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The Distribution and Characteristics of Louisiana Petrified Palmwood

MELVIN E. SCHMIDT

Department of Biological and Environmental Science, McNeese State University, Lake Charles, LA 70609[1]

ABSTRACT

The color variations and vascular bundle characteristics were examined from 72 different specimens of Louisiana petrified palmwood. While all specimens studied had consistent vascular bundle structure, no relationship was found between the vessel diameter and stem size. Vascular bundles do not decrease in size near the periphery of stems. The color variation and range of color in the well-silicated stem specimens was incredible. The age of the palmwood was established as late Oligocene to early Miocene. Vascular bundle and stem characteristics of the fossil palms appear to be similar to extant Phoenicoid palms.

Searching for new fossil palm specimens is a very satisfying recreational activity. Locating such specimens is now a real challenge as most of the surface specimens have long since been found. Some of the best localities for collecting are "posted" and are unavailable for scientific study. Finding a well-silicified specimen with unusual colorations or patterns is the ultimate dream of a fossil palm collector. Usually the exterior surface of a chunk of fossil palm is well oxidized and must be sliced with a lapidary diamond saw before its quality and color are known. The vascular bundle patterns present in fossil palmwood have always fascinated me. So it was quite natural to finally study the palmwood more closely.

The fossil record for many palms (including those found along the Gulf Coast) has been described (Uhl and Dransfield 1987, Tuta 1967). Vascular bundle characteristics are well documented (Tomlinson 1961). Other observations on the vessels in palms have been made (Klotz 1978).

Materials and Methods

Although specimens were observed and collected in a number of parishes in Central and North Louisiana, only the specimens from Natchitoches and Rapides Parishes were used in this study as the structure of palm stems in these locations was very well preserved by a complete impregnation of colored silicas during the fossilization process.

Specimens were sliced using a Lortone lapidary saw with an 18″ Vanguard diamond blade. This sectioning was at right angles to the vessels in each section of the palmwood. This exposed the vascular bundles in cross-section and allowed for consistency in describing the sizes and characteristics of those bundles. A comparator and metric reticle were purchased from Edmund Scientific that were used to measure the sizes of the vascular bundles. Vascular bundles were measured by moving the reticle over a slice of the palmwood until one of the metric circles exactly circumscribed an entire vascular bundle. Vessel diameter has been established as a significant criterion in the study of palms (Klotz 1978a, b).

I originally intended to record the color variations in the palmwood using the color scheme developed by the U.S. Geological Survey. A new plan was developed due to the almost unlimited range of coloration found. Color sample cards were acquired in sequence for all of the major paint companies. After comparing these sample colors with the colors in palmwood slices, only the Pratt and Lambert paint sequence matched the entire range of coloration found in the fossil palm stems. A color match was attained by holding the paint sample cards directly on the palmwood slices. When three of us agreed on a color match, it was recorded.

Results and Discussion

A total of 72 specimens were examined. Although a total of 278 colors were found in these specimens, only 150 different colors were identified overall. These colors were later grouped into 8 categories to simplify the results: 1—Blacks and grays, 2—White and variations of white, 3—Blues and greens, 4—True browns, 5—Beige to

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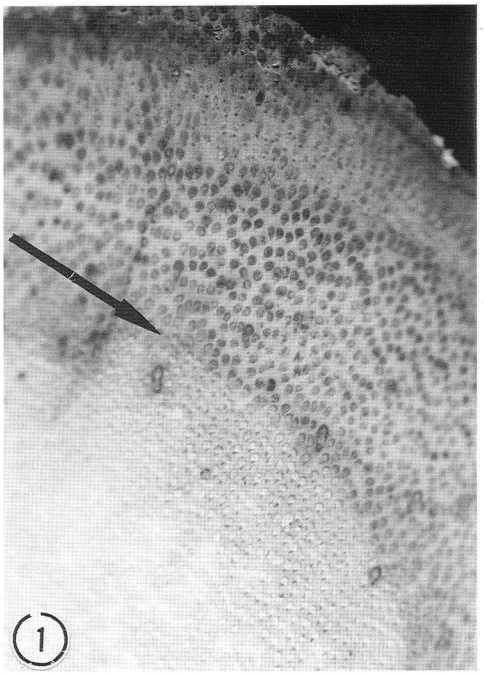
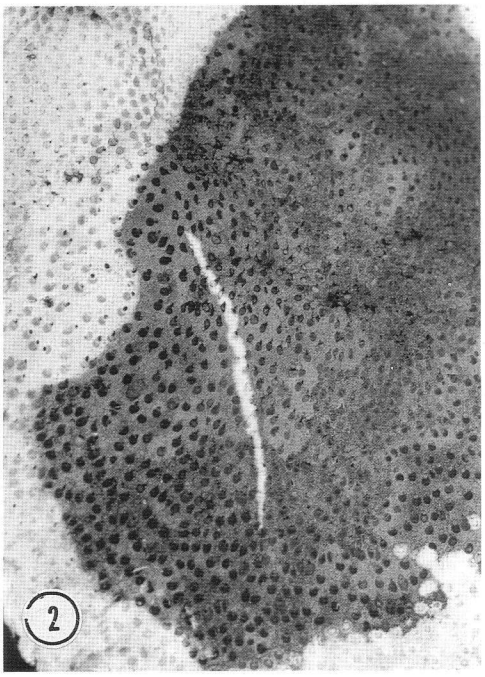




1. Vascular bundles are well defined. Phloem is usually light in color (especially in the central cylinder) and is positioned toward the stem periphery. Xylem appears quite dark (usually as a small dot facing the core of the stem). The arrow marks the usual abrupt transition between the central cylinder and the cortex. Vascular bundles in this specimen measured 1.0 mm in diameter. 2. Note the contrast in coloration. Zones of color often have no relationship to stem structure or location along the stem. Vascular bundles in this specimen measured 1.0 mm in diameter.

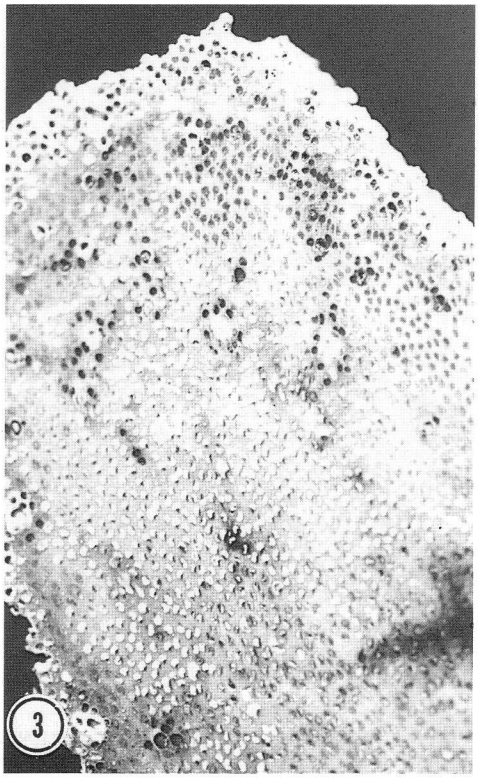
tan–browns, 6—Brownish grays, 7—Dark reddish browns, 8—Pink to light purple.

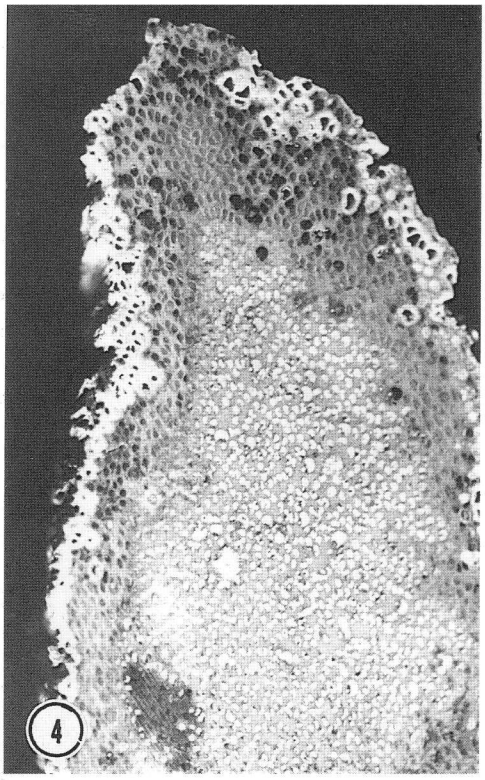
The petrified palms of Central Louisiana were solitary, moderately tall, mostly between 6 and 20 feet. Several specimens have been found (in broken sections) which were later assembled into complete stem reconstructions. The stems of petrified palms found in Northwest Rapides Parish and Southeast Natchitoches Parish are well silicified thereby preserving the stem structure (i.e., individual vascular bundles) in superb detail. Unfortunately, no petrified fruits, fronds, etc. of the fossil palms have been located. Only the stems are available for study.

Table 1. Summary of the colors found in the palmwood.

Color Category	# Different Colors in Each Category	# Colors Identified in Each Category	Percentage of Identified Colors Found
1	28	46	16.55%
2	15	22	7.91%
3	8	35	12.59%
4	18	35	12.59%
5	49	82	29.50%
6	12	27	9.71%
7	7	16	5.76%
8	13	15	5.40%

Although it is difficult to relate a fossil palm to a modern genus (Uhl and Dransfield 1987), I have attempted to do just that. Identification is based exclusively on preserved stem structure. Vascular bundle characteristics were compared to extant species (Tomlinson 1961) in the attempt to identify the possible genus of the extinct palms. The specimens collected have a narrow cortex which is usually of a different coloration from the central cylinder. Vascular bundles have a consistent orientation with an inner, single xylem strand surrounded by parenchyma and an outer, individual phloem component which is covered by a fibrous sheath (not always visible). The vascular bundles are uniformly scattered throughout the cortex and central cylinder, but are congested at the outer edge of the central cylinder. The diameters of





3. An unusual section of a palm stem where the vascular bundles exhibited a wide range of coloration. Vascular bundles in this specimen measured at 0.7 mm in diameter. 4. An example of the occasional variation in vascular bundle shapes: central cylinder bundles are oval to round while those of the cortex have a fusiform shape. Note the holes along the periphery of the cortex. These indicate areas of poor preservation. Vascular bundles in this specimen measured 0.7 mm in diameter.

individual bundles ranged from 0.2 mm to 2.0 mm. Individual xylem diameters ranged from 0.05 to 1.25 mm. Vascular bundles are very consistent in diameter and structure throughout the length of a stem. The size of the bundles is not related to the diameter of the palm nor do the vessels decrease in size near the periphery of a stem. However, while most vascular bundles are very round, a few vascular bundles toward the periphery tend to be more elongate to fusiform in shape. The ground parenchyma is uniform in texture, typically with concentric color variations across the stems; random color alteration is not uncommon.

These characteristics are more similar to the extant Genus Phoenix than to other genera. It is therefore possible the extinct Louisiana petrified palms were the predecessors of the Phoenicoid palms of today.

Fossil palms have been located along the Gulf Coast in ages ranging from Eocene to Miocene (Tuta 1967). Most of the specimens collected in this study were located in sediments of the Carnahan Bayou Member of the Fleming Formation (early Miocene) and Catahoula Formation (late Oligocene). This indicates a probable age of the specimens at around 30 million years old. It is interesting that local residents insist the specimens are 60 million years old.

Acknowledgments

I especially want to thank Dr. Natalie W. Uhl for answering my many questions during this project and my two student associates, Mr. Todd Honeycutt and Mr. Richard Martinez for the long hours they spent in the laboratory helping gather and record the data reported in this paper.

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What's in a Name?

Lemurophoenix (lee mure oh fee nix)—a compound of lemur, the endemic Madagascar primate group, and *phoenix* (Gr.), the date palm and used as a general name for a palm; a partial translation of the Malagasy vernacular name for this splendid palm "hovitra vari mena," the palm of the red-ruffed lemur.

Acanthophoenix (a kan though fee nix)—a compound of *acanthos* (Gr.), a spine, and *phoenix* (Gr.), the date palm, also used as a general term for a palm. The name reflects the very spiny nature of this Mascarene genus.

Borassus (bor ass us), said to be from borassos (Gr.), an immature inflorescence of the date palm *Phoenix*, though why Linnaeus should have used this word for a completely different palm is not clear.

Borassodendron (bor ass oh den dron), a compound of *Borassus* (see above) and dendron (Gr.), a tree.

Calamosagus (kah lam oh say gus), combines two generic names, *Calamus* and *Sagus*. We assume that the name, a synonym of *Korthalsia*, reflects the climbing, *Calamus*-like habit of this rattan genus and the inflorescence branches that bear a strong resemblance to those of the sago palm *Metroxylon* (to which at one time the generic name *Sagus* was applied).

Calappa (kah lap a), an early synonym of *Cocos*, the coconut, is a latinisation of *kelapa*, one of the most widely used vernacular names of the coconut in Malaysia and Indonesia.

Sagus (say gus), latinisation of the Indonesian/Malay word *sagu*, from which the English "sago" is also derived; this is a synonym of *Metroxylon*, the sago palms. Sago is extracted from the pith of the stem.

Marojejya (mah roh zhay zhee a) is named for the extraordinary rugged mountain massif of Marojejy in northeastern Madagascar where the palm was first collected by Humbert.

Masoala (mah zoh ah la) is the rugged peninsula in northeastern Madagascar where the eponymous genus was first collected by Perrier de la Bâthie.

Voanioala (voh ah nee oh al a) is the Malagasy name for this relative of the coconut. The name means, literally, fruit of the coconut of the forest, or forest coconut. It illustrates the remarkable connections between Malagasy and the Malay languages of southeast Asia, reflecting the early colonization of Madagascar by peoples of southeast Asian origin. *Voanioala* is linguistically very close to *buah niur ala* which would be recognisable in Java as "fruit of the coconut of the forest."

John Dransfield