

Plate 5-3. Stomata of neotropical *Beilschmiedia* species (continued). q. *B.* sp. 1 (*Haber 11070*). r. *B.* sp. 2 (*Folli 409*). s. *B.* sp. 3 (*Lorence 4376*). t. *B.* sp. 4 (*Chávez 443*). u. *Hufelandia latifolia* (*Steyermarkii 98386*). v. *H. towarensis* (*Díaz 3587*). Scale bars equal 20 μm .

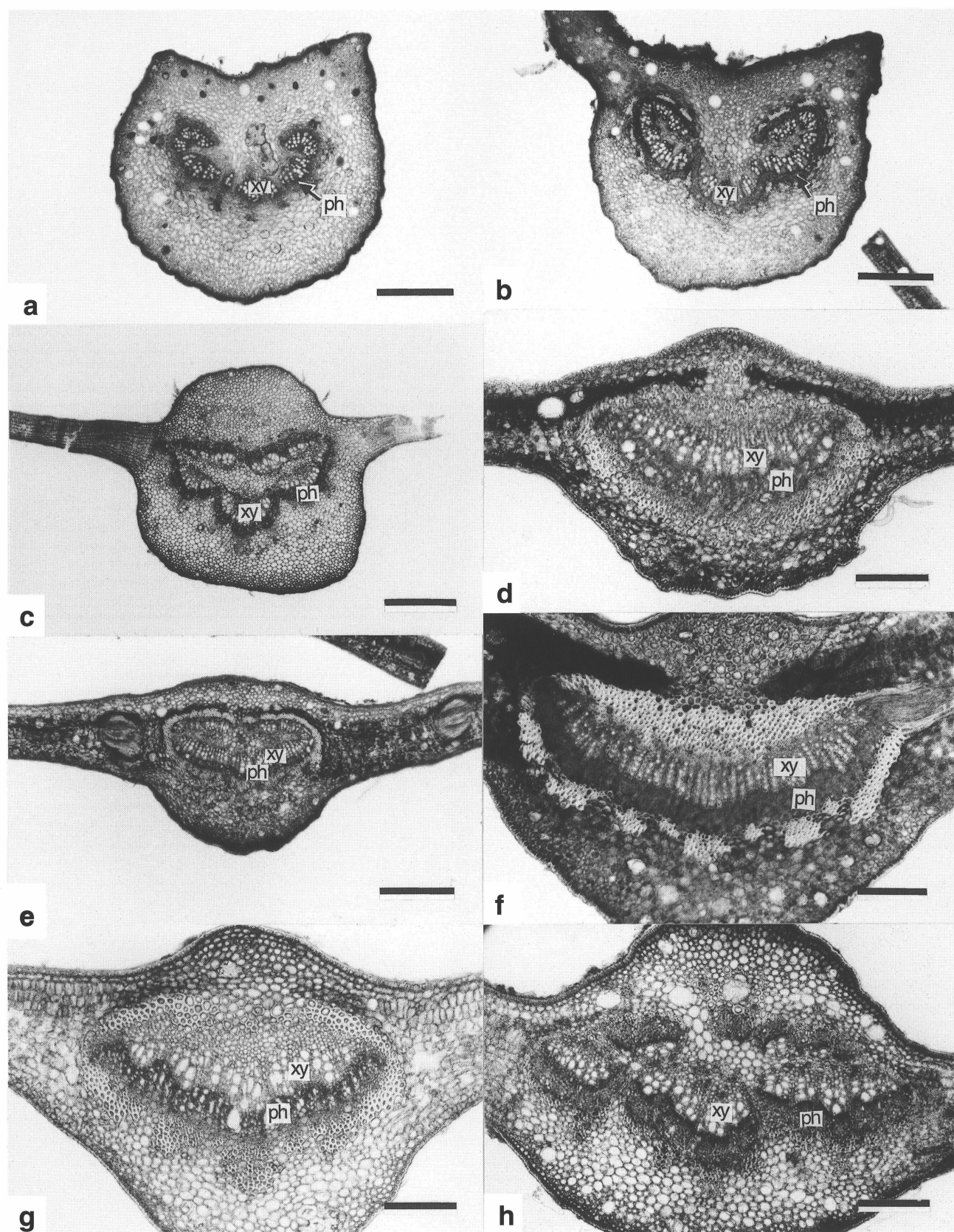


Plate 6-1. Midrib sections of neotropical *Beilschmiedia* species. a & b. Petiole section in the middle position (a) and near the blade (b) of *Beilschmiedia mexicana* (Croat 65900). -c-x. Midrib sections of neotropical *Beilschmiedia* species. c. *B. alloiophylla* (Bristan 1472). d. *B. angustil elliptica* (Núñez 1159). e. *B. angustifolia* (Lima 2177). f. *B. berteriana* (anonymous). g. *B. brenesii* (Yasuda 1314). h. *B. costaricensis* (Yasuda 1309). Scale bars equal 500 µm in c, e; 200 µm in a, b, d, f-h. Figure abbreviations, ph, phloem; xy, xylem.

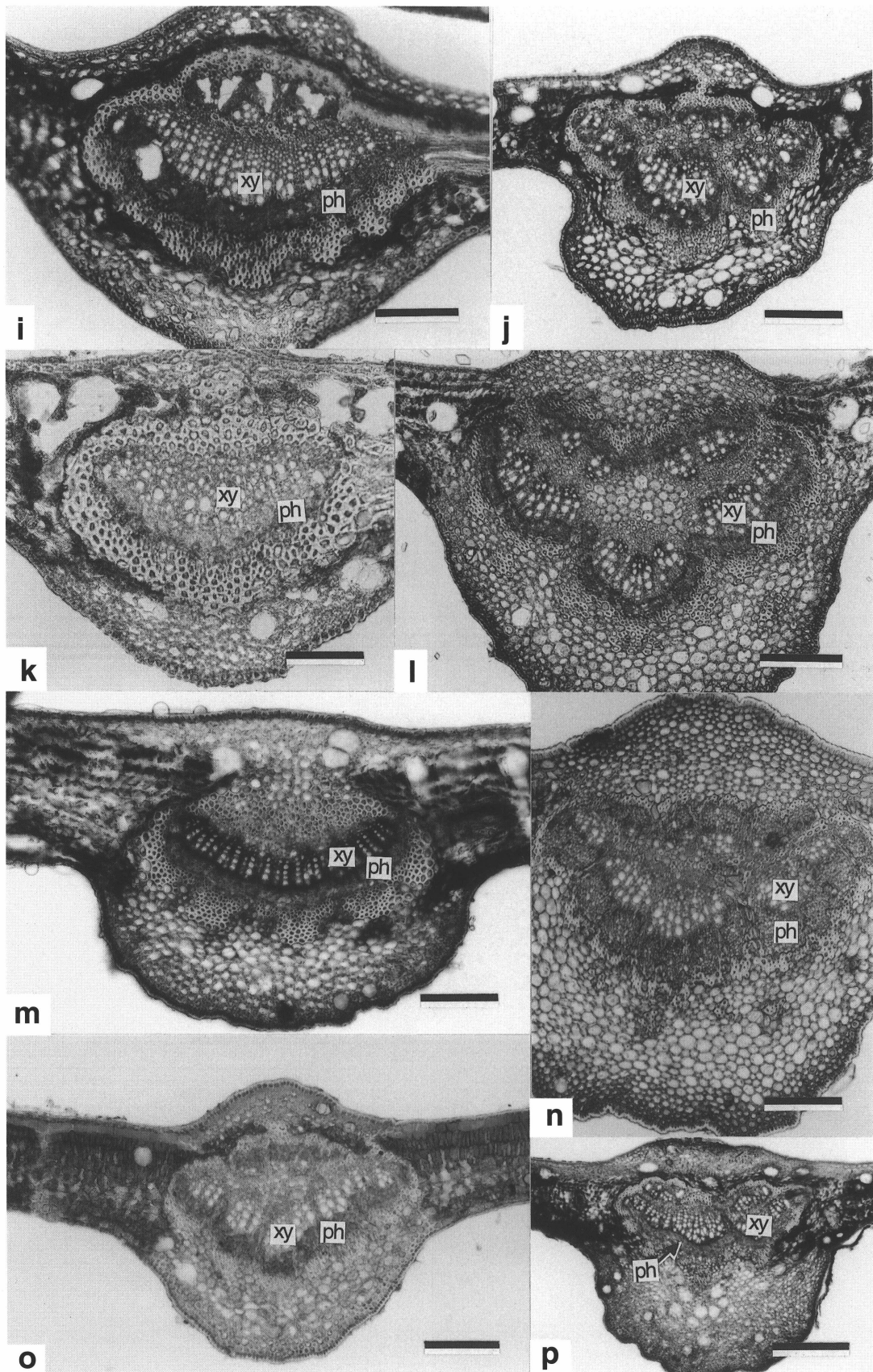


Plate 6-2. Midrib sections of neotropical *Beilschmiedia* species (continued). i. *B. curviramea* (Marcano-Berti 387). j. *B. hexanthera* (van der Werff 12951). k. *B. hondurensis* (Gentle 7292). l. *B. mexicana* (Croat 65900). m. *B. miersii* (Taylor 10883). n. *B. ovalis* (Yasuda 1301). o. *B. pendula* (Zanoni 19410). p. *B. rigida* (Martinelli 12889). Scale bars equal 500 µm in p; 200 µm in i, j, l-o; 100 µm in k. Figure abbreviations, ph, phloem; xy, xylem.

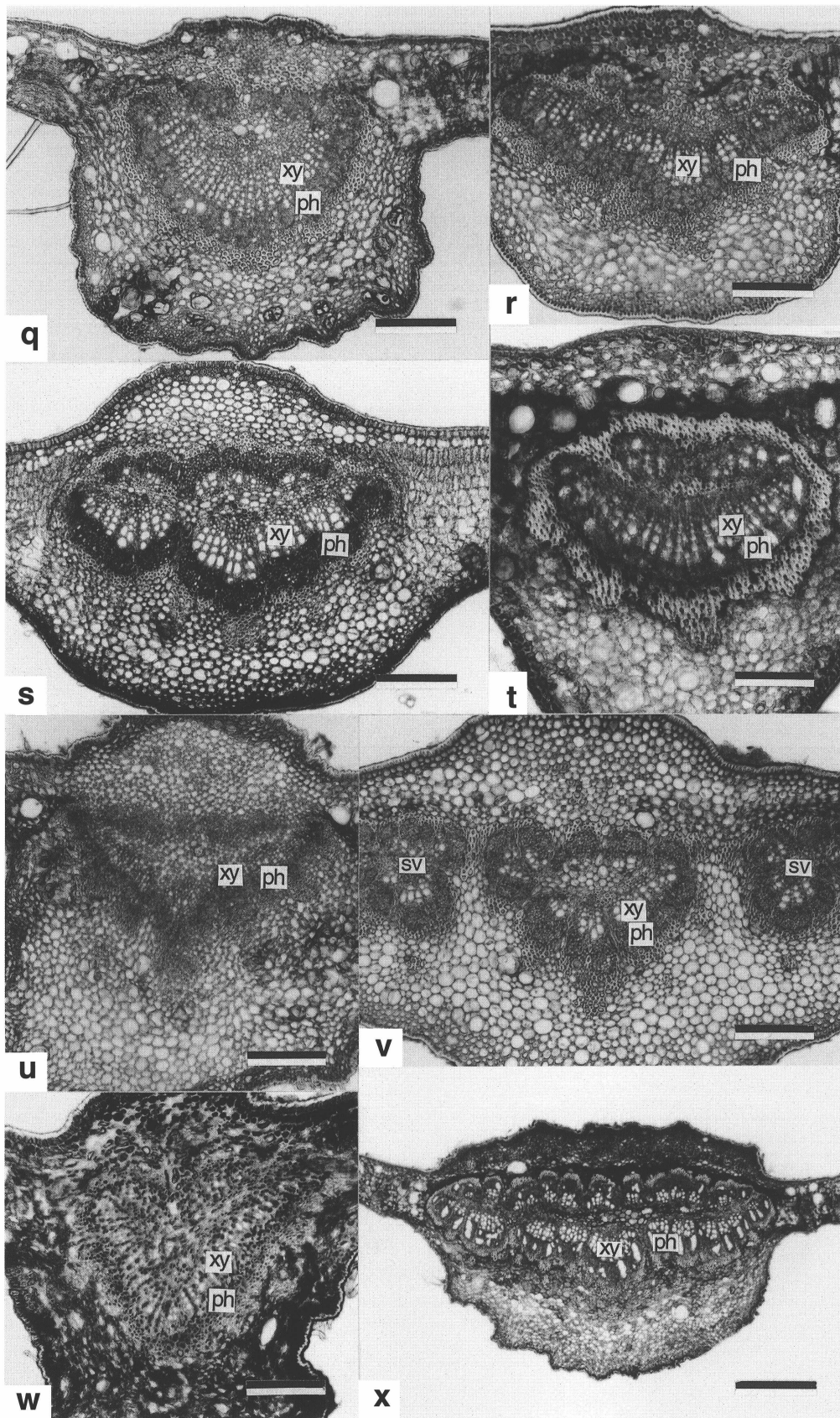


Plate 6-3. Midrib sections of neotropical *Beilschmiedia* species (continued). q. *B. riparia* (Lorea 5498). r. *B. steyermarkii* (Contreras 9448). s. *B. sp. 1* (Yasuda 1312). t. *B. sp. 2* (Folli 409). u. *B. sp. 3* (Lorence 4376). v. *B. sp. 4* (Guindon 40). w. *Hufelandia latifolia* (*Steyermarkii* 98386). x. *H. towarensis* (Devia 2290). Scale bars equal 500 µm in x; 200 µm in q-w. Figure abbreviations, ph, phloem; sv, secondary vein; xy, xylem.

Appendix 1. Exsiccatae data of samples for venation study of neotropical *Beilschmiedia* species.

Species	venation patterns	cuticle	leaf section
<i>Beilschmiedia alloiophylla</i> (Rusby) Kosterm.	Clark 850 (MO)	Clark 850 (MO), Dodson 6489 (MO)	Haber 9121 (MO), Bristan 1472 (MO), Hammel 18504, Yasuda 1308 (MO), 1316 (MO)
<i>B. anay</i> (S.F.Blake) Kosterm.	Popenoe 754 (U)	-	-
<i>B. angustiliplica</i> Lorea-Hern.	Lorea 5540 (MO)	Lozano 227 (MO), Núñez 1159 (MO)	Lorea 5540 (MO), Núñez 1159 (MO)
<i>B. angustifolia</i> Kosterm.	Constantino 19914 (RB)	Constantino 19914 (RB)	Lima 2177 (NY)
<i>B. berteriana</i> (Gay) Kosterm.	anonymous (MO)	anonymous (MO)	anonymous (MO)
<i>B. brenesii</i> C.K.Allen	Guindon 35 (MO)	Guindon 35 (MO), Bello 580 (MO)	Guindon 35 (MO), Yasuda 1314 (MO)
<i>B. costaricensis</i> (Mez & Pittier) C.K.Allen	Bello 4882 (MO)	Bello 4882 (MO), Lorea 5563 (MO), van der Werff 12168 (MO), 13368 (MO)	Benavides 8964 (MO), Yasuda 1309 (MO)
<i>B. curviramea</i> (Meisn.) Kosterm.	Tutin 114 (US)	Persaud 70 (NY)	Marcano-Berti 387 (MO)
<i>B. emarginata</i> (Meisn.) Kosterm.	-	-	-
<i>B. fluminensis</i> Kosterm.	Brade 18642 (RB)	-	-
<i>B. hexanthera</i> van der Werff	van der Werff 12951 (MO)	van der Werff 12951 (MO)	van der Werff 12951 (MO)
<i>B. hondurensis</i> Kosterm.	Gentle 7292 (MO)	Gentle 7292 (MO), Lundel 19280 (MO)	Gentle 7292 (MO), Thomas 420 (MO)
<i>B. manantlanensis</i> Cuevas & Cochrane	-	-	-
<i>B. mexicana</i> (Mez) Kosterm.	Rubio 2209 (MO)	Croat 65900 (MO), Lorea 5553 (MO)	Croat 65900 (MO), Lorea 5553 (MO)
<i>B. miersii</i> (Gay) Kosterm.	Zöllner 18999 (MO)	Taylor 10883 (MO)	Taylor 10883 (MO), West 5195 (MO)
<i>B. ovalis</i> (S.F.Blake) C.K.Allen	Sytsma 2148 (MO)	Lao 395 (MO), Sytsma 2148 (MO)	Yasuda 1300 (MO), 1301 (MO)
<i>B. pendula</i> (Sw.) Hemsl.	Gonzales 173 (NY)	Herrera 5861 (MO), Zanoni 36009 (MO)	Proctor 39101 (MO), Zanoni 19410 (MO)
<i>B. rigida</i> (Mez) Kosterm.	Glaziou 19790 (C)	Martinelli 12889 (MO)	Martinelli 12889 (MO)
<i>B. riparia</i> Miranda	Lorea 5498 (MO)	Lorea 5498 (MO), Maya 1296 (MO)	Lorea 5498 (MO), Rodriguez 374 (MO)
<i>B. styermarkii</i> C.K.Allen	Contreras 9448 (MO)	Contreras 9448 (MO)	Contreras 9448 (MO)
<i>B. stricta</i> Kosterm.	Nunes 313 (U)	-	-
<i>B. taubertiana</i> (Schwacke & Mez) Kosterm.	Araujo s.n. (U)	-	-
<i>B. sp. 1</i>	Haber 11070 (MO)	Haber 11070 (MO), Hammel 17502 (MO)	Hammel 17502 (MO), Yasuda 1312 (MO)
<i>B. sp. 2</i>	Forias 243 (MO)	Folli 409 (MO)	Folli 409 (MO)
<i>B. sp. 3</i>	Lorence 4078 (MO)	Lorence 4376 (MO), Martínez 19456 (MO)	Lorence 4376 (MO), Martínez 19456 (MO)
<i>B. sp. 4</i>	Guindon 40 (MO)	Chávez 443 (MO), Guindon 40 (MO)	Guindon 40 (MO), Yasuda 1307 (INB), 1313 (MO)
<i>Hufelandia latifolia</i> Nees	Tanner 709 (MO)	Steyermark 98386 (NY)	Steyermark 98386 (NY)
<i>H. towarensis</i> Meisn.	van der Werff 10584 (MO)	Croat 14063 (MO), Devia 2290 (MO), Díaz 3587 (MO), van der Werff 13377 (MO)	Devia 2290 (MO), van der Werff 10584 (MO)

Appendix 2. Phyllotaxis and venation patterns of neotropical *Beischmiedia* species.

species name	phyllotaxis		venation patterns			
		basic pattern	secondary veins	tertiary veins	higher-ordered veins	veinlets
<i>B. alloiophylla</i>	AL	PEN	PB	PER, strongly	FIN	N-SIM
<i>B. anay</i>	AL	PEN	PB	PER, strongly	FIN	BRA
<i>B. angustieliptica</i>	OP	PEN	PB	RET, RAN	COA	BRA
<i>B. angustifolia</i>	OP	PEN	PB to BRO	RET, RAN	COA	BRA
<i>B. berteriana</i>	OP	PEN	PB to BRO	RET, RAN	COA	BRA
<i>B. brenesii</i>	OP	PEN	PB	RET, RAN	COA	BRA
<i>B. costaricensis</i>	AL	PEN	PB	PER, weakly / RET, ORT	FIN	N-SIM
<i>B. curviramea</i>	OP	PEN	PB	RET, RAN	COA	BRA
<i>B. emarginata</i>	OP	PEN	PB	RET, RAN	COA	BRA
<i>B. fluminensis</i>	OP	PEN	PB	RET, RAN	COA	BRA
<i>B. hexanthera</i>	AL	PEN	PB	PER, weakly / RET, ORT	FIN	BRA
<i>B. hondurensis</i>	OP	PEN	PB	RET, RAN	COA	BRA
<i>B. manantlanensis</i>	OP	PEN	PB	RET, RAN	COA	BRA
<i>B. mexicana</i>	AL	PEN	PB	RET, RAN	FIN	N
<i>B. miersii</i>	OP	PEN	PB to BRO	RET, RAN	COA	BRA
<i>B. ovalis</i>	AL	PEN	PB to EU	PER, weakly, to RET, RAN	FIN	N-SIM
<i>B. pendula</i>	AL	PEN	PB	RET, RAN	FIN	BRA
<i>B. rigida</i>	OP	PEN	PB to BRO	RET, RAN	COA	BRA
<i>B. riparia</i>	AL	PEN	PB	PER, strongly	FIN	N-SIM
<i>B. steyermarkii</i>	AL	PEN	PB to EU	PER, weakly	FIN	N-SIM
<i>B. stricta</i>	OP	PEN	PB to BRO	RET, RAN	COA	BRA
<i>B. taubertiana</i>	OP	PEN	PB	RET, RAN	COA	BRA
<i>B. sp. 1</i>	AL	PEN	PB	PER, weakly / RET, ORT	FIN	N-SIM
<i>B. sp. 2</i>	OP	PEN	PB to BRO	RET, RAN	COA	BRA
<i>B. sp. 3</i>	AL	PEN	PB	PER, strongly	FIN	N
<i>B. sp. 4</i>	AL	PEN	PB	PER, strongly	FIN	N-SIM
<i>H. latifolia</i>	AL	PEN	PB	PER, strongly	FIN	N-SIM
<i>H. tovaensis</i>	AL	PEN	PB	PER, weakly	FIN	N-SIM

Abbreviations: AL= alternate, BRA= branched, BRO= brochidodromous, COA= coarse, EU= eucamptodromous, FIN= fine, N=none, OP= opposite, ORT= orthogonal, PB= pseudo-brochidodromous, PEN= penninerved, PER= percurrent, RAN= random, RET= reticulate, SIM= simple.

Appendix 3-1. Cuticular and leaf-section characters of neotropical *Beilschmiedia* species.

species name	cuticle									
	periclinal wall		anticlinal wall thickness		anticlinal wall straightness		cell size	maximum dimension (µm)		cell size
	adaxial	abaxial	adaxial	abaxial	adaxial	abaxial	uniformity	adaxial	abaxial	dorsiventral differences
<i>B. alloiophylla</i>	SM	SM	BE	IR	AN	UND	VA	ca. 25	ca. 30	AB
<i>B. anay</i>	-	-	-	-	-	-	-	-	-	-
<i>B. angustiliplica</i>	DO	DO	BUR	BUR	SI	SI	VA	ca. 40	ca. 40	AB
<i>B. angustifolia</i>	DO	GR	BRA	IR	BRA	UND	VA	ca. 40	ca. 40	AB
<i>B. berteroa</i>	SM	SM	BE	BE	AN	AN	VA	ca. 40	ca. 40	AB
<i>B. brenesii</i>	DO	DO	BUR	BUR	SI	SI	VA	ca. 40	ca. 40	AB
<i>B. costaricensis</i>	SM	SM	BE	BE	AN	AN	VA	ca. 25	ca. 25	AB
<i>B. curviramea</i>	DO	GR	BRA	BRA	BRA	UND	VA	ca. 40	ca. 40	AB
<i>B. emarginata</i>	-	-	-	-	-	-	-	-	-	-
<i>B. fluminensis</i>	-	-	-	-	-	-	-	-	-	-
<i>B. hexanthera</i>	SM	SM	BE	BE	AN	RO	VA	ca. 25	ca. 30	AB
<i>B. hondurensis</i>	DO	DO	BUR	BUR	SI	SI	VA	ca. 45	ca. 50	AB
<i>B. manantlanensis</i>	-	-	-	-	-	-	-	-	-	-
<i>B. mexicana</i>	SM	SM	BE	SM	AN	RO	VA	ca. 25	ca. 30	AB
<i>B. miersii</i>	SM	SM	BE	BE	AN	AN	VA	ca. 60	ca. 40	PR (adaxial>abaxial)
<i>B. ovalis</i>	SM	SM	SM	BE	AN	AN	VA	ca. 20	ca. 20	AB
<i>B. pendula</i>	SM	SM	BE	BE	AN	RO	VA	ca. 25	ca. 30	AB
<i>B. rigida</i>	DO	GR	BE	IR	AN	RO	VA	ca. 30	ca. 35	AB
<i>B. riparia</i>	SM	SM	SM	BE	AN	AN	VA	ca. 25	ca. 25	AB
<i>B. steyermarkii</i>	SM	SM	BE	SM	AN	AN	VA	ca. 25	ca. 30	AB
<i>B. stricta</i>	-	-	-	-	-	-	-	-	-	-
<i>B. taubertiana</i>	-	-	-	-	-	-	-	-	-	-
<i>B. sp. 1</i>	SM	SM	BE	SM	AN	AN	VA	ca. 25	ca. 30	AB
<i>B. sp. 2</i>	DO	GR	BRA	BRA	BRA	BRA	VA	ca. 40	ca. 40	AB
<i>B. sp. 3</i>	SM	SM	BE	BE	AN	AN	VA	ca. 20	ca. 30	PR (adaxial<abaxial)
<i>B. sp. 4</i>	SM	SM	SM	BE	AN	AN	VA	ca. 20	ca. 30	PR (adaxial<abaxial)
<i>H. latifolia</i>	SM	SM	SM	BE	AN	AN	VA	ca. 20	ca. 30	PR (adaxial<abaxial)
<i>H. tovarensis</i>	SM	SM	SM	IR	AN	RO	VA	ca. 20	ca. 30	PR (adaxial<abaxial)

Abbreviations: AB= absent, AN= angular, BE= beaded, BRA= branched, BUR= buttressed, DO= dotted, GR= granular, IR= irregular, PR= present, RO= rounded, SI= sinuous, SM= smooth, UND= undulate, VA= variable.

Appendix 3-2. Cuticular and leaf-section characters of neotropical *Beilschmiedia* species (continued).

species name	cuticle			leaf section			
	cell shape variation	subsidiary cells	stamatal ledges	hypodermis (-layered)	palisade tissue (-layered)	bundle-sheath extension	midrib vascular bundle arrangement
<i>B. alloiophylla</i>	AB to PR	UNE	NA	non	2-3	PR	RI
<i>B. anay</i>	-	-	-	-	-	-	-
<i>B. angustil elliptica</i>	AB	UNE	BUT	1	2	AB to PR	FL
<i>B. angustifolia</i>	PR	UNE, GR	SW	2	1	AB	RI
<i>B. berteriana</i>	AB	UNE	BO	1-2	2-3	AB	FL
<i>B. brenesii</i>	AB	UNE	BUT	non	0-2	AB	FL
<i>B. costaricensis</i>	AB	UNE	NA	1	2-3	PR	RI
<i>B. curviramea</i>	PR	UNE, GR	SW	1-2	2	AB	RI
<i>B. emarginata</i>	-	-	-	-	-	-	-
<i>B. fluminensis</i>	-	-	-	-	-	-	-
<i>B. hexanthera</i>	AB	UNE	NA	1	1-2	PR	RI
<i>B. hondurensis</i>	AB	UNE	BUT	0-1	1-2	AB	FL
<i>B. manantlanensis</i>	-	-	-	-	-	-	-
<i>B. mexicana</i>	AB	UNE	NA	0-1	2-3	PR	RI
<i>B. miersii</i>	AB	UNE	NA	1-2	3	AB	FL
<i>B. ovalis</i>	AB	UNE	NA	1	2-3	PR	RI
<i>B. pendula</i>	AB	UNE	NA	1	3	PR	RI
<i>B. rigida</i>	PR	UNE, GR	SW	3	1-2	AB	RI
<i>B. riparia</i>	AB	UNE	NA	1	2	PR	RI
<i>B. steyermarkii</i>	AB	UNE	NA	1	2	PR	RI
<i>B. stricta</i>	-	-	-	-	-	-	-
<i>B. taubertiana</i>	-	-	-	-	-	-	-
<i>B. sp. 1</i>	AB	UNE	NA	non	2-3	PR	RI
<i>B. sp. 2</i>	PR	UNE, GR	SW	1	2	AB	RI
<i>B. sp. 3</i>	AB	UNE	NA	1-2	1	PR	RI
<i>B. sp. 4</i>	AB	UNE	NA	1	2-3	PR	RI
<i>H. latifolia</i>	AB	UNE	NA	1	3	PR	RI
<i>H. tovarensis</i>	AB	UNE	NA	1	2	PR	RI

Abbreviations: AB= absent, BO= box-shape, BUT= butterfly-shape, FL= flattenend arc, GR= granular, NA= narrow, PR= present, RI= ring, SW= slightly wide, UNE= uneven.

Appendix 4. Groupings of neotropical *Beilschmiedia* species. Species with asterisk are temporally placed with thus far known characters.

Group	Phyllotaxis	Venation patterns	Cuticle type	Vascular bundle arrangement	Species name	Rough geographical distribution
<i>B. costaricensis</i> group	alternate	fine	<i>B. costaricensis</i> type	ring	<i>B. alloiophylla</i>	CA, AN
					<i>B. anay*</i>	CA
					<i>B. costaricensis</i>	CA, AN
					<i>B. hexanthera</i>	GU
					<i>B. mexicana</i>	CA
					<i>B. ovalis</i>	CA
					<i>B. pendula</i>	CA, WI, northern SA, AN
					<i>B. riparia</i>	CA
					<i>B. steyermarkii</i>	CA
					<i>B. sp. 1</i>	CA
					<i>B. sp. 3</i>	CA
					<i>B. sp. 4</i>	CA
					<i>H. latifolia</i>	AN
					<i>H. tovarensis</i>	CA, AN
<i>B. curviramea</i> group	opposite	coarse	<i>B. curviramea</i> type	ring	<i>B. angustifolia</i>	BR
					<i>B. curviramea</i>	GU
					<i>B. emarginata*</i>	BR
					<i>B. fluminensis*</i>	BR
					<i>B. rigida</i>	BR
					<i>B. stricta*</i>	BR
					<i>B. taubertiana*</i>	BR
					<i>B. sp. 2</i>	BR
<i>B. hondurensis</i> group	opposite	coarse	<i>B. hondurensis</i> type	flattened arc	<i>B. angustieliptica</i>	CA
					<i>B. brenesii</i>	CA
					<i>B. hondurensis</i>	CA
					<i>B. manantlanensis*</i>	CA
<i>B. miersii</i> group	opposite	coarse	<i>B. miersii</i> type	flattened arc	<i>B. miersii</i>	CH
<i>B. berteroaana</i> group	opposite	coarse	<i>B. berteroaana</i> type	flattened arc	<i>B. berteroaana</i>	CH

Abbreviations: AN= Andes, BR= Brazil, CA= Central America, CH= Chile, GU= Guianas, SA= South America, WI= West Indies.