WOOD ANATOMY OF THE NEOTROPICAL SAPOTACEAE

XXII. PRADOSIA

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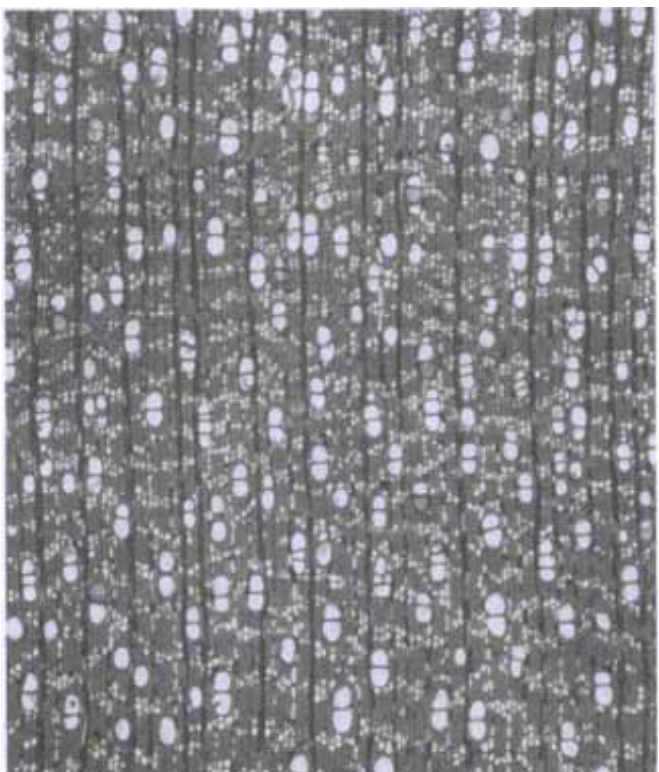

Abstract

As constituted here, the genus Pradosia consists of a group of closely related species including the species attributed to Glycoxylon and Neopometia. The members of Pradosia are readily separable anatomically from other American Sapotaceae by the presence of silica in the wood rays and of microcrystals (crystal sand) in the axial parenchyma. Although Podoluma does share these features with Pradosia, it has much larger pores arranged in a clustered-echelon arrangement.

Preface

The Sapotaceae form an important part of the ecosystem in the neotropics; for example, limited inventories made in the Amazon Basin indicate that this family makes up about 25 percent of the standing timber volume there. This would represent an astronomical volume of timber, but at present only a very small fraction is being utilized. Obviously, better information would help utilization--especially if that information can result in clear identification of species.

The Sapotaceae represent a well-marked and natural family, but the homogeneous nature of their floral characters makes generic identification extremely difficult. This in turn is responsible for the extensive synonomy. Unfortunately, species continue to be named on the basis of flowering or fruiting material alone and this continues to add to the already confused state of affairs.

This paper on Pradosia is the twenty-second in a series describing the anatomy of the secondary xylem of the neotropical Sapotaceae. The earlier papers, all by the same author and under the same general heading, include:

I. Bumelia--Res. Pap. FPL 325
II. Mastichodendron--Res. Pap. FPL 326
III. Dipholis--Res. Pap. FPL 327
IV. Achrouteria--Res. Pap. FPL 328
V. Calocarpum--Res. Pap. FPL 329
VI. Chloroluma--Res. Pap. FPL 330
VII. Chrysophyllum--Res. Pap. FPL 331
VIII. Diploon--Res. Pap. FPL 349
IX. Pseudoxythece--Res. Pap. FPL 350
X. Micropholis--Res. Pap. FPL 351
XI. Prieurella--Res. Pap. FPL 352
XII. Neoxythece--Res. Pap. FPL 353
XIII. Podoluma--Res. Pap. FPL 354
XIV. Elaeoluma--Res. Pap. FPL 358
XV. Sandwithiodoxa--Res. Pap. FPL 359
XVI. Paralabatia--Res. Pap. FPL 360
XVII. Gambeya--Res. Pap. FPL 361
XVIII. Gomphiluma--Res. Pap. FPL 362
XIX. Chromolucuma--Res. Pap. 363
XX. Manilkara--Res. Pap. 371
XXI. Barylucuma--Res. Pap. 372

Publication in this manner will afford interested anatomists and taxonomists the time to make known their opinions and all such information is hereby solicited. At the termination of this series the data will be assembled into a single comprehensive unit.

WOOD ANATOMY OF THE NEOTROPICAL SAPOTACEAE

XXII. PRADOSIA

By

B. F. Kukachka, Botanist[1/]

Forest Products Laboratory,[2/] Forest Service
U.S. Department of Agriculture

Introduction

Much has been written regarding the three genera Pradosia Liais 1872, Glycoxylon Ducke, 1922, and Neopometia (Vell.) Aubr. 1961 by recent students of the family: Aubréville (1),[3/] Baehni (4), Ducke (5), and Eyma (7). Confusion has prevailed since Pradosia was founded, and it appears that the end is not yet in sight.

Eyma (7) considered all the species attributed to the above genera as belonging to the genus Pouteria. Aubréville (1, 2, 3) recognized the three genera as distinct, but Baehni (4) recognized Neopometia with two species (lactescens and ptychandra) and assigned all the other species to the genus Chrysophyllum.

Ducke had originally founded the genus Glycoxylon but later (5) reconsidered and submerged Glycoxylon in Pradosia together with the two species assigned to Neopometia by Aubréville and Baehni.

Record (10) briefly described the wood anatomy of Pradosia but did not mention the occurrence of silica and microcrystals, features which would have easily separated Pradosia from the other genera he had described. His statement that the "wood sometimes with rather vague streaks of yellowish to purplish brown" was not confirmed in this study. The wood samples and slides used by Record in his study were available to the author. The slides were heavily stained which would have made detection of silica and microcrystals rather difficult. Moreover, it is apparent that the sectioning blocks were treated with hydrofluoric acid which effectively removed the silica, particularly at the lower concentrations, and all evidence of microcrystals.

1/ Pioneer Research Unit, Forest Products Laboratory.

2/ Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

3/ Underlined numbers in parentheses refer to literature cited at the end of this report.

The name Pradosia has been adopted here, since it is the oldest and most distinctive. Anatomically, the members of this group constitute a very homogeneous unit readily separable from the other American Sapotaceae. If Neopometia is maintained, its two (or more?) species would be separated from Pradosia only on the basis of pore arrangement. Glycoxylon and Pradosia are not separable anatomically.

During the course of this study, specimens backed by herbarium material and designated as Neoxythece, Prieurella, Pouteria, Ecclinusa, Sideroxylon, or unassigned were found to be members of the Pradosia complex and conversely, wood specimens named Pradosia were in a number of instances assigned to other genera.

The range of Pradosia includes northern Bolivia, Brazil, French Guiana, Guyana, Surinam, Venezuela, Colombia, and Ecuador.

Description

Based on 25 named specimens representing 9 species and 32 unassigned specimens from all parts of the range (table 1).

General: Wood grayish-brown to light brown with no distinction between sapwood and heartwood; very fine textured; without luster. Growth rings indistinct but generally present; appearing under the microscope as very narrow zones of flattened wood fibers with or without associated parenchyma. Specific gravity of individual specimens ranging from 0.62 to 1.08 with an overall average of 0.89 for 43 specimens.

Anatomical:

Pores in radial-echelon arrangement in specimens of lactescens from Bahia (fig. 1) but not so distinct in specimens from Espirito Santo as also in ptychandra (fig. 3). According to Aubréville (1) and Baehni (4), these species belong to the genus Neopometia. In all the other specimens examined, the pore arrangement would be classified as typically diffuse (figs. 5, 6, 7). Solitary pores present in all specimens, but more commonly in radial multiples of 2 to 4 or infrequently to 6. Pores very small to small with a maximum tangential diameter of different specimens ranging from 63 µm to 134 µm with an overall average of 92 µm. The largest pores were observed in the two Cuatrecasas collections from Colombia.

Vessel-member length ranges from 450 µm to 1,010 µm with an average of 660 µm for the 57 specimens examined. Intervessel pitting 4 to 6 µm in the majority of the specimens; commonly 6 to 8 µm in the Colombian specimens. Perforation plates predominantly simple, but

scalariform plates with a few bars were observed in Froes 323 D and Krukoff 5410 (fig. 8). In this respect these two collections (unassigned) are unique among the neotropical Sapotaceae. Tyloses, when present, thin-walled.

Axial parenchyma closely banded; the individual bands irregularly 1 to 2 (3) seriate in the majority of the specimens; irregularly 1 to 4 (5) seriate in most of the specimens from Colombia and Venezuela (fig. 7). Under a hand lens appearing conspicuously lighter in color than the background; frequently very conspicuous because of the microcrystalline content. Microcrystals frequent to sparse and typically observed only in the axial parenchyma. Silica occasional; rhombic crystals lacking.

Wood rays 1 to 2 (3 to 4) seriate; heterocellular; vertical fusions common. Maximum body height of the multiseriate portion extremely variable and ranging from 80 µm to 1,025 µm; most commonly 200 to 600 µm; of no diagnostic value. Vessel-ray and vessel-parenchyma pitting variable in shape and size; frequently linear. Silica present in all specimens; generally spheroidal and ranging in size from 4 µm to 22 µm. Lateral walls of the square and erect marginals inconspicuously pitted.

Wood fibers thick-walled; average length of different specimens ranging from 1.16 mm to 2.08 mm with an overall average of 1.61 mm. Vascular tracheids generally present but may be sparse or lacking from individual macerations (identifition is difficult from prepared sections).

Silica content analyses performed on 56 wood specimens provided a range of 0.01 percent to 1.49 percent based on the ovendry weight of the wood. It is of interest to note that the range of values in lactescens (table 2) was equal to the entire range for the genus and immediately poses the question of identification accuracy. More than one-half of the specimens (32) contained less than 0.10 percent silica and only four specimens exceeded the 1.00 percent level. It should be noted that silica particles are best observed in unstained radial sections derived from blocks which have not been treated with hydrofluoric acid. Silica is readily detectable in macerated material in which case the extraneous cell contents have been bleached or removed leaving only the silica.

Diagnostic features: Readily separable from other American Sapotaceae by the combination of silica in the wood rays and microcrystals in the axial parenchyma. These features are shared with Podoluma but here the pores are in clustered-echelon arrangement and attain a diameter of 181 µm.

Table 1.--Specimens of *Pradosia* examined in this study

Species	Collector and number	Source	Wood collection and number[1/]
decipiens Ducke	Ducke 385 (Type)	Brazil	SJR 44303
glycyphloea (Casar.) Kuhlm.	Curran s.n.	Brazil	SJR 610
	Curran 24	Brazil	SJR 4694
	Filho s.n.	Brazil	IPT 12968
	Rio Bot. Gard.	Brazil	[2/] --- -----
inophylla (Mart. ex Miq.) Ducke	Ducke 264	Brazil	SJR 32640
lactescens (Vell.) Kuhlm.	Barreto 75	Brazil	RB 1683
	Filho s.n.	Brazil	IPT 8660
	Filho-Magnani s.n.	Brazil	RB 2962
	Filho-Magnani 42	Brazil	RB 2972
	Filho-Netto 506	Brazil	RB 5975
	Filho-Rizzini s.n.	Brazil	RB 5542
maguirei (Aubr.) Comb novo	Maguire-Politi 27865 (Type)	Venezuela	SJR 52105
	Maguire-Adderley 43268	Venezuela	SJR 54406
praealta Ducke	Pires 4094	Brazil	RB 2809
	Pires et al. 51774	Brazil	MAD 21467
praealta subsessilis Ducke	Ducke 825 (type)	Brazil	SJR 32652
ptychandra (Eyma) Comb novo	BAFOG 55	French Guiana	MAD 32953
	Schulz 7319	Surinam	MAD 32942
schomburgkiana (A. DC.) Cronq.	Forest Department 937	Guyana	SJR 32885
	Forest Department 2759	Guyana	SJR 43655
	Maguire 24309	Surinam	SJR 44116
surinamensis (Eyma) Comb novo	Lindeman 6298	Surinam	MAD 32937
	Oliveira 2465	Brazil	--- -----
	Stahel 256	Surinam	MAD 19769

Table 1.--Specimens of Pradosia examined in this study--con.

Species	Collector and number	Source	Wood collection and number[1/]
Unassigned specimens	Acosta Solis 11711	Ecuador	SJR 45424
	Bertin 3009	French Guiana	SJR 5371
	Cuatrecasas 13988	Colombia	SJR 42695
	Cuatrecasas 16560	Colombia	SJR 43056
	Curran s.n.	Brazil	SJR 595
	Curran-Haman 623	Curacao	SJR 2860
	Dugand 236	Colombia	SJR 22525
	Dugand 556	Colombia	SJR 27091
	Dugand 703	Colombia	SJR 28526
	Dugand 1043	Colombia	SJR 33782
	Espina-Giacometto 70	Colombia	SJR 20519
	Field Museum 12140	Ecuador	MAD 32911
	Froes 85	Brazil	A 27366
	Froes 98	Brazil	A 27371
	Froes 323 D	Brazil	A 27477
	Irmay 60	Bolivia	MAD 6108
	Krukoff 5410	Brazil	MAD 19054
	Little 6606	Ecuador	MAD 10426
	Little 6629	Ecuador	MAD 10433
	Little 6715	Ecuador	SJR 40990
	Merida Laboratory 87	Venezuela	MAD 21248
	Oliveira 2439	Brazil	[2/] --- -----
	Oliveria 5801 C	Brazil	[2/] --- -----
	Pires 13038	Brazil	[2/] --- -----
	Pittier TS 490	Venezuela	SJR 6839
	Record 81	Colombia	SJR 16480
	Rosa 652	Brazil	[2/] --- -----
	Rosa 1847	Brazil	MG 1166
	Smith, A. C. 3112	Guyana	SJR 35808
	Turner 105	Venezuela	SJR 45650
	Turner 123	Venezuela	SJR 45651
	Turner 143	Venezuela	SJR 45681

1/ A = Harvard Univ., Cambridge, Mass.; MAD = Forest Products Laboratory, Madison, Wis.; RB = Jardin Botanico do Rio de Janeiro, Brazil; SJR = Samuel J. Record Memorial Collection, formerly at Yale Univ., but now housed at Madison, Wis.; IPT = Instituto Pesquisas Tecnologicas, Sao Paulo, Brazil; MG = Museo Goeldi; Belem, Brazil.

2/ No wood specimen number.

Table 2. --Silica content of named species of *Pradosia*[1/]

Species	Collector	Silica content	Source
		Pct	
decipiens	Ducke 385	1.12	Amazonas
glycypholea	Curran s.n.	0.16	Bahia
	Curran 24	.33	Bahia
	Filho s.n.	.08	Bahia
	Rio Bot Gard.	.22	Rio de Janeiro
inophylla	Ducke 264	0.02	Amazonas
lactescens	Barreto 75	0.19	Minas Gerais
	Filho s.n.	.76	Espirito Santo
	Filho-Magnani s.n.	.34	Espirito Santo
	Filho-Magnani 42	1.49	Espirito Santo
	Filho-Netto 506	.02	Bahia
	Filho-Rizzini s.n.	.03	Bahia
maguirei	Maguire-Adderley 43268	0.04	Venezuela
	Maguire-Politi 27865	.02	Venezuela
praealta	Pires 4094	0.09	Para
	Pires et al. 51774	.19	Para
praealta subsessilis	Ducke 825	0.67	Amazonas
ptychandra	BAFOG 55	0.01	French Guiana
	Schulz 7319	.02	Surinam
schomburgkiana	Forest Department 937	0.04	Guyana
	Forest Department 2759	.07	Guyana
	Maguire 24309	.46	Surinam
surinamensis	Lindeman 6298	0.04	Surinam
	Oliveira 2465	.05	Para
	Stahel 256	.07	Surinam

1/ The author is indebted to Martin F. Wesolowski, Chemist, Forest Products Laboratory, for the silica determinations.

Notes

1. Standley (11) described *Sideroxylon colombianum* from Colombia citing Record 81 (SJRw 16480) and characterizing the wood as orange.

2. Espina and Giacometto (6) cited their number 70 (SJRw 20519) as *Sideroxylon colombianum* Standl.

3. Kribs (9) briefly described the properties and anatomy of *Pouteria carabobensis* Pittier, illustrated by his figure 463. It is apparent that this description was based on specimens collected in Venezuela for the Navy-Yale Project (8) by Turner (his numbers 105, 123, and 143) represented by SJRw 45650, 45651, and 45681.

4. *Ecclinusa cuatrecasasii* described by Aubréville in Adansonia 7:2:144 belongs in *Pradosia*. The two specimens cited, Cuatrecasas 13988 (SJRw 42695) and Cuatrecasas 16560 (SJRw 43056) were available for this study. This is apparently a new species and readily distinguished from the other Colombian specimens by its large pores.

5. *Ecclinusa* aff. *cuatrecasasii* Aubr. is cited (3) from the Bolivar Department of Venezuela but wood specimens from the cited specimens were not available for this study.

6. *Pradosia schomburgkiana* (A. DC.) Cronq. is reduced to synonomy under *Glycoxylon pedicellatum* Ducke by Aubréville (3).

Figure 1. --Pradosia lactescens, pore and parenchyma arrangement (RBw5975, Bahia) X 30.

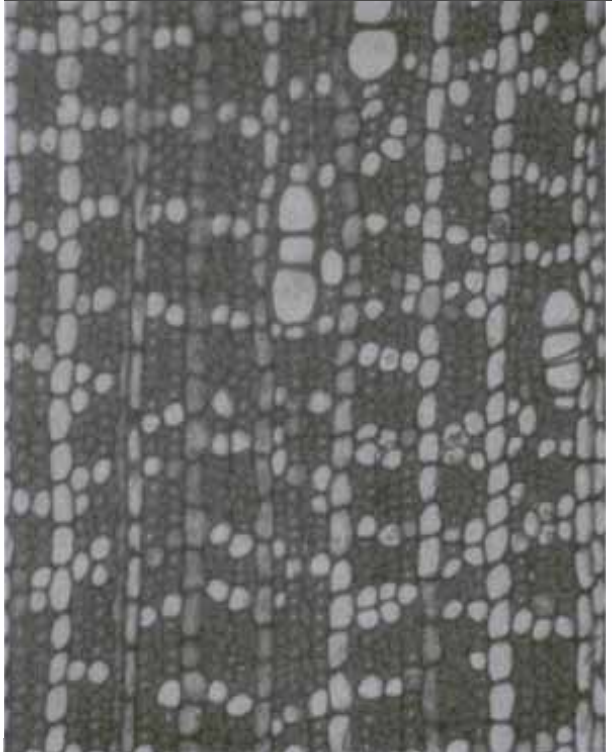

Figure 2. --Same as figure 1, parenchyma detail X 110.

Figure 3.--P. ptychandra, pore and parenchyma arrangement (BAFOG 55, French Guiana) X 30.

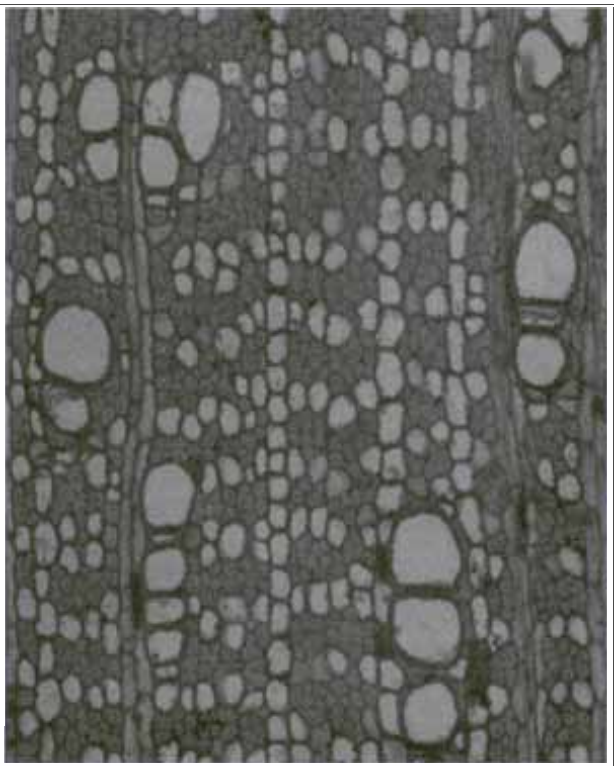

Figure 4. --Same as figure 3, parenchyma detail X 110.

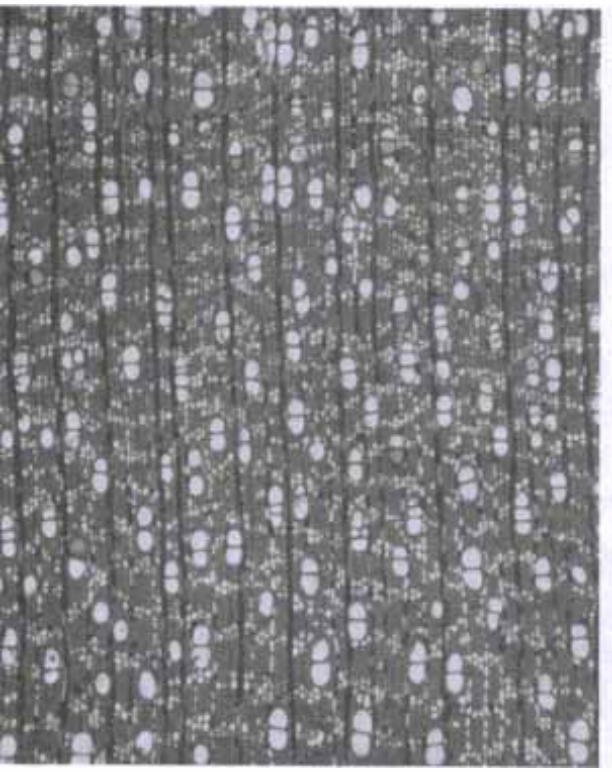

Figure 5.--P. glycyphloea, pore and parenchyma arrangement (IPTw 12968, Bahia) X 30.

Figure 6. --P. inophylla, pore and parenchyma arrangement (Ducke 264, Amazonas) X 30.

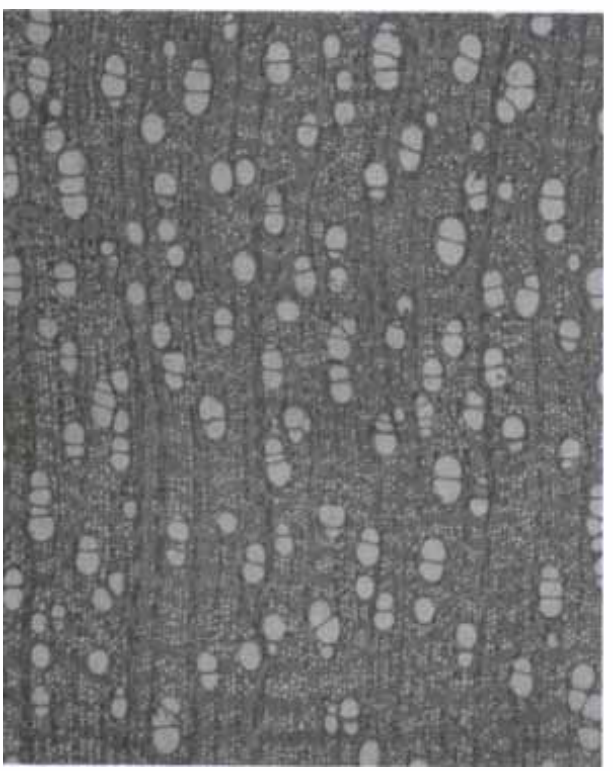

Figure 7.--P. sp. , pore and parenchyma arrangement (Cuatrecasas 13988, Colombia) X 30.

Figure 8.--P. sp., scalariform plates (Froes 323 D, Maranhao) X 110.

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