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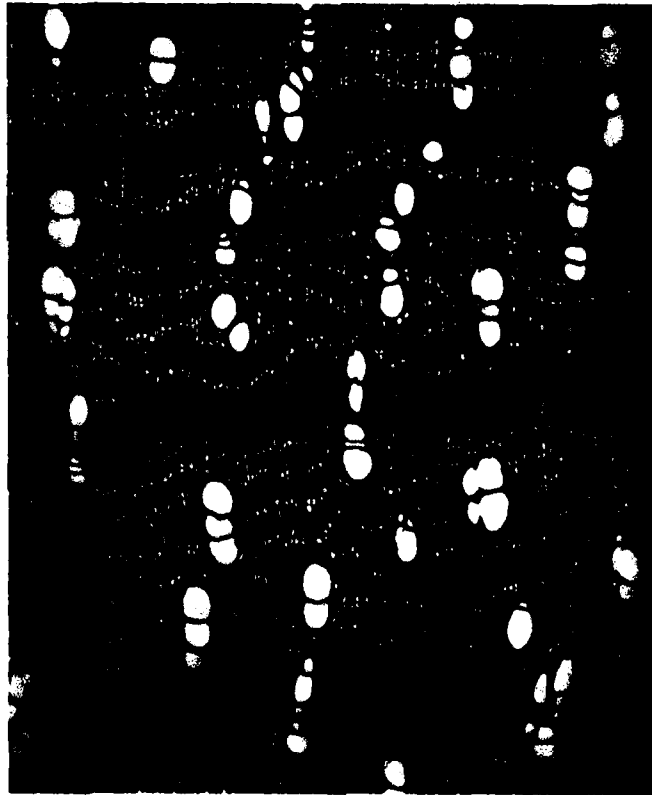
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**WOOD ANATOMY
OF THE
NEOTROPICAL SAPOTACEAE
XXXII. RICHARDELLA**

RESEARCH PAPER FPL 420

FOREST PRODUCTS LABORATORY
FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE
MADISON, WIS.

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Abstract

Richardella and Radlkoferella were founded by Pierre in 1890 but soon were absorbed into the large genus Lucuma. In 1942 Baehni reduced the above genera and many others to synonymy under Pouteria. In 1961 Aubréville reinstated Richardella and Radlkoferella to generic status and in 1965 Baehni adopted Richardella as a pantropical genus. Anatomically, the woods of Richardella and Radlkoferella form a rather distinctive group with the exception of Richardella speciosa and its allies. The anatomy of the "speciosa" group is very different from that of typical Richardella and consequently has been described under Englerella.

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 synonymy. 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 Richardella is the thirty-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:

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| I. Bumelia--Res. Pap. FPL 325 | XVII. Gambeya--Res. Pap. FPL 361 |
| II. Mastichodendron--Res. Pap. FPL 326 | XVIII. Gomphiluma--Res. Pap. FPL 362 |
| III. Dipholis--Res. Pap. FPL 327 | XIX. Chromolucuma--Res. Pap. FPL 363 |
| IV. Achrouteria--Res. Pap. FPL 328 | XX. Manilkara--Res. Pap. FPL 371 |
| V. Calocarpum--Res. Pap. FPL 329 | XXI. Barylucuma--Res. Pap. FPL 372 |
| VI. Chloroluma--Res. Pap. FPL 330 | XXII. Pradosia--Res. Pap. FPL 373 |
| VII. Chrysophyllum--Res. Pap. FPL 331 | XXIII. Gayella--Res. Pap. FPL 374 |
| VIII. Diploon--Res. Pap. FPL 349 | XXIV. Ecclinusa--Res. Pap. FPL 395 |
| IX. Pseudoxythece--Res. Pap. FPL 350 | XXV. Ragala--Res. Pap. FPL 396 |
| X. Micropholis--Res. Pap. FPL 351 | XXVI. Myrtiluma--Res. Pap. FPL 397 |
| XI. Prieurella--Res. Pap. FPL 352 | XXVII. Sarcaulis--Res. Pap. FPL 398 |
| XII. Neoxythece--Res. Pap. FPL 353 | XXVIII. Labatia--Res. Pap. FPL 416 |
| XIII. Podoluma--Res. Pap. FPL 354 | XXIX. Eglerodendron--Res. Pap. FPL 417 |
| XIV. Elaeoluma--Res. Pap. FPL 358 | XXX. Pseudocladia--Res. Pap. FPL 418 |
| XV. Sandwithiodoxa--Res. Pap. FPL 359 | XXXI. Pouteria--Res. Pap. FPL 419 |
| XVI. Paralabatia--Res. Pap. FPL 360 | |

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 comprehensive unit.

WOOD ANATOMY OF THE NEOTROPICAL SAPOTACEAE

XXXII. RICHARDELLA

By

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U.S. Department of Agriculture

Introduction

Richardella and Radlkoferella were both described by Pierre in 1890 and soon became reduced to synonymy in the large genus Lucuma. Baehni (3)^{3/} in his 1942 monograph of the genus transferred all the species of both genera to Pouteria. In 1961 Aubréville (1) reinstated Richardella and Radlkoferella to generic status and subsequently (2) added two new species from Colombia, Richardella buenaventurensis and Richardella chocoensis. In 1965 Baehni (4) adopted Richardella but made it a pantropical genus containing components of Richardella and several other genera. The name Richardella seems to have priority over Radlkoferella and is characterized by the generic type Richardella macrophylla (Lam.) Aubr.

Anatomically, the species attributed to Richardella by Baehni (4) are a very heterogeneous group and cannot be accepted as a valid unit. On the other hand, the species assigned to Radlkoferella by Aubréville (1) form a distinct anatomical unit but are not distinguishable from several species he had assigned to Richardella including the generic type Richardella macrophylla. Furthermore, Aubréville's Richardella consists of two very distinct anatomical types, one characterized by the generic type Richardella macrophylla and the other by Richardella speciosa (Ducke) Aubr., that are readily separable by physical appearance and hand lens examination. For practical considerations the group of species characterized by Richardella speciosa are described in the next paper of this series under the generic name Englerella.

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.

Description

The following description is based on 50 specimens of which 44 belong to 9 named species and 6 to unassigned specimens (table 1).

General: Wood moderately heavy to very heavy with a specific gravity range of 0.71 to 1.22; average for 47 specimens was 0.94. Wood brown to dark brown and particularly in those specimens showing a distinct heartwood (especially evident in trigonosperma). Growth rings (under the microscope) defined by very narrow bands of flattened wood fibers associated with parenchyma; adjacent is a fibrous zone occasionally occupied by pores. These fibrous zones are readily evident with a hand lens and are quite typical of this group. Wood surfaces with little or no luster. Bark on available specimens less than 1 cm thick, smooth, and mottled (except in Lindeman 4151 where it is fissured and shows distinct transverse breaks). Froth test negative.

Anatomical:

Pores in diffuse arrangement (fig. 1); solitary pores present but most commonly in radial multiples of 2 to 5 and infrequently longer, with an observed maximum of 10 pores in venosa. Maximum tangential pore diameter ranges from 95 μm in domingensis to 276 μm in macrophylla (BAFOG 6); average of all specimens was 169 μm .

Vessel member length averages 710 μm for the 50 specimens used in this study; ranging from an average of 520 in macrophylla to 920 μm in trigonosperma. Intervessel pitting commonly 6 to 8 μm and infrequently to 10 μm in diameter. Tyloses commonly thin-walled but usually sclerotic in the dark-colored heartwood. Perforation plates simple.

Axial parenchyma in irregular wavy bands (figs. 1,2); the individual bands irregularly 1 to 2(3) seriate and frequently discontinuous to locally diffuse; in marked contrast to the uniform and straight bands seen in many genera, such as Pouteria. The individual cells with or without brown contents. Small silica particles infrequently present and then only in the cells with brown contents. Rhombic and microcrystals lacking.

Wood rays heterocellular; 1 to 3 and occasionally in-part 4 seriate. Strictly uniseriate rays were observed only in one specimen (Lenjouw and Lindeman 2166 from Surinam). Pitting on lateral walls of erect marginals and square cells distinct and abundant. Ray cells commonly with brown contents; silica particles may be quite sparse and small to very abundant and large; spheroidal. Vessel-ray pitting irregular in shape and size; frequently obovoid to linear. Rhombic and microcrystals lacking.

Wood fibers thick-walled. Fiber length averages of the individual specimens range from 1.12 mm to 2.00 mm with an overall average of 1.55 mm. Vascular tracheids present but generally sparse.

Silica content determined by chemical analysis ranged from 0.05 percent to a maximum of 2.06 percent, with an overall average of 0.71 percent for the 38 specimens analyzed. Silica analyses by Martin F. Wesolowski, Chemist, FPL.

Diagnostic features: Wood brown to dark brown and generally heavy. Axial parenchyma in wavy and irregular bands as opposed to the banded straight lines seen in many genera. Growth rings defined by zones of fibrous tissue which are quite conspicuous with a hand lens. Silica present in the wood rays. Vascular tracheids sparse. Generally similar to the Pouteria species with intervessel pitting 6 to 8 μ m in diameter but can be separated on the basis of the axial parenchyma arrangement and relative abundance of vascular tracheids. Refer to previous paper, XXXI. Pouteria, in this series.

Notes

1. Richardella cayennensis (A.DC.) Aubr. represented by Froes 849 and Radlkofarella grandiflora (A.DC.) Pierre represented by Froes 490 are practically identical with respect to bark, physical appearance, and wood anatomy. The pore and parenchyma arrangement suggests that they are incorrectly named and have been excluded from consideration under Richardella; their status remains uncertain.

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1. Aubréville, Andre.
1961. Notes sur des Poutériées Américaines. *Adansonia* 1(2):174-176.
2. Aubréville, Andre.
1967. Sapotacées nouvelles de la Côte Colombienne du Pacifique.
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Candollea 9:194-476.
4. Baehni, Charles.
1965. Mémoires sur les Sapotacées. III. Inventaire des genres.
Boissiera II:95-99.

Table 1.--Selected measurements of specimens examined--Richardella (including Radlkoferella)^{1/}

Species	Collector and number	Sp.gr.	Si	MPD		VML		FL	IV	R	MBH	Source
				%	μ m	μ m	μ m					
<u>campechiana</u> (H.B.K.) Pierre	Forgeson 107	1.00		142	770	1.60	6-8	2	252			Panama
	Lundell 4	0.83	1.74	173	700	1.46	6-8	2	315			Belize
	MEXUw 267	0.91	0.74	142	730	1.47	6-8	2	220			Mexico
	MEXUw 154	0.98	2.06	165	810	1.60	6-8	3	354			Mexico
	Williams, L1. 9434	0.89	0.22	165	720	1.26	6-8	2	118			Mexico
	Williams, L1. 9503	0.97	0.40	173	590	1.12	6-8	2	197			Mexico
<u>domingensis</u> (Gaertn.f.)	Bucher 152	0.86	0.68	95	660	1.38	6	2	165			Cuba
	Dept. Agr. 175	0.93	0.60	110	660	1.38	6	2	102			Haiti
<u>macrocarpa</u> (Huber)	Capucho 409	1.10	1.59	173	800	1.63	6-8	2	165			Brazil
	Museu Goeldi tree 746	0.90	1.08	142	720	1.34	6-8	2	236			Brazil
	Nascimento 364	1.00		142	840	1.64	6-8	2	355			Brazil
	Silva, M. G. 3150	1.00		142	870	1.59	6-8	2	087			Brazil
	Silva, N. T. 3937	1.00		158	850	1.86	6-8	2	079			Brazil
<u>macrophylla</u> (Lam.) Aubr.	Archer 7745	0.87	0.23	181	680	1.56	6-8	2	236			Brazil
	BAFOG 6	0.85	0.05	276	650	1.50	6-8	3	990			French Guiana
	Capucho 428	0.90	1.69	205	670	1.69	8-10	2	550			Brazil
	Krukoff 1863	0.71	0.20	213	520	1.17	6-8	2	394			Brazil
	Krukoff 5711	0.90	2.03	165	660	1.74	6-8	2	473			Brazil
	Maguire et al. 51750	0.97	0.25	165	600	1.72	6-8	2	197			Brazil
	Museu Goeldi tree 451		1.90	213	580	1.45	6-8	4	990			Brazil
	Oliveira 1088	0.89		150	560	1.31	6-8	3	244			Brazil
	Pires 12259		0.22	213	630	1.55	6-8	2	276			Brazil
	Pires 13071			197	660	1.57	8-10	2	181			Brazil
	Rodrigues-Loureiro 7190	0.97	0.55	181	650	1.56	6-8	2	252			Brazil
Silva, N. T. 4605	1.00		158	650	1.69	6-8	2	197			Brazil	
Smith, A. C. 3249	0.87	0.58	158	840	1.53	6-8	2	126			Guyana	
<u>mansoniensis</u> Aubr. & Pellegr.	Rodrigues-Chagas 114	1.00		197	790	2.00	6-8	2	181			Brazil
	Rodrigues-Chagas 1749	1.08	0.60	205	730	1.98	6	2	236			Brazil
	Rodrigues-Chagas 1754	1.00	0.80	158	840	1.81	6-8	2	079			Brazil
	Silva-Jangoux 176	0.90	1.22	197	610	1.40	6-8	3	347			Brazil

Table 1.--Selected measurements of specimens examined--Richardella (including Radlkoferella)^{1/}--con.

Species	Collector and number	Sp. gr.	Si	MPD	VML		FL	IV	R	MBH	Source
					μm	μm					
<u>multiflora</u> (A. DC.)	Broadway 63	0.86	0.72	134	640	1.33	6-8	2	315	Trinidad	
	Trop. Station s.n.	0.94	0.12	197	740	1.59	6-8	2	197	Puerto Rico	
	Traje specimen	0.84	0.24	102	710	1.31	6-8	2	079	Puerto Rico	
<u>rodriguesiana</u>	Rosa, N. A. 1103	0.90		150	720	1.56	6	2	079	Brazil	
	Kosa, N. A. 1181	1.00	0.82	173	620	1.38	6	2	213	Brazil	
<u>trigonosperma</u> (<u>Eyma</u>) <u>Baehni</u>	For. Dept. 3356	1.05	0.54	205	800	1.72	6	2	394	Guyana	
	For. Dept. 4846	1.22	0.49	197	800	1.72	6-8	2	173	Guyana	
	Lanjouw-Lindeman 2166	1.17	0.74	158	920	1.81	6	1	000	Surinam	
	Lindeman 4151	0.95	0.42	220	680	1.43	6	2	158	Surinam	
	Maguire et al. 47489	1.08	0.28	150	810	1.95	6	2	110	Brazil	
	Maguire et al. 47558	1.02	0.15	173	770	1.50	6-8	2	158	Brazil	
	Schulz 7293	1.02	0.15	150	730	1.50	6-8	2	118	Surinam	
	Stahel 220	0.95	0.43	142	800	1.64	6-8	2	158	Surinam	
<u>venosa</u> (Mart.)	Reitz-Klein 3278	0.80	0.24	110	570	1.58	6-8	2	134	Brazil	
	<u>Unassigned specimens</u>										
<u>Filho-Rizzine s.n.</u>	Filho-Rizzine s.n.	0.80	1.08	197	670	1.56	8	3	631	Brazil	
	Maguire et al. 47097	1.02	0.22	197	790	1.81	6-8	2	102	Brazil	
	Rosa, N. A. 1118	1.00	1.05	158	670	1.31	8	2	165	Brazil	
	Silva, M. G. 3712	0.90		165	700	1.61	6-8	3	552	Brazil	
	Silva, M. G. 3872	0.90		142	690	1.29	6	2	236	Brazil	
Silva, M. G. 4019	0.80		197	670	1.50	6	2	197	Brazil		

^{1/} Sp. gr. = specific gravity; Si = silica content; MPD = maximum tangential pore diameter; VML = vessel member length; FL = fiber length; IV = intervessel pit diameter; R = maximum ray seriation; and MBH = maximum body height of multiseriate ray portion.

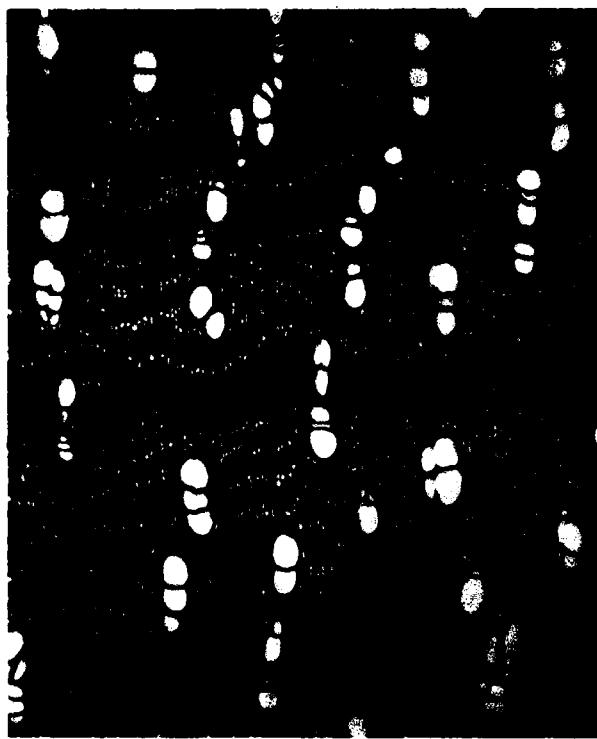


Figure 1.--*Richardella macrophylla*, pore and parenchyma arrangement X 30 (Maguire et al. 51750).

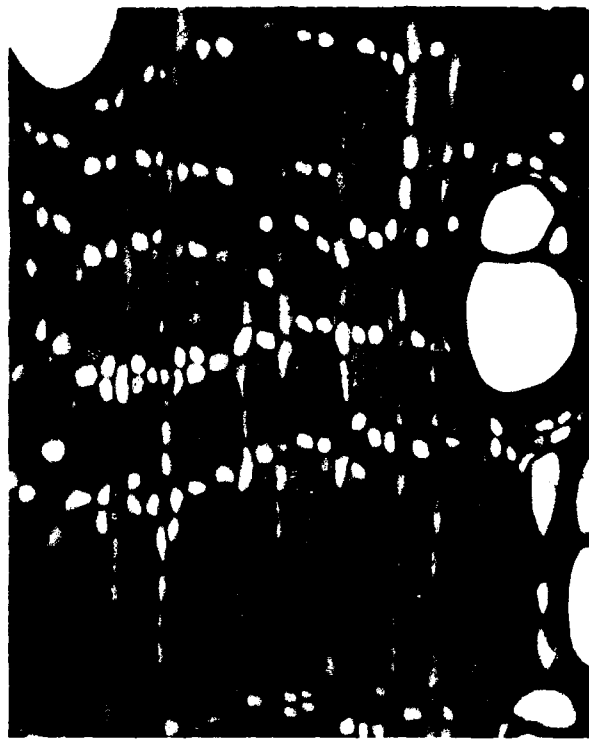


Figure 2.--Same as figure 1, parenchyma detail at 110 X.

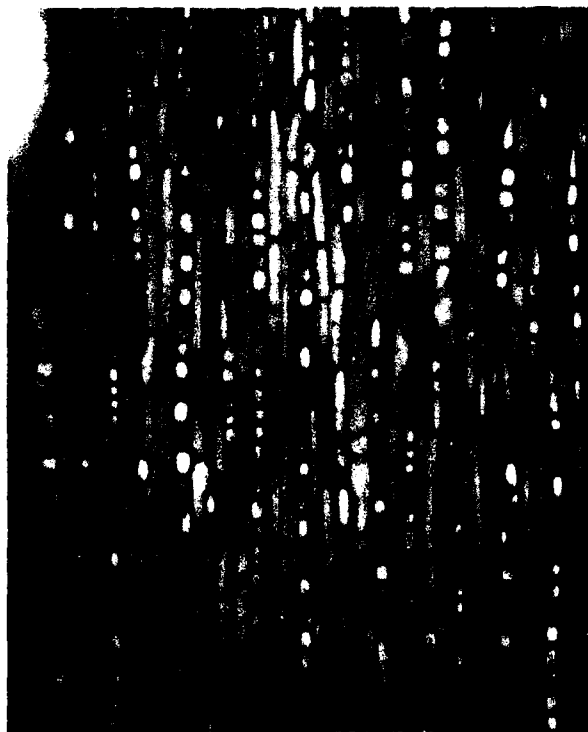


Figure 3.--Same as figure 1, wood rays at 110 X.

U.S. Forest Products Laboratory

Wood anatomy of the neotropical Sapotaceae: XXXII.
Richardella, by B. F. Kukachka, FPL.
7 p. (USDA For. Serv. Res. Pap. FPL 420).

Richardella and Radlkoferella were founded by Pierre in 1890 but soon were absorbed into the large genus Lucuma. In 1942 Baehni reduced the above genera and many others to synonymy under Pouteria. In 1961 Aubréville reinstated Richardella and Radlkoferella to generic status and in 1965 Baehni adopted Richardella as a pantropical genus. Anatomically, the woods of Richardella and Radlkoferella form a rather distinctive group with the exception of Richardella speciosa and its allies. The anatomy of the "speciosa" group is very different from that of typical Richardella and consequently has been described under Englerella.

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