A PALM TRUNK FROM THE LOWER MIOCENE COAL BASIN OF SALGÓTARJÁN

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ABSTRACT

The tree-trunk examined originates from North Hungary, from the coal basin of Salgótarján. Its age is Lower Miocene. The presence of scattered vascular bundles in the 10 cm. long and 8 cm. wide trunk piece shows that it is of palm origin. The minute anatomical structure also confirms that the petrifaction in question is a palm-stem. Another fossil palm has been reported from Hungary from the Lower Miocene, which resembles rather the recent *Sabal*. The above-mentioned petrifaction is essentially different from this and, therefore, it has been described under a new name: *Palmoxylon hungaricum* Greg.

INTRODUCTION

THE Botanical Institute of the University, Szeged, received a highly silicified wood-trunk, $10 \times 7{\cdot}5$ cm. in dimension, transmitted by Prof. Elemer Vadasz, Academician, from the coal basin of Salgótarján, North Hungary, in order to identify it (PL. 1, FIG. 1). On the surface of the petrified trunk were visible longitudinal furrows and ribs. On the periphery of the top there were pin-head sized holes, irregularly arranged. The interior of the trunk seemed to be entirely compact, with black dots of the size of pin-heads irregularly arranged in it. It seemed evidently to be some sort of Palmaceae. The exact examination verified that supposition.

DESCRIPTION

Transverse Section — Already at a moderate magnification ($\times 10$) one's eye catches instantly the groups of vessels, which are placed in the main stock on the concave side of the bean-like sclerenchyma bunches. The space between them is filled with elongated, loose, cyst-like parenchyma cells. Besides the sclerenchyma bunches with vessels, here and there far smaller sclerenchyma bunches are also present (PL. 1, FIG. 2). An $\times 100$ magnification shows particularly the cyst-like elongated parenchyma cells, which are irregularly arranged in the main stock, sometimes the cell-ends are directed to the smaller sclerenchyma bunches or to the sclerenchyma bunches with vessels. Among the cyst-like parenchyma cells there are visible many tiny round cells with dark contents. In transverse section of sclerenchyma bunches, the narrow lumen and stratiform cell wall structure are quite distinct. The place of some sclerenchyma bunches, particularly towards the periphery, is empty as a result of disorganization at preservation, while close to them the woody part of vessel-bundles is still intact. Mostly the bark of the collateral vessel-bundle is also disorganized. On the concave side of the bean-like sclerenchyma bunches the structure of the collateral vascular bundle is well preserved (PL. 1, FIGS. 3, 5, 6). The vascular bundle is covered by endodermis composed of thin-walled cells. In the woody part are situated the tracheids with narrow lumen and two much larger, prominent vessels with wide lumen. The structure of the vascular bundle reminds of Monocotyledons, e.g. *Zea*, *Scirpus*, etc. The spaces between the tracheids are filled by parenchyma cells with thin walls. Sometimes twin vessels occur among the prominent vessels (PL. 1, FIG. 5). The elements of bark are seldom perceptible on account of disintegration, hence in their place there are cavities. In some cases a vascular bundle evolves between the bean-like and the smaller, round sclerenchyma bunches; thus this bundle is far larger than the isolated, closed, collateral bundle in the angle of bean-like sclerenchyma bunch (PL. 1, FIG. 3). In some cases it is seen that the horizontal elongated parenchyma cells in main stock stand perpendicular to the longitudinal axis of the vascular bundle (PL. 1, FIG. 3).

Longitudinal Section — Since this trunk has no ray structure, the radial and the longitudinal sections are just the same, we may speak about longitudinal structure only. The sclerenchyma fibres are elongated, longitudinally inserted amid themselves; the wall is arranged into strata and the lumen is relatively narrow (PL. 1, FIG. 6; PL. 2, FIG. 7).

The parenchyma cells of the main stock join the fibre bunches; sometimes they surround the sclerenchyma bunch in an arch. In transverse section these cells are round, others are perpendicular to the longitudinal axis, consequently placed horizontally and elongated (PL. 2, FIG. 9). The vessels on the longitudinal structure of the collateral vascular bundle have annular or scalariform thickenings (PL. 2, FIG. 8). Mainly the spiral scalariform thickening of the two longitudinal vessels is conspicuous. This structure resembles the similar thickenings of Cycadaceae (*Microcycas, Stangeria, Zamia*). The space amid the tracheids and vessels is filled up with small parenchyma cells; their walls are thin.

Dimensions — In transverse section the fibrovascular bundles are situated 1-5 mm. apart. The tiny sclerenchymatous bundles occur about 1-2 mm. apart. There are 150-200 sclerenchymatous cells in a single sclerenchymatous bunch. The smaller bundles have only 25-30 sclerenchymatous cells. The size of the larger bunches is 1200-1300 μ, the thickness is 700-800 μ. The diameter of the smaller round fibrous bundles is 300-400 μ. The length of the cyst-like parenchyma cells is generally 300-400 μ, the width is 60-70 μ. The transverse cut of sclerenchymatous fibres is 60-70 μ, the length 1000-1200 μ. The diameter of the cells filled with contents is 50-60 μ. The diameter of the larger vessels is 120-130 μ, that of the tracheids with narrow lumen is merely 40-50 μ. The height of the longitudinal wood parenchyma cells is 50-60 μ, the width is 40-50 μ.

DISCUSSION

These anatomical features prove undoubtedly that the trunk originates from some sort of Palmaceae. But from which? It is difficult to give an acceptable and reliable answer. In this regard we have some hints from palm remains from a different age found in Hungary mostly in the form of leaf impressions.

Our trunk does not correspond with *Palmoxylon pietzschii* described by Schönfeld on the basis of arrangement and the form of the sclerenchyma bunches. It does not resemble *Palmoxylon arcotense* described by Ramanujam, who brought it closer to *Livistona*. It does not correspond with *Palmoxylon* found in Szentgál and recently described by Haraszty and the palm remains found in Ipolytarnóc. Also it does not correspond with *Palmoxylon shónicoides* described by E. Hofmann on account of the different form of sclerenchyma bunches. It is worth mentioning that E. Hofmann obtained this sort of palm from Oligocene. In the identification of this petrifaction we must remember that the coal basin of Salgótarján belongs either to the Lower Miocene (Burdigalian) or to the Upper Miocene (Helvetian) stage. Recently Csepreginé Meznerics and I have put the coal seam, from where our trunk was found, on the border of Burdigalian and Helvetian stages. Since we know many palm remains from Hungary, both in the form of fructifications as well as leaf impressions, it is not impossible that our silicified trunk belongs to an already known palm type. The question could be settled only if some leaf, fructification or flower had been found close by the trunk. Unfortunately there are no such remains.

The question can be raised whether the trunk is *'allochton'* in Salgótarján's coal basin. It is unlikely since pollen analytical studies of Simoncsics proved the presence of many palm genera, e.g. the pollens of *Sabal* and *Phoenix*. The internal structure of our petrifaction shows the closest similarity to *Sabal*. It is possible that the remains of leaf and fructification of the petrifaction have already been discovered and named. Distinguishing from the already known palm species I, therefore, name this one as *Palmoxylon hungaricum* sp. nov.

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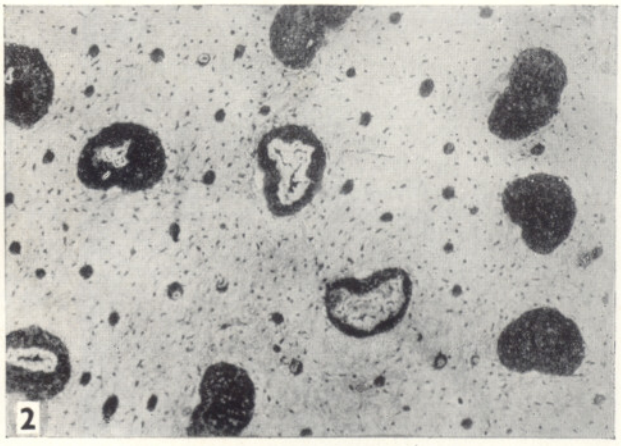
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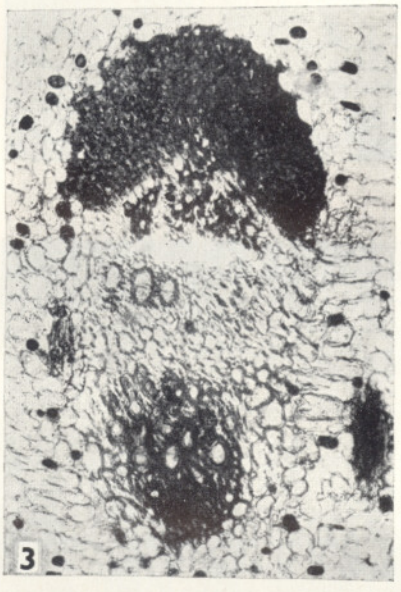
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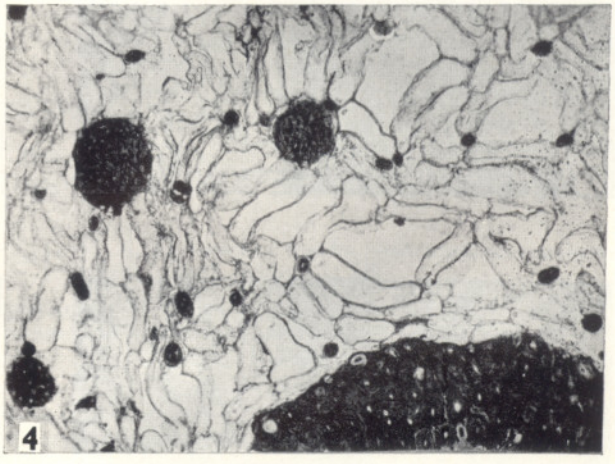
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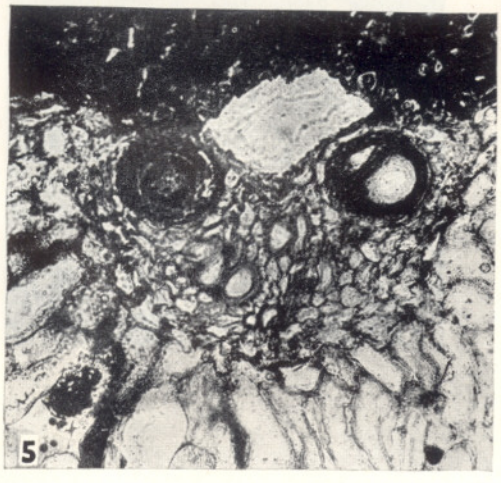
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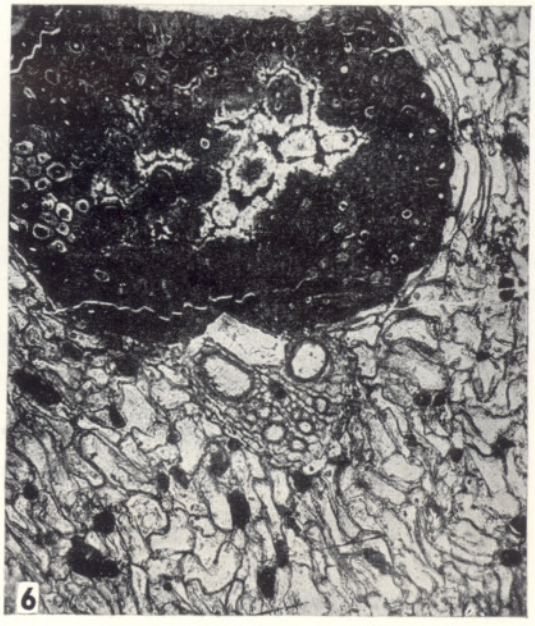
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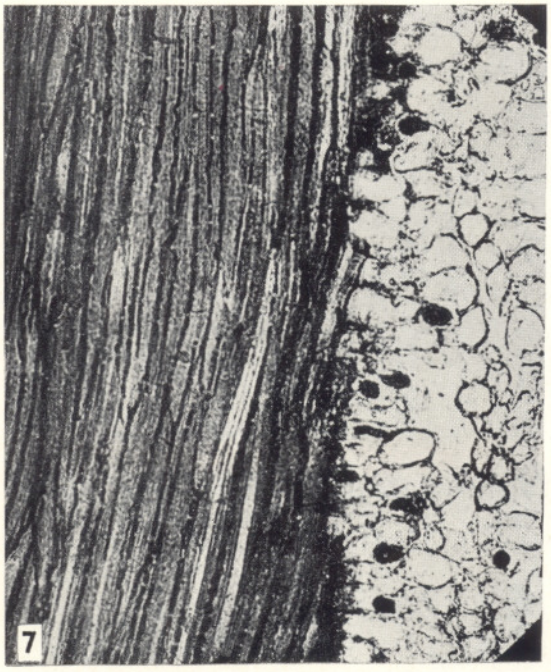
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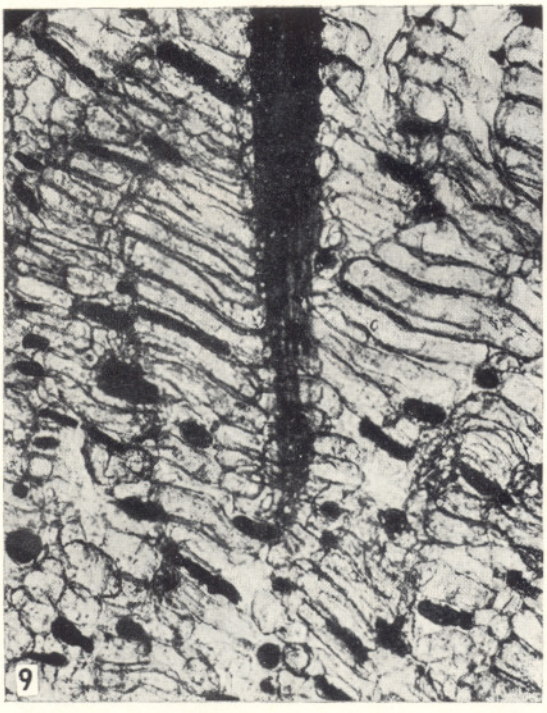
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EXPLANATION OF PLATES

T. = Transverse Section
L. = Longitudinal Section

PLATE 1

1. The examined piece. × ½.

2. *T.* Vascular bundles in main stock, arranged in the concavity of bean-shaped sclerenchyma bunches. There are also visible the smaller round sclerenchymatous bundles. × 10.

3. *T.* Vascular bundle structure. × 100.

4. *T.* Sclerenchyma bunches amid the cyst-like cells of main stock. On the lower part of the figure is a fragment of fibre-bunch with vascular bundles. The round and elliptic cells are filled with dark contents. × 100.

5. *T.* Vascular bundle structure. Twin vessels on the right upper part. Bark disintegrated. × 100.

6. *T.* Vascular bundle with joint sclerenchyma bunch, bark lacking. × 100.

PLATE 2

7. *L.* Longitudinal structure of sclerenchymatous bunch, round and elongated parenchyma cells in the main stock. × 100.

8. *L.* Longitudinal structure of a wood-bundle. Annular and scalariform thickenings in prominent vessels. On the left side are round and horizontal cyst-like cells in the main stock. × 100.

9. *L.* In the main stock cyst-like cells join perpendicularly to the vascular bundle. × 100.

10. *L.* Vascular bundle structure. On the left side are wood parenchyma cells among the annular tracheids. × 100.