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THE PRESENCE OF SOME *PINUXYLON* GOTHAN 1906 WOODS IN THE BADENIAN SALT FROM OCNA DEJ (NW ROMANIA)

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Abstract. The study was based on six samples of carbonized woods collected from the Ocna Dej salt. Fragments of carbonized trunks or branches preserving well the anatomical structure represent the studied samples. The oriented thin sections (cross, tangential and radial) preserved more or less deformed structures that still allowed the identification of diagnostic histological features necessary for assigning the species to *Pinuxylon* GOTHAN 1906.

The microscopic observations show that the cellular structure is well preserved on certain areas of the oriented cross sections. There are areas where the cellular architecture is deformed or even destroyed. However, the histological features conserved in the well-preserved areas allowed the assignment of the samples to Pinaceae family, respectively to *Pinuxylon.*

The annual growth rings are well individualized. The early wood shows a gradual transition into the late wood in the outer part of the annual ring. The tracheids have a polygonal contour, with well-individualized lumen and thick walls in the late wood. The resin ducts, always located in the late wood, are arranged only in a single layer. Within certain ducts some elongated epithelial cells, with relatively thin walls are preserved. The grey resin glomerules are preserved in the parenchyma cells. The medullary rays separate a variable number of tracheids. They are uni-seriate, but in the some places they may be 2 or 3-fold seriated.

In the microflora from Ocna Dej salt formation an important participation of different types of Pinaceae was evidenced; among them, *Pinus* are very frequent to dominant.

The microfloristic data corroborated with xylotomical anatomy ones emphasize the important role that Conifers - including *Pinus* genus, have played in the mountain forests from this part of Romania during the Middle Badenian (Wielician).

Keywords: Middle Badenian, salt, fossil wood, Transylvanian Basin.

INTRODUCTION

Six samples of carbonized wood from Ocna Dej salt were collected and analyzed. One of the samples was collected by geologist Vesparian Aramă (in 1959) from Noua Mine, and the others by geologist Mircea Meseşan from +188,5 m horizon of Transylvania salt mine. Both are acknowledged for providing the samples to one of the authors (I. P.). The samples will be registered in the collection of the Museum of Geology and Paleontology, Faculty of Biology and Geology, Cluj-Napoca.

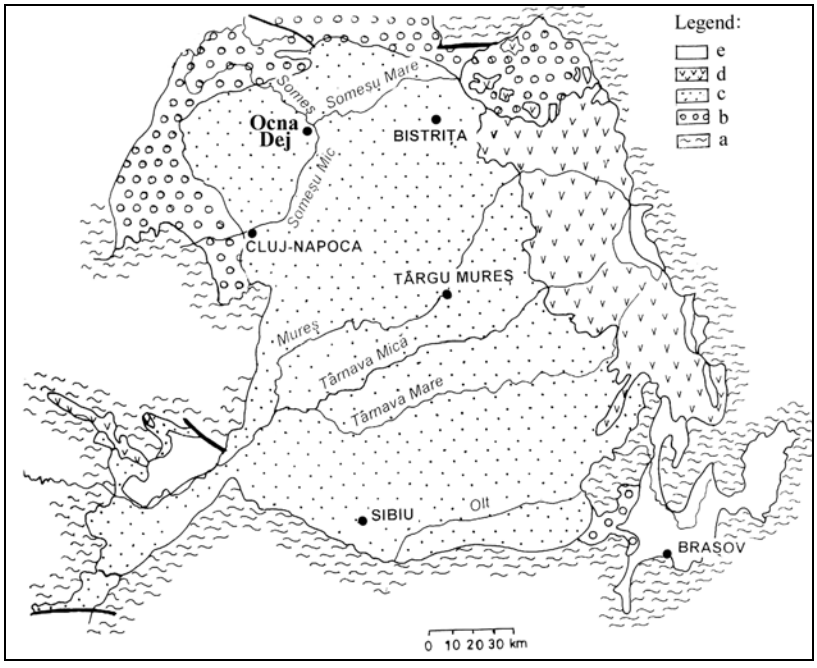

Figure 1 - Location of the Ocna Dej area (after Popescu et al., 1995, modified): a. Basement; b. Paleogene; c. Neogene; d. Neogene volcanic rocks; e. Quaternary.

The salt ore from Ocna Dej is situated on the northwestern border of the Transylvanian Basin,

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about 4 km southwest from Dej and 57 km north of Cluj-Napoca (Fig.1). From geological point of view, in this area the salt belonging to the Ocna Dej Formation is disposed above volcanic tuffs (the Dej Formation). The "Radiolarian shales" and "*Spirialis* marls" (Pietroasa Formation) occur at the top of the salt. The Ocna Dej salt massif forms a north-south elongated lens, extended between Codor brook in northern part and south of Săcădaş brook. Based upon the measurements performed in 53 drillings that pierced the salt, the thickness varies between 12.66 m and 156 m.

PALEOBOTANICAL DATA

Fragments of carbonized trunks or branches preserving well the anatomical structure represent the studied samples. The oriented thin sections (cross, tangential and radial) preserved more or less deformed structures that still allowed the identification of diagnostic histological features necessary for assigning the species to *Pinuxylon* GOTHAN 1906.

Cross Plane (Pl. I, Fig. 1, 2, 3)

Cellular structure is well preserved on certain areas of oriented transversal sections. There are areas where the cellular architecture is deformed or even destroyed. However, the histological features conserved in the well-preserved areas allowed the assignment of the samples to Pinaceae family, respectively to *Pinuxylon.*

The annual growth rings are well individualized and they have average sizes between 250 - 1125 µm. The earlywood shows a gradual transition into the latewood in the outer part of the annual ring.

The *tracheids* have a polygonal contour with well-individualized lumen, larger in the case of the early wood. In the late wood, the tracheides have a narrow lumen and thick walls.

The resin ducts, with ellipsoidal or circular contour have average sizes of 35 – 100 µm. They are located in the late wood. Within certain ducts

some elongated epithelial cells, with relatively thin walls are preserved.

The medullary rays separate a variable number of tracheids. They are uni-seriate, but in the some places they may be also 2 or 3-seriated.

Tangential Plane (Pl. I, Fig. 4, 5)

In tangential thin sections, the structure of medullary rays may be specially observed. The great majority (85%) is uni-seriated, 8% are 2-seriated and 5% are 3-seriated. Reckoning of 100 rays shows the following height: 6% (1 cell), 9% (2 cells), 11% (3 cells), 13% (4 cells), 12% (5 cells), 11% (6 cells), 8% (7 cells), 10% (8 cells), 8% (9 cells), 6% (10 cells), 4% (12 cells), 2% (15 cells).

Locally, the tracheids preserved the well-individualized areolated pits; these are always arranged only in one layer. The walls are smooth or nodulated.

The grey resin glomerules are preserved in the parenchyma cells.

Radial Plane (Pl. I, Fig. 6)

Areolated pits (with diameters up to 15 µ, and possibly 20 µ) have been well preserved on the radial walls.

Little pinoide pits, arranged two or three in a row could be identified at the joints of the medullary rays. Where preserved, the horizontal tracheids seem to be relatively narrow.

DISCUSSIONS

In the Romanian literature, fossil woods assigned to *Pinuxylon* belong to two time intervals.

An intensely silicified *Pinuxylon* wood from the Lower Cretaceous was described at Boiul-de-Jos (Gurasada commune) from the Metaliferi Mountains (Petrescu & Nuțu, 1970).

A few well-preserved wood structures from the Badenian from Ociu and Prăvăleni, Metaliferi Mountains (*P. marinasi* and respectively *P. parryoides, P.* cf. *parryoides* and *Pinuxylon* sp.) were also described (Iamandei, 2002).

The European literature reports several occurrences of structures of fossil woods assigned to *Pinuxylon*; Iamandei (2002, p. 167) realized a synthetic review of this topic, of which here we mention only two papers:

Gotwald (1966), which describes several structures of well-preserved woods from the coal-bearing Eocene deposits from Helmstedt - Germany, among which *Pinuxylon parryoides;*

Greguss (1967), which presents an inventory of several fossil structures of pine from the Tertiary of Hungary: *Pinuxylon haploxyloides, P. albicauloides, P. tarnocziense, Pinuxylon* sp.

The salt formation from Ocna Dej has been previously studied from palynological point of view, too (Petrescu & Meseşan, 1993). The identified microflora sustains an important participation of different types of Pinaceae in the spectrum: *Cedrus* (rare to frequent), *Abies* (rare), *Pinus* (very frequent to abundant), *Picea* (rare), *Tsuga* (rare to frequent).

The distribution with altitude of the original forest, suggested by palynological analyses, allowed us to assume that the woods were carryed to the coast areas of the Badenian Sea by the rivers that crossed the continental lands. The identification of the few samples of *Pinuxylon* is an additional argument on the role played by this tree in the assemblage of the Middle Badenian (Wielician in this part of Romania) mountain forest.

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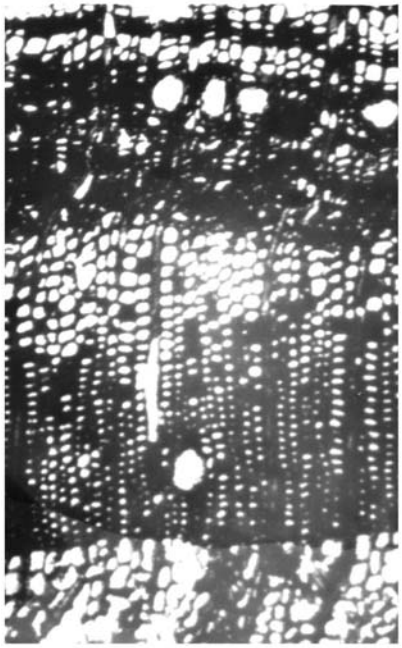
PLATE I

***Pinuxylon* sp.**

Fig. 1, 2, 3 (40x) – cross sections;
Fig. 4, 5 (80x) – tangential sections;
Fig. 6 (100x) – radial section.



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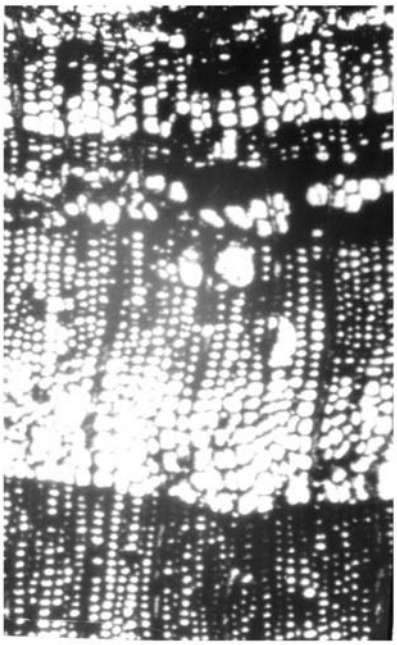

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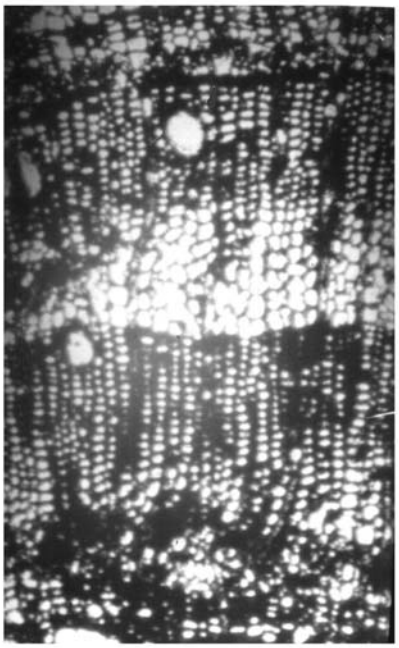

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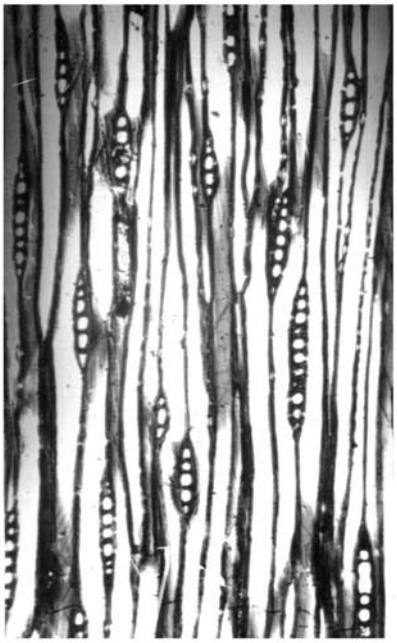

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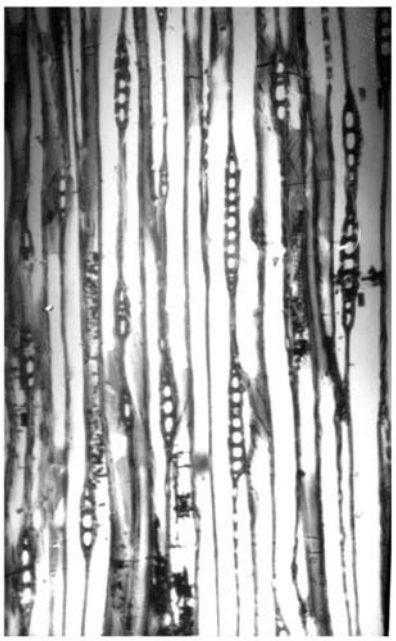

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