples have centimetric size and have a brownish to light ash-like color, an f ring porous and fibrous structure with big vessels visible even by naked eye, relatively wide rays and obvious growth rings, typical for a dicot. The material with field numbers 2219, 2222–2228 is deposited in GIR Collection at National Geological Museum, under the numbers: 26641, 26642, 26643, 26644, 26645, 26646, 26647 and 26648, respectively.

Microscopic description

The general structure of the wood, in cross section seen, is ring porous. *The growth rings* are distinct, marked by the abrupt change of size and distribution of the vessels in the early wood and the late wood, the vessels being obviously two-sized and the late wood having small vessels typically disposed.

The vessels of the early-wood are usually solitary of large size, on (1)2–3 continuous rows, but in the late-wood they are clustered in tangential bands of 3–4 rows of smaller, unequal, crowded thinwalled vessels. The bands are not always tangential but usually diagonal between two rays, giving to the general structure a slightly wavy aspect. The solitary large vessels are oval or deformed by tangential compression, and have the radial/tangential diameter of the lumina of 200–300 / 30–80 µm, with moderately thick walls of 2–3.5 µm (simple wall). The smaller pores of the late-wood are usually oval or deformed by tangential compression, with lumina of 20–50 µm and with relatively thin walls of about 2–3 µm (double wall). The density is variable, of 3–5 pores on tangential millimeter (about 12–15 pores on square millimeter sometimes more, sometimes less) in the early wood and more numerous, of 12–18 pores on tangential millimeter (i. e. 40–72 pores on square millimeters, sometimes more) in the late wood. Longitudinally bad preserved simple perforations difficultly can be observed. The intervascular pitting very badly preserved is alternate, contiguous, numerous, round, bordered 7–9 µm in diameter and having small circular apertures but usually less visible. The size of the vascular elements (65–100 µm?) is difficult to measure because the simple perforations are usually less visible. Inside tyloses and fungi remains can be observed.

The axial parenchyma in cross section appears irregularly apotracheal, diffuse in the transitional and late wood mixed with libriforms, but also paratracheal, close to the early-wood vessels or close to the clusters of vessels in the late-wood type. It is visible also in the longitudinal sections where is touching the vessels (patracheal parenchyma) coating the big vessels, it is obviously pitted and sometimes chambered and crystalliferous.

The rays have a flexuous trajectory and are slightly dilated at the ring boundary. Tangentially seen are 1–7, but frequently 4–6–seriates, are fusiform, tall from 10 up to 60 cells in height, often dissected by libriform fibres. The ray cells are rounded to oval and relatively thick-walled (of 3–4 µm double wall), slightly unequal, even though the rays are homocellular in radial section. The ray-density is variable, of 7–10 rays on tangential millimeter, the fine rays being less frequent. Radially the rays show cells all procumbent, small pitted with pits of 3–4 µm in the cross field with vessels, very badly preserved, usually indistinct.

The libriform fibres have moderately thick walls 3–5 µm, rounded-shaped lumina, in cross-section, of 10–20 µm in diameters and are densely arranged especially in the early wood.

Affinities and discussions

From the cross section, distribution of the vessels defining a ring-porous structure with two-sized classes of vessels can be recognized as typical for the extant **Ulmaceae**, especially for the genus *Ulmus* L.

Consulting the atlas of Schweingruber (1990), the paper of Sweitzer (1971), the sites of Schoch *et al*. (2004) onwards, and of Wheeler et al. (2004) onwards – we found a great similitude of the structure of our specimens with the extant *Ulmus glabra* Huds. (scotch elm or wych elm) a taxon spread in Europe and temperate Asia, and also in Mediterranean (including Northern Africa and Middle East). This species include now several synonyms: *Ulmus campestris* L. Mill. et Wilk., *Ulmus corylacea* Dumrt., *Ulmus elliptica* Koch, *Ulmus effusa* Sibth., *Ulmus excelsa* Borkh., *Ulmus expansa* Rota, *Ulmus leucocarpa* Schur., *Ulmus macrophylla* Mill., *Ulmus major* Sm., *Ulmus montana* Stokes *et al*., *Ulmus nuda* Ehrh., *Ulmus podolica* (Wilcz.) Klok., *Ulmus popovii* Giga., *Ulmus scabra* Mill., C. K. Schneid., Ley *et al*., *Ulmus scotica* Gand., *Ulmus suberosa* Michx., and *Ulmus sukaczevii* Andron.

Few fossil correspondents were already described till present, and we used for comparison those found in the papers of Hofmann (1939), Starostin & Trelea (1969), Privé & Brousse (1969), Wheeler *et al*. (1989), Zhong *et al*. (1992), Sakala (2002), Wheeler & Manchester (2007), Privé-Gill *et al*. (2008) and some others.

- Hofmann (1939), described from the Tertiaire of Hungary a fossil wood structure of *Ulmus campestris* L. type.
- Andreászky (1953) describe shortly an *Ulmus* sp. also from the Tertiaire from Hungary similar to *Celtis* or to the fossil form *Ulmus plurinervia* Unger.
- Petrescu & Dragastan (1971) described an *Ulmoxylon* cf. *Ulmus americana* L.
- Lupu *et al*. (1984) described two subfossil wood of *Ulmus* as *U. minor* (Mill.) and *U. laevis* Pall.
- Privé-Gill *et al*. (2008) described an *Ulmoxylon lapidariorum* (UNGER) FELIX, 1883, considered to be closer to the extant species *Ulmus campestris* L., having similar structure. Also similar structure have *Ulmoxylon* aff. *lapidariorum* (Unger) Felix, 1883, described by Privé & Brousse (1969), *U. khersonianum* Starostin & Trelea 1969, *Ulminium hungaricum* Lingelsheim 1917. Three forms described by Edwards (1931) and the species of Sacchi Viali (1958) are quoted by Privé-Gill *et al*. (2008) which seems to have similar structure with *Ulmus campestris* L.
- Prakash & Barghoorn (1961) described an *Ulmus miocenica* Prakash & Barghoorn, which seems to have the nearest affinities with the type of modern *Ulmus americana* L.,

- *Ulmus pacifica* (Prakash & Barghoorn, 1961) shows structural resemblance with the modern *Ulmus mexicana* (Liebm.) Planch. which represents its nearest relative species of *Ulmus*.
- The species described by Sakala (2002) as *Ulmoxylon marchesonii* Biondi, 1981 has structural details which close it to the extant species *Ulmus macrocarpa* Hance from North America, to *U. parvifolia* Jacq. from China and to the European common elm *U. carpinifolia* Gled. Otherwise Sakala (2002) consider for comparison five more species which show a rather similar wood pattern: *Ulmus crystallophora* (Watari, 1952), from the Miocene of Japan, *Ulmus baileyana* (Prakash & Barghoorn, 1961) from the Miocene of USA, *Ulmoxylon kersonianum* (Starostin & Trelea, 1969) from the Miocene of Moldavia, *Ulmoxylon* cf. *Ulmus carpinifolia* Gled. from the Mio-Pliocene of Hungary describe by Greguss (1969).
- The new species described by Wheeler & Manchester (2007), as *Ulmus woodii* Wheeler & Manchester – similar to the Chinese *Trichoptelea* type, and *Ulmus danielii* Wheeler & Manchester – similar to the American *Ulmus lanceifolia* Roxb. *ex* Wall.
- However it is *Ulmoxylon scabroides* (Greguss, 1969) which seems to be closest to our here described specimens, and even if the figures of Greguss (1969) are slightly unclear, the description corresponds to the extant equivalent *Ulmus scabra* Mill., which is a synonym of *Ulmus glabra* Huds., the extant species to which we compared our studied material and we found it closest.

By its typical ulmoid ring-porous structure, with two-sized vessels, (1)2-3 rows of big vessels in the early-wood, simple perforations and alternate pitting on vessels, apotracheal and paratracheal chambered parenchyma and with crystals, broad rays till 7 cells and of medium height, homocelular and with typical pitting in "the cross fields" of rays with vessels the structure of our specimens is closer to the extant *Ulmus glabra* Huds. and was attributed to the fossil morphospecies *Ulmoxylon scabroides* (Greguss, 1969).

Family **Fagaceae**
Genus *Quercoxylon* KRÄUSEL (em. MÜLLER STOLL & MÄDEL 1957; em. GROS 1988)
Quercoxylon bavaricum SELMEIER 1971
Plate IV fig. 1–4; Plate V, fig. 1–4; Plate VI, fig. 1–4.

Macroscopic description

The studied material is represented by four small fragments of petrified wood collected from Soleşti area, Vaslui county, Romania, more specified from an outcrop on the hill, south of Şerboteşti, northward of Soleşti locality. All the samples are centimetric in size and have a brownish to light ash-like color, an obvious ring porous and fibrous structure with big vessels – visible even by naked eye, relatively wide rays and obvious growth rings, typical for a dicot. The material with field numbers 2217, 2218, 2220, 2221 is deposited in GIR Collection at National Geological Museum, under the numbers: 26658, 26659, 26660 and 26661, respectively,

Microscopic description

Seen in cross section the wood structure looks ring-porous and shows distinct *growth rings* marked by an abrupt change between the early wood – with big vessels and the late wood with smaller vessels, sometimes almost porously disposed and gradually diminishing their size to the final wood.

The vessels of the early wood are large sized, exclusively solitary, in 2–3 rows disposed, but in the transitional to the late wood small sized vessels almost exclusively solitary, rarely 2–3–grouped and slightly diminishing to the ring boundary. They appear either in a diffuse distribution (Plate V, fig. 1–2), or slightly irregularly distributed in radial rows of vessels with gradually diminishing size in a mixed ground mass constituted from parenchyma and tracheids and libriform often difficult to identify each other because the bad preservation (Plate IV, fig. 1–2). The solitary large vessels are round to oval, radially elongate or slightly irregular. The smaller vessels from the transitional to the late wood are usually polygonal, slightly rounded, even star-like, probably due to the fossilization processes. The vessel walls are relatively thick, of 3–5 µm (the simple wall). The large solitary vessels have the lumina size of 350–450 / 100–250 µm (radial to tangential diameters), whilst the pores of the late wood have 20–30(50) / 15–30(50) µm. One of the specimens seems to be slightly different regarding the distribution of the vessels within the early wood, where the radial oval big vessels (250–300 / 150–200 µm the radial / tangential diameters) are disposed in 2–3(4) tangential rows, diminishing in size, as well as in the transitional-late wood, where the small vessels have also polygonal cross section, slightly rounded, or star-like having the radial to tangential diameters of 60–100 / 30 µm, gradually diminishing to 20/20 µm, dendritically or “in flame” disposed. The vessels’ density is variable, of 2–3 pores on tangential millimeter i.e. up to 4–6(9) on square millimeter) in early wood and more numerous, up to 50–75 or more pores on square millimeter in the late wood, but locally often there are areas devoid of vessels. Longitudinally it is difficult to see the simple perforations of the vessels, or the intervascular pitting due to bad preservation of wood structure chiefly because the vessels are usually solitary. Bordered pits in on vasicentric tracheids appear small, round, with small round aperture and in a vertical row disposed. The vascular element size is difficult to measure because the rarely visible simple perforations. Inside the vessels large tyloses can be seen.

The axial wood parenchyma, less visible in cross section, must be of diffuse, of apotracheal type, scattered among the libriform or tracheids. In longitudinal sections can be seen amongst the elements of ground mass or paratracheal. Sometimes vertical rows of large crystals in chambered parenchyma appear, however they were not observed in all the studied specimens.

The rays – linear or slightly curved in the early wood – are two sized: uniseriates and biseriate low and numerous, and multiseriates, of 13–20 cells (up to 50–60 µm in thickness), often taller than 1 mm, usually dissected by libriform fibers. They are constituted from rounded to polygonal cells, unequal in size (12–25 µm) and relatively thin-walled (2–3 µm the double wall). The ray frequency is variable, of 10–20 rays on tangential millimeter, the multiseriates being rare and at relatively uniform intervals, and are compact or composed. Radially the rays are homocellular and show cells all procumbent, within the cross fields have 5–7 small bordered pits, rounded rectangular or vertical elliptic, usually hardly visible. Sometimes gum remains and solitary crystals inside the ray cells are present.

The fibers transversally appear more clear in the early wood and unclear or slightly irregularly disposed mixed with parenchyma and vascular tracheids in the end part of the growth ring. They and have polygonal section and are relatively thick walled (4–5 µm double wall), unpitted and unsepted.

Fibro-tracheids and vascular tracheids are relatively unclear in cross section also because bad preservation. Longitudinally they present small pitting, bordered, round or slightly elliptic, with small apertures, and in 1(2) vertical rows. These cells are usually coiling the vessels.

Affinities and discutions

The studied material shows still cross section affinity to the fagaceous wood structure by its well expressed ring-porosity. The two-sized rays (multiseriates broad and finer, mostly uniseriate) and the distribution or the big and of the small vessels more or less dendritically is typical for ***Quercineae*** (Privé, 1975), especially for the extant genus *Quercus* L.

The atlas of Schweingruber (1990), the site of Schoch *et al*. (2004) onwards, Wheeler *et al*. (2004) onwards – also showed us the similitude of the quercineous structure with our studied specimens.

For a correct generic identification other keys of identification were consulted also.

1. The key of Petrescu (1976) which systematize the fossil Fagaceous wood structures separating within the ring porous structures those with uniseriate and compact pluriseriate, sometimes compact-composed or partially aggregate corresponding to extant *Quercus* type, and in fossil to *Quercoxylon*;

2. The key of Shimanji who made a comparative synthesis of the essential xylotomical characters of the extant fagaceous taxa, based on the anatomic studies and the phylogenetic relations between the genera of Fagaceae, comprised in a big table presented in Suzuki & Ohba (1991). Using this key we observed that having ring porous structure, round-polygonal thick walled vessels in latewood , simple perforations and compound thick rays, our structures can be similar to a *Quercus* of white type from *Quercus* section;

3. The key of Hadziev & Mädel (1962) who separated within ***Quercineae*** group four types:

- Type "Weisseichen" (the white oaks), comprising most of the species of section *Lepidobalanus* – having ring porous structure and small, polygonal, thin-walled vessels in the late wood. This type of structure is quite similar to ours;
- Type "Roteichen" (the red oaks), comprising the species of the section *Eritrobalanus* and some species of *Lepidobalanoideae*, with ring porous structure and relatively large, round, thick-walled vessels in the late wood;
- Type "sempervirent oaks", comprising species of *Quercus* and of *Lithocarpus* with porous (diffuse) or half-ring-porous structure, the relatively small and spaced vessels often radially disposed, in the late wood;
- Type "root wood", present in all the ***Quercineae*** and having diffuse porous structure and crowded large pores.

Using at least these keys, the generic identification of our structures is correct and suggests a type of white oak. The corresponding fossil morphogenus is *Quercoxylon* a genus created by Hofmann in 1929, but which was correctly defined by Kräusel in 1939, and emended by Müller-Stoll & Mädel in 1957, by Gros (1983, 1988), and lastly by Suzuki & Ohba (1991). A detailed discussion of the adventures of this morphogenus – in Iamandei *et al*. (2008a).

The xylotomical analysis of our studied specimens shows that they should belong to "Weisseichen" type, from *Lepidobalanus* section, since they present in cross section ring porous structure and small, polygonal, thin-walled vessels in late wood (Hadziev & Mädel, 1962). But the distribution of the vessels may have many variations, as some other authors previously have been shown (see Selmeier, 1971; Privé, 1975).

Compared with the fossil morphotaxa described by it is obvious that our specimens mostly agrees with *Quercoxylon bavaricum* (Selmeier, 1971), a species that present such a variation of distribution of the vessels in the late wood where the author observe 5 types of distribution also found again by Privé (1975):

– a typical dendritical distribution, as radial complexes separate by libriform bands;
– a diffuse distribution;
– none or few vessels irregularly distributed;
– separate of the early wood by a fibrous zone;
– radial complexes of vessels with slightly gradual diminishing size and separate by libriform fibers.

Also she observed that the different types of distribution of the late wood vessels may correspond to some ecological variation that affected the trunk growing. A well developed late wood indicates an irrigate soil while a dry climate determine a reduced late wood. Also, the localization of the sample in the tree is told by the proportion of late wood, that can be bigger in the trunk than just under the canopy or at periphery and the growth rings are more reduced at the branches that in the trunk. Privé (1975), showed also (p. 125) that reviewing many extant described species of "white oak" there is a big intraspecific variation. However the genus *Quercus* L. showing a great interspecific anatomic homogeneity, it is very difficult to delimitate the fossil species, so they have only a descriptive value, as form-species.

Selmeier (1996) observed that the vessel diameter, ray size, ray frequency and ray distribution are variable and even in the same described fossil species the biometric values may be different. For this reason in the xylotomical description of extant wood we find no actualized measurements. So the accurate measurements made by palaeoxylologists cannot be always useful to identify an unknown. Much more, the rules from "IAWA List of Microscopic Features for Hardwood" (Wheeler *at al*., 1989) impose different ways to express the older measurements.

After this discussion, it is clear that the structure of our studied specimens upward described, can be assigned to this taxon that has dominated the European Miocene. Similar forms, even identical (see Petrescu, 1976) have been described in the Pannonian space by Felix, Andreánszky, Hofmann, Greguss (in Müller-Stoll & Mädel, 1957), usually identified with *Quercoxylon bavaricum* (Selmeier, 1971), a perfect equivalent of the extant *Quercus robur* L., which belong to *Quercus* section.

This species described by Selmeier (1971) have a correspondent within the Carpathian area in *Quercoxylon sarmaticum* (Starostin & Trelea, 1969), a species which must be revised soon because, if Petrescu (1976) was right the Romanian morphospecies could have priority versus the German one, defining the same type of wood.

In such circumstances, taking into account the structural details observed in our studied specimens and the considerations of Privé (1975) we assign them to the species *Quercoxylon bavaricum* (Selmeier, 1971), having *Quercus robur* L. as nearest living relative.

CONCLUSIONS

Priory some fossil oak wood and of some other trees coming from the late Miocene of the Moldavian Platform have been described by Starostin & Trelea (1969, 1984), Lupu (1984), Iamandei *et al*. (2001c, 2008a), indicating that during that time a forestry association maybe of mixed type was or dominated by Dicots, especially by oaks of *Quercus robur* L. type commonly known as the Pedunculate Oak or English oak. This tree is now live in *Europe*, in *Asia Minor* to the *Caucasus*, and partially in the *North Africa*. Studies of other fossilized plant parts (leaves, fruits, pollen) support the mixed type of the forest, not yet with steppic character, even if pollen of *Artemisia* suggests it was not too far.

In this paper we identified two new type of morpho-taxa, as a contribution to the reconstruction of the lignoflora of the late Miocene of the Moldavian Platform: *Ulmoxylon scabroides* and *Quercoxylon bavaricum* after the study of some small samples collected from Solesti area (Vaslui county) which most probably come from different trees. The presence of such fossil taxa within this region could suggest for the Khersonian, on the land, a temperate palaeoclimate with two marked seasons, probably situated at the sylvosteppic edge.

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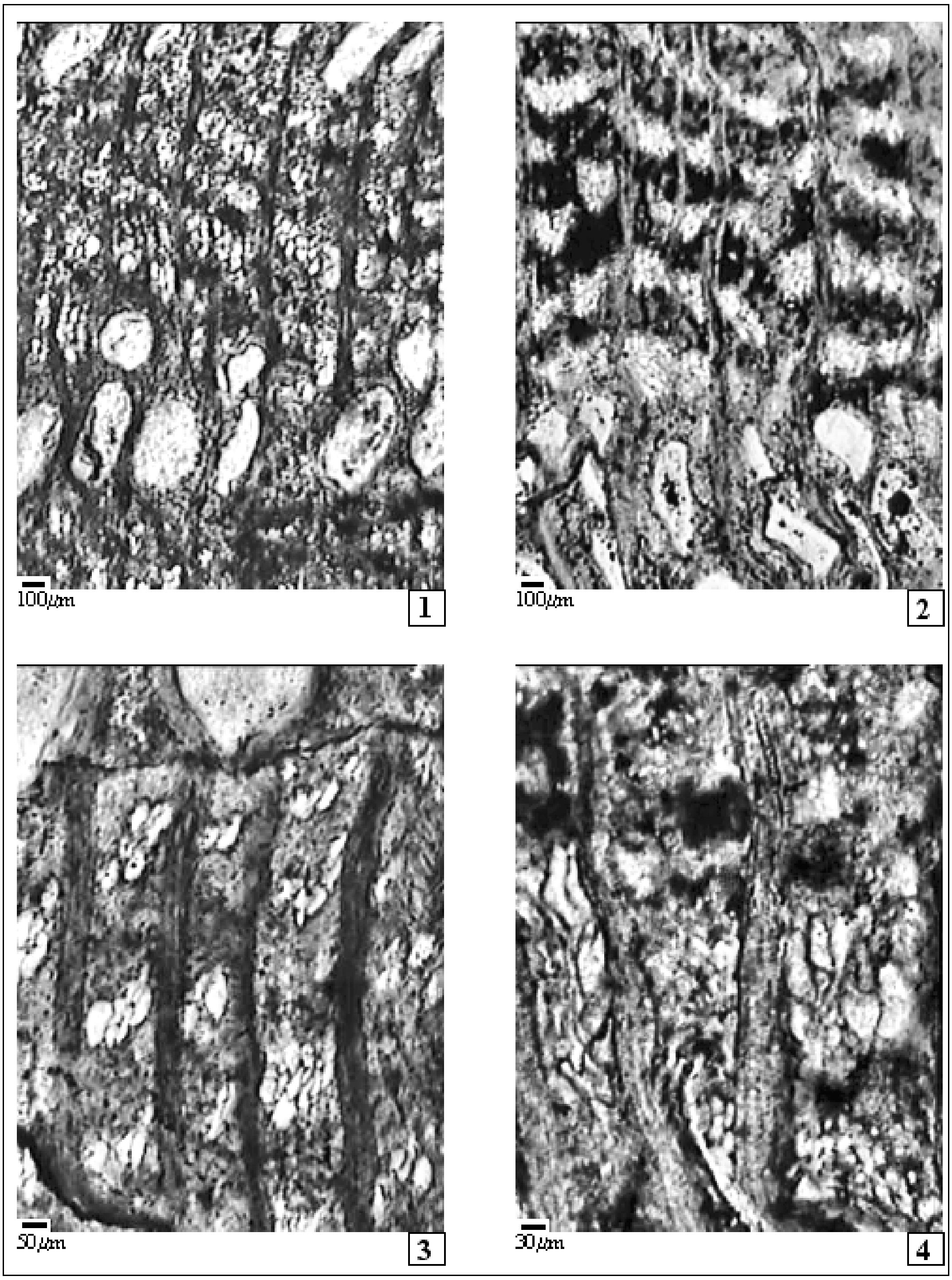


Plate 1

Figs. 1–4. *Ulmoxylon scabroides* (Greguss, 1969), material,
Soleşti, Rupturii hill (GIR Coll. Inv. Nr. 26,642).
Figs. 1–2. Cross-section: general view of the “ulmoid” structure,
distribution of the twosized vessels in early wood and in late wood;
Figs. 3–4. Cross-section: details with broad rays, ground mass and vessels within the late wood.

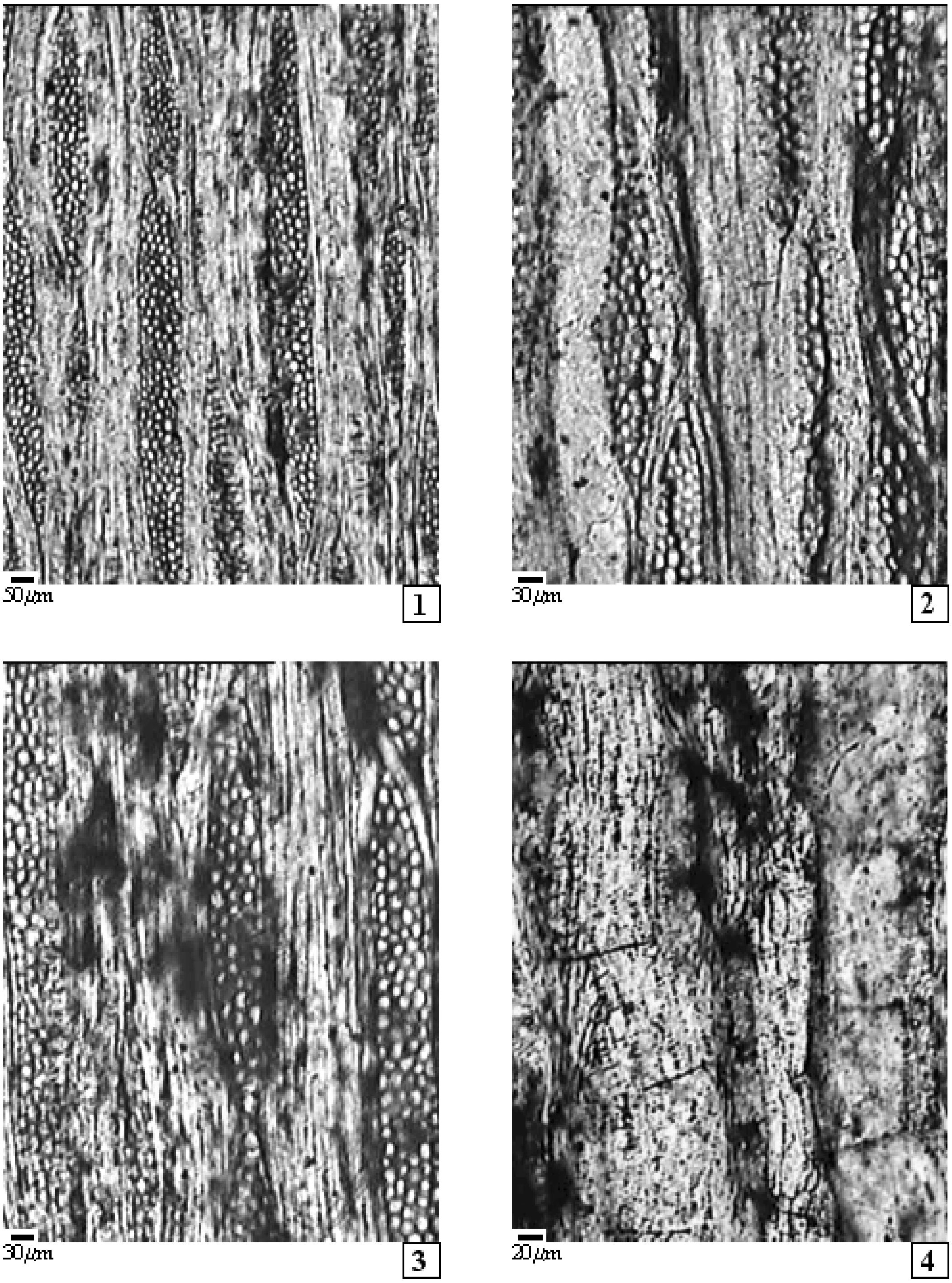


Plate 2

Figs. 1–4. *Ulmoxylon scabroides* (Greguss, 1969), material, Soleşti Rupturii hill
(GIR Coll. Inv. Nr. 26,642, 26,643).
Figs. 1–3. Tangential section: fusiform broad rays, vessels, ground mass;
Fig. 4. Tangential section: big vessels rounded by paratracheal parenchyma.

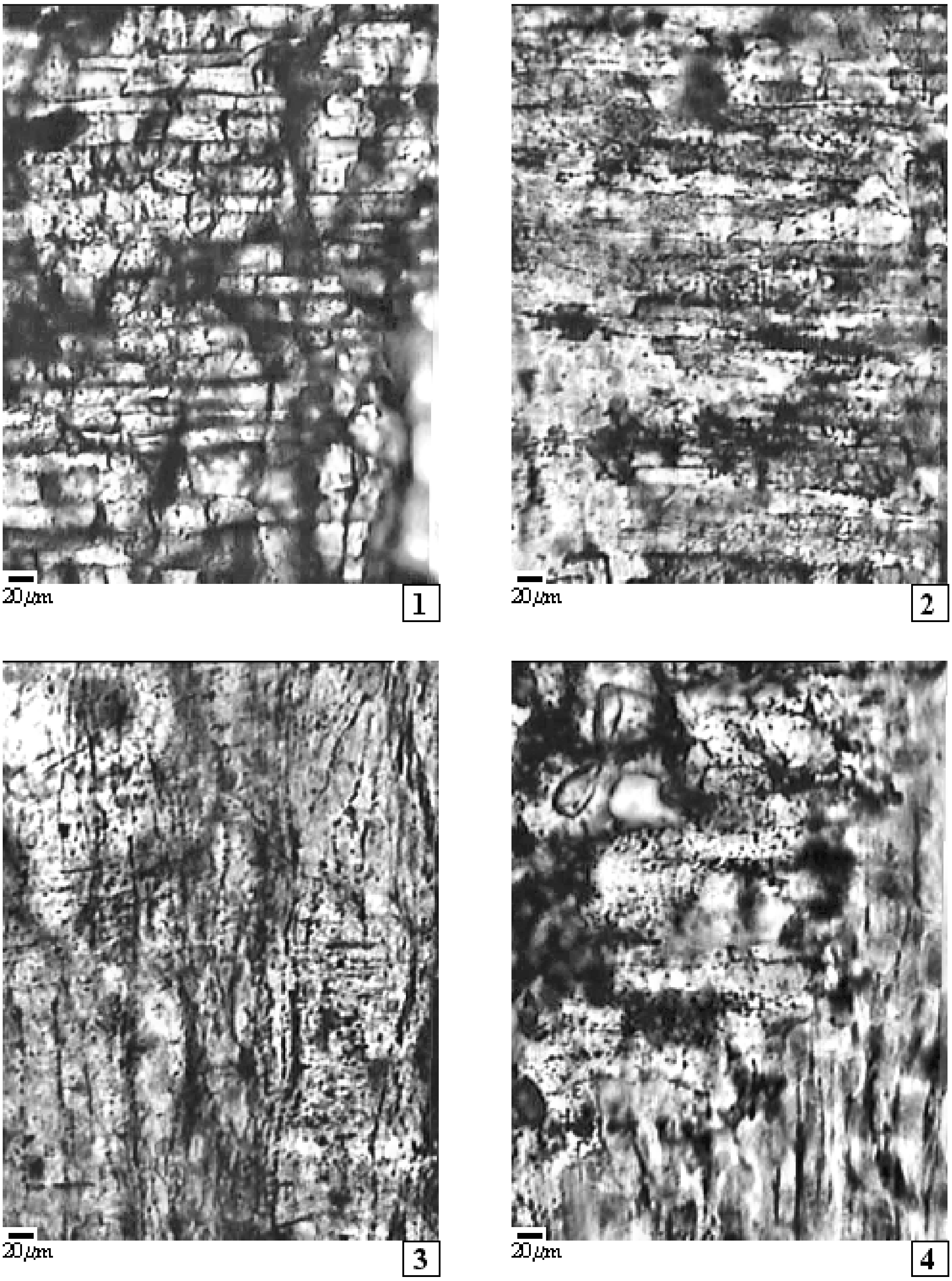
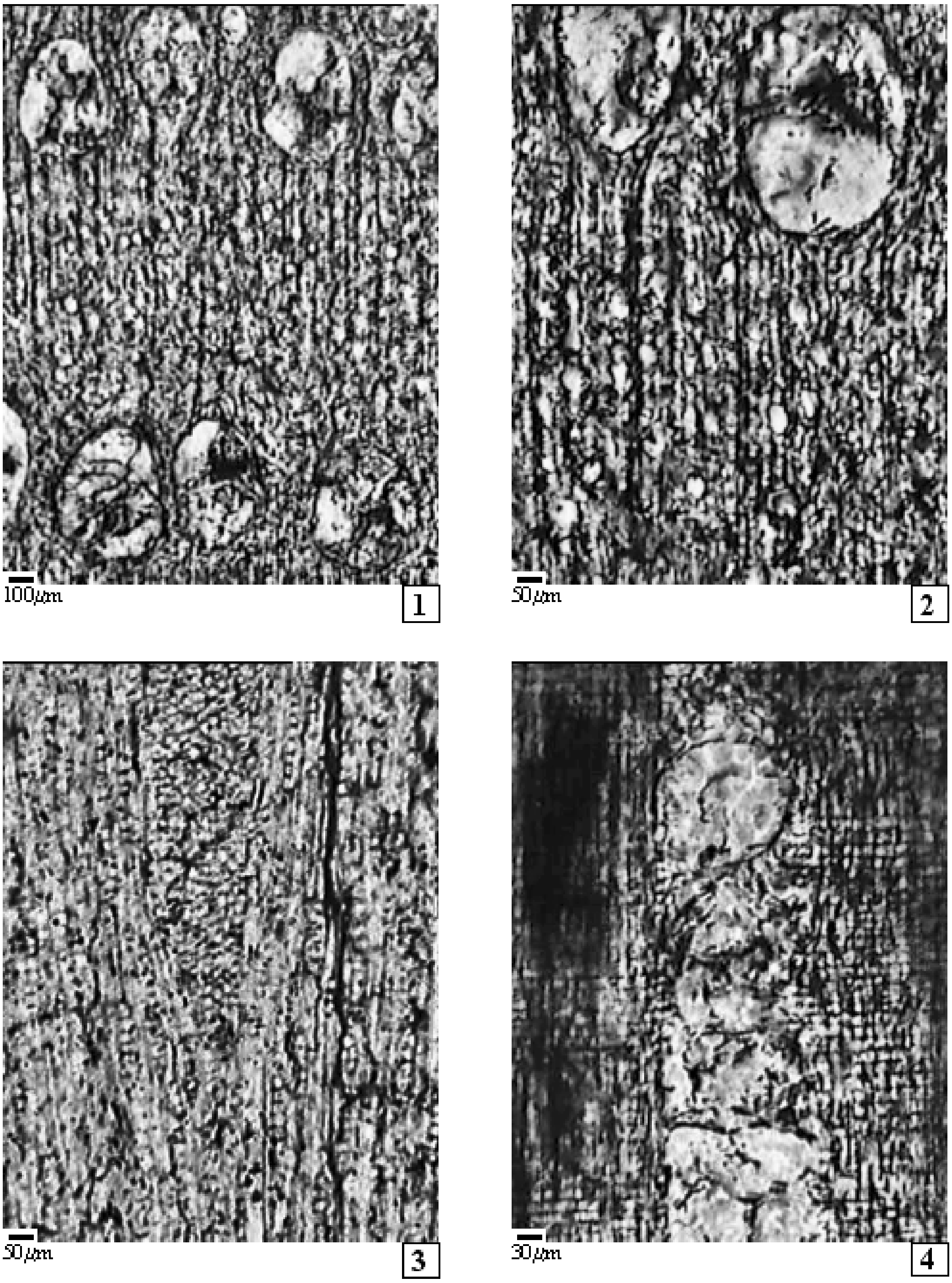


Plate 3

Figs. 1–4. *Ulmoxylon scabroides* (Greguss, 1969), material, Soleşti Rupturii hill
(GIR Coll. Inv. Nr. 26,642; 26,643; 26,648).
Figs. 1, 2 and 4. Radial section: homocellular rays, pitted ray cells in cross fields;
Fig. 3. Radial section: vessels rounded by paratracheal parenchyma, pitted ray cells in cross fields.



Pate 4

Figs. 1–4. *Quercoxylon bavaricum* (Selmeier, 1971), material, Soleşti, South Şerboteşti hill (GIR Coll. Inv. Nr. 26,658).
Figs. 1–2. Cross-section: quercineous distribution of the twosized vessels, early wood vessels in one row, late wood vessels polygonal, distributed;
Fig. 3. Tangential section: twosized rays, broad ray and fine rays;
Fig. 4. Radial section: simple perforated tylosed big vessel and cross fields.

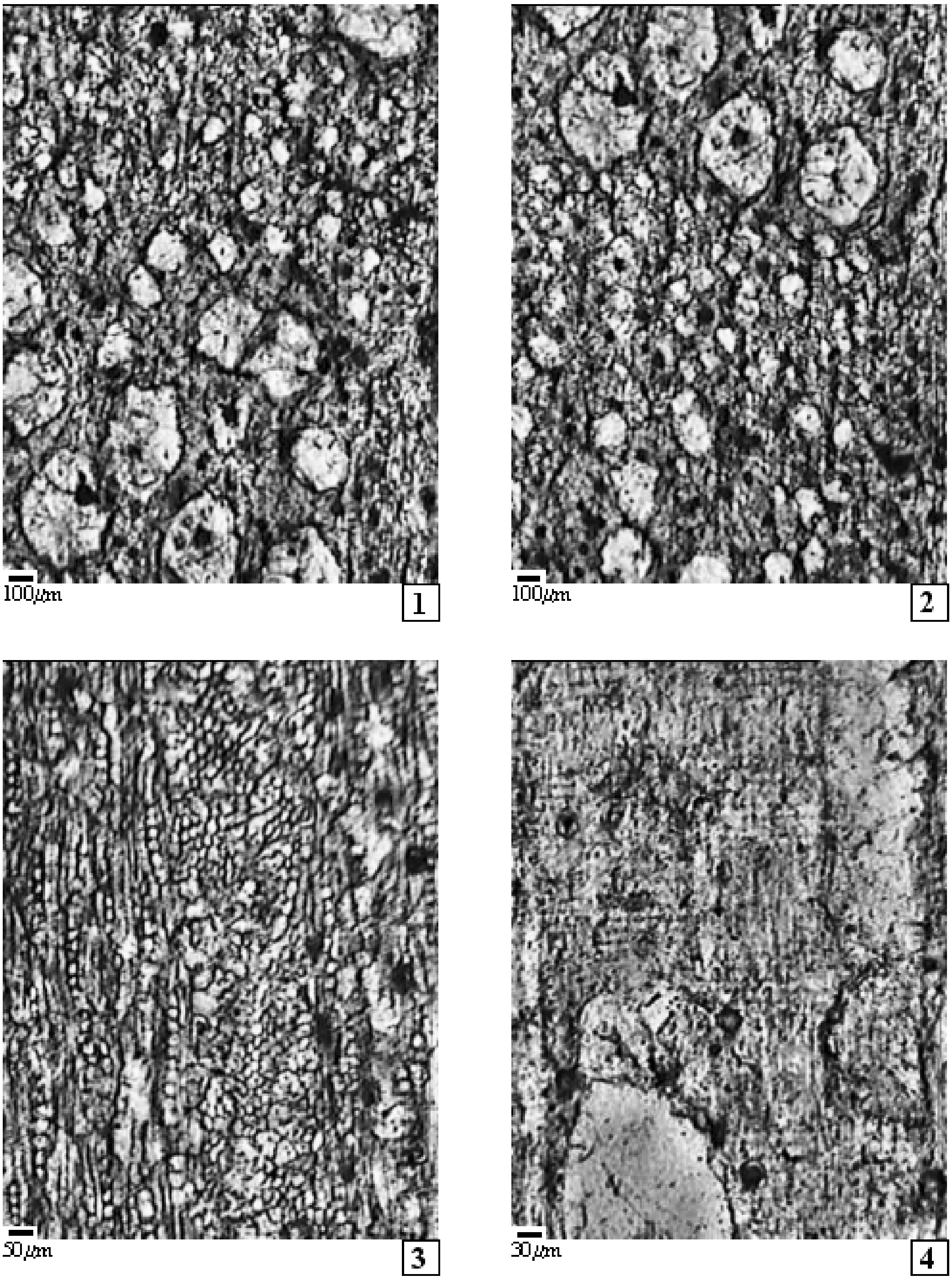


Plate 5

Figs. 1–4. *Quercoxylon bavaricum* (Selmeier, 1971), material, Soleşti, South Şerboteşti hill (GIR Coll. Inv. Nr. 26,661).
Figs. 1–2. Cross-section: quercineous distribution of twosized vessels, early wood vessels in 2–3 rows, late wood vessels polygonal, quasidifusely distributed, or slightly "in flame";
Fig. 3. Tangential section: twosized rays, dissected broad ray and fine rays;
Fig. 4. Radial section: simple perforated tylosed big vessels and cross fields.

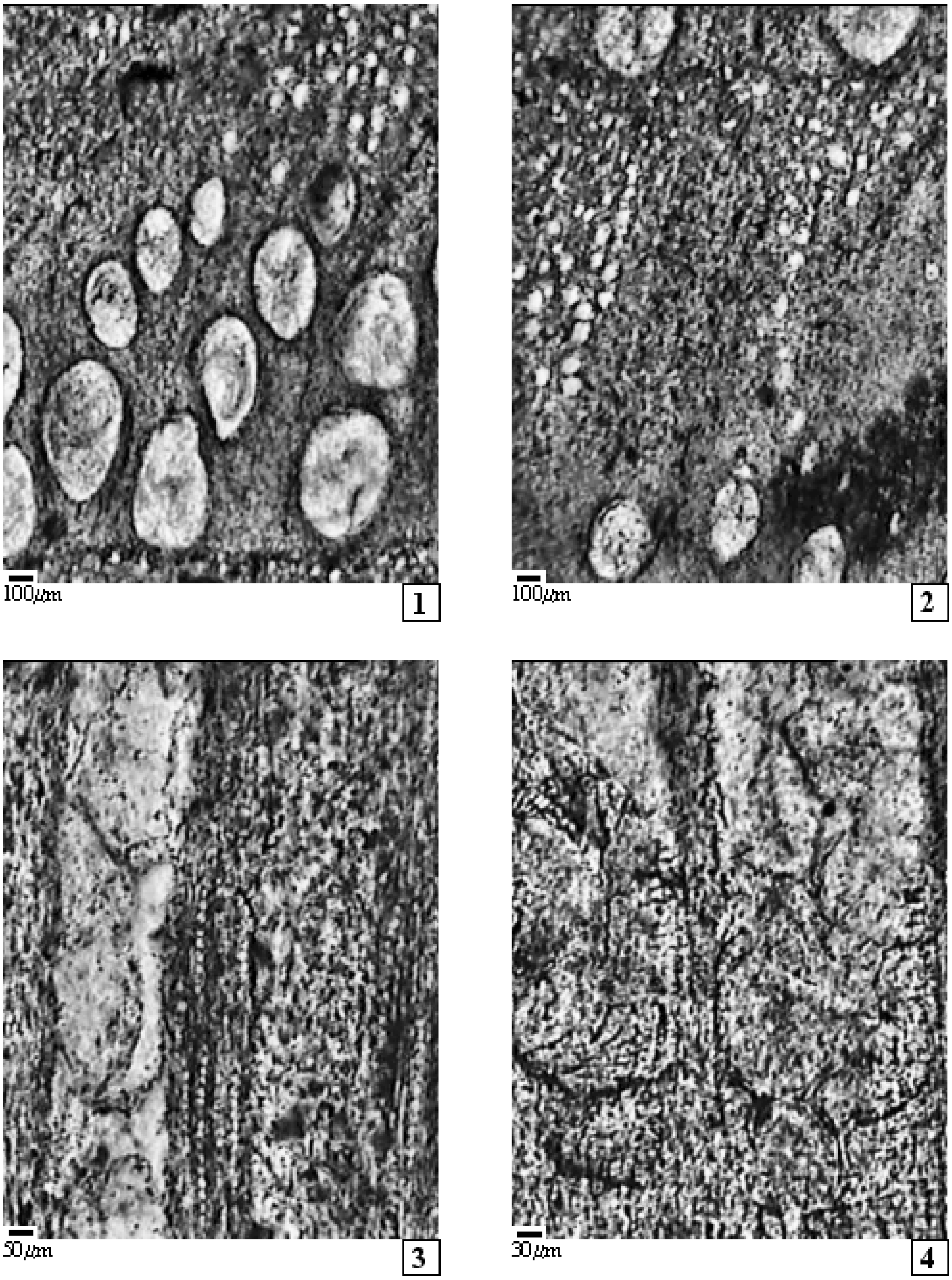


Plate 6

Figs. 1-4. *Quercoxylon bavaricum* (Selmeier, 1971), material, Soleşti, South Şerboteşti hill (GIR Coll. Inv. Nr. 26,659).
Figs. 1–2. Cross-section: quercineous distribution of twosized vessels, early wood vessels in 2–4 rows, late wood vessels polygonal, dendritically or “in flame” distributed;
Fig. 3. Tangential section: tylosed big vessel, twosized rays, dissected broad ray and fine rays;
Fig. 4. Radial section: simple perforated tylosed big vessels and cross fields.

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