FOSSIL WOODS IN THE COLLECTIONS OF DROBETA-TR. SEVERIN MUSEUM

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Abstract. We have studied a small collection of petrified wood coming from a new location: Bala (Mehedinți County), currently hosted by the Muzeul Regiunii "Porților de Fier" ("Iron Gates" Region Museum) in Drobeta-Turnu Severin. The newly identified lignotaxa belong to Conifers and Dicots; it adds to the Middle Miocene flora already known in the region. The paleoclimatic and paleoecologic significance of the identified taxa is also briefly discussed.

Keywords: "Iron Gates" Museum Collection, petrified wood, paleoclimate.

INTRODUCTION

Our study concerns a small collection of Middle Miocene petrified wood originating from Bala area (Mehedinți County), currently curated in the collections of "Iron Gates" Region Museum, in Drobeta-Tr. Severin (Fig. 1).

Fig. 1 - Geographic location of Drobeta-Tr. Severin and Bala area on the map of Romania.

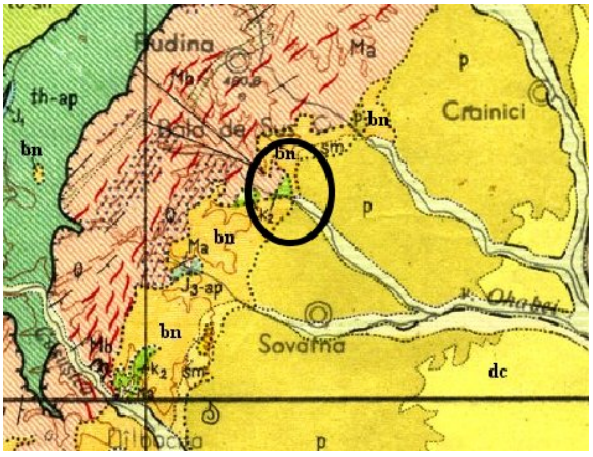

Fig. 2 - Geological map of Bala area (marked with **O**) on a segment of map 1:200000, Baia de Arama Sheet (Geological Institute of Romania, GIR).

The exact geographical provenance of the small collection was difficult to reconstruct, it needed to be verified in the field. Bala Area is a new and unknown fossiliferous site for fossil wood, which will be further cautiously investigated to better locate the level with petrified wood in order to better define its geological age (Fig. 2).

The studied material is represented by small samples coming from some petrified trunk fragments of decimetric size, representing secondary wood.

As study material, we have used standard oriented thin sections cut along cross, tangential and radial directions in these small samples. This allowed a correct microscopic study and a comparative approach with other previously studied and published wood structures, in order to identify the unknown original taxon.

Cautious microscopic observations on the wood structure were done, in order to identify also paleoenvironmental indices. As first results, conifer and dicot remains have been identified, as wood of *Cupressus* and *Pinus* type, and also of *Magnolia*, *Quercus*, *Carpinus*, *Populus* and *Fraxinus* type, the structures being sometimes highly affected by fossilization processes before mineralization.

From the Middle Miocene, i.e. Late Badenian–Earliest Sarmatian of the north and north-western marginal parts of the Dacian Basin, several floras have been identified due to studies of vegetal remains of Barbu (1954, 1960), Givulescu (2001), Țicleanu (1984, 2006), or Paraschiv (2004-2008); to a lesser extent, paleoxylotomy investigations were also carried out (see Petrescu, 1976).

Few and thin Middle Miocene levels of coals, devoid of significance, were identified in the northern part of the Dacian Basin. However, Țicleanu (in Jipa, 2006) included as personal communication the information on a coal seam of 1.2 m thickness located SE of Novaci, in Ariniş Valley (?).

Anyway, during the Middle Miocene the southern slopes of the rising Carpathians had to be highly forested, as some well known deposits of plant remains prove it: Badenian and/to Sarmatian Floras of Valea Morii, Pârlagele, Ciocadia, Porceni and Râmeşti (see the chapter of conclusions). This new approach of the

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Neogene palaeovegetation now focused on petrified wood originating from the southern Sub-Carpathians, Bala area, Mehedinți County, allows us to increase our knowledge on the Middle Miocene flora, by summing up information resulted from the study of various fossilized plant parts.

New ligno-morphotaxa were identified after a difficult study on rather badly preserved material, as the petrified wood of some Conifers and Dicotyledons, presented in the next chapter. Nevertheless the research will be extended to other petrified wood collections, or on own collected material during field prospections, given interesting paleobiogeographic, paleoecologic and paleoclimatic significance of this material. Such remains illustrate better the local vegetation because wood fragments could not be transported at too long distances from the original place, and usually they cannot be reworked (Philippe *et al.* 2006).

On the other hand systematic research in the area could increase the Petrified Wood Collection of the Natural Sciences Department of "Iron Gates" Region Museum in Drobeta-Turnu Severin, Romania, and also our knowledge on the Middle Miocene palaeobotany of the western part of the Dacian Basin.

SYSTEMATICS

Phyllum **PINOPHYTA** CRONQUIST, TAKHT. & ZIMMERM. EX REVEAL
Family **CUPRESSACEAE** GRAY
Genus ***Cupressinoxylon*** GOEPPERT 1850
Cupressinoxylon sp. aff. *Thujoxylon* sp.
Plate I, figs. 1-9.

Material

The studied material originates from Bala Area, Mehedinți County; it is represented by a decimetric trunk fragment hosted now by the "Iron Gates" Region Museum's Collection of Drobeta-Turnu Severin (inv. no. 1496). Macroscopically or under magnifying glass the sample shows beige to light grey colours, regular fibrous texture without vessels and obvious annual rings, suggesting a coniferous wood.

Microscopic description

Growth ring boundaries distinctive for early wood have big relatively thick walled (6-8 µm double wall) quadrangular, radially elongate cells, lumina with rounded corners (tg/r= 30-40/50-70 µm); in the late wood they are smaller, squarish within trasitional wood and gradually diminishing to smaller, quadrangular, radialy crushed and very thick walled cells (9-12 µm double wall) in the late wood (tg/r=10/30 µm), represented by 3-5 rows of cells, and without any resin canal. The interradial bundles have 1-8 rows of tracheids. Radial pitting abietinean, uniseriate or biseriate, spaced, sometimes with *crassulae*. The bordered pits are relatively small (of 8-9 µm), with visible round aperture (of 2-3 µm). Tangential walls with cupressoid ondulation seem to be also smaller pitted but, due to bad preservation, it is difficult to say if pitting is contiguous, or spaced, or even absent.

The axial wood parenchyma seems to be absent but in fact it is thick-walled and thus difficult to be observed among the tracheids. It appears very clearly in tangential view, having short elements separated by horizontal or/and inclined transversal walls, which are fine and smooth, or slightly knotted (?). Longitudinally, the cells present glomerules of resin, or plugs.

The uniseriate medullary rays, extending not more than 12-15 cells in height, are not too visible in cross section, while in tangential sections they are thin. Radially the rays seem to be homogeneous and are constituted from cells of 12-14 µm, marginals higher and with ondulations, given the radial pits on tracheid right near the marginal ray cell. No inclined walls and no indentures have been observed. In the cross fields 1-2 small round to oval cupressoid pits (of 5-6 µm in diameter) are present, with lens-like apertures inclined to vertically disposed.

Affinities and discussions

All these xylotomical observations made on the studied material provide a combination of features which suggests a cupressaceous structure; however, the badly preserved material supplied insufficient details to choose between extant *Juniperus* or *Thuja* type structure. Thus, all these features difficultly point to fossil cupressaceous structure to *Junniperoxylon* or to *Thujoxylon* genera, without allowing the identification of a species.

In their identification key, Vaudois & Privé (1971) stated that these structures have "zones d'acroissement distinctes, tracheides a ponctuations radiales abietineénnes uniseriées, parenchyme absent ou rare, a parois transversales noduleuses ou ponctuées, rayons généralement peu élevés, uniseriés, parfois biseriés sur un faible hauteur; champs de croisement contenant 1-4 ponctuations taxodioides, parfois cupressoides, indentures présentes" for *Thuja* type, but with a lot of parenchyma in *Chamaecyparis*. But neither juniperoid nodules non inclined tangential walls of ray cells were observed, probably also due to the bad preservation state of the fossil material.

Since we could not study a well fossilized material and also taking into account the studies of Greguss (1967, 1969), Dupéron-Laudouéneix (1979), Zalewska (1953), the revised diagnoses of Kräusel (1949), Vogellehner (1967, 1968), and using the key of identification proposed by Vaudois et Privé (1971), we prefer to name our studied material *Cupressinoxylon* sp. aff. *Thujoxylon* sp. because there is no correlation between the few xylotomical characters observed on our specimen and the similar types in the cupressaceous structure.

Family **PINACEAE** LINDLEY
Genus ***Pinuxylon*** GOTHAN 1906
Pinuxylon sp. cf. *Pinus sylvestris* L.
Plate II, figs. 1-9

Material

The studied material originates from Bala Area, Mehedinți County; it is represented by a decimetric trunk fragment, currenlty hosted by the "Iron Gates" Region Museum Drobeta-Turnu Severin (inv. no. 1497). The material is brown-grey to redish or yellowish in colour and shows fibrous texture. With naked eye or under magnifying glass growth rings and axial resin ducts can be seen, typical in some Pinaceae.

Microscopic description

High growth rings with distinct boundaries; the early wood mostly developed and formed via relatively thick-walled cells; the transition is gradual, the final wood is represented by 4-8 rows of flattened thicker-walled cells. Normal axial resin canals, usually solitary but also rarely coupled are present inside the ring, especially in the transition and final wood; they are circular or slightly oval in cross field, with lumina diameter of 200-350 µm. The epithelial cells are altered, thus difficult to count, but probably they are developed in 1-2 layers. Their pitting was not observed, due to bad preservation. The tracheids have polygonal, usually rectangular cross field. The lumina diameters are of 50-60 µm, and the cellular wall is 8-12 µm (double wall). Their frequency is of 2965 tracheids on one mm^2. Tangential pitting is scarce, or already absent, or even difficult to observe given the bad preservation. Radial pitting is abietinean, 1-2 seriated, however affected by the bad preservation.

The axial parenchyma is usually absent.

In cross field, the medullary rays are constituted by rectangular elongated cells, with dark content. Tangentially they are uniseriate and not too high. Due to the bad preservation, pitting in this section cannot be observed. Spindel shaped rays with 1-2 resin ducts can be rarely observed. The density is of 4-6 rays on tangential mm. In radial sections, the rays show parenchymatous procumbent cells, 18-25 µm high, with relatively thick horizontal walls (1-3 µm the double wall). Details on tangential walls are not visible, indentures indistinct or absent. Cross field pitting not visible due to bad preservation; however it seems to show small taxodioid pits. Transverse tracheids are absent or are not visible, given the bad preservation.

Affinities and discussions

Based on the presence and the aspect of the normal axial and radial resin ducts, the studied structure seems to be a fossil correspondent of the extant *Pinus* L. The radial ones suggested to be present within some uniseriate rays can be also very typical. More than that, the epithelial cells of the ducts are moderately thick-walled. In our specimens the axial resin ducts are large, up to 200-350 µm. Even there are not enough arguments to identify properly the unkown species, having no details on radial tracheids we consider our specimen to have affinities with *Pinus* of *Diploxylon*-type (see Greguss 1955, Schweingruber, 1990). The comparative study showed that the xylotomically most similar extant species is *Pinus sylvestris* L.

Some fossil forms described by Greguss in 1954, Petrescu (1970), Comblé et al. (1973), Privé (1976), Privé-Gill et Watelet (1980), Gotwald (1966), Iamandei (2000), Iamandei & Iamandei (2005) seem to be similar to our specimen, but in their case the material had preserved enough details to allow their description as species.

Thus, following the brief comparative analysis with the already described structures, the currently studied specimen does not show identity with any of them; given its bad stage of preservation we can only identify it as *Pinuxylon* sp. cf. *Pinus sylvestris* L., most probably of *Diploxylon*-type.

Phylum **MAGNOLIOPHYTA** CRONQUIST, TAKHT. & ZIMMERM. EX REVEAL
Family **MAGNOLIACEAE** JUSS.
Genus ***Magnolioxylon*** HOFMANN 1952
Magnolioxylon sp. cf. *M. transilvanicum* NAGY & MÂRZA, 1967
Plate III, figs. 1-9.

Material

The studied sample originates from Bala area, Mehedinți County, from some sedimentary Middle Miocene formation. It is represented by a decimetric trunk fragment, grey to beige in colour, with fibrous structure, big vessels and growth rings visible by naked eye, all typical characters for a dicotyledonate. The material is currently hosted in the collections of the "Iron Gates" Region Museum Drobeta-Turnu Severin (inv. no. 1499).

Microscopic description

High growth rings not too distinct, with boundaries marked by some tangential rows of parenchyma cells (terminal parenchyma), slightly radially compressed. The structure is generally diffuse-porous to semi-ring-porous and the rays present typical dilations at the limit of the annual rings. However, given the bad preservation of the petrified wood, many details can be only assumed.

The vessels are disposed in 1-3 radial rows between two rays and are usually solitary; however radial small multiples of 2-4 vessels could be observed with difficulty, given the bad preservation of the material. The solitary pores seem to be oval in shape, usually deformed, relatively thick walled, probably touching the rays. Diameters of the solitary vessels are 50-70 µm. The vessel density seems to be more than 40 vessels on mm^2. Short scalariform perforations on inclined plates are present, and simple and scalariform perforations on tilted plates. Intervascular pitting is horizontal-elliptic, opposite to genuine scalariform. Any measurement (including the length of vessel elements) can be done only with difficulty, given the bad preservation state. Sometimes tyloses inside vessels are visible.

Moderately thick walled, septed and small fibres or fibrotracheids pitted on both vertical walls are hardly visible, given to the preservation state.

Wood parenchyma must appear as terminal bands, rarely diffuse, or scanty-paratracheal; as in the case of the fibres, they are difficult to be observed in both sections given the bad preservation.

Medullary rays – seen in cross field, seem to be fine, consisting of rectangular cells radially elongated filled with some brown material, having slight dilations at the growth ring boundary. Generally the rays have a curled trajectory because often there is an inflection around vessels; sometimes they even touch the vessels. In tangential section it is obvious that the rays are 1-3-seriate and that their frequency is 6-10 rays on tangential horizontal mm. They are 10-25 cells in height, or even higher. The cells are rounded polygonal and alternately disposed, sometimes slightly uneven. In radial sections they show heterocellular character; the body cells are low, procumbent, and show marginals of square or high

cells. It is very obvious that in cross-fields elongated superposed pits are present.

Affinities and discussions

Even if the structure is highly overlapped by fossilization processes, some xylotomical features suggest that the material is a possible member of **Magnoliaceae**, a family that currenly groups around 230 species of only 7 genera, widespread in temperate to tropical areas from Eastern Asia and North America (see Watson & Dalwitz, 1992); not all of the species show arboreal habit. However only two fossil ligno-morpho-genera were validly described from the European Tertiary:

- *Liriodendroxylon* PRAKASH, BŘEZINOVÁ & BŮŽEK 1971., corresponding to the extant genus *Liriodendron* known as tulip tree, whose wood structure can be diagnosed as such: diffuse-porous wood, small to mean sized vessels, solitary or as multiples of 2 or more scalariform perforated plate with few bars (6-13), angular to elliptic intervascullar pitting, opposite, in horizontal pairs or rows, terminal parenchyma, 1-5-seriate rays or broader, slightly heterogeneous, fibers with polygonal cross field, thin to thick walled, unsepted.
- *Magnolioxylon* HOFMANN 1952, corresponding to extant genera of magnolias such as *Magnolia*, *Michelia*, *Talauma*, with the following diagnosis: diffuse-porous wood with low growth rings, small solitary vessels or as multiples of 2-3...5(7), simple perforated plates, small to large vascular pitting, paratracheal uniseriate parenchyma, 1-4(5)-seriate rays, rarely broader, slightly sinuous trajectory, high to 22 cells, heterogeneous, procumbent body cells, marginals upright, thick walled fibers.

Additionally, some species of *Magnolioxylon* can show scalariform perforations and scalariform pitting, and even very specific ones, a reason to emmend the genus's diagnosis. The xylotomical details observed in our specimen, unfortunately badly preserved, suggested us the assignment to *Magnolioxylon.* We could not access some previous identification of magnoliaceous fossil woods (of Unger, Caspary, Lignier, Edwards, and Kruse) quoted by Schönfeld (1958), but we compared our structure with the following forms:

- *Magnolioxylon michelioides* HOFMANN 1952, the type species, has radial multiples of 3-5-7 vessels, paratracheal and terminal parenchyma, rays of two sizes - broad of 3-5 cells and uniseriates numerous which bring it closer to the extant species *Michelia baviens L*.
- *Magnolioxylon scandens* SCHÖNFELD, 1958, described from the Late Oligocene of Niederrheinischen Bucht, showed diffuse-porous wood with thick growth rings, solitary vessels and in small radial multiples, sometimes diagonal to tangential, simple to scalariform perforated plates (up to 33 bars), scalariform intervascular pitting; tracheids thick walled, round to scalariform pitted, thick walled pitted libriform, 1-4-seriate high rays, heterocellular with 1-3(5) rows of marginal, thick walled, upright cells (77-92 mm high). Schönfeld shows that these details suggest similarities with extant species like *Magnolia* and *Talauma*, but also with some lianas like *Schisandra, Kadsura*. We have previously described the species from Middle Miocene deposits of Prăvăleni, South Apuseni area (Iamandei et al., 2005).
- *Magnolioxylon transilvanicum* NAGY & MÂRZA 1967, firstly described from Prăvăleni, South Apuseni area. The wood structure presents bi- and triseriate rays, platanoid dilations at the boundary of the growth-rings, simple and scalariform perforations, bordered pits elongated to scalariform on vessels, simple and bordered with slit-like apertures to the ray cells, tracheids with spiral thickenings and scalariform pits. The species described by Nagy & Mârza (1967), and subsequently identified by us in the same area (Iamandei & Iamandei, 1997), has 2(3)-seriate rays, with secretory cells, scalariform perforations, bordered elliptic to scalariform pitting, similar on tracheids and of "buttonhole type" on the fibers.
- *Magnolioxylon sp*., described by Petrescu (1970) from Prăvăleni, from the same formation, has badly preserved anatomical details - solitary vessels or in 2-3 radial multiples and 1-4-seriate rays, typical generic details - but not sufficient for specific identification.
- *Magnolioxylon kräuselii* (GREGUSS) VAN DER BURGH 1973, initially described by Greguss (1969) as *Liquidambaroxylon*, presents besides the generic details simple and scalariform perforations with (3)10-12 spaced thick bars, sometimes forked, pitted and crystalliferous parenchyma, 1-2-seriate heterocellular rays, of 10-16 cells high, thick to very thick fibers, pitted firbo-tracheids.
- *Magnolioxylon parenchymatosum* VAN DER BURGH 1973, described from the Late Oligocene of Niederrheinischen Braunkohlenformation, presents many xylotomical similarities with the extant species *Magnolia fraseri* and *M. sororum*, and with the fossil species *Magnolioxylon scandens* described by Schönfeld from the same deposits. The terminal parenchyma is obvious, the vessels with small sections, scalariform perforated (2-12 spaced bars), intervascullar scalariform pitting, helical thickenings, pitted tracheids and fiber, banded parenchyma, 2-3-seriate rays, heterocellular (with two rows of marginal upright ray cells), specially pitted.

Since our studied specimen displays a bad preservation state, thus a lot of details being hardly noticeable, we propose identification only at generic level, as *Magnolioxylon* sp. possibly of *transsylvanicum* type, given the very similar scalariform perforations on vessels.

Family **FAGACEAE** DUM.
Genul ***Quercoxylon*** (KRÄUSEL) GROS1988
Quercoxylon sp. cf. *Quercus frainetto* TEN.
Plate IV, figs. 1-9.

Material

The studied sample was collected from Bala area, Mehedinți County, from the Middle Miocene sedimentary formation. It is represented by a decimetric trunk fragment, grey to beige in colour, with fibrous structure, big vessels and growth rings visible by naked eye, i.e. typical characters for a dicotyledonate. The material is currently hosted in the collections of the "Iron Gates" Region Museum Drobeta-Turnu Severin (inv. no. 1495).

Microscopic description

In cross field distinct growth rings can be seen, marked by an abrupt change between the early wood with very large vessels and the late wood with small vessels, defining a typical ring-porous structure.

Large vessels in early wood as tangential bands, in the late wood exclusively solitary mixed with tracheids arranged in radial or in dendritic pattern. The solitary large vessels are round to oval, radially elongate and have the lumina size of 200-350 µm in diameters, rarely up to 400 µm. The smaller vessels from the late wood are usually round or slightly oval and with diameters of 40-100 µm. The vessel walls are moderately thick, of 5-6-8 µm. Simple perforation plates and intervessel pits bordered, circular to oval, of 4.5-6 µm in diameter, opposite, subopposite to slightly alternate, spaced arranged, small (of 4.5-6 µm in diameter) can be seen. Helical thickenings in vessel elements are not visible. Mean vessel elements, otherwise difficult to measure, are probably 350 - 800 µm in size. Large and folded thin walled tyloses in vessels can be seen. Pores' frequency is between 5-20 vessels per mm^2.

Vascular tracheids coiling the vessels are very frequent, with small, bordered, round or slightly round pitting, 5-6 µm border diameter, 2 µm the aperture, spaced disposed in 1-2 vertical rows.

Fibers and fibrotracheids transversally appear together with wood parenchyma ground tissue, are thick walled and seem to be pitted and septed.

In cross field, wood parenchyma is usually of diffuse apotracheal type, scattered among the vascular tracheids – thus sometimes difficult to observe, or building 1-3 seriate bands within the transitional wood. Rows of chambered axial parenchyma cells with solitary large prismatic crystals sometimes rounded and with gum remains content inside are present.

The medullary rays with linear trajectory or slightly curled are two-sized: uniseriates numerous, and also multiseriate, very thick, (20-40-seriates) built of polygonal rounded to oval cells of 8-16 µm in size, high and dissected by fibers and very high, of more than 1 mm. Their frequency is variable, i.e. 10-20 rays per tangential millimeter, the high and broad multiseriates (~400 µm thick) being rare and at relatively uniform intervals, being compact or composed. In radial section the rays are homocellular and show cells all procumbent, having numerous rounded quadrangular vertically disposed bordered pits, relatively badly preserved. The ray cells often bear rounded prismatic crystals usually floating in gum remains content.

Affinities and discussions

The cross fields of the studied specimens show a typical aspect of the wood of the members of **Fagaceae**, i.e. the obvious ring-porosity. The two-sized rays (multiseriates broad and finer, mostly uniseriate), the rounded aspect of the large vessels and of the small ones are also typical for some **Quercineae**, especially for *Quercus* genus.

In this respect, Hadziev & Mädel (1962) separated four types:

- Type "Weisseichen" (white oak), most of the species of section *Lepidobalanus* ENDL., ring porous, with small, polygonal, thin walled latewood vessels.
- Type "Roteichen" (red oak), the species of section *Eritrobalanus* O. SCHWARZ and some species of *Lepido-balanoideae*, with ring porousness and relatively large round thick-walled late wood vessels.
- Type "sempervirent", species of *Quercus* and *Lithocarpus* with porous (diffuse) or half-ring-porous structure, the relatively small and spaced vessels, often radially disposed.
- Type "root wood", corresponding to all types, with diffuse-porous structure and crowded large pores.

Privé (1975), in perfect agreement with Hadziev & Mädel, shows that the oak wood is characterized by vessels in radial rows more or less dendritically distributed and simply perforated. She emphasized that two-sized rays (very broad multiseriates and finer, 1-2-seriates) are present in *Quercus* L. and in *Lithocarpus* BL. (= *Pasania* OERST.) with some tens of species from temperate to warm regions of northern hemisphere, islander included. These structures have a diffuse pore distribution which characterizes the evergreen species; the ring-porous one is typical to the deciduous species of *Quercus* and the most septentrional species of *Lithocarpus*. In the root wood, the deciduous species often tend to loose the ring-porousness and thus they become similar to the evergreen species, while the broad rays divide into false rays (aggregate rays).

Another comparative synthesis made by Shimanji on the essential xylotomical characters of the extant fagaceous taxa, based on the anatomic studies on phylogenetic relations between the genera of **Fagaceae** was included in Suzuki & Ohba (1991).

The best systematization of xylotomical details of Fagaceae that can be used as key to the identification of fossil fagaceous woods was introduced by Petrescu (1976), and presented as follows (Table 1):

Table 1

Type A	Structures with solitary vessels or grouped (2-3 or more), with simple and scalariform perforations on vessels.	Fine rays (1-3-seriate) and compact multiseriate.	*Fagoxylon* *Nothofagoxylon*
Type B	Structures with solitary vessels, simple perforated, sometimes some scalariform, with few bars.	Exclusively uniseriate rays.	*Castanoxylon*
		Uniseriate and compact pluriseriate, sometimes compact-composed or partially aggregate rays.	*Quercoxylon*
		Uniseriate and pluriseriate aggregate rays.	*Lithocarpoxylon*

The history of *Quercoxylon* is very interesting: it was created by Hofmann in 1929, but defined by Kräusel in 1939 and emended by Müller-Stoll & Mädel in 1957, by Gros (1983, 1988), and by Suzuki & Ohba (1991). Some authors consider only Kräusel (1939) as author of this genus (see Selmeier, 1997).

Since we did not have access to the paper of Hofmann, E. (published in *Ann. Sabariensis,* 3/1929: 81-87) as it was quoted by Müller-Stoll & Mädel (1957), Greguss (1969), Privé-Gill (1990) and Suzuki & Ohba (1991) and, very probably, since Hofman had not designated a type species and had not provided a generic diagnosis, the initial name proposed was considered *nomen nudum*.

Subsequently, many authors such as Goeppert, Felix, Unger, Conwentz, Mercklin, Schleiden, Edwards, Schüster, Platen, Knowlton, Pampaloni, Webber, Nee, Ogura, Watari, or Shimakura (cited by Müller-Stoll & Mädel, 1957) have used names as *Kloedenia, Quercinium, Quercites, Quercus* for the fossil oak wood. It is Unger in 1842 who firstly presented a generic diagnosis for *Quercinium*, later revised by Felix (1884), but only Kräusel (1939) established the name *Quercoxylon*, with type species *Q. retzianum* KRAUSEL, in spite of the fact that, as mentioned before, the first species described under this genus name was *Q. cerris* HOFMANN 1929. It is very probable that Kräusel simply ignored the paper of Hofmann published ten years before.

Emended in 1957 by Müller-Stoll & Mädel, and by Gros (1983, 1988), the genus diagnosis comprise specifications on: porous or ring-porous structure, usually solitary vessels simply perforated, alternate vascular pitting, with pitted parenchyma banded or diffuse, libriform, tracheids and small vessels in groundmass and two-sized rays.

Another revision and emendation of Suzuki & Ohba (1991), even proposed to leave out some of the confusing validly published generic names of oaks by considering as synonymies all the previous known names (*Kloedenia, Quercinium, Quercites, Quercoxylon)* and replacing them with the linéan name *Quercus*; however their proposal did not respect the extant ICBN rules, thus it has not been followed by any paleoxylologist (see Selmeier, 1997).

After reviewing many previously described extant species of “white oak”, Privé (1975) concluded that there was a big intraspecific variation; that was confirmed for the entire genus *Quercus* L. which shows a great interspecific anatomic homogeneity. This makes it very difficult to ascribe fossil species, thus terms that have only a descriptive value, as for morphospecies being used. Selmeier (1996) observed that vessel diameter, ray size, ray frequency and ray distribution are variable: even in the same described fossil species the biometric values may differ.

For this reason, in xylotomical description of extant wood no actualized measurements are given, and any accurate measurements made by paleoxylologists cannot be always used to identify an unknown species. More than this, the rules from "IAWA List of Microscopic Features for Hardwood" (Wheeler at al., 1989) impose different ways to convert older measurements.

A lot of oak fossil woods described from the European Miocene were usually identified as white oaks type, as *Quercoxylon bavaricum* SELMEIER 1971, a perfect equivalent for the extant *Quercus robur* L., which belongs to *Quercus* section.

This species described by Selmeier (1971) has a correspondent within the Carpathian area in *Q. sarmaticum* STAROSTIN & TRELEA 1969 which has to have priority given the fact that it defines the same type of wood; it was described again by Petrescu (1976), Lupu (1984), Iamandei et al. (2001, 2005).

The xylotomical analysis of the studied specimen shows that it should belong to "Roteichen" type, from *Erytrobalanus* sectio, since it presents, in cross field, ring porous structure and small, round, thickwalled vessels in late wood, with slightly radial or dendritic distribution of the vessels, in spite of the many possible variations as some other authors have previously shown (see Selmeier, 1971; Privé, 1975).

At first sight the wood structure seems to correspond to the extant *Quercus borealis* L. (in Schweingruber, 1990), known now as synonym of the extant *Quercus rubra L.,* an oak in the red oak group (*Quercus,* section *Lobatae*), which currently lives in North America, in the northeastern United States and southeast Canada (locally named Northern Red Oak, or Champion Oak).

However the cross fields with vessels show a homocellular ray structure with numerous quadrangular rounded vertically disposed bordered pits very similar to those in the extant species *Quercus frainetto* TEN.. (see Schweingruber, 1990), known as Hungarian Oak or Italian Oak (synonyms: *Quercus conferta* KIT., *Quercus frainetto* TEN.). Thus it is classified in the *Quercus* sect. *Mesobalanus*, as a species of native oak for southeastern Europe and Turkey.

Under these circumstances, we prefer to assign to our studied specimen the name *Quercoxylon* sp. cf. *Quercus frainetto* TEN.; we intend to search for better fossilized specimens which could support the description of a new species.

Family **BETULACEAE** GRAY
Genus *Eucarpinoxylon* MÜLLER-STOLL & MÄDEL, 1959
Eucarpinoxylon sp.
Plate V, figs. 1-9.

Material

The studied sample was collected from Bala area, Mehedinți County, from the Middle Miocene sedimentary formation. It is represented by a decimetric trunk fragment, grey to beige in colour, with fibrous structure, with vessels and growth rings, most probably from a dicotyledonate. It is currently hosted in the collections of the “Iron Gates” Region Museum Drobeta-Turnu Severin, (inv. no. 1498).

Microscopic description

Growth rings with indistinct or even absent boundaries, probably with a diffuse porous or semi-ring-porous structure, which is relatively unclear given the bad preservation state.

Vessels are probably sparse, in long radial pore multiples (2 to 10 pores) but this is difficultly to clarify in the crushed structure of the very badly preserved material. Intervessel pits are alternate and perforation plates are simple. No measurements could be done, given the preservation state.

Crushed ground mass as libriform fibres, which seem

to be thick-walled, is difficult to separate; they are probably septed and simple to minutely bordered pitted. Diffuse apotracheal axial parenchyma is present.

The rays, of aggregate type, homogeneous, sometimes are absent. The ray-vessel pits are slightly enlarged. The rays are usually uni- to biseriate, in aggregate rays sometimes up to 4-seriate, however difficult to distinguish. Mean height of the uniseriate rays is 10 to 20 cells, the multiseriate ray height is up to 40 cells. All ray cells procumbent and occasionally prismatic crystals in enlarged ray cells.

Affinities and discussions

There are not too many details available to support this identification; however some characters have to be considered: diffuse-porousness, radial long multiples of simple perforated vessels and presence of aggregate rays homogeneous, sometimes even absent**,** which suggest the presence of a possible fossil member of **Betulaceae**, namely as an equivalent of the extant genus *Carpinus* (Hornbeam). In this family there are some small groups defining subfamilies, i.e.: ***Betulaeae*** with *Alnus* (Alder) and *Betula* (Birch) and ***Corylaceae*** (or/and Carpinaceae?) with: *Corylus* (Hazel), *Carpinus* (Hornbeam), *Ostrya* (Hop-hornbeam) and *Ostryopsis* (Hazel-hornbeam).

Some corylaceous equivalent fossil ligno-morphotaxa comprise:

- A correspondent of *Corylus* – *Coryloxylon* PRAKASH, BŘEZINOVÁ & BŮŽEK described in 1971, with few species (*Coryloxylon nemejcii* PRAKASH, BŘEZINOVÁ & BŮŽEK, *Coryloxylon tertíarum* PRAKASH, BŘEZINOVÁ & BŮŽEK, or with the linean name (*Corylus macquarrii* WHEELER, SCOTT & BARGHOORN, 1977).
- As correspondent of *Carpinus* which cannot be considered as *Carpinoxylon* PLATEN, 1908 because it was mis-identified and than was redescribed as a species of *Paraphyllanthoxylon*: *P. pfefferi* (PLATEN 1908) (see Thaine et al. 1983). It was clear that the genus was invalid.
- Older described species of *Carpinoxylon (C. vasculosum* FELIX 1888, and *C. hungaricum* GREGUSS 1943) have been synonimized by Müller-Stoll & Mädel (1959) with species of a new validly described genus: *Eucarpinoxylon* [*E. vasculosum* (FELIX) MÜLLER-STOLL & MÄDEL, and respectively with *E. hungaricum* (GREGUSS) MÜLLER-STOLL & MÄDEL and *Eucarpinoxylon laxum* (WATARI) MÜLLER-STOLL & MÄDEL].
- Even a badly identified oak fossil wood (*Quercoxylon gevinii* BOUREAU 1949) was synonimized with species of *Eucarpinoxylon* [*Eucarpinoxylon gevinii* (BOUREAU) MÜLLER-STOLL & MÄDEL, 1959].
- However in 1970, Page - probably ignoring the paper of Müller-Stoll & Mädel (1959), described a species of *Carpinoxylon* (*C. ostryopsoides* PAGE, 1970), which however must be cautiously considered, since the Platen (1908) type species failed.
- Under a linean genus name *Carpinus,* species of fossil wood have been described in US or in Japan or Korea (*C. ancipites* WHEELER, SCOTT & BARGHOORN, 1977, *C. absarokensis* WHEELER, SCOTT & BARGHOORN, 1977, *C. saximontana* WHEELER, SCOTT & BARGHOORN, 1977, *C. laxa* WATARI 1952, *C. donghaensis* JEONG & KIM 2009.
- And as correspondent of *Ostrya*, also under the linean name (*O. monzenensis* SUZUKI & WATARI, 1994, *O. geumgwangensis* JEONG & KIM 2009).

Since there is currently not any clear decision within the taxonomy of these corylaceous morphotaxa, and the studied specimen is too badly preserved to allows an accurate identification, on the basis of the presence of some xylotomical features found especially to extant genus *Carpinus* (Schweingruber, 1990) and in agreement with the fossil genus diagnosis, we attribute our studied specimen to genus *Eucarpinoxylon* MÜLLER-STOLL & MÄDEL 1959 that seems to be valid by respecting the ICBN rules, and thus we name it *Eucarpinoxylon* sp.

Family **SALICACEAE** MIRBEL
Genus ***Populoxylon*** MÄDEL-ANGELIEWA 1968
Populoxylon sp. cf. *Populus alba* L.
Plate VI, figs. 1-9.

Material

The studied sample was collected from Bala area, Mehedinți County, from the Middle Miocene sedimentary formation. It is represented by a decimetric trunk fragment, grey to beige in colour, with fibrous structure, with visible vessels and growth rings, typical characters for a dicotyledonate. It is currently hosted in the collections of the "Iron Gates" Region Museum Drobeta-Turnu Severin, (inv. no. 1494).

Microscopic description

The growth rings are distinct, with boundaries marked by slightly compressed libriform cells. The structure is diffuse-porous. The numerous vessels of similar size are uniformly spread in the ground mass and give a diffuse-porous aspect to the wood structure.

The vessels, in cross field, appear mainly solitary; given the bad fossilization state, it is difficult to see if they are grouped into multiples or clusters. Even the (round to oval?) cross section of vessels appears deformed; the size of their diameters - between 50-100 µm, probably has no taxonomic significance since the structure was very much affected during fossilization processes. The vessels are moderately thick walled, have simple perforated plates, and numerous small bordered intervascular pitting, usually alternate, slightly spaced, horizontal elliptic or polygonal, with horizontal-elliptic aperture. The vessel elements seem to be short and their lumina bear sometimes dark granular gum remains or thin-walled tyloses; however this is difficult to evaluate, given the bad preservation state.

The libriform fibers crushed between vessels are difficult to be observed in both directions; no detail was observed regarding vertical walls.

Wood parenchyma is indiscernible.

The medullary rays – fine in cross section, exclusively uniseriate, are constituted from rectangular cells, radially elongated, crushed during fossilization processes. In tangential section the rays occur as clearly uniseriate, low, of up to 15 cells high (usually 5-9), built from slightly rounded cells. Their frequency is of 5-8 rays on tangential horizontal millimetre. Radially, the rays are homocellular, constituted from thin walled cells all procumbent, the marginals slightly higher; however it is difficult to observe their pitting in cross fields.

Affinities and discussions

The homogeneous uniseriate rays, the diffuse-porousness of the structure observed in cross section, guided us to assign the studied specimen to the extant genus *Populus* L. from Salicaceae family (see Greguss, 1959).

The correspondent fossil genus *Populoxylon* was created by Erica Mädel-Angeliewa (1968), with *P. priscum* MÄDEL-ANGELIEWA, 1968 as type species. The original diagnosis states the followings: 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 and 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 studied material is very similar to the diagnosis of the type species. There are not too many fossil forms described by previous studies on similar wood remains:

- *Populoxylon* sp., described by Dutrelepont et al. (1997), which has in cross section, a particular vessels' distribution similar to the extant species *Populus euphratica* OLIVIER.
- *Populoxylon* sp. (cf. *Populus tremula* L.) described by Greguss (1969), from the Sarmatian of Mikfalva (Hungary);
- *Populus* sp. (*Populus tremula* L.?) described by Nastschokin (1968), from the Quaternary of Yenisei-river basin (Russia);
- *Populoxylon tremuloides* IAMANDEI & IAMANDEI 2006, and in Iamandei et al. (2008), both described from the same area and the same formation, most probably an equivalent of the extant *Populus tremula* L.(?).
- *Populoxylon* sp. (cf. *Populus alba* L.), Iamandei et al. 2005, which seems to be closer to this currently studied structure.

Taking into account the few xylotomical features observed in our specimen, with rather badly preserved structure, we assigned it only generically to *Populoxylon* sp., being probably an equivalent of the extant *Populus alba* L.

Family **OLEACEAE** HOFFMANS & LINK
Genus ***Fraxinoxylon*** HOFMANN1952
Fraxinoxylon aff. *F. komlosense* GREGUSS 1969
Plate VII, figs. 1-9.

Material

The studied material originates from Bala Area, Mehedinți County; it is represented by a decimetric trunk fragment currently curated in the collections of the "Iron Gates" Region Museum Drobeta-Turnu Severin, (inv. no. 1502).

Microscopic description

The wood structure seems to display low growth rings probably with distinct boundaries marked by terminal parenchyma defining a ring porous wood, even if it is very deformed.

The vessels seem to be exclusively solitary, having simple perforated plates, rarely scalariform with rare fine bars, lesser than ten. Intervessel pitting not so visible, seems to be minute, opposite to alternate; fine helical thickenings in the vessel elements seem to be present. Tangential diameter of vessel lumina in early wood is under 50 μm but vessels frequency and mean vessel element length are difficult to evaluate since the structure is compressed. No tyloses and deposits are present in the vessels.

No tracheids vascular or vasicentric tracheids are present. Even if the ground tissue is not obvious in order to be described, it seems that the fibres are pitted with small round pits in a uniseriate vertical row.

The axial parenchyma, if present, can not be described since it is extremely crushed. It seems to be paratracheal vasicentric and banded but usually it is destroyed by compression.

The rays are fine, of 1-3(4) cells in thickness, not too high and with unequal cells, in radial section probably heterocellular – the body ray-cells are procumbent and the marginal square; pitting to tracheids are not visible; dark remains inside cells are present. Ray frequency is difficult to appreciate.

Affinities and discussions

The xylotomical features of this rather badly preserved specimen seem to fit to those of the extant genus *Fraxinus* from **Oleaceae**, taking into account at least the ring porous wood structure and the aspect of vessel in cross field; given the width of the rays, the simple perforated plates in vessels, the short vascular elements closer, it seems to represent *Fraxinus ornus* L., a species with an extant area restricted to Mediterranean European regions (see Greguss 1959, Schweingruber 1991).

Only few species of *Fraxinoxylon* have been described until the present. For example, Erica Hofmann described some forms in 1928, 1939, 1944 but only in 1952 she has typified the genus by describing *F. prambachense* HOFMANN, 1952 from the Late Oligocene of Prambachkirchen (Austria). From the Late Pliocene of Germany, *Fraxinoxylon gothanii* MÜLLER-STOLL, 1954 has been described.

When describing some forms of *Fraxinoxylon*, Greguss (1969) cited some other fossil woods of *Fraxinus* type described by Andreanszky (1959), Szeky-Fuchs (1959) from Hungary (non vidi). Thus, Greguss described a specimen from the Pleistocene of Pestszentlorinc, identified as *Fraxinoxylon cf. Fraxinus excelsior* L. and a Sarmatian specimen from Fuzerkomlos, also in Hungary, as a new species: *Fraxinoxylon komlosense* GREGUSS, 1969.

This was considered by the author as fossil equivalent of the extant *Fraxinus ornus* L., even if a correspondent genus *Ornoxylon* FELIX 1882 already existed, although represented by a single species, *Ornoxylon fraxinoides* FELIX 1882. Only recently two species of this genus have been described: *Ornoxylon grandiporosum* SÜSS, 2005 from Pontlevoy in France and *O. mikófalvense* SÜSS, 2005 from Mikófalva in Hungary.

Other Tertiary fossil woods of *Fraxinus* type have been described from Japan but, despite ICBN rules, they were attributed the linéan name: *Fraxinus oligocenica* SUZUKI, 1982 and *Fraxinus notoensis* SUZUKI & WATARY, 1994.

Iamandei (2002) described a new species *Fraxinoxylon crisii*, close to the extant *Fraxinus americana*, as well as a specimen of *Fraxinoxylon komlosense* GREGUSS (unpublished).

Iamandei et al. (2005) have additionally described, from the same late Badenian Prăvăleni area, South Apuseni Mountains., *Fraxinoxylon prambachense* HOFMANN and a new *Fraxinoxylon komlosense* GREGUSS published in 2005, also as correspondent of the extant *Fraxinus ornus*, characterized by exclusively solitary vessels, rarely as radial pairs and 1-4 seriate rays.

We add here a new specimen identified as *Fraxinoxylon* sp. cf. *F. komlosense* GREGUSS, originating from the Middle Miocene of the South Sub-Carpathians, on the western border of the Dacian Basin. Given the bad preservation state of this material, we prefer to keep the current assignment at this level only.

CONCLUSIONS

The current study, carried out with difficulty on the badly-preserved material from the small collection of Middle Miocene petrified wood of the "Iron Gates" Museum, Drobeta-Tr. Severin revealed several newly identified vegetal taxa: *Cupressinoxylon, Pinuxylon, Magnolioxylon, Carpinoxylon, Quercoxylon, Fraxinoxylon* and *Populoxylon*). They belong to Conifers and to Dicotyledons and they add to the previously known flora of similar age of the Romanian Subcarpathians, which further eastwards provide some coal seams (Barbu, 1954, 1960; Givulescu, 2001, Ticleanu, 1984, 2006; Paraschiv, 2004-2008). The previously know flora concerns the following localities/forms:

- **Slătioara, Ciocadia and Morilor Valley Floras (Romania, Oltenia province, Sarmatian):**

Sphaerites (*Sphaeria*) *interpungens* HEER, *Sphaerites* sp., *Rhytismites* sp., *Fungillus* sp., *Ceramium* sp., *Cystoseirites partschi* STERNB., *Equisetum sp. 1, 2, Osmunda parschlugiana* (UNG.) ANDR., *Lygodium gaudini* HEER, *Pteridium crenatum* (WEB.) VAHR., *Eostangeria* cf. *ruzinciniana* (PALAM., PETK. & UZUN.) PALAM. & UZUN., *Glyptostrobus europaeus* (BRONGN.) HEER, *Sequoia abietina* (BRONGN.) KN., *Taxodium dubium* (STERNB.) HEER, *Thuja* cf. *occidentalis* L., *Cunninghamia sp., Tetraclinis salicornioides* (UNG.) KV., *Tetraclinis (Callitris) brongniarti* (ENDL.) UNGER, *Torreya nucifera* SIEB. & ZUCC., *Pinus parvinucula* SAP., *P. florissanti* LESQ., *P.* sp. aff. *P. laricio* POIRET, *P.* sp. aff. *P. taeda* L., *P.* sp. aff. *P. mitis* MCHX. (= *P. echinata* MILLER), *P.* cf. *strobus* L., *P.* cf. *nigra* ARNOLD, *P. taedaeformis* (UNGER) HEER, *P. maritima* POIRET, *P.* sp. aff. *P. nigra* ARNOLD, *P.* sp. aff. *P. maritima* POIRET, *P.* div. sp. *cones, male inflorescences, P. leucodermis* ANTOINE, *Abies* cf. *alba* MILLER, *Picea sp., Tsuga europaea* MENZEL, *Pseudotsuga taxifolia* BRITT., *Pseudotsuga sp., Pseudolarix schmidtgeni* KR., *Cephalotaxus sp., Magnolia dianae* UNGER, *Magnolia sp., Liriodendron sp., Kadsura bredini* WEYL., *Laurus obovata* WEB., *Laurus agathophyllum* UNGER, *Laurus primigenia* UNGER, *Laurus praenobilis* SITAR, *Laurus canariensis* WEBB. *fossilis* GIV., *Laurophyllum princeps* KR. & WEYL. emend. RUFFLE, *Laurophyllum sp. 1, 2, Daphnogene polymorpha* (AL. BR.) ETT., *Persea speciosa* HEER, *Oreodephne heeri* GAUDIN, *Clematis sp., Berberis andreanszkyi* KV. & ERDEI, *Berberis sp., Mahonia hakeaeformis* BECKER, *Matudaea menzeli* WALTH., *Platanus sp.,* cf. *Platanus sp., Ulmus dragastani* PARASCHIV, *U. slatioarae* PARASCHIV, *U. longifolia* UNGER, *U. brauni* HEER, *U. parschlugiana* KOVAR-EDER & KV., *Ulmus sp., Zelkova zelkovifolia* (UNG.) BUZ. & KOTL., *Cedrelospermum ciocadiae* PARASCHIV, *Cedrelospermum marinescui* PARASCHIV, *Celtis trachytica* ETT., *Tremophyllum tenerrimum* (WEB.) RUFFLE, *Fagus silesiaca* WALTH. & ZASTAW., *Fagus* sp. aff. *orientalis* LIPSKY, *Castanea atavia* UNGER, *Quercus stefanescui* MAR. & LAUR., *Q. kubinyi* (KOV. EX ETT.) CZECZOTT, *Q. shrevoides* AXELROD, *Q. gigas* GOEPP. emend. WALTH. & ZASTAW., *Q. drymeja* UNGER, *Q. palaeolibani* PARASCHIV, *Q. mediterranea* UNGER, „*Quercus*" *daphnes* UNGER, *Q. furuhjelmi* HEER, *Betula pseudoluminifera* GIV., *Betula* cf. *macrophylla* (GOEPP.) HEER, *B. longisquamosa* MÄDLER, *Betula sp., Alnus kefersteini* (GOEPP.) UNGER, *Carpinus grandis* UNGER sensu HEER, *C. betulus* L. *fossilis* ENGEL. & KINK., *C. neilreichi* KOV., *Myrica lignitum* (UNG.) SAP., *Juglans acuminata* AL. BR. EX UNGER, *J. globosa* LUDWIG, *Carya serrifolia* (GOEPP.) KR., *Pterocarya paradisiaca* (UNGER) ILJIN., *Engelhardia orsbergensis* (WESS. & WEB.) JAHN., MAI & WALTH., *E. macroptera* (BRONGN.) UNGER, *Hydrangea ticleanui* PARASCHIV, *H. florentini* PARASCHIV, *Rosa bohemica* ENGELH., *Robinia* cf. *regeli* HEER, *Podocarpium podocarpum* (AL. BR.) HERENDEEN, *Mimosites palaeogaea* UNGER, *Leguminosites parschlugianus* (UNGER) KOVAR-EDER & KVACEK, *Toddalia naviculaeformis* (E.M. REID) GREGOR, *Sapindus falcifolius* (AL. BR.) HEER, *Acer integrilobum* WEB. sensu WALTH., *A. jurenaky* STUR, *A. minor* KNOWLTON, *A. trifoliatum* RAFINESQUE, *A. palaeo-miyabei* (MAXIM) GREGOR, *Acer* div. sp., *Hedera auriculata* HEER, *Rhamnus decheni* WEBER, *Berchemia multinervis* (AL. BR.) HEER, *Zizyphus paradisiaca* (UNGER) HEER, *Vitis strictum* (GOEPP.) KN., *Loranthus obovatifolia* GIV., *Salix varians* GOEPP., *Populus populina* (BRONGN.) KN., *P. attenuata* AL. BR., *Tilia dacica* PARASCHIV, *Byttneriophyllum tiliaefolium* (AL. BR.) KN. & KV., *Byttneriophyllum (Banisteriaecarpum) giganteum* (GOEPP.) KR., *Dombeyopsis lobata* UNGER, *Diospyros brachisepala* AL. BR. *sensu* HANTKE, *Periploca givulescui* PARASCHIV, cf. *Nerium sp., Fraxinus* sp. aff. *F. excelsior* L., *F. juglandina* SAP., *Potamogeton cuspidatus* ETT., *P. sp. aff. P. praenatans* KNOLL, *Poacites sp., Phragmites oeningensis* AL. BR., *Typha latissima* AL. BR., *Smilax weberi* WESS. in WESS. & WEB.

Petrified Wood from Valcea area: *Quercoxylon sarmaticum* STAROSTIN & TRELEA, 1969 (in Petrescu & Dragastan, 1976),

- **Petrified Wood from V. Morilor area:**

Diospyroxylon knolii (HOFMANN) PETRESCU, 1978 (in Iamandei et al. 2001)

- **Petrified Wood from Bala area**:

Cupressinoxylon sp. aff. *Thujoxylon* sp., *Pinuxylon* sp. cf. *Pinus sylvestris L, Magnolioxylon* sp. cf. *M. transilvanicum* NAGY & MÂRZA, 1967, *Quercoxylon* sp. cf. *Quercus frainetto* TEN., *Eucarpinoxylon* sp., *Populoxylon* sp. cf. *Populus alba* L., *Fraxinoxylon* aff. *F. komlosense* GREGUSS 1969 (all in this paper).

When analyzing comparatively these lists, one can observe that the newly identified taxa were already present in the general list of the Middle Miocene vegetation of Oltenia province. However, research will be extended to other petrified wood collections. Surely the newly described lignotaxa could provide interesting paleobiogeographic, paleoecologic and paleoclimatic clues, as they illustrate better than other floral elements

the local vegetation given the fact that they cannot be transported too far from the original location, and usually they cannot be reworked (Philippe, 2006).

The interpretations based on the new list of plants identified in Bala area perfectly corresponds to the previous evaluation on paleoclimate (warm temperate and wet) and paleoecology for the Middle Miocene environment proximal to a marine extended surface (the Dacian basin). Further systematic research could increase the fossil wood collection of the "Iron Gates Region" Museum from Drobeta-Turnu Severin, and also our knowledge on the Middle Miocene paleobotany of the western part of the Dacian Basin.

Acknowledgments

This research was supported by the NURC projects: ID_441 contract inv. nr. 336/2007 and ID_584 contract inv. nr. 1074/2009.

This paper was presented at the 7th National Symposium of Paleontology, 2009 organized by the Romanian Society of Paleontologists and "Babeş-Bolyai" University Cluj-Napoca .

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PLATE CAPTION

PLATE I

Cupressinoxylon sp. aff. *Thujoxylon* sp*.,* material, Bala area (Mh.), inv. nr. 1496, in "Iron Gates" Region Museum's Collection, Drobeta-Turnu Severin.
Figs. 1-3. Cross section. Distribution of tracheids, parenchyma and rays. Growth rings marked by late-wood thickened cells.
Figs. 4-6. Tangential section. Uniseriate rays, tracheids and parenchyma
Figs. 7-9. Radial section. Radial pitting, cross fields.

PLATE II

Pinuxylon sp. cf*. Pinus sylvestris* L. *,* material, Bala area (Mh.), inv. nr. 1497, in "Iron Gates" Region Museum's Collection, Drobeta-Turnu Severin.
Figs. 1-3. Cross section. Distribution of thickwalled tracheids, parenchyma? and rays. Growth rings marked by late wood thickened cells.
Figs. 4-6. Tangential section. Uniseriate rays, tracheids and parenchyma
Figs. 7-9. Radial section. Radial pitting, cross fields.

PLATE III

Magnolioxylon sp. cf. *M. transilvanicum* NAGY & MÂRZA, 1967*,* material, Bala area (Mh.), inv. nr. 1499, in "Iron Gates" Region Museum's Collection of Drobeta-Turnu Severin.
Figs. 1-3. Cross section. Distribution of vessels, fibers, parenchyma and rays. Growth rings marked by late wood thickened cells.
Figs. 4-6. Tangential section. Multiseriate rays, vessels and parenchyma
Figs. 7-9. Radial section. Radial pitting, cross fields.

PLATE IV

Quercoxylon sp. cf. *Quercus frainetto* TEN.*,* material, Bala area (Mh.), inv. nr. 1495, in "Iron Gates" Region Museum's Collection, Drobeta-Turnu Severin.
Figs. 1-3. Cross section. Distribution of vessels, fibers, parenchyma and rays. Growth rings marked by late wood thickened cells.
Figs. 4-6. Tangential section. Multiseriate rays, vessels and parenchyma
Figs. 7-9. Radial section. Radial pitting, cross fields.

PLATE V

Eucarpinoxylon sp*.,* material, Bala area (Mh.),inv. nr. 1498, in "Iron Gates" Region Museum's Collection, Drobeta-Turnu Severin.
Figs. 1-3. Cross section. Distribution of vessels, fibers, parenchyma and rays. Growth rings marked by late wood thickened cells.
Figs. 4-6. Tangential section. Multiseriate rays, vessels and parenchyma
Figs. 7-9. Radial section. Radial pitting, cross fields.

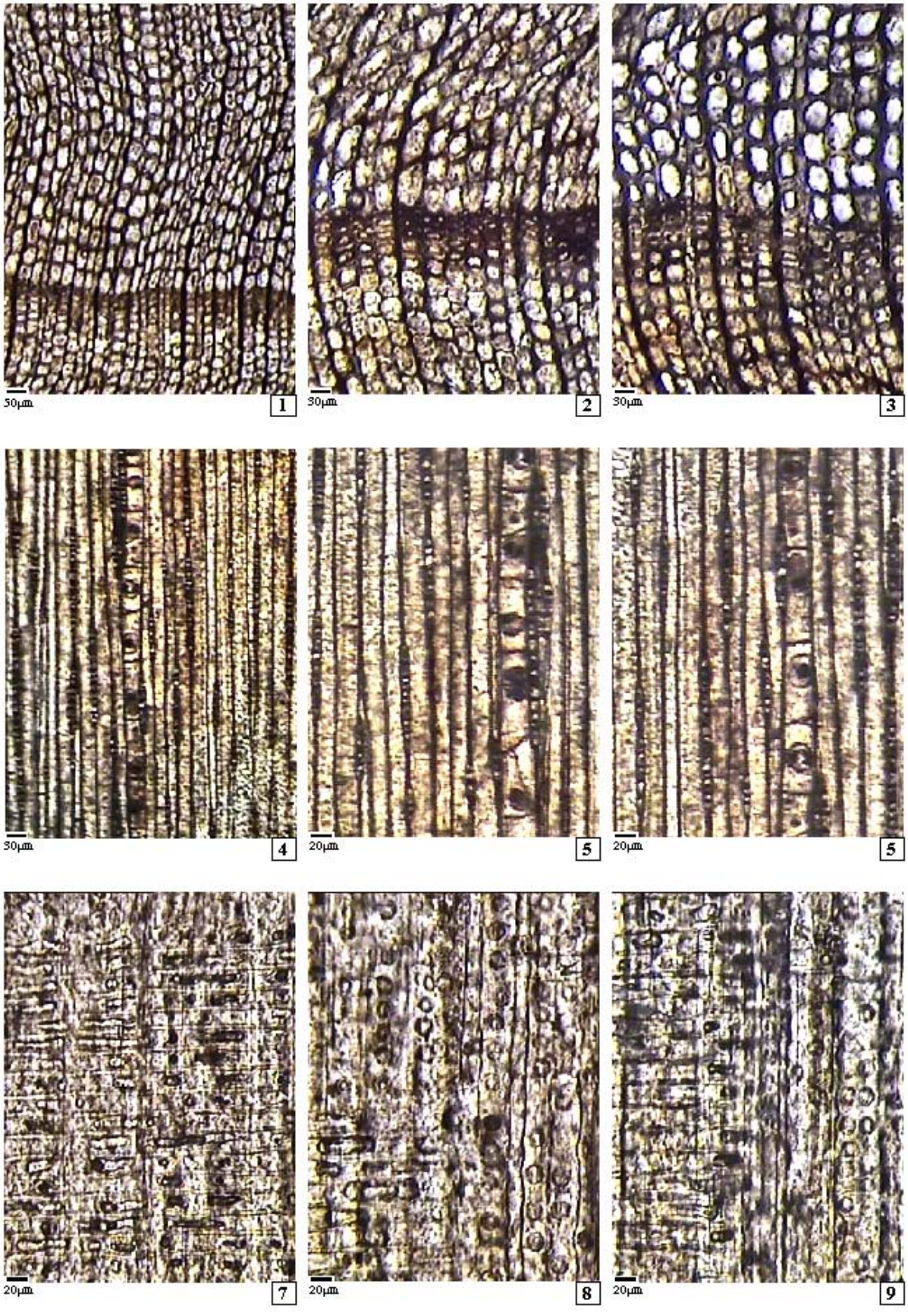
PLATE VI

Populoxylon sp. cf. *Populus alba* L.*,* material, Bala area (Mh.), inv. nr. 1494, in "Iron Gates" Region Museum's Collection, Drobeta-Turnu Severin.
Figs. 1-3. Cross section. Distribution of vessels, fibers, parenchyma and rays. Growth rings marked by late wood thickened cells.
Figs. 4-6. Tangential section. Multiseriate rays, vessels and parenchyma
Figs. 7-9. Radial section. Radial pitting, cross fields.

PLATE VII

Fraxinoxylon aff. *F. komlosense* GREGUSS 1969*,* material, Bala area (Mh.), inv. nr. 1502, in "Iron Gates" Region Museum's Collection of Drobeta-Turnu Severin.
Figs. 1-3. Cross section. Distribution of vessels, fibers, parenchyma and rays. Marked growth rings by late wood thickened cells.
Figs. 4-6. Tangential section. Multiseriate rays, vessels and parenchyma
Figs. 7-9. Radial section. Radial pitting, cross fields.

PLATE I



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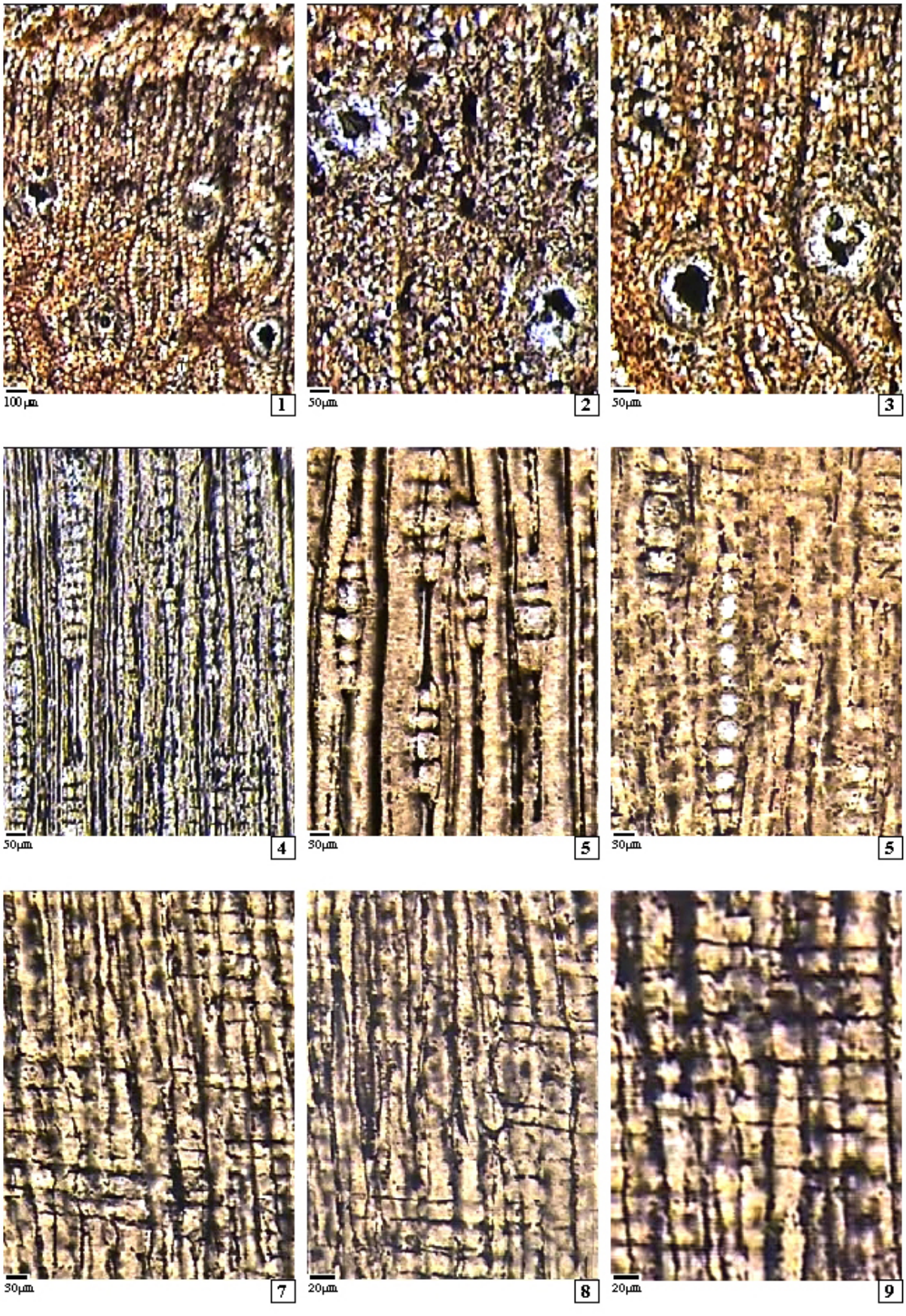

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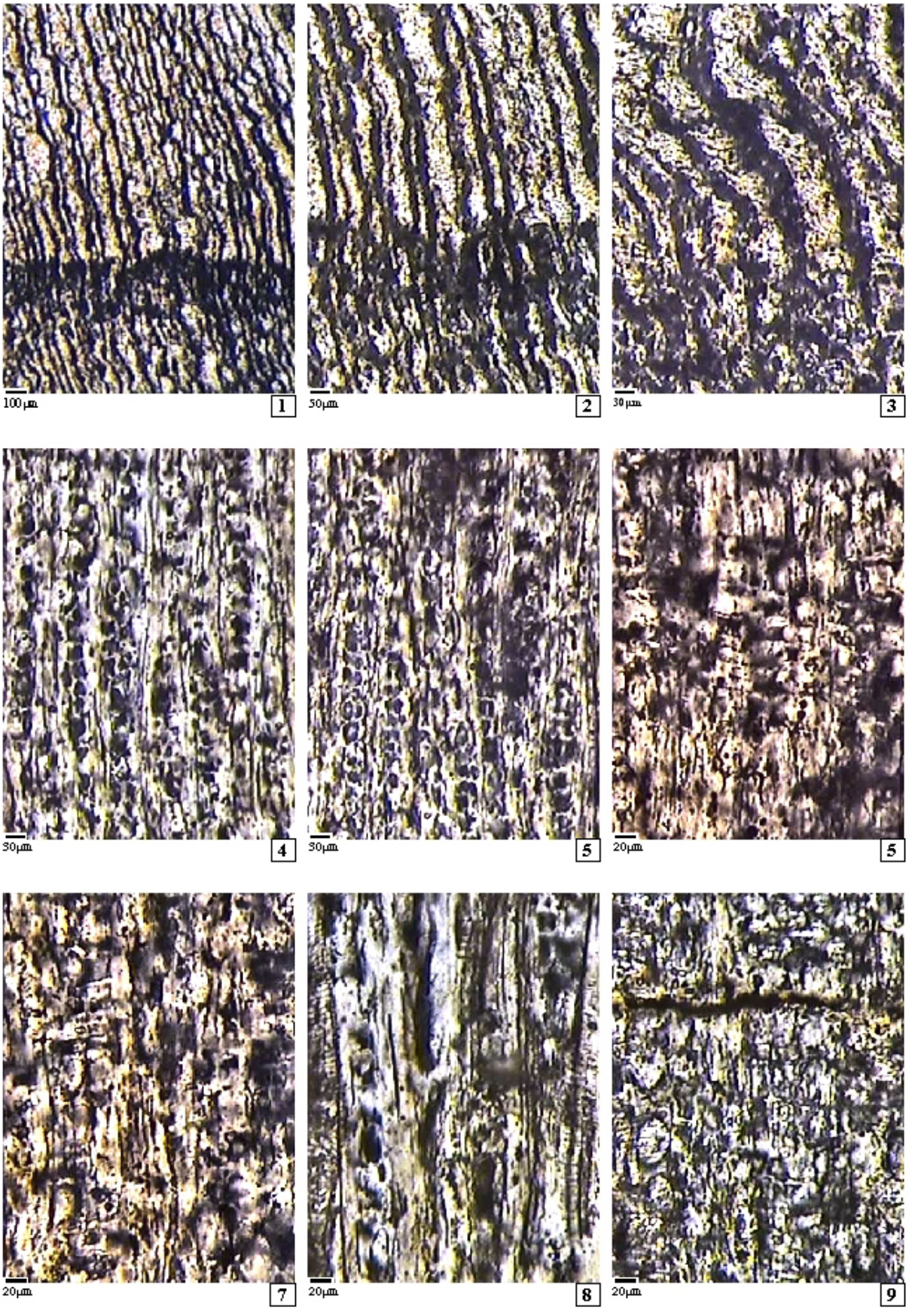

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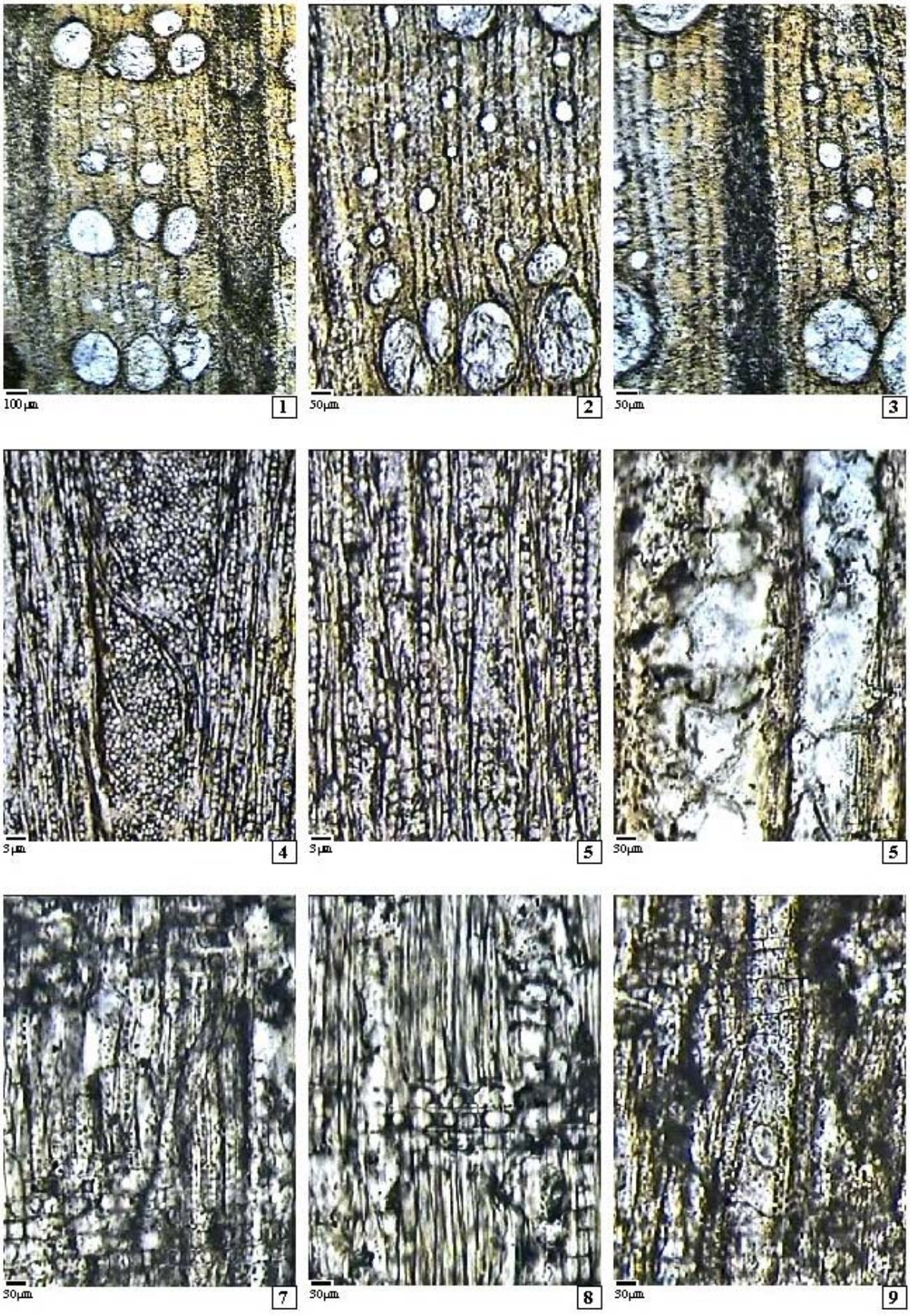

PLATE V

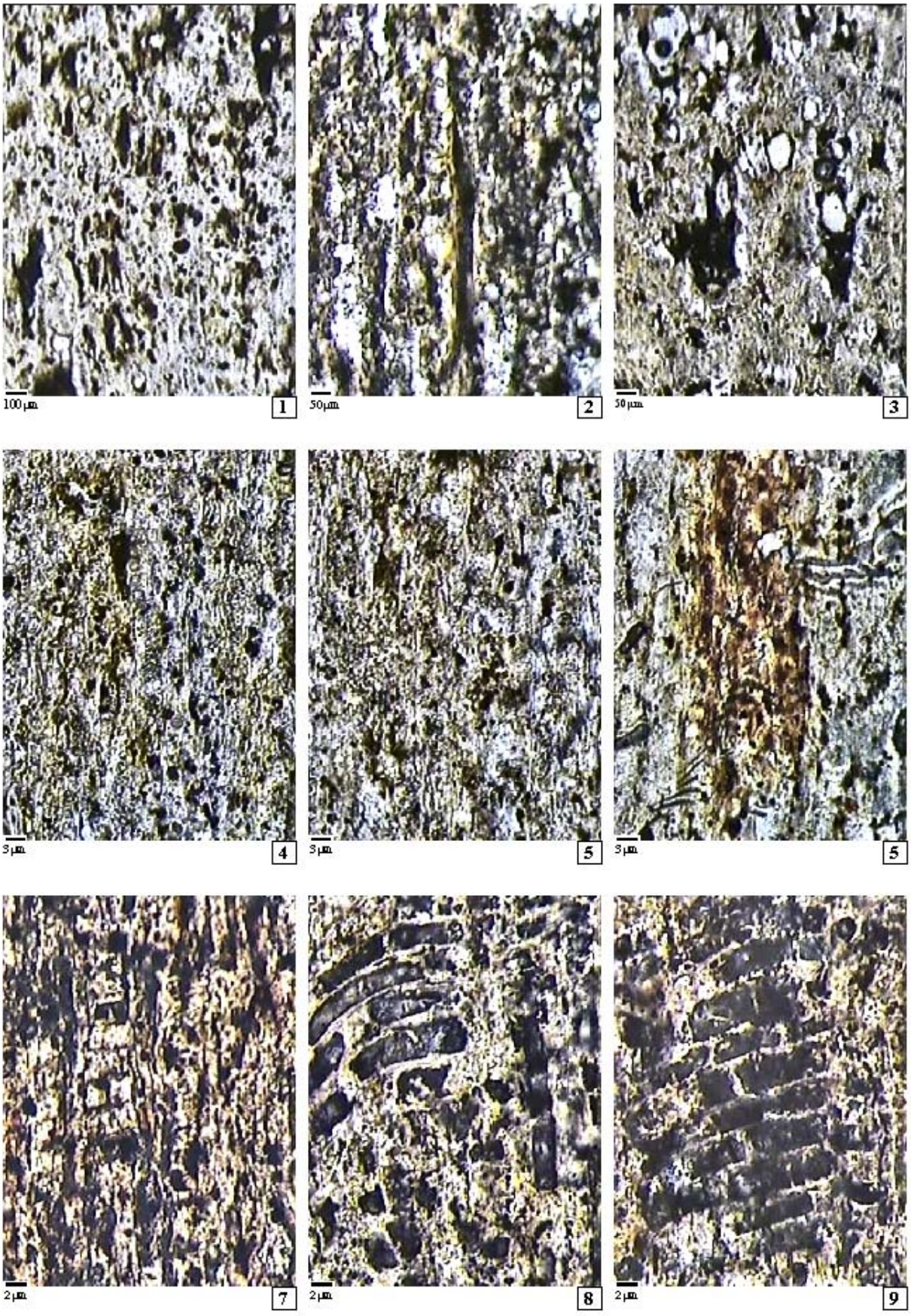

PLATE VI

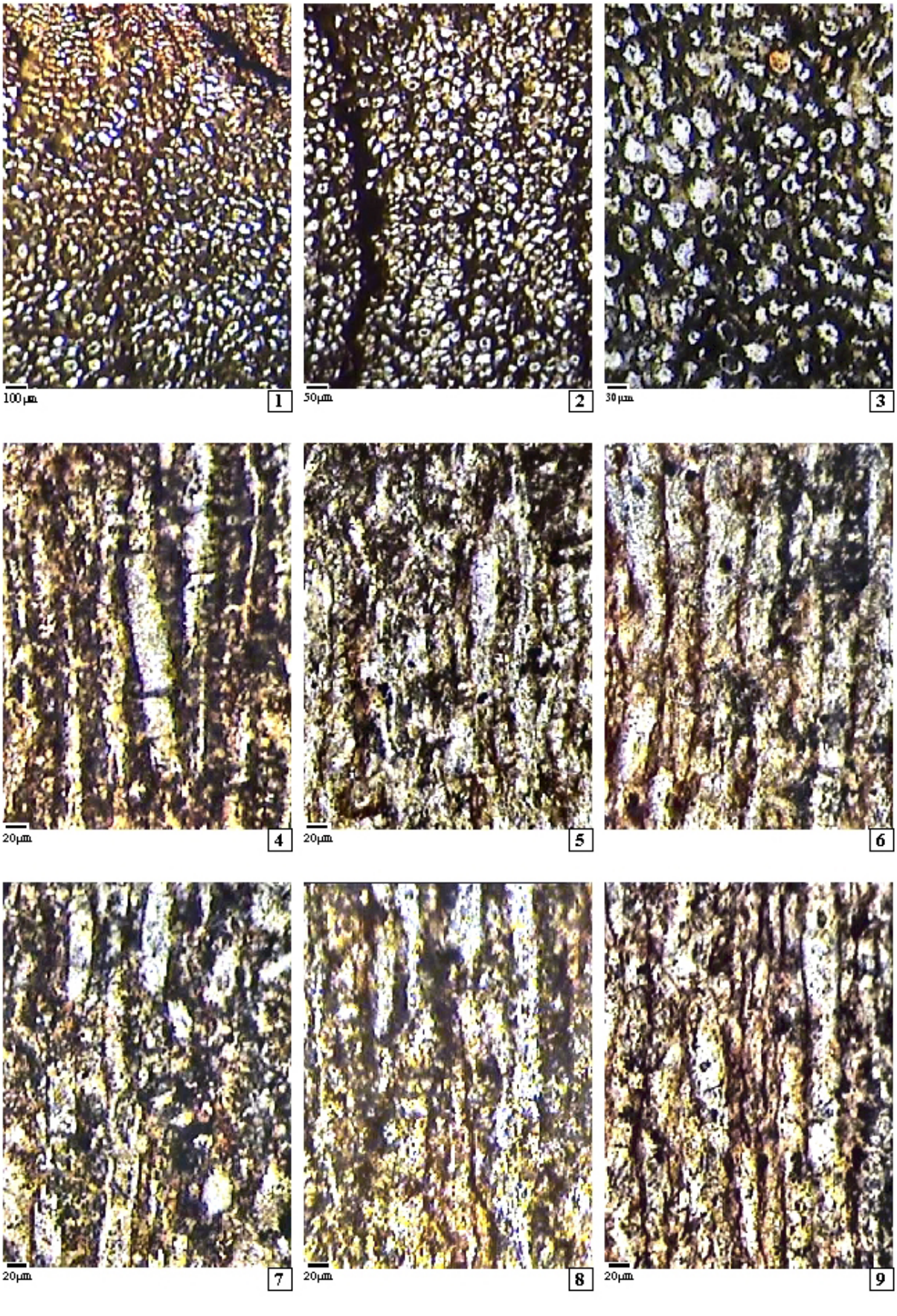

PLATE VII