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Editorial

Este fascículo da Rodriguésia dá continuidade à publicação dos tratamentos taxonômicos da flora da Reserva Ducke, aborda 11 famílias de angiospermas, totalizando 48 gêneros e 194 espécies, com a descrição de nove espécies novas de Sapotaceae.

A publicação do primeiro fascículo sobre a flora da Reserva Ducke, em junho de 2005, foi seguida de comentários de muitos colegas botânicos, ressaltando a relevância de tal iniciativa. Esse retorno é gratificante e estimulante, reforçando a determinação do Corpo Editorial em dar prosseguimento a esta série, sendo que a publicação de seu terceiro fascículo está planejada para 2007.

A editoração dos manuscritos contou com a colaboração de Cíntia Sotheres (RBG-Kew) e Mike Hopkins (UFRAM). Gostaríamos também de agradecer aos pesquisadores Alessandro Rapini (UEFS), Andrea Costa (UFRJ), Elsie F. Guimarães (JBRJ), Inês Cordeiro (Ibt-SP), Lúcia G. Lohmann (USP) Marcos Sobral (UFMG), Milton Groppo (USP-Ribeirão Preto), Regina Andreata (USU), Renato de Mello-Silva (USP) e Vinícius Castro Sousa (ESALQ-USP) pela valiosa contribuição na revisão dos artigos.

Leandro Freitas
Gestor do Corpo Editorial

Rafaela Campostrini Forzza
Editora-chefe

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Flora da Reserva Ducke, Amazonas, Brasil: Acanthaceae

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Durkee, L. H. 1986. Flora Costaricensis, Acanthaceae. Fieldiana, Bot., n.s. 18: 1-87.

Gibson, D. N. 1974. Flora of Guatemala. Acanthaceae. Fieldiana, Bot., n.s. 21: 328-461.

Graham, V. A. W. 1988. Delimitation and infra-generic classification of *Justicia* (Acanthaceae). Kew Bull. 43: 551-624.

Nees von Esenbeck, C. G. 1847. Acanthaceae. *In*: C. F. P. Martius (ed.). Fl. bras. 9: 1-164; tab. 1-31.

Profice, S. R. 1988. *Mendoncia* Vell. *ex* Vand. (Acanthaceae). Espécies ocorrentes no Brasil. Arq. J. Bot. Rio de Janeiro 29: 201-279.

Wasshausen, D. C. 1995. Acanthaceae. *In*: P. E. Berry; B. K. Holst & K. Yatskievych (eds). Flora of the Venezuelan Guyana. 2. Pteridophytes, Spermatophytes: Acanthaceae-Araceae. Timber Press, Portland, Oregon. Pp. 335-374.

Wasshausen, D. C. & Wood, J. R. I. 2000. Acanthaceae of Bolivia. Contr. U. S. Natl. Herb. 49: 1-152.

Ervas, subarbustos, arbustos, lianas ou mais raramente árvores, hermafroditas, apresentam comumente cistólitos silicificados nos parênquimas ou nas células epidérmicas, do caule e das folhas. **Folhas** opostas, simples, sem estípulas. **Flores** hermafroditas, isoladas ou em inflorescências; brácteas e bractéolas muitas vezes coloridas e vistosas; cálice persistente no fruto, sépalas (4–)5(–16), livres ou unidas somente na base ou mais extensamente, raramente cálice reduzido a um anel; corola gamopétala, zigomorfa, pentalobada, bilabiada ou mais raramente unilabiada; estames adnatos ao tubo da corola, alternos aos lobos, comumente quatro didínamos ou dois, apresentando, às vezes, estaminódios; anteras bitecas, tetrasporangiadas, deiscência geralmente longitudinal, sacos polínicos paralelos ou justapostos, algumas vezes separados por um conectivo modificado, ou uma das tecas reduzida ou ausente; disco nectarífero anular ou cupular em geral presente na base do ovário; ovário súpero, bicarpelar e bilocular, placentação axial, óvulos 2–10 por lóculo, superpostos ou algumas vezes colaterais, raramente mais numerosos e dispostos em duas fileiras em cada lóculo, freqüentemente com um funículo fortemente modificado, que se desenvolve em uma estrutura em forma de gancho ou papila; estilete simples, em geral longo com estigma freqüentemente bilobado. **Frutos** capsulares com deiscência explosiva, ou raramente drupa. **Sementes** em geral planas, glabras ou pilosas, testa lisa, rugosa ou reticulada, algumas mucilaginosas quando úmidas.

Acanthaceae *sensu lato* possui cerca de 250 gêneros e 2.500 espécies com distribuição pantropical, alcançando algumas regiões temperadas. No Brasil a família apresenta maior número de espécies na Mata Atlântica e nas formações florestais mesófilas das Regiões Sudeste e Centro-Oeste, ocorrendo também em outras formações vegetais.

Na Reserva Ducke está representada por cinco gêneros e sete espécies.

Chave para os gêneros de Acanthaceae na Reserva Ducke

1. Planta volúvel ou arbusto com ramos escandentes; corolas não bilabiadas.
   2. Planta volúvel, flores pedunculadas com um par de brácteas recobrindo o cálice, que tem forma de anel, e parte da corola tubulosa vermelha ou branca com manchas vermelhas ... . 3. *Mendoncia*
   2. Arbusto com ramos escandentes, flores sésseis em uma espiga terminal muito curta, sem brácteas, corola infundibuliforme totalmente branca ..... 5. *Ruellia*

[1] Instituto de Botânica de São Paulo, C.P. 4005, CEP 01061-970, São Paulo, SP, Brasil.

1. Ervas a subarbustos eretos ou com ramos decumbentes na base, corolas bilabiadas
   3. Estames férteis 4 ..... 2. *Lepidagathis*
   3. Estames férteis 2.
      4. Flores sésseis, estaminódios ausentes, tecas das anteras inseridas em alturas diferentes no conectivo, divergentes ..... 1. *Justicia*
      4. Flores pediceladas, estaminódios 2, tecas das anteras inseridas na mesma altura no conectivo, paralelas ..... 4. *Pulchranthus*

1. *Justicia*

Justicia Linnaeus, Sp. Pl. 1: 15. 1753.

Ervas, subarbustos a arbustos eretos ou escandentes. Cistólitos presentes. **Inflorescências** terminais ou axilares, determinadas ou indeterminadas, simples ou compostas. **Flores** em geral com uma bráctea e duas bractéolas; cálice com 4–5 sépalas unidas somente na base, em geral estreitas e subiguais; corola bilabiada, com tubo quase sempre estreito e alongado, fauce mais ou menos diferenciada, lábio superior em geral estreito, bífido ou levemente bilobado, lábio inferior mais largo, mais ou menos alargado ou recurvado, leve ou profundamente trilobado; estames 2, filetes em geral inseridos próximos ou acima do meio do tubo; anteras 2-tecas, tecas em geral oblongas ou lineares, algumas vezes curvadas ou reniformes, superpostas ou quase paralelas ao conectivo, uma ou ambas as tecas calcaradas na base ou não, estaminódio ausente; disco nectarífero anular, cupular ou ciatiforme inteiro ou sinuadamente lobado; óvulos 2 por lóculo; estilete filiforme, estigma em geral ligeiramente bilobado. **Cápsula** com 4 sementes ou raramente, 2–3 por aborto, parte inferior diferenciada numa porção estéril ou haste, valvas inteiras durante a deiscência ou raramente o septo desloca-se para cima; **sementes** esféricas ou discóides, testa lisa ou ornamentada, alveolada, rugulosa, tuberculada, pubescente, híspida ou equinada.

Justicia em um senso mais amplo (Graham 1988) apresenta cerca de 600 espécies e distribuição pantropical. Na Reserva Ducke foram encontradas duas espécies.

Chave para as espécies de *Justicia* na Reserva Ducke

1. Flores dispostas em panículas formadas por espigas secundifloras ..... 1. *J. pectoralis*
1. Flores decussadas em espiga terminal ..... 2. *Justicia* sp.

1.1 *Justicia pectoralis* Jacq. Enum. syst. pl.: 11. 1760.; Durkee, Fieldiana, Bot., n.s. 18: 57.1986; Wasshausen *in*: P.E. Berry, B. K. Holst & K. Yatskievych (eds). Flora of the Venezuelan Guayana 2: 354. 1995.

Erva ramificada, ereta ou decumbente até ca. 1,5 m alt. Ramos hexagonais a cilíndricos, com duas faixas longitudinais de tricomas, glabrescentes. **Folhas** sésseis ou com pecíolo até 1 mm, lanceoladas, 3,5–6 × 0,4–0,6 cm, ápice agudo a atenuado, base atenuada, margem crenada a inteira, ciliadas, pubescentes nas nervuras. **Panícula** secundiflora, eixos da inflorescência hirsutos com tricomas tectores simples e glandulares. **Flores** sésseis, brácteas e bractéolas subuladas, 0,5–1 mm compr.; sépalas 5, linear-lanceoladas ca. 3 mm compr., glandular-pubescentes; corola branca com manchas róseas a lilases, 7–9 mm compr., tubo 3–5 mm compr., lábio superior ca. 3 mm compr., unilobado, ápice arredondado, lábio inferior 4–5 mm compr., trilobado, palato com venação peninérvia evidente, lobos ca. 1 mm compr., lobos laterais ca. 1,5 mm larg., lobo central ca. 2 mm larg., ápice arredondado a obtuso; estames levemente exsertos, tecas das anteras inseridas em alturas diferentes no conectivo, divergentes, sem apêndices, a inferior menor.

Justicia pectoralis é uma espécie amplamente distribuída em regiões úmidas e quentes da América tropical, especialmen-te em áreas perturbadas. Para este trabalho foi examinado um único espécime coletado em uma área alterada.
5.X.1995 (fl) *Costa, M. A. S. & Assunção, P. A. C. L. 378* (INPA K MG NY RB SPF).

O material examinado encontra-se bastante depauperado, especialmente as inflorescências, por isso a descrição da corola foi baseada em fotografias da planta, materiais provenientes de outras regiões e na literatura (Gibson 1974, Durkee 1985).

1.2 *Justicia* sp.

Erva semi-prostrada, não ramificada, ca. 8 cm alt. Caule subquadrangular a cilíndrico. **Folhas** com pecíolo 0,5–0,7 cm compr., oblongas a elípticas, 4–7 × 1–2,4 cm, ápice agudo, base aguda a obtusa, margem inteira a subcrenada, esparsamente pubescente, mais densamente nas nervuras da face abaxial. **Espiga** terminal com flores decussadas; brácteas ovais, ca. 5 × 5 mm, verdes esparsamente hirsutas, ciliadas, ápice acuminado, base atenuada; bractéolas elípticas a lanceoladas, ca. 9 × 1 mm, atenuadas na base, ápice longamente acuminado, indumento como das brácteas; sépalas 4, lineares, iguais entre si, ca. 2 mm compr., longamente ciliadas; corola lilás, ca. 1,3 cm compr., tubo ca. 6 mm compr., fauce ca. 4 mm compr., lábios ca. 0,3 mm compr., o superior unilobado, ápice arredondado, o inferior trilobado, lobos arredondados no ápice, hirsutos externamente, especialmente nas nervuras; anteras inseridas em alturas diferentes no conectivo, a inferior obliquamente, sem apêndices.

Foram encontrados outros dois materiais desta mesma espécie no herbário US, coletados entre o final de julho e início de agosto, provenientes da região de Manaus. Na Reserva Ducke foi encontrado um único espécime na floresta de baixio.
19.VII.1997 (fl) *Forzza, R. C. 298* (INPA).

Não foi possível identificar esta espécie, talvez se trate de um táxon não descrito.

2. *Lepidagathis*

Lepidagathis Willd. Sp. Pl. 3: 400. 1800.

Ervas, subarbustos ou arbustos, decumbentes, eretos ou semi-escandentes. **Espigas** decussadas ou secundifloras ou tirsos, terminais ou axilares. **Flores** subtendidas por uma bráctea e um par de bractéolas, espigas secundifloras com 4 séries de brácteas: duas fileiras adjacentes de brácteas estéreis e duas de brácteas férteis. Sépalas 5, desiguais, unidas na base, coloridas ou não, comumente mucronadas a cuspidadas, sendo uma sépala ventral maior e alargada, 2 dorsais mais ou menos unidas, muitas vezes dimidiatas, 2 sépalas laterais estreitas e menores e, às vezes, mais internas; corola com tubo cilíndrico, reto ou levemente recurvado, fauce mais ou menos distinta, limbo bilabiado, o lábio superior levemente bilobado a inteiro, o inferior trilobado; estames 4, didínamos, inseridos na região mediana do tubo da corola em pares (um ventral + um dorsal), os ventrais com anteras bitecas, tecas paralelas inseridas na mesma altura ou levemente divergentes inseridas em alturas diferentes, sem apêndices, os dorsais com anteras iguais às dos ventrais ou monotecas ou reduzidas (estaminódios); disco nectarífero cupular ou anular; estilete com estigma bilobado subclavado a capitado; óvulos 2 por lóculo. **Cápsula** elipsoidal, oblonga ou ovalada, aguda ou curtamente rostrada, cilíndrica ou comprimida paralelamente ao septo, paredes relativamente finas a membranáceas e septo rígido espessado; **sementes** 4 ou menos por aborto, lenticulares, achatadas, com tricomas higroscópicos.

Lepidagathis é um gênero pantropical com cerca de 100 espécies. No Brasil ocorrem cerca de 16 espécies a maioria nas regiões Centro Oeste e Sudeste. Na Reserva Ducke foi encontrada somente uma espécie.

2.1 ***Lepidagathis alopecuroides*** (Vahl) R. Br. *ex* Griseb., Fl. Brit. W. I.: 453. 1862. Wasshausen *in*: P. E. Berry, B. K. Holst & K. Yatskievych (eds.). Flora of the Venezuelan Guyana 2: 358. 1995.

Ruellia allopecuroidea Vahl, Eclog. Amer. 2: 49. 1798.

Telyostachya alopecuroidea (Vahl) Nees, *in* Mart., Fl. bras. 9: 72. 1847.

Erva a subarbusto semidecumbente. Ramos subquadrangulares a cilíndricos, pubescentes, glabrescentes. **Folhas** com pecíolo 2-6 mm compr., ovais a elípticas 3,5–6 × 1,4–2,3 cm, ápice agudo, base atenuada, margem subcrenada. **Tirsos** terminais e axilares; bractéolas 2 por flor, oblongas, linear-oblanceoladas a lineares, as das primeiras flores sempre maiores 6–8 × 0,5–1 mm, ápice acuminado, ciliada; sépalas acuminadas, pubescentes, ciliadas, a ventral oblanceolada, 8–9 × 4 mm, trinervadas; as ventrais unidas na base, estreita-mente oblanceoladas, assimétricas, 6–7 × 1–1,5 mm, as laterais linear-lanceoladas, ca. 1 × 0,2 mm; corola branca com manchas púrpuras, 5–6 mm compr., tubo ca. 4 mm, lábio superior ca. 2 mm compr., bilobado, lábio inferior ca. 3 mm compr., trilo-bado, lobos ca. 2 mm compr., ápice arredondado, lobo central mais largo, glabra externamente, internamente com um anel de tricomas na fauce; todas anteras bitecas, tecas inseridas em alturas diferentes no conectivo. **Cápsula** oblonga, curtamente rostrada, pubescente; **sementes** 4.

Espécie comum em áreas perturbadas e úmidas, ocorrendo desde o Sul do México até o norte da América do Sul e Antilhas. Na área da Reserva Ducke foi coletada na borda de uma capoeira.

4.V.1995 (fl) *Costa, M. A. S. & Silva, C. F. 254* (INPA K MG MO NY RB SPF U UB); 6.IV.1998 (fl) *Costa, M. A. S. et al. 831* (INPA K SPF).

Lepidagathis alopecuroides caracteriza-se pelas inflorescências bastante congestas e com muitas flores brancas com manchas púrpuras, pequenas e bilabiadas, quase totalmente envolvidas pelo cálice bastante conspícuo, com sépalas acuminadas.

3. ***Mendoncia***

Mendoncia Vell. Fl. Lusit. Bras. Spec. 43 f. 22. 1788.

Plantas volúveis. **Folhas** opostas, pecioladas, margem inteira, cistólitos ausentes. **Flores** solitárias ou fasciculadas, axilares, pediceladas; bractéolas 2, evidentes, recobrindo o cálice e parte da corola, persistente no fruto. Cálice persistente, reduzido a um anel a cupuliforme; corola infundibuliforme ou tubulosa, lobos elíptico a orbiculares, iguais entre si ou quase, externamente glabras, internamente com uma faixa de tricomas glandulares na região mediana, prefloração contorta; estames 4, didínamos, inclusos, anteras bitecas, deiscência poricida, tricomas glandulares no dorso, tricomas simples na base, estaminódio 1; ovário unilocular por aborto de um carpelo, óvulos 2, estilete com 2 ramos. **Fruto** tipo drupa.

Mendoncia possui cerca de 60 espécies ocorrendo na América Tropical e África, incluindo Madagascar (Wasshausen & Wood 2000). No Brasil ocorrem cerca de 14 espécies, a maioria na região amazônica (Profice 1988). Na reserva Ducke foram encontradas duas espécies.

Chave para as espécies de *Mendoncia* na Reserva Ducke

1. Folhas viloso-tomentosas na face abaxial e pubescentes na face adaxial, cartáceas; brácteas tomentosas; corola vermelha ..... 1. *M. hoffmannseggiana*
1. Folhas pubérulo-glabrescentes em ambas as faces, coriáceas; brácteas glabras; corola branca com manchas avermelhadas ..... 2. *M. pedunculata*

3.1 ***Mendoncia hoffmannseggiana*** Nees *in*: Mart., Fl. bras. 9: 9. 1847. Profice, Arq. J. Bot. Rio de Janeiro 29: 228. 1988.

Trepadeira, ramos quadrangulares a cilíndricos, tomentosos-glabrescentes. **Folhas** com pecíolo 1,6–2,2 cm compr., elípticas a oblongas, raramente obovais, 7,5–13,5 × 3,8–8,0 cm, ápice agudo a acuminado e apiculado ou emarginado-mútico, base aguda a atenuada, margem inteira a subcrenada, cartácea,.; face

abaxial viloso-tomentosa, células da base do tricoma 4, dispostas radialmente, quase totalmente unidas, face adaxial pubescente, células da base do tricoma 4–5 dispostas radialmente, bem evidentes. **Flores** solitárias ou aos pares nas axilas das folhas, pedúnculos 2,6–4 cm compr., tomentosos, brácteas oblongo-lanceoladas, 3,4–3,7 × 0,9-1,1 cm, ápice acuminado, tomentosas, verdes; cálice levemente lobado, ca. 1 mm alt.; corola vermelha, fauce esbranquiçada internamente, tubo 4–4,5 cm, fauce pouco diferenciada, lobos ca. 3 × 5 mm, oblongos com ápice retusos a arredondados. **Drupa** negra 0,7 × 1,8–2 cm.

Segundo Profice (1988) *Mendoncia hofmannseggiana* ocorre na Guiana, Suriname, Venezuela e no Brasil no Amazonas, Pará, Maranhão, Roraima e Amapá, em florestas de terra firme e capoeiras. Na Reserva Ducke ocorre em florestas de terra firme, de baixio, em capoeiras e em áreas alteradas. 28.II.1996 (fr) *Campos, M. T. V. A. et al. 528* (INPA K MBM MG MO NY RB SPF U); 12.I.1996 (fl) *Costa, M. A. S. & Silva, C. F. 682* (INPA K MG MO NY RB SPF); 12.I.1996 (fl) *Costa, M. A. S. & Silva, C. F. 683* (INPA K MG MO NY SP SPF); 25.I.1996 (fl) *Costa, M. A. S. et al. 746* (G INPA K MG SPF); 8.II.1995 (fl) *Hopkins, M. J. G. et al. 1530* (INPA K MG MO NY RB SP SPF); 9.VIII.1995 (fl) *Sothers, C. A. et al. 554* (INPA K SPF); 26.XI.1996 (fl) *Sothers, C. A. 940* (INPA); 10.II.1995 (fl) *Vicentini, A. et al. 875* (INPA K MG R SPF U); 19.IX.1995 (fr) *Vicentini, A. & Silva, C. F. 1034* (G INPA K MG SP SPF US).

Esta espécie pode ser reconhecida pela presença de indumento viloso a tomentoso em quase toda a planta e pelas flores tubulosas vermelhas.

3.2 *Mendoncia pedunculata* Leonard, J. Wash. Acad. Sci. 21: 150. 1931. Profice, Arq. J. Bot. Rio de Janeiro 29: 230. 1988.

Trepadeira lenhosa. Ramos cilíndricos a subcilíndricos, glabrescentes. **Folhas** com pecíolo 2–3,5 cm compr., elípticas a oblongo-elípticas, 9–11 × 4,5–6 cm, ápice acuminado, ácumen 0,5–1,5 cm compr., base atenuada, margem inteira a ondulada, pubérulo-glabrescente em ambas as faces, coriácea. **Flores** 1–4 por axila; pedúnculo ca. 3 cm compr.; bráctea oblonga, 2,5 × 1,5 mm, ápice curtamente mucronado, base obtusa, glabra; cálice ca. 2,5 mm compr.; corola branca com manchas avermelhadas, 4,5–6 cm compr., lobos orbiculares. **Drupa** 1,5–1,8 cm compr., ca. 1 cm larg.

Mendoncia pedunculata ocorre na amazônia equatoriana, peruana, colombiana e no Brasil nos estados do Acre, Amazonas e Roraima. Na Reserva Ducke foi coletado um único material no Igarapé do Tinga. 27.IV.1994 (fr) *Ribeiro, J. E. L. S. et al. 1275* (INPA K MG MO NY RB SPF).

O único material examinado proveniente da Reserva Ducke apresenta apenas um fruto parcialmente destruído. A descrição das flores foi baseada na literatura (Profice 1988) e em materiais provenientes de outras regiões.

4. *Pulchranthus*

Pulchranthus V. M. Baum, Reveal & Nowicke, Syst. Bot. 8: 212. 1983.

Ervas a subarbustos, cistólitos presentes. **Flores** em espigas ou racemos terminais ou panículas terminais bastante ramificadas com tricomas glandulares; cálice com 5 sépalas iguais; corola fortemente bilabiada, tubo curto largo e recurvado, 2 lobos superiores, 3 lobos inferiores; estames 2, exsertos, estaminódios 2. **Cápsulas** clavadas, sementes 4.

Pulchranthus possui atualmente quatro espécies distribuindo-se pelo norte da América do Sul. É um gênero próximo a *Odontonema* do qual foi desmembrado por Baum *et al.* (1983) e distingue-se deste e de *Pseuderanthemum*, outro gênero próximo, por apresentar a corola fortemente bilabiada, os estames longamente exsertos e filetes curvos além da raque com tricomas glandulares. Na Reserva Ducke foi encontrada apenas uma espécie, *P. congestus*.

4.1 *Pulchranthus congestus* (Lindau) V. M. Baum, Reveal & Nowicke, Syst. Bot. 8: 219. 1983.

Odontonema congestum Lindau, Notzbl. Königl. Bot. Gart. Berlin 6: 197.1914.

Erva ereta não ramificada, 15–35 cm alt. Caule subquadrangular a cilíndrico, pubescente-glabrescente, esfoliante. **Folhas**

com pecíolo 0,3–2 cm compr., oblongas, elípticas a obovais, 5,5–9 × 2,3–3,7 cm, ápice acuminado, base aguda a atenuada, margem subcrenada a crenada, pubescente em ambas as faces. **Racemo** terminal; pedúnculo, raque, brácteas, bractéolas, pedicelos e sépalas hirsutos, tricomas tectores simples e glandulares; pedúnculo 0,4–4 cm compr., raque 5–8 cm compr., primeiro par de brácteas estéril; bráctea estreitamente triangular a linear, 2–4 mm compr.; bractéolas 2, ca. 1 mm compr., linear, geralmente com uma gema presente na sua axila; pedicelo 3–5 mm; sépalas lineares, 5 mm compr.; corola branca a rosa claro com manchas rosa-escuro nos lobos e fauce, ca. 8 mm compr., tubo ca. 4 mm, fauce 4 mm compr., lobos superiores 6 × 3 mm, ápice arredondado; lobos inferiores 5 × 2 mm, ápice arredondado, pubescente externamente, glabro internamente; filetes ca. 1 cm, anteras brancas. **Cápsula** ca. 1,5 cm.

Segundo Baum *et al.* (1983) *Pulchranthus congestus* é uma espécie rara com coletas conhecidas da região da Manaus e do Rio Trombetas no Pará. Na Reserva Ducke esta espécie foi encontrada em bordas de floresta de baixio e margem de igarapé.
16.III.1995 (fl) *Costa, M. A. S. et al. 158* (INPA SPF); 21.VII.1995 (fl) *Costa, M. A. S. 328* (INPA K SPF US); 3.VII.1997 (fl) *Costa, M. A. S. et al. 573* (IAN INPA K MBM MO NY SP SPF U UB); 4.VII.1997 (fl) *Martins, L. H. P. et al. 22* (IAN INPA K SPF); 2.VI.1993 (fl) *Ribeiro, J. E. L. S. et al. 784* (G INPA K MG SPF); 8.VIII.1995 (fl) *Souza, M. A. D. et al. 66* (SPF); 13.V.1994 (fl) *Vicentini, A. et al. 552* (INPA).

5. *Ruellia*

Ruellia L. Sp. Pl. 2: 634. 1753.

Ervas perenes a arbustos eretos ou decumbentes; cistólitos presentes. **Flores** solitárias ou em vários tipos de inflorescências; cálice com 5 sépalas unidas somente na base, iguais ou subiguais geralmente estreitas; corola tubular, infundibuliforme a hipocrateriforme, tubo reto ou recurvado, fauce mais ou menos evidente, lobos 5, reflexos a eretos, contortos, iguais ou os dois lobos posteriores mais ou menos unidos na base formando um lábio inferior; estames 4 didínamos, inseridos abaixo da fauce, anteras bitecas, oblongo-sagitadas, tecas paralelas, iguais, sem apêndices; disco geralmente inconspícuo; óvulos 2–10 por lóculo; estigma bífido. **Cápsula** obovada, clavada, oblongo-linear ou elipsoidal, subséssil a estipitada, cilíndrica a mais ou menos compressa. **Sementes** obliquamente ovais a orbiculadas, mucilaginosas quando molhadas; ejaculador em forma de gancho.

Ruellia é um gênero pantropical com cerca de 400 espécies. Na Reserva Ducke só foi encontrada uma espécie, *R. sprucei*.

5.1 *Ruellia sprucei* Lindau, Bull. Herb. Boissier 5: 653. 1897. Wasshausen *in* P. E. Berry, B. K. Holst & K. Yatskievych (eds.). Flora of the Venezuelan Guayana 2: 368. 1995.

Subarbusto com ramos escandentes que atingem até 5 m alt. Ramos quadrangulares a cilíndricos, pubescente-glabrescentes. **Folhas** com pecíolo 1-1,4 cm compr. elípticas, oblongas a oblanceoladas, 7,5-10 × 3-4 cm, ápice acuminado, base aguda, margem subcrenada, pubérula-glabrescente, principalmente na face abaxial. **Flores** em espigas curtas terminais; bractéolas aparentemente ausentes; sépalas quase iguais entre si, linear-lanceoladas, ca. 1,9 mm compr., ápice agudo, pubescente externamente; corola branca, tubo 3,5-4 cm compr., fauce 3,4–4 cm compr., 2 lobos superiores unidos, ápice arredondado a obcordado ca. 2 × 2 cm; estames insertos.

Esta espécie é conhecida da Venezuela (Amazonas) e no estado do Amazonas no Brasil. Para este trabalho foram examinados também materiais provenientes da região do Rio Uaupés e Manaus. Na Reserva Ducke foi coletada próximo ao Igarapé do Acará, em floresta de baixio.
24.VII.1996 (fl) *Assunção, P. A. C. L. et al. 360* (SPF); 9.VIII.1995 (fl) *Sothers, C. A. et al. 552* (INPA K MG NY SPF); 24.VI.1998 (fr) *Souza, M. A. D. et al. 705* (INPA SPF).

Ruellia sprucei é facilmente reconhecida pelas flores grandes e brancas.

Flora da Reserva Ducke, Amazonas, Brasil: Caryocaraceae

Ghillean T. Prance[1] & † *Marlene F. da Silva*[2]

Wittmark, L. 1886. Rhizolobeae. *In*: Martius, Fl. bras. 12(1): 338-362.
Prance, G. T. & M. F. da Silva. 1973. Caryocaraceae. Fl. Neotrop. 12: 1-75.

Árvores, raramente **arbustos** ou **sub-arbustos**. Estípulas 2–4, geralmente caducas, ou ausentes. **Folhas** pecioladas, trifolioladas, opostas ou alternas; folíolos com venação peninérvia, as margens geralmente serreadas, denteadas, ou crenadas, raramente inteiras, freqüentementre com estipelas na base dos folíolos. **Flores** em racemos terminais, grandes, bissexuais, actinomorfas. Receptáculo campanulada ou cupuliforme; sépalas 5(–6), imbricadas, livres, inseridas no ápice do hipanto, prontamente decíduo. Estames 55–750, os filetes soldados na base formando um anel, decíduo com as pétalas após a antese; os estames externos compridos e delgados, com anteras basifixas, 2-loculares, de deiscência longitudinal; os internos sem anteras (estaminódios), geralmente mais breve e recurvado; filetes verrucosos. Ovário súpero, multilocular com um óvulo por lóculo, os óvulos basais, eretos, anátropos ou átropos; estiletes distintos, compridos e delgados; estigmas terminais, pequenos. **Fruto** drupa indeiscente, mesocarpo carnoso, endocarpo duro, lenhoso, muricado, verrucoso, ou espinhoso externamente; sementes reniformes, com ou sem endosperma, a célula fecundada com uma radícula reta, arqueada, ou espirala, um hipocotilo carnoso, e dois cotiledones pequenos.

Restrita à América tropical, a família estende-se da Costa Rica até a Região Sudeste do Brasil, e tem dois gêneros e 25 espécies. O gênero *Anthodiscus* (9 spp.) possui uma espécie apresentada na Amazônia ocidental (*A. amazonicus*).

1. *Caryocar*

Gênero de 16 espécies que ocorrem da Costa Rica ao Paraguai e estado do Paraná, Brasil, com maio diversidade na Amazônia. Três espécies ocorrem na Reserva Ducke. Além destas, *Caryocar microcarpum* Ducke ocorre próximo de Manaus, e pode ser diferenciada por apresentar *ca.* de 60 estames e uma drupa globosa de 2,0–3,5 × 2,5–3,0 cm.

Chave para as espécies de *Caryocar* da Reserva Ducke

1. Superfície abaxial do folíolo com venação reticulada e proeminente, vilosa; pedicelos com 2 bractéolas ..... 3. *C. villosum*
1. Superfície abaxial do folíolo com venação plana ou promínula, glabra; pedicelos sem bractéolas
   2. Margem dos folíolos serreada; pétalas e filetes branco-amareladas ..... 2. *C. pallidum*
   2. Margem dos folíolos inteira ou levemente crenulado-serreada; pétalas amareladas com tonalidade rósea; filetes roxos a avermelhados ..... 1. *C. glabrum*

1.1 *Caryocar glabrum* (Aubl.) Pers., Syn. Pl. 2: 84. 1806.

Árvore até 40 m de altura. Tronco com sapopemas arredondadas até 50 cm de altura, algumas prolongando-se formando raízes superficiais, lenhosas. Casca 1,2–1,5 cm de espessura, castanho-avermelhada, externamente escamosa sem estrias; parte interna da casca castanha ligeiramente avermelhada, uniforme. Madeira branca. Ramos jovens glabros ou escassamente puberulentos. Estípulas cerca de 8 mm de comprimento, oval-lanceoladas; estipelas pequenas, caducas ou persistentes. **Folhas** opostas; pecíolos 3–10 cm compr. Folíolo terminal 7,5–15 × 3,5–7 cm, folíolos laterais iguais ou um pouco menores; lâminas

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elíticas, oblongo-elíticas, ou ovadas, ligeiramente assimétricas, ápice acuminado, acume 5–10 mm compr., base subcuneada a arredondada e desigual, margem inteira a ligeiramente crenada ou serreada, glabras na face adaxial, glabras ou com poucos pêlos na nervura principal na face abaxial; nervuras secundárias 8–10 pares, planas na face adaxial, promínulas na face abaxial. **Inflorescência** com pedúnculo de 2–8,5 cm de compr., glabro ou escassamente pubérulo, lenticelado; pedicelos 1–2,6 cm compr., sem bractéolas. Receptáculo 7–12 mm compr., campanulado, glabrescente na face externa; sépalas arredondadas, margens ciliadas; pétalas 1,7–2,5 cm compr., ligeiramente desiguais, amareladas, freqüentemente com tonalidade rósea; estames ca. 280, os externos de 3–6 cm compr., ligeiramente desiguais, amarelados, freqüentemente com tonalidade rósea, estaminódios 1–1,5 cm compr.; filetes roxos a avermelhados. Ovário globoso, glabro, 4-locular; estiletes 4, 4–5 cm compr. **Drupa** globosa a elipsóide, 5–6 × 5–8 cm, 1–2 locular; epicarpo glabro, crustáceo, mesocarpo carnoso, endocarpo com espinhos de 3 cm compr. Germinação criptocotilar.

"Piquiarana".

Das três subespécies conhecidas, duas ocorrem na Reserva Ducke.

Chave para as subespécies de *Caryocar glabrum*

1. Estipelas caducas; receptáculo 8–12 mm compr.; estames 5–6 cm compr. ..... *C. glabrum* subsp. *glabrum*
1. Estipelas persistentes; receptáculo 7 mm compr., estames 3–4,5 cm compr. ..... *C. glabrum* subsp. *parvifolium*

1.1a *Caryocar glabrum* subsp. ***glabrum***

Freqüente na mata de terra firme, solo argiloso; floresce em outubro e novembro.

Ocorre em toda a Amazônia e nas Guianas.

3.X.1967 (fl) *Coêlho, D. s/n INPA20766* (INPA); 24.X.1995 (fl) *Sothers, C. A. & Pereira, E. C. 640* (INPA K MG MO NY R RB SP U); 24.I.1995 (fr) *Vicentini, A. et al. 805* (INPA K MG MO NY R RB SP U).

1.1b *Caryocar glabrum* subsp. ***parvifolium*** (A.C. Sm.) Prance & Silva, Fl. Neotrop. 12: 43. 1973.

Freqüente na mata de terra firme, solo argiloso; floresce em outubro-novembro e frutifica em abril.

Amazônia brasileira, central.

10.XI.1994 (fl) *Assunção, P. A. C. L. 78* (IAN INPA K R U); 28.X.1994 (fl) *Hopkins, M. J. G. & Nascimento, J. R. 1504* (BM G INPA K MBM MG UB US); 7.IX.1969 (fl) *Monteiro, O.P. 11* (INPA); 7.VII.1993 (fl) *Ribeiro, J. E. L. S. et al. 1053* (INPA K MG MO NY RB SP); 4.IV.1968 (fr) *Silva, M. F. et al. s/n INPA21130* (INPA); 7.XII.1995 (fl) *Sothers, C.A. et al. 701* (COL IAN INPA K UEC VEN).

1.2 *Caryocar pallidum* A.C. Sm., J. Arnold Arbor. 20: 297. 1939.

Árvore até 40 m de altura. Tronco sem sapopemas, com raízes superficiais lenhosas saindo da base. Casca com cerca de 1,5 cm de espessura, externamente castanho-escura com fendas longitudinais de ca. 1 cm de profundidade; internamente castanho escuro com riscos brancos. Madeira castanho-clara, avermelhada. Ramos jovens glabrescentes. Estípulas 17–22 mm compr., lanceoladas, estipelas 5–10 mm compr., persistentes, recurvadas, glabras, membranosas. **Folhas** opostas; pecíolos 2–12 cm compr., cilíndricos; pecíolos breves, o terminal 7–10 mm de compr.; folíolo terminal 8–17 ×3–8 cm, os folíolos laterais iguais ou um pouco menores; folíolos elíticas, ligeiramente assimétricas, ápice acuminado, acume 5–12 mm compr., base cuneada ou subcuneada, desigual, margens serreadas, glabras em ambas as faces; nervuras secundárias 11–13 pares, planas na face adaxial, promínulas na face abaxial. **Inflorescência** com pedúnculo de 7,5–13 cm compr., glabro, lenticelado, cilíndrico; racemos

de 17–25 flores, raque 2,5–4 cm compr., glabra, pedicelos 1,6–3,5 cm compr., sem bractéolas; receptáculo 7–11 mm compr., campanulado, externamente glabro; sépalas arredondadas, margens ciliadas; pétalas 1,5 cm compr., branco-amareladas; estames cerca de 360, os externos 2–3 cm compr.; estaminódios 1–1,5 cm compr.; filetes branco-amarelados; ovário globoso, glabro, 4-locular. **Drupa** globosa a ovóide, epicarpo glabro, crustáceo, mesocarpo carnoso, endocarpo com espinhos até 7 mm compr.

"Piquiarana".

Freqüente na mata de terra firme, solo argiloso; floresce em outubro-dezembro e frutifica em janeiro a março.

Amazônia central e região oeste e sul da Venezuela.

15.XII.1995 (bt) *Assunção, P. A. C. L. & Pereira, E. C. 268* (INPA K MG MO NY R RB SP U); 5.II.1976 (fr) *Mello, F. et al. s/n INPA54755* (INPA); 7.XI.1969 (fl) *Monteiro, O. P. 10* (INPA); 11.XII.1969 (fl) *Monteiro, O. P. 18* (INPA); 4.X.1968 (fl) *Rodrigues, W. & Coêlho, L. 8580* (INPA); 11.IV.1972 (fr) *Schultes, R. E. & Rodrigues, W. 26152* (INPA); 5.XII.1969 (fr) *Silva, M. F. et al. 11* (INPA); 5.XII.1969 (fl) *Silva, M. F. et al. 14* (INPA); 13.XI.1996 *(fl) Sothers, C. A. et al. 929* (INPA K MG MO NY RB SP).

1.3 *Caryocar villosum* (Aubl.) Pers., Syn. Pl. 2: 84. 1806.

Árvore até 40 m de altura e 2,5 m de diam. Tronco sem sapopemas e sem raízes superficiais. Casca com cerca de 1 cm de espessura, castanho-acinzentada externamente, com fendas longitudinais com ca. 0,5 cm de profundidade; parte interna da casca castanho-escura, com listras brancas nas árvores jovens. Madeira castanho-amarelada, clara. Ramos jovens viloso-tomentosos a pubérulos. Estípulas ausentes. **Folhas** opostas; pecíolos 4–15 cm compr., viloso-tomentosos ou pubérulos, cilíndricos, levemente estriados, sem lenticelas; peciólulos breves, o terminal 3–6 mm compr.; folíolo terminal 8–22 cm compr., 6–12 cm larg., folíolos laterais menores; folíolos elípticos, ápice acuminado, acume 3–10 mm compr., base arredondada a cordada, margens serreadas ou crenadas, face adaxial vilosa a glabra, face abaxial densamente vilosa ou escassamente pubérula nas nervuras; nervuras secundárias 12–19 pares, planas ou imersas na face adaxial, proeminentes na face abaxial; nervuras menores também proeminentes na face abaxial. **Inflorescência** com pedúnculo 5–13 cm compr., tomentelos ou pubérulos, lenticelados; racemos com cerca de 25 flores; raque 3–4 cm compr., tomentosa quando joven; pedicelos 1,8–3,5 cm compr., com 2 bractéolas sub-persistentes de 1 cm compr.; receptáculo cerca de 15 mm compr., campanulado-cupuliforme, pubérulo ou glabro externamente; sépalas arredondadas; pétalas 2,5 cm compr., lanceoladas ou elíticas, amarelo-claras; estames ca. 300, os externos 6,5–7 cm compr., estaminódios 1–1,5 cm compr., concrescido na base; filetes amarelados; ovário globoso, glabro, 4-locular; estiletes 4. **Drupa** ovóide ou globosa, 6–7 × 7–8, 1–2 locular, epicarpo glabro, lenticelado, carnoso, livre do mesocarpo, mesocarpo e endocarpo unidos formando um caroço, endocarpo com muitos espinhos de 3 mm de compr. penetrando no mesocarpo; semente reniforme, 5 mm compr. Germinação criptocotilar.

Freqüente na mata de terra firme, solo argiloso e também nas capoeiras em regeneração; floresce em julho-agosto, frutifica de dezembro a março. O fruto cozido é comestível.

Ocorre na região leste e central da Amazônia e nas Guianas.

19.VII.1967 (fl) *Monteiro, O. P. s/n INPA20594* (INPA); 5.VII.1994 (fl) *Nascimento, J. R. et al. 523* (INPA K MG NY SP); 30.III.1966 (fr) *Rodrigues, W. 7631* (INPA); 4.VII.1974 (fl) *Rodrigues, W. & Coêlho, D. 9438* (INPA); 23.II.1996 (fr) *Sothers, C. A. et al. 802* (INPA K MG NY); 5.III.1996 (fr) *Sothers, C. A. & Assunção, P. A. C. L. 809* (INPA K MG MO RB SP U); 27.VIII.1968 (fl) *Souza, J. A. 116* (INPA).

Flora da Reserva Ducke, Amazonas, Brasil: Cyclanthaceae[1]

Fabiana Pinto Gomes & Renato de Mello-Silva[2]

Cyclanthaceae Poit. *ex* A. Rich. *In*: Bory de Saint-Vincent, Dict. class. hist. nat. 5: 222. 1824.

Beck, H. T. 2004. Cyclanthaceae. *In*: N. Smith, S. A. Mori, A. Henderson, D. W. Stevenson, & S. V. Heald (eds). Flowering plants of the neotropics. Princeton University Press. Princeton. Pp. 431-432.

Cremers, G. & Hoff, M. 1994. Inventaire taxonomique des plantes de la Guyane Française. Les monocotyledones (Orchidacees, Cyperacees et Poacees exclues). Muséum National d'Histoire Naturelle. Paris. v.4.

Croat, T. B. 1978. Cyclanthaceae. *In*: T. B. Croat (ed.). Flora of Barro Colorado Island. Stanford University Press. Stanford. Pp. 178-184.

Drude, O. 1881. Cyclanthaceae. *In*: C. F. P. Martius & A. W. Eichler (eds.). Fl. bras. Frid. Fleischer. Lipzig. 3(2): 226-250.

Harling, G. W. 1958. Monograph of the Cyclanthaceae. Acta Horti Bergiani 18(1): 1-428.

Harling, G. W., Wilder, G. J. & Eriksson, R. 1998. Cyclanthaceae. *In*: K. Kubitzki, The families and genera of vascular plants. Springer-Verlag. Berlin. v.3. Pp. 202-215.

Kunth, C. S. 1841. Enumeratio plantarum. J. G. Collae. Stuttgart. v.3.

Lindman, C.A. M. 1900. Einige neue brasilianishe Cyclanthaceen. Bihang til Kongliga Svenska Vetenskaps-Akademiens Handlingar 26(3,8): 9.

Neumann, J. H. F. 1847. Note sur quelques plantes nouvelles ou peu connes, actuellement en fleurs dans les serves du muséum. Revue horticole 3 (1): 86.

Poiteau, M. A. 1822. Établissement d'une nouvelle famille de plantes sous le nom de Cyclantheae, les Cyclanthées. Mémoires du Muséum d'Histoire Naturelle 9: 34-36.

Sprengel, K. P. J. 1826. Systema vegetabilium. Librariae Dieterichianae. Göttingen. v.3.

Tuberquia, D. 1994. Cuatro especies nuevas de Cyclanthaceae de Colombia. Caldasia 19(1-2):179-189.

Ervas rizomatosas, hemiepífitas secundárias com raízes aéreas e grampiformes abundantes, ou terrestres, raro epífitas (*Ludovia*). Folhas espiraladas ou dísticas, pecioladas, bainha conspícua, limbo plicado, bífido, raro palmado (*Carludovica*), segmentos glabros, lanceolados, raro linear-lanceolados ou ovado-lanceolados, podendo dividir-se no ápice; venação paralela. Inflorescências axilares ou terminais, espádices cilíndricos, raro esféricos, envoltos por 2–11 espatas lanceoladas a cimbiformes, esverdeadas, esbranquiçadas, alaranjadas ou vermelhas. Flores muito reduzidas, diclinas, cada flor pistilada envolvida por quatro estaminadas ou flores estaminadas e pistiladas coalescentes, dispostas em anéis alternados (*Cyclanthus bipartitus*). Flores estaminadas com numerosas tépalas esbranquiçadas a hialinas, concrescidas ou não, dispostas de modo simétrico ou assimétrico em 1(–2 em *Evodianthus funifer*) séries, reduzidas, raro ausentes; estames 10–50(–150), filetes de base bulbiforme, concrescidos em anel estaminal (*Cyclanthus bipartitus*); anteras basifixas, bitecas, tetrasporangiadas, deiscência longitudinal; pólen monossulcado ou anaporado. Flores pistiladas tricíclicas, tetrâmeras, tépalas distintas, raro reduzidas (*Ludovia*), livres ou concrescidas na base; estaminódios filiformes muito longos, epitépalos; ovário ínfero, raro súpero (*Sphaeradenia* e *Strelestylis*) ou flores pistiladas unidas formando anéis ligados a cavidades ovarianas únicas (*Cyclanthus bipartitus*); placentação parietal ou apical, estilete curto ou estigmas sésseis; óvulos numerosos, anátropos, endosperma helobial. Infrutescência verde-escura, amarelada ou alaranjada, bagas livres ou fundidas ao espádice, raro coalescentes. Sementes pequenas, numerosas, complanadas ou cilíndricas, elípticas, ovaladas ou falciformes;

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embrião pequeno a médio, cilíndrico, linear, raro recurvado.

Cyclanthaceae tem 12 gêneros e de 180 (Beck 2004) a 230 (Harling *et al.* 1998) espécies. Esta variação reflete as incertezas na delimitação de muitas delas. Ocorrem no sul do México, América Central, Antilhas, região Amazônica e, disjuntamente, no Ceará, Bahia e do Rio de Janeiro a Santa Catarina (Harling *et al.* 1998). O centro de diversidade é a Amazônia colombiana. Compõe-se de duas subfamílias. A subfamília Cyclanthoideae é monotípica e abriga a primeira espécie descrita da família, *Cyclanthus bipartitus*. A subfamília Carludovicoideae inclui todas as espécies e gêneros restantes. *Asplundia*, o maior, engloba ca. 85 espécies; *Carludovica*, três espécies; *Chorigyne*, oito; *Dianthoveus*, uma (*Dianthoveus cremnophilus* Hammel & Wilder); *Dicranopygium*, 45; *Evodianthus*, uma (*Evodianthus funifer*); *Ludovia*, três; *Schultesiophytum*, uma (*Schultesiophytum chorianthum* Harling); *Sphaeradenia*, 38; *Stelestylis*, quatro; e *Thoracocarpus*, uma espécie (*Thoracocarpus bissectus*). Na Reserva Ducke a família conta com cinco gêneros e sete espécies.

Chave para gêneros de Cyclanthaceae na Reserva Ducke

1. Terrestres; limbo foliar plano; nervuras principais 1–2 por segmento, muito conspícuas; flores coalescentes, distribuídas em verticilos estaminados e pistilados alternos ..... 2. *Cyclanthus*
1. Hemiepífitas, epífitas ou terrestres e, então, folhas flabeliformes; limbo foliar plicado; nervuras principais 1–3, inconspícuas; flores livres, cada flor pistilada circundada por quatro estaminadas.
   2. Epífitas; folhas inteiras; nervura principal 1, muito conspícua; sementes globosas, castanhas ..... 4. *Ludovia*
   2. Hemiepífitas; folhas bífidas; nervuras 1–3, visíveis apenas na base; sementes elípticas, alaranjadas a castanhas.
      3. Caule 10–30 m compr., densamente anelado; espatas 8, de tamanho crescente da proximal externa para a distal interna; sementes com testa levemente reticulada, verrucosa .... 5. *Thoracocarpus*
      3. Caule 1–2 m compr., liso; espatas 2–5, do mesmo tamanho, sementes com testa reticulada, não verrucosa.
         4. Espatas 4, congestas no ápice do pedúnculo; receptáculo das flores estaminadas afunilado; flores pistiladas livres; sementes com testa impresso-reticulada, foveolada ..... 3. *Evodianthus*
         4. Espatas 3–5, dispostas ao longo da metade distal do pedúnculo; receptáculo das flores estaminadas aplanado; flores pistiladas conatas; sementes com testa reticulada ..... 1. *Asplundia*

1. *Asplundia*

Asplundia Harling, Acta Horti Berg. 17(3): 41. 1954.

Hemiepífitas secundárias, raro terrestres; caules bem desenvolvidos ou muito curtos nas espécies terrestres. Folhas espiraladas; pecíolo canaliculado ou aplanado; limbo sempre bífido, plicado, nervuras 1–3, conspícuas na base da folha; segmentos foliares lanceolados a ovados, agudos, raro acuminados. Inflorescência axilar; pedúnculo ca. 1/3 do comprimento do pecíolo, secção transversal circular na parte proximal e levemente elíptica na parte distal; espatas 3–5, lanceoladas a ovadas, raro cimbiformes, nunca congestas, dispostas ao longo da metade distal do pedúnculo; espádice elíptico, raro esférico. Flores estaminadas com perianto simétrico ou assimétrico; lobos esbranquiçados, translúcidos, oblongos a obovados, obtusos a truncados, portando glândulas; receptáculo aplanado, pedicelo excêntrico nas flores de perianto assimétrico; estames poucos a numerosos, adnatos na base do bulbo basal; anteras iguais entre si, sem

glândulas; tecas hemielípticas; conectivo filiforme, inconspícuo; pólen monossulcado. Flores pistiladas conatas; tépalas bem desenvolvidas adnatas na base; estiletes 4, muito curtos, livres; estigmas com formas variáveis. Sementes aplanadas, ovadas a elípticas, pequenas, castanhas a alaranjadas.

Asplundia é o maior gênero da família, com ca. 85 espécies, de ampla distribuição no neotrópico. No gênero há dois tipos de flores masculinas e, baseado nisto, Harling (1958) distribui as espécies em dois subgêneros. O subgênero *Asplundia* apresenta folhas sub ou distintamente tricostadas, raramente unicostadas, flores masculinas com receptáculo aplanado, pedicelo excêntrico, perianto unilateral e pólen monossulcado. O subgênero *Choanopsis* apresenta folhas exclusivamente unicostadas, flores masculinas com receptáculo levemente afunilado, pedicelo central, perianto simetricamente disposto e pólen monossulcoidado ou ulcerado. Das três espécies de *Asplundia* encontradas na Reserva, duas pertencem ao subgênero *Asplundia*. A terceira, ainda indeterminada, não pôde ser classificada em nenhum dos dois subgêneros por falta de flores masculinas.

Chave para as espécies de *Asplundia*

1. Folhas 130–160 cm compr.; segmentos foliares 10–20 cm larg.; nervuras secundárias ca. 20; bainha alaranjada com epiderme soltando-se por fricção ..... 1.3. *Asplundia* sp.
1. Folhas 30–110 cm compr.; segmentos foliares com até 10 cm larg.; nervuras secundárias 4–8; bainha amarelada com epiderme fixa.
   2. Folhas 30–50 cm compr.; segmentos foliares oblanceolados, 5–10 cm larg.; bainha amarelada de coloração uniforme; estigmas ovado-triangulares ..... 1.1. *A. vaupesiana*
   2. Folhas 70–110 cm compr.; segmentos foliares linear-lanceolados, ca. 3-4 cm larg.; bainha amarelada, variegada com pontos marrons, estigmas lanceolados ..... 1.2. *A. xiphophylla*

1.1 *Asplundia vaupesiana* Harling, Acta Horti Berg. 18(1): 202. 1958. **Fig. 1 f-j**

Herbácea, hemiepífita secundária; 50-150 cm compr.; raízes aéreas avermelhadas; raízes grampiformes castanhas; caule ca. 1 m compr., 0,5–1 cm diâm. Folhas 5–10, verde-claras, pendentes; bainha amarelada 0,5–1 cm larg., margem desintegrando-se em fibras; pecíolo 10–20(–26) cm compr., aplanado a canaliculado; lâmina 20–30(–35) cm compr., bífidas até 2/3 do compr., unicostadas, segmentos 4,5–7(–9) cm larg., obovados, ápice acuminado, base atenuada, nervuras secundárias 4–6 por segmento, proeminentes na face adaxial, as marginais proeminentes na face abaxial; profilos 1–4, membranáceos, palhete, *in sicco* brilhantes. Inflorescência axilar, 1 por folha; pedúnculo 3–5 cm compr.; espatas, 3–5 cm compr., ca. 1 cm larg., cimbiformes, distribuídas em intervalos regulares na porção distal do pedúnculo, decíduas, margem convoluta, ápice acuminado; espádice cilíndrico a elipsóide, 2,5–3 cm compr., ca. 1 cm diâm. Flores estaminadas, ca. 1,5 mm compr., receptáculo achatado, perianto assimétrico; lobos 15–20, ovado-obtusos, esbranquiçados; estames 25–40, adnatos pela base do bulbo; bulbo basal inconspícuo; anteras iguais entre si, basifixas, tecas hemielípticas, conectivo filiforme, inconspícuo. Flores pistiladas 2–3 mm diâm., tépalas inteiras, conatas na base, ca. 1 mm compr., ca. 2 mm larg., truncadas; estaminódios esbranquiçados, ca. 4 cm compr.; estigmas castanhos, sésseis, ovado-elípticos, aplanados, ca. 1 mm compr. Infrutescência verde-escuro passando a verde mais claro quando madura; pedúnculo, 4–8 cm compr.; espádice 3–4 cm compr., ca. 1,5(–2) cm diâm. Sementes castanho-alaranjadas, ovadas, ca. 1 mm compr.; testa reticulada.

Igarapé Barro Branco, 26.IV.1994 (fl) *Hopkins, M. J. G. et al. 1410* (INPA); id., 15.I.1998 (fr) *Gomes, F. P. et al. 4* (INPA); entrada do Igarapé do Tinga, 4.I.1998 (fr) *Martins, L. H. P. et al. 81* (INPA).

Material complementar: AMAZONAS: São Gabriel da Cachoeira, aldeia dos índios Cana, 15.X.1987(fl) *Maas, P. J. M. et al. 6761* (INPA).

Asplundia vaupesiana é a única Cyclanthaceae de pequeno porte na Reserva. Além disso, as folhas verde-claras, de segmentos obovados com ápice lanceolado, a tornam inconfundível, mesmo estéril. São característicos também os estigmas largos e achatados, e a infrutescência congesta, cilíndrico-ovada. Ocorre sempre a cerca de 6 m de altura. Harling (1958) afirma que *A. vaupesiana* seria comum nas matas de baixio da Amazônia ocidental. Isto pôde ser parcialmente confirmado, já que a espécie ocorre na Amazônia Central e na região de São Gabriel da Cachoeira, apesar de representada por poucas coletas. Embora pareça ser rara, é bem distribuída na Amazônia ocidental.

1.2 *Asplundia xiphophylla* Harling, Acta Horti Berg. 18(1): 199. 1958. **Fig. 1 a-d**

Herbácea, hemiepífita secundária, 70–150 cm compr.; raízes aéreas avermelhadas, raízes grampiformes muito delgadas, castanhas; caule ca. 1 m compr., ca. 1,5 cm diâm. Folhas 5–10 por ramo, verde-escuras, eretas; bainha ca. 2 cm larg., verde-amarelada, variegada com pontos marrons, *in sicco* ocre, lustrosa; pecíolo 23–30(–50) cm compr., sulcado no ápice, passando a côncavo em direção à base; lâmina 49–56(–85) cm compr., sub-tricostada, bífidas quase até a base; segmentos 3,5–5cm larg., lineares, ápice acuminado, base atenuada; nervuras secundárias (4–)5–8 por segmento, proeminentes na face adaxial, as marginais pouco conspícuas; profilo 1, membranáceo, ocre, desintegrando-se em fibras, às vezes formando uma massa de fragmentos e fibras na bainha das folhas. Inflorescência axilar, 1 por folha; pedúnculo 5–8 cm compr.; espatas 3–4, (3–)5–10 cm compr., ca. 1,5 cm larg., cimbiformes, bicarenadas, margem convoluta, ápice acuminado, a inferior situada na metade do pedúnculo e as superiores congestas no ápice, ou todas concentradas na metade do pedúnculo, decíduas; espádice largamente cilíndrico, 1–2,5 cm compr., 0,5–1 cm diâm. Flores estaminadas ca. 2 mm compr.; receptáculo achatado; perianto assimétrico, lobos lineares, esbranquiçados, ápice agudo; estames 20–35. Flores pistiladas ca. 5 mm diâm., tépalas inteiras, conatas na base, ca. 5 mm compr., ca. 3 mm larg., truncadas; estaminódios não vistos; estigmas castanhos, sésseis, ca. 2 mm compr., aplanados, ultrapassando as tépalas. Infrutescência verde-escura, pedúnculo, 5–15 cm compr.; espádice 3–5 cm compr., 0,7–2 cm diâm. Sementes alaranjadas, estreito-elípticas, ca. 1–2 mm compr., testa reticulada.

Baixio, 14.II.1995 (fr) *Sothers, C. A. & Pereira, E. C. 331* (INPA); Igarapé Água Branca, 14.IX.1995 (fr) *Costa, M. A. S. & Assunção, P. A. C. L. 358* (INPA); Igarapé Barro Branco, 15.I.1998 (fr) *Gomes, F. P. et al. 1* (INPA SPF); id., próximo ao buritizal, 5.IV.1998 (fr) *Gomes, F. P. 32* (INPA); id., id., 5.IV.1998 (st) *Gomes, F. P. 33* (INPA); Igarapé do Tinga, 5.II.1998 (fr) *Gomes, F. P. & Silva, C. F. 26* (INPA); Igarapé da Bolívia, 6.VII.1993 (fr) *Ribeiro, J. E. L. S. et al. 902* (INPA SPF).

A "folha em forma de espada", como diz o epíteto, é o caráter mais marcante de *A. xiphophylla*. Além dos segmentos foliares longos e afilados, a base do pecíolo variegada e os estigmas estreitos e aplanados, pouco maiores que os carpelos, facilitam sua identificação. É próxima de *A. longicrura* (Drude) Harling por apresentarem folhas semelhantes (Harling 1958). Desta última há apenas o material-tipo do Alto Xingu (*Spruce s.n.*) e há dúvida de que sejam espécies distintas. *Asplundia xiphophylla* apresenta-se bem distribuída nas regiões Central e Ocidental da Amazônia brasileira. Ocorre entre 2 a 7 m do solo.

1.3 *Asplundia* sp. **Fig. 1 e**

Herbácea, hemiepífita secundária, 2-3 m compr.; raízes aéreas castanho-avermelhadas; raízes grampiformes castanhas; caule ca. 1 m compr., 3,5–5 cm diâm. Folhas ca. 10–15, verde-claras, pendentes; bainha convoluta, alaranjada; epiderme castanho-esverdeada, descamando por fricção, ca. 5 cm larg.; pecíolo ca. 55 cm compr., canaliculado na base das folhas a

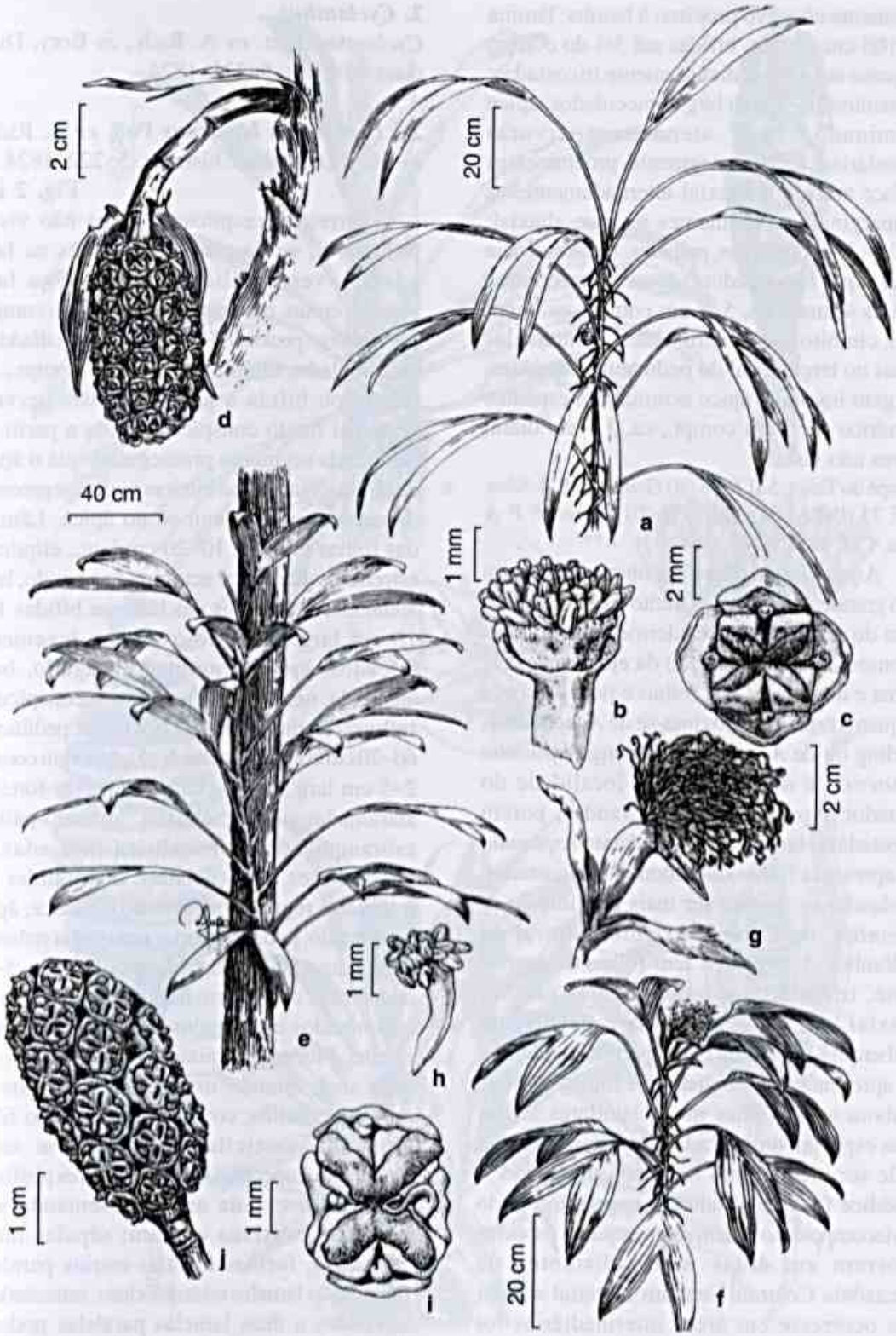

Figura 1 - a-d. *Asplundia xiphophylla* - a. hábito; b. flor estaminada, vista lateral; c. flor pistilada, vista frontal; d. infrutescência; e. *Asplundia* sp. - e. hábito; f-j. *Asplundia vaupesiana* - f. hábito; g. inflorescência; h. flor estaminada, vista lateral; i. flor pistilada, vista frontal; j. infrutescência. (a-d. *Gomes 32*; e. *Gomes 25*; f-j. *Maas 6761*).

fortemente côncavo próximo à bainha; lâmina 75–105 cm compr., bífidas até 3/4 do compr. ou quase até a base, distintamente tricostadas; segmentos 10–20 cm larg., lanceolados, ápice acuminado, base atenuada, nervuras secundárias ca. 20 por segmento, proeminentes na face adaxial e abaxial alternadamente, as submarginais proeminentes na face abaxial; profilos 3–5, coriáceos, palhetes. Inflorescência axilar, 1 por folha, pedúnculo ca. 10 cm compr.; espatas 4, marrons, 5–8 cm compr., ca. 2 cm larg., cimbiformes, distribuídas em intervalos iguais no terço distal do pedúnculo, decíduas, margem involuta, ápice acuminado; espádice cilíndrico ca. 5 cm compr., ca. 1,5 cm diâm. Flores não vistas.

Igarapé do Tinga, 5.II.1998 (st) *Gomes, F. P. & Silva, C. F. 25* (INPA); id., 5.II.1998 (fl) *Gomes, F. P. & Silva, C. F. 28* (INPA).

Asplundia sp. difere das outras da Reserva pelo grande porte e folhas muito largas e longas, além do pecíolo com periderme em formação e conseqüente descamação da epiderme. Pela forma e dimensões das folhas e pela presença de quatro espatas, aproxima-se de *A. nonoensis* Harling ou de *A. gigantea* Tuberq. *Asplundia nonoensis* é de apenas uma localidade do Equador. Apresenta folhas grandes, porém bicostadas (Harling 1958), enquanto *Asplundia* sp. apresenta folhas distintamente tricostadas. *Asplundia* sp. parece ser mais próxima de *A. gigantea*, de Cabo Corrientes, litoral da Colômbia. *A. gigantea* tem folhas de grande porte, tricostadas e pulverulentas na face abaxial, a base é atenuada e decurrente (Tuberquia 1994). Em contrapartida, *Asplundia* sp. apresenta pecíolo distinto e folhas glabras. Embora tenha folhas muito similares às das duas espécies supracitadas, *Asplundia* sp. não pôde ser incluída em nenhuma delas pois o espádice foi encontrado em avançado estado de decomposição. Além disso, aquelas espécies ocorrem em áreas muito distantes da Amazônia Central. Nenhum material similar que ocorresse em áreas intermediárias foi encontrado nas coleções. Análise da inflorescência completa é necessária para o estabelecimento da identidade deste material.

2. *Cyclanthus*

Cyclanthus Poit. *ex* A. Rich., *in* Bory, Dict. class. hist. nat. 5: 221. 1824.

2.1 *Cyclanthus bipartitus* Poit. *ex* A. Rich., *in* Bory, Dict. class. hist. nat. 5: 222. 1824.

Fig. 2 e-g

Terrestre, cespitosa, rizoma não visto; folhas 4-8, verde-claras, brilhantes na face adaxial, verde-pálidas a glaucas na face abaxial, eretas, dísticas; bainha 1–3 cm compr., 3–5 cm larg.; pecíolo 80–110 cm compr., cilíndrico, canaliculado; lâmina 60–120 cm compr., ou inteira ou bífida a partir da base, nervura principal muito conspícua, bífida a partir da base, cada segmento prosseguindo até o ápice da lâmina. Nas folhas inteiras os dois segmentos da nervura podem unir-se no ápice. Lâmina das folhas inteiras, 10–20 cm larg., elíptica a estreito-ovada, ápice acuminado a agudo, base atenuada; segmentos das lâminas bífidas 10–15 cm larg., estreito-ovados a levemente falcados, ápice acuminado a agudo, base atenuada, nervuras secundárias inconspícuas. Inflorescência terminal, 1 por ramo, pedúnculo 60–70 cm compr.; espatas 4(–5), 5–15 cm compr., 2–5 cm larg., verde-claras a amarelo-forte ou alaranjadas na face abaxial, amarelo-pálido, esbranquiçado ou rosado na face adaxial, cimbiformes a lanceoladas, distribuídas em intervalos regulares abaixo do espádice, ápice acuminado, podendo portar uma folha reduzida na espata externa; espádice cilíndrico, 5–10 cm compr., ca. 2–3 cm diâm., 8–10(–15) anéis estaminados e pistilados dispostos alternadamente. Flores estaminadas coalescentes em cada anel; estames usualmente dispostos em quatro verticilos, conatos pela base do filete em cada verticilo; anteras com tecas alongadas, conectivo filiforme. Flores pistiladas coalescentes; cada anel apresentando uma cavidade ovariana comum; sépalas muito reduzidas, formando duas estrias paralelas fundidas às lamelas estaminodiais; estaminódios reduzidos a duas lamelas paralelas podendo portar anteras estéreis; lamelas estaminodiais involutas na fase estaminada e revolutas na fase pistilada. Anel estigmático delimitado por duas

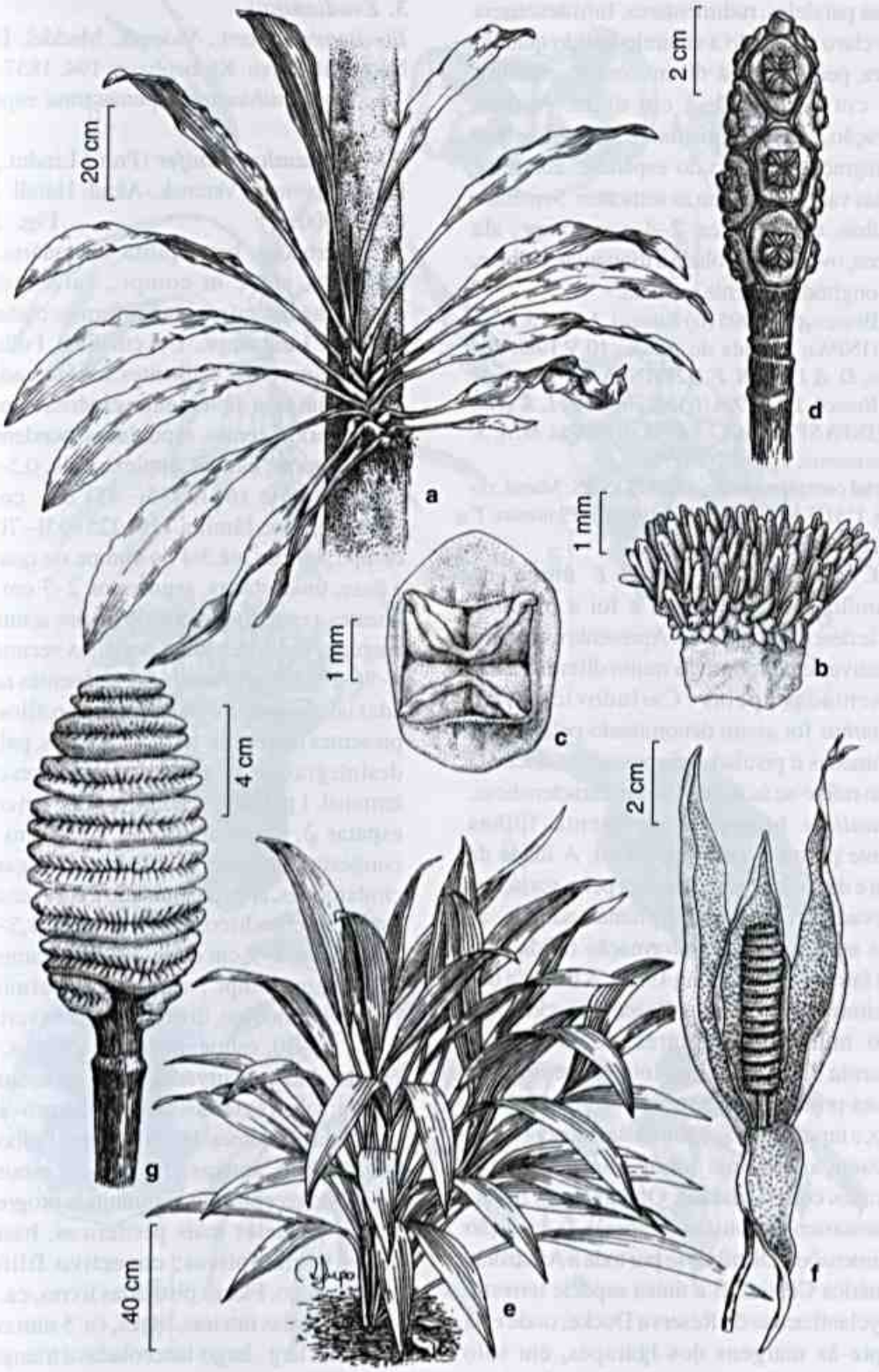

Figura 2 - a-d. *Ludovia lancifolia* - a. hábito; b. flor estaminada, vista lateral; c. flor pistilada, vista frontal; d. infrutescência. e-g. *Cyclanthus bipartitus* - e. hábito; f. inflorescência; g. infrutescência. (a-d. *Plowman 12140*. e-g. *Plowman 12217*).

lamelas paralelas, rudimentares. Infrutescência verde-claro passando a amarelo-pálido quando madura, pedúnculo ca. 60 cm compr., espádice 5–10 cm compr., 2–4 cm diâm. Após a maturação, os anéis pistilados soltam-se por desintegração do eixo do espádice, abrem-se em duas valvas e liberam as sementes. Sementes castanhas, esféricas, ca. 2–4 mm compr., ala coriácea, ovado-lanceolada a triangular, palhete, testa longitudinalmente estriada.

Barro Branco, 6.X.1995 (fr) *Ribeiro, J. E. L. S. et al. 1720* (INPA); Estrada do Acará, 10.V.1988 (fr) *Coelho, D. & Lima, R. P. D27* (INPA SPF); Igarapé Barro Branco, 1.XI.1994 (fr) *Ribeiro, J. E. L. S. et al. 1467* (INPA SPF); id., 17.I.1995 (fl) *Costa, M. A. S. & Nascimento, J. R. 97* (INPA).

Material complementar: AMAZONAS: Maraã, rio Japurá, 1°51'S 65°36'W, 4.XII.1982 (fl) *Plowman, T. et al. 12217* (INPA MG).

Cyclanthus bipartitus é único na subfamília Cyclanthoideae e foi a primeira espécie descrita da família. Apresenta estruturas vegetativas e reprodutivas muito diferentes das apresentadas pelas Carludovicoideae. *Cyclanthus* foi assim denominado pelas flores estaminadas e pistiladas dispostas em anéis. O epíteto refere-se às folhas bífidas caracteristicas. *Cyclanthus bipartitus* apresenta folhas bastante plásticas (Harling 1958). A idade da planta e das folhas é responsavel pelas variações observadas e, apenas em plantas adultas, as folhas adquirem sua conformação bífida com lobos falciformes (Harling 1958). A maioria dos espécimes observados na Reserva Ducke, bem como muitos exemplares de herbários, apresenta folhas adultas inteiras, com uma nervura principal percorrendo cada metade do limbo, e uma linha frágil entre estas, denunciando a presença dos dois lobos que podem ser separados com facilidade. Os caracteres florais apresentaram-se constantes apesar da variação nas dimensões. Distribui-se por toda a Amazônia e América Central. É a única espécie terrestre de Cyclanthaceae da Reserva Ducke, onde está sempre às margens dos igarapés, em solo encharcado onde, por vezes, a base da planta permanece submersa. Pode ocorrer também em bordas de mata e áreas alteradas.

3. *Evodianthus*

Evodianthus Oerst., Vidensk. Meddel. Dansk Naturhist. Foren. Kjobenhavn: 194. 1857.

Evodianthus tem apenas uma espécie.

3.1 *Evodianthus funifer* (Poit.) Lindm., Bih. Kongl. Svenska Vetensk.-Akad. Handl. 26(3/8): 8. 1900. **Fig. 3 a-d**

Herbácea, hemiepífita secundária, raro terrestre, até 2 m compr., raízes aéreas avermelhadas; raízes grampiformes castanhas; caule ca. 1 m compr., 1–4 cm diâm. Folhas 5–7, verde-escuras, brilhantes na face adaxial, verde-claras a levemente cinéreas na face abaxial, iridescentes, espiraladas, pendentes, *in sicco* ásperas; bainha amplexicaule, 0,5–1 cm larg., pecíolo (6–)9–35(–45) cm. compr., canaliculado; lâmina (15–)25–55(–70) cm compr., bífidas até 3/4 do compr. ou quase até a base, unicostadas, segmentos 2–7 cm larg., lineares a estreito-lanceolados, ápice acuminado a agudo, base atenuada; nervuras secundárias 4–8(–10) por segmento, proeminentes na face adaxial, impressas na abaxial; profilos 1–3, presentes nos ramos férteis e estéreis, palhetes, desintegrando-se em fibras. Inflorescência terminal, 1 por ramo, pedúnculo 3–8 cm compr.; espatas 3, 4–6 cm compr., ca. 2 cm larg., congestas na base do espádice, largamente cimbiformes, ápice acuminado a curto-caudado; espádice cilíndrico, raro esférico, 1,5–3 cm compr., ca. 1–2 cm diâm. Flores estaminadas, ca. 4 mm compr.; receptáculo afunilado; perianto simétrico, dividido em dois verticilos, lobos 10–20, esbranquiçados, lineares, ápice arredondado, recurvados sobre os estames na antese; lobos externos do perianto providos de glândulas; estames 10–30, livres; bulbo basal inconspícuo, anteras maiores nos estames do centro do receptáculo, diminuindo progressivamente naqueles mais periféricos, basifixas; tecas hemielípticas; conectivo filiforme, inconspícuo. Flores pistiladas livres, ca. 4 mm diâm.; tépalas inteiras, livres, ca. 5 mm compr., ca. 3 mm larg., largo-lanceoladas a triangulares, recurvadas na antese; estaminódios palhetes a alaranjados, raro avermelhados, ca. 10 cm compr.; estigmas castanhos a rosados, sésseis,

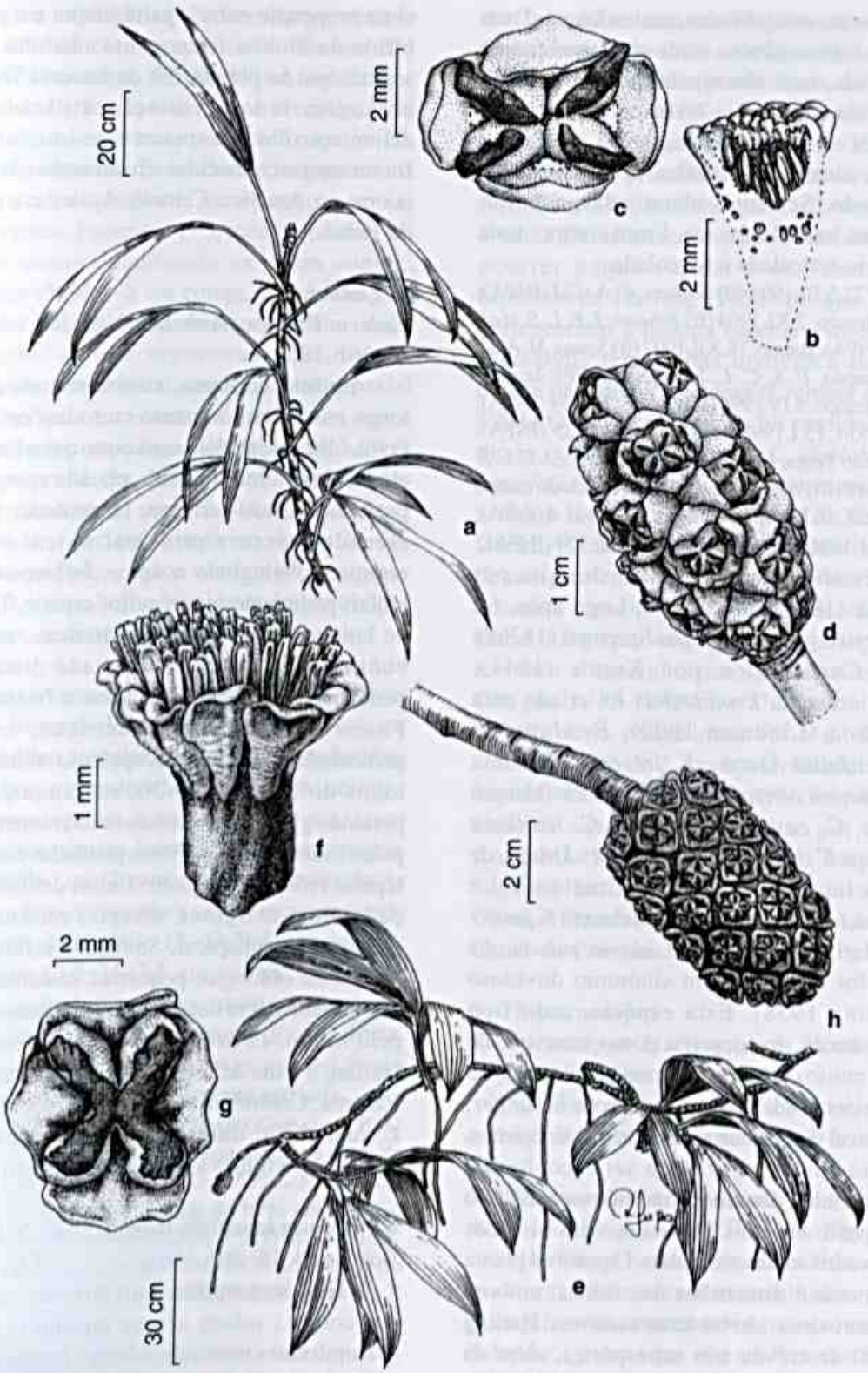

Figura 3 - a-d. *Evodianthus funifer* - a. hábito; b. flor estaminada, corte em vista lateral; c. flor pistilada, vista frontal; d. infrutescência. e-h. *Thoracocarpus bissectus* - e. hábito; f. flor estaminada, vista lateral; g. flor pistilada, vista frontal; h. infrutescência. (a-d. *Ribeiro 1149*. e-f. *Silva s.n.* (IAN 31). g-h. *Silva 1399*).

lateralmente comprimidos, uncinados, ca. 2 mm compr. Infrutescência verde-clara passando a amarelada, raro alaranjada quando madura; pedúnculo, (6–)8–15(–20) cm compr.; espádice 2,5–4,5(–5,5) cm compr., 1–2,5 cm diâm.; tépalas conatas, rotundadas, ápice levemente recurvado. Sementes alaranjadas, estreito-elípticas, translúcidas, ca. 1 mm compr.; testa impresso-reticulada e foveolada.

Baixio, 22.VIII.1994 (fl) *Sothers, C. A. 123* (INPA); Barro Branco, 2.XI.1994 (fr) *Ribeiro, J. E. L. S. et al. 1481* (INPA); Baixio, 18.XII.1997 (fr) *Souza, M. A. D. & Assunção, P. A. C. L. 505* (INPA SPF); Igarapé Barro Branco, 5.IV.1998 (st) *Gomes, F. P. 34* (INPA); id., Baixio, 15.I.1998 (st) *Gomes, F. P. 35* (INPA); Igarapé do Tinga, 14.VIII.1993 (fl) *Ribeiro, J. E. L. S. et al. 1149* (INPA); trilha para área 3, saindo do campo de futebol, 16.I.1998 (fr) *Gomes, F. P. et al. 6* (INPA); s.l., 19.1.1996 (fr) *Costa, M. A. S. et al. 724* (INPA).

Evodianthus funifer foi descrita por Poiteau (1822) em *Ludovia*. Logo após, foi transferida para *Salmia* por Sprengel (1826) e para *Carludovica* por Kunth (1841). Posteriormente, *Evodianthus* foi criado para abrigá-la (Lindman 1900). *Evodianthus angustifolius* Oerst., *E. freyreisii* Lindm., *Carludovica oerstedii* Hemsley, *C. chelidonura* Drude, *C. coronata* Gleason, *C. trailiana* Drude e *C. heterophylla* Mart. *ex* Drude, de várias localidades das Américas do Sul e Central, foram todas sinonimizadas em *E. funifer* por Harling (1958). Já *Ludovia subacaulis* Poit. foi considera um sinônimo duvidoso (Harling 1958). Esta espécie, cujo tipo desapareceu, foi descrita como terrestre, de caule muito curto e com flores similares às de *E. funifer*. Dada a variabilidade de *E. funifer*, é possível que as duas sejam mesmo sinônimos. *Evodianthus funifer* pode ser reconhecida pelo perianto das flores masculinas simétrico e disposto em dois verticilos, com os lobos recurvados sobre os estames. O porte da planta e a forma e dimensões das folhas, embora característicos, são bastante variáveis. Harling (1958) descreveu três subespécies, além da típica, baseado nestes caracteres: *E. funifer* ssp. *fendleranus*, *E. funifer* ssp. *peruvianus* e *E. funifer* ssp. *trailianus*. Difereriam entre si na proporção entre a parte inteira e a parte bífida da lâmina foliar e nas medidas dos segmentos. As populações da Reserva Ducke abrangem toda a variação utilizada na delimitação das subespécies e, assim, elas não foram aqui reconhecidas. *Evodianthus funifer* ocorre na América Central, Amazônia e sul da Bahia.

4. *Ludovia*

Ludovia Brongn., Ann. Sci. Nat., Bot., sér. 4, 15: 361. 1861.

Epífitas ou lianas, raro terrestres; caule longo nas lianas, ou muito curto nas epífitas. Folhas dísticas; pecíolo mais curto que a lâmina, alado, lâmina foliar inteira, plicada apenas na prefoliação, sub-coriácea, lanceolada, ápice crenado; nervura principal única, muito conspícua, atingindo o ápice. Inflorescência axilar; pedúnculo muito curto; espatas 3, raro 4, lanceoladas a ovadas, dísticas, nunca congestas, dispostas na metade distal do pedúnculo; espádice cilíndrico a fusiforme. Flores estaminadas simétricas, curto-pediceladas a sésseis; receptáculo afunilado; lobos do perianto 20-30, esbranquiçados, portando glândulas; estames muito numerosos; pólen monossulcado. Flores pistiladas conatas; tépalas reduzidas a quatro linhas delimitando cada flor; estigmas sésseis, uncinados; placentação subapical. Sementes esféricas a levemente oblongas, pequenas, castanhas.

Ludovia tem duas espécies, reconhecíveis pelo hábito. *Ludovia integrifolia* (Woodson) Harling é liana de folhas curtas que ocorre no Panamá, Colômbia e Equador (Croat 1978) e *L. lancifolia*, única epífita verdadeira da família, tem folhas longas e caule muito curto.

4.1 *Ludovia lancifolia* Brongn., Ann. Sci. Nat., Bot., ser. 4, 15: 363. 1861. **Fig. 2 a-d**

Herbácea, epífita, raro terrestre, até 150 cm compr.; raízes aéreas ausentes; raízes grampiformes muito abundantes formando um aglomerado na base da planta; caule ca. 40 cm compr., 3–7 cm diâm. Folhas 5–12, verde-escuras, brilhantes, eretas, bainha conduplicada,

margens expandidas, 2–3 cm larg.; pecíolo (20–)25–35 cm. compr., alado; lâmina 25–75(–85) cm compr., 5,5–8(–11) cm larg., inteira, unicostada, lanceolada, ápice crenado, base atenuada; nervuras secundárias 6–10, proeminentes na face adaxial, impressas na face abaxial; profilo 1, membranáceo, muito rudimentar. Prospatas 1–3, membranáceas, ca. 3 cm compr., pedúnculo ca. 5 cm compr.; espatas (3–)4,3–8 cm compr. 1–2 cm larg., a inferior situada na metade do pedúnculo, verde, carnosa, as três superiores próximas ao espádice, face adaxial amarelada, face abaxial avermelhada a castanha, cimbiformes, ápice acuminado; espádice cilíndrico, ca.1,5 cm compr., ca. 1 cm diâm. Flores estaminadas ca. 1 mm compr.; receptáculo côncavo, ca. 3 mm diâm.; perianto simétrico, lobos 20–30, esbranquiçados, ápice acuminado; estames 50–90, livres, bulbo basal bem desenvolvido, anteras maiores nos estames situados no centro do receptáculo, diminuindo progressivamente naqueles mais periféricos; tecas lineares. Flores pistiladas conatas, ca. 2 mm diâm.; tépalas inteiras, muito reduzidas, conatas; estaminódios ca. 4 cm compr., esbranquiçados a amarelados; estigmas castanhos, sésseis, lateralmente comprimidos, uncinados, ca. 2 mm compr. Infrutescência verde-claro, passando a verde-escuro quando madura; pedúnculo (2–)3,5–8 cm compr.; espádice (3,5–)4–7,5 cm compr., 1–2,5 cm diâm.; tépalas conatas, muito reduzidas, conferindo aspecto hexagonal a cada fruto. Sementes castanhas, globosas, ca. 1–1,5 mm diâm., testa longitudinalmente estriada.
Igarapé do Acará, 2.III.1998 (fr) *Gomes, F. P. 31* (INPA SPF); Igarapé da Bolívia, picada a oeste da reserva, 3.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 820* (INPA SPF); fim da estrada da torre em frente à casinha, 20.I.1998 (st) *Gomes, F. P. et al. 8* (INPA). **Material complementar**: AMAZONAS: Maraã, rio Japurá, 2°28'S 65°03'W, 3.XII.1982 (fl) *Plowman, T. et al. 12140* (INPA).

Harling (1958) considera *L. lancifolia* um provável sinônimo de *Carludovica disticha* Neumann. A primeira foi descrita de material coletado no Horto de Paris e que fora enviado da Guiana Francesa por Melinon. A segunda fora descrita em 1847 com base em material vivo enviado, também por Melinon, da Guiana Francesa. É provável que ambos os nomes refiram-se à mesma planta. Neste caso, *C. disticha* teria prioridade sobre *L. lancifolia*. Neumann (1847) afirma que *C. disticha* seria a única Cyclanthaceae com folhas dísticas a ocorrer naquela área, o que sustenta a hipótese de Harling (1958) de que ambas pertenceriam à mesma espécie. No entanto, *Stelestylis* tem folhas dísticas e também ocorre na Guiana Francesa (Cremers & Hoff 1994). O tipo de *C. disticha* foi perdido. Deste modo, a sinonimização de *C. disticha* e *L. lancifolia* é duvidosa. *Ludovia lancifolia* é a única Cyclanthaceae epífita da Reserva Ducke. É caracterizada pelas folhas inteiras, de margem crenulada no ápice, e dísticas. É bastante homogênea quanto à morfologia floral mas apresenta alguma variação no formato e tamanho das folhas, como em *Chagas 1335* (INPA) e *Ducke s.n.* (MG 12319). Esta plasticidade foi o motivo da sinonimização de *L. crenifolia* Drude, do rio Japurá, em *L. lancifolia* (Harling 1958). *Ludovia lancifolia* distribui-se por toda a Amazônia brasileira e é pouco freqüente. Segundo Harling (1958), ocorre ainda no Peru, Guiana Francesa, Suriname e na área do Canal do Panamá.

5. *Thoracocarpus*

Thoracocarpus Harling, Acta Horti Berg. 18(1): 254. 1958.

Thoracocarpus é um gênero monotípico e abriga a única liana da família, *T. bissectus*.

5.1 *Thoracocarpus bissectus* (Vell.) Harling, Acta Horti Berg. 18(1): 255. 1958. **Fig. 3 e-h**

Herbácea, hemiepífita secundária, ca. 30 m compr.; raízes aéreas avermelhadas; raízes grampiformes muito mais numerosas nos indivíduos jovens que nos adultos, castanhas; caule densamente anelado pelas cicatrizes foliares, ramificado, 1–2 cm diâm. Folhas 5–10 por ápice de ramo, verde-escuro, brilhantes,

cartáceas, espiraladas, eretas; bainha ca. 2 cm larg., verde-amarelado, variegada com pontos castanhos, *in sicco* ocre, lustrosa; pecíolo 23-30(–50) cm compr., sulcado no ápice, passando a côncavo em direção à base; lâmina 49–56(–85) cm compr., sub-tricostada, bífida quase até a base; segmentos 3,5–5 cm larg., lineares, ápice acuminado; base atenuada; nervuras secundárias (4–)5–8 por segmento, proeminentes na face adaxial, as marginais pouco conspícuas; profilo 1, membranáceo, ocre, desintegrando-se em fibras, podendo formar uma massa de fragmentos e fibras na bainha das folhas. Inflorescência axilar, 1 por folha; pedúnculo 5–8 cm compr., espatas 3–4, (3–)5–10 cm compr., ca. 1,5 cm larg., cimbiformes, bicarenadas, margem involuta, ápice acuminado, a inferior situada na metade do pedúnculo e as superiores congestas no ápice, ou todas concentradas na metade do pedúnculo, decíduas; espádice cilíndrico 1–2,5 cm compr., ca. 0,5–1 cm diâm. Flores estaminadas ca. 2 mm compr.; receptáculo aplanado, perianto assimétrico, lobos lineares, ápice agudo; estames 20–35, adnatos pela base do bulbo basal conspícuo; anteras iguais entre si, tecas hemielípticas, conectivo filiforme, inconspícuo. Flores pistiladas ca. 5 mm diâm.; tépalas inteiras, conatas na base, ca. 5 mm compr., ca. 3 mm larg., truncadas; estaminódios alvos, 5–7 cm compr; estigmas castanhos, sésseis, ca. 2 mm compr., aplanados, ultrapassando as tépalas. Infrutescência verde-escuro; pedúnculo 5–15 cm compr.; espádice 3–5 cm compr., 0,7–2 cm diâm. Sementes alaranjadas, elípticas, ca. 1 mm compr.; testa levemente reticulada, verrucosa.

Estrada alojamento-torre, km 0,35, 17.XI.1995 (fr) *Vicentini, A. & Pereira, E. C. 1159* (INPA SPF); estrada para a torre, km 0,35, 19.I.1998 (st) *Gomes, F. P. et al. 7* (INPA).

Material complementar: AMAPÁ: Monte Dourado, rio Jari, 1°51'S 65°36'W, 12.I.1968 (fr) *Silva, N. T. 1399* (IAN). PARÁ: Castanhal, ferrovia Belém-Bragança, rio Jari, 1°51'S 65°36'W, 3.IX.1968 (fr) *Silva, M. B. s.n.* (IAN 31).

Thoracocarpus bissectus apresenta caracteres vegetativos constantes. É reconhecido pelo caule muito longo e anelado e pelas folhas curtas, cartáceas e muito brilhantes dispostas no ápice dos ramos. São característicos ainda as oito espatas que envolvem a inflorescência e o limbo foliar isolateral. O caule apresenta-se mais longo nas plantas de baixas latitudes. Em São Paulo atingem no máximo 10 m compr.; na Amazônia, chegam a 30 m. Drude (1881) descreveu *Carludovica sarmentosa* Sagot *ex* Drude de material coletado no Brasil. Sagot já havia identificado uma coleta da Guiana Francesa como *C. sarmentosa*, porém não publicara o nome. Drude o fez sem citar o material da Guiana, mas ambas as coletas pertencem à mesma espécie (Harling 1958). Entre 1881 e 1950 foram descritas ainda *Carludovica kegeliana* Lem., *C. mattogrossensis* Lindman e *C. bracteosa* Gleason. À exceção de *C. bracteosa*, os outros nomes foram atribuídos a exemplares indubitavelmente classificáveis como *T. bissectus*, tendo sido sinonimizados (Harling 1958). Este autor considerou também *C. bracteosa* sinônimo de *T. bissectus*, ressalvando que poderia ser uma subespécie do último, caso fossem encontradas espatas mais longas e largas em *C. bracteosa*. No entanto, em *T. bissectus*, as dimensões das espatas são muito variáveis, sustentando a sinonimização de *C. bracteosa*. *Thoracocarpus bissectus* é comum desde o Panamá e Trinidad até o litoral sul de São Paulo, em florestas úmidas, sendo mais freqüente nas porções Central e Oriental da Amazônia.

Flora da Reserva Ducke, Amazonas, Brasil: Cyperaceae

David A. Simpson[1]

Bruhl, J. J. 1995. Sedge genera of the world: relationships and a new classification of the Cyperaceae. Aust. Syst. Bot. 8: 125-305.

Dahlgren, R. M. T.; Clifford, H. T. & Yeo, P. F. 1985. The families of Monocotyledons. Springer-Verlag, Berlin and New York. 520p.

Goetghebeur, P. 1998. Cyperaceae. *In*: K. Kubitzki (ed.). The families and genera of vascular plants. Springer-Verlag, Berlin, Germany. Vol. 4, pp. 141-190.

Linder, H. P. & Kellogg, E. A. 1995. Phylogenetic patterns in the commelinid clade. *In*: P. J. Rudall; P. J. Cribb; D. F. Cutler & C. J. Humphries (eds.). Monocotyledons: systematics and evolution. Royal Botanic Gardens, Kew. Pp. 473-496.

Simpson, D. A. 1995. Relationships within Cyperales. *In*: P. J. Rudall; P. J. Cribb; D. F. Cutler & C. J. Humphries (eds.): Monocotyledons: systematics and evolution. Royal Botanic Gardens, Kew. Pp. 497-509

Annual or perennial, rhizomatous to stoloniferous **herbs**. Stems (culms) simple, often 3-sided. **Leaves** basal and/or cauline, often 3-ranked, comprising blade and sheath, sometimes sheath only present; blade usually linear, grass-like, sometimes broader and constricted into a pseudopetiole below; sheath open or closed; ligule often present, sometimes on opposite side to blade. Involucral bracts 1-several, leaf-like or glume-like. Inflorescence unbranched to simply, compoundly or decompoundly branched and umbel-like, or paniculate, comprising 1-many ultimate inflorescence units (spikelets or spicoids). **Spikelets** comprising 1-many glumes, the glumes membranous to coriaceous, spirally arranged or 2-ranked, each subtending a single bisexual or unisexual flower or sterile, the spikelet sometimes reduced to a single flower and aggregated into spikes; spicoids (tribe Hypolytreae only) comprising a terminal female flower, 2–12 membranous scale-like floral bracts on a much reduced axis, the lowest 2 bracts opposite and keeled, some of the bracts subtending a male flower, the spicoid subtended and usually hidden by a glume-like spicoid bract, these spirally arranged and aggregated into spikelet-like spikes. **Perianth** absent or reduced to bristles or scale-like segments. Stamens 1–3; anthers basifixed. Stigmas 2–3, rarely style undivided, the base sometimes persistent and variously shaped in nutlet. Ovary 2–3-carpellate, unilocular, with a single ovule. **Nutlets** usually a hard, a 2 or 3-sided nutlet, rarely with a succulent or corky exocarp, surface smooth or variously minutely patterned, sometimes partially or completely enclosed by an enlarged basal prophyll (utricle), sometimes with a cup-like hypogynous disk at base.

Cyperaceae comprises *ca.* 104 genera and *ca.* 5000 species (Goetghebeur 1998). The family is nearly cosmopolitan but does not occur in Antarctica.

Cyperaceae can be recognised by the minute bisexual or unisexual flowers with the perianth reduced to small bristles or blades or absent, the flowers subtended by small bracts (glumes or floral bracts) these being aggregated into inflorescence units (spikelets and spicoids) which in turn are aggregated larger partial and full inflorescences. The fruit is a small, hard, 1-seeded nutlet.

The closest relatives to Cyperaceae are Juncaceae and Thurniaceae in the order Cyperales (Dahlgren *et al.* 1985, Simpson 1995). Gramineae, which shares some characteristics of Cyperaceae such as wind pollination and reduced floral structure, has often been placed near to Cyperaceae, but is now thought to be more distantly related (Linder & Kellogg 1995, Simpson 1995).

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Inflorescence structure in Cyperaceae is difficult to interpret due to its highly reduced nature. Consequently, the terminology used in describing parts of the inflorescence is confusing with several terms often being applied to the same structure. In addition, several terms are also used in the Poaceae but they do not always relate to the same structure in both families. In this account an attempt has been to keep terminology as simple as possible. Definitions of the terms used are given in the Glossary below.

For accurate identification of Cyperaceae good fruiting material should be used wherever possible. Indeed this is essential in certain genera, such as *Fimbristylis* and *Scleria*. It is also important to have underground parts as these may be diagnostic for some species. Care is needed when counting the number of stigmas as these are easily broken off. Several should be observed from the same specimen. Care is also needed when counting the stamens. Anthers break off easily leaving the filaments partially hidden within the glumes. Always check that filaments are present.

Glossary

Terms which are italicised within each definition are themselves defined elsewhere in the Glossary.

Acuminate. Gradually narrowed to a long fine point.

Acute. Abruptly narrowed to a short point.

Biconvex. Two-sided, the sides convex.

Cancellate. Having the appearance of a lattice.

Capitate. Head-like inflorescence, without any apparent branching.

Compound. Applied to an inflorescence or partial inflorescence where there are two orders of branching, i.e. primary and secondary.

Compressed-trigonous. Three-sided, but distinctly flattened and thus appearing to be two-sided.

Conical. Cone-shaped, being wider at the base than the apex; here it is used as the 3-dimensional equivalent of lanceolate.

Connective. Tissue connecting the pollen sacs of an anther. Sometimes it extends beyond the apex of the pollen sacs to form a prominent tip to the anther.

Contraligule. Membranous, ligule-like structure at the apex of the leaf-sheath on the side of the culm facing away from the leaf-blade.

Coriaceous. Having a leathery texture.

Culm. Stem supporting the inflorescence.

Cylindric. Cylinder-shaped.

Decompound. Applied to an inflorescence or partial inflorescence where there are three or more orders of branching, i.e., primary, secondary and tertiary.

Deltoid. Triangular in outline.

Disk. Three-lobed structure occurring at the base of the nutlet in Scleria, Calyptrocarya and Becquerelia. In some species it may be indistinct.

Filiform. Thread-like.

Fimbriate. With a margin divided into a fringe.

Floral bract. Membranous scale-like structure in the spicoid-type inflorescence unit each of which subtends a male flower comprising a single stamen only. The lowest two floral bracts are usually have a keel and are opposite.

Globose. Rounded, resembling a ball.

Glume. Membranous to coriaceous scale-like structure subtending individual flowers.

Hyaline. Transparent and usually colourless.

Imbricate. Tightly overlapping.

Involucral bract. Bract or bracts occurring at the point where the inflorescence arises from the culm. Vary from being leaf-like to glume-like or setaceous.

Keel. Used here for the midrib of a glume or floral bract.

Lanceolate. Lance-shaped, i.e. broadest below the middle and gradually tapering above.

Ligule. Membranous tissue or fringe of hairs occurring at the apex of the leaf sheath on the inner side at the point where it joins the leaf-blade.

Mucronate. Terminating in a short stiff point.

Nutlet. Hardened, usually minute, one-seeded fruit, the surface of which may be smooth to variously patterned and a diagnostic character for many species. Often called an achene in literature on Cyperaceae.

Ob. (prefix) Used to indicate inversion of a shape, e.g. obdeltoid, obovoid, oblanceolate.

Obtuse. Blunt.

Orbicular. Circular.

Ovate. Egg-shaped in two-dimensional outline.

Ovoid. Egg-shaped in three dimensions.

Paniculate. Inflorescence partial inflorescences arising at intervals along the main inflorescence axis.

Partial inflorescence. Primary branches of an inflorescence.

Perianth segments. Small bristle-like or scale-like structures at the base of the nutlet. Presumed to be the remnants of a fully developed perianth.

Plicate. Folded longitudinally.

Prophyll. Two-keeled structure at the base of a branch within an inflorescence. It may be glume-like or tubular.

Puncticulate. Dotted.

Reticulate. Forming a network.

Retrorse. Turned backwards.

Rhizome. Underground stem which may be short, often giving the plant a tufted habit, or long-creeping.

Rugose. Wrinkled.

Setaceous. Bristle-like.

Simple. Applied to an inflorescence or partial inflorescence where there is only order of branching, i.e. primary branching.

Spicoid. The ultimate inflorescence unit in Cyperaceae Tribe Hypolytreae. Has a much reduced axis and appears flower-like. It comprises 2-6 floral bracts each subtending a male flower. The whole structure is terminated by a female flower.

Spicoid bract. A glume-like bract which subtends the spicoid.

Spike. An aggregation of spikelets or spicoids; sometimes the whole structure is similar in appearance to a spikelet (in Mapania and Hypolytrum).

Spikelet. The ultimate inflorescence unit in most genera of Cyperaceae. Has an elongated or reduced axis with 1-many glumes, each glume subtending a bisexual or unisexual flower.

Stolon. In Cyperaceae this term is applied to a thin underground branch arising from the rhizome or base of the culm. Each stolon terminates in an aerial shoot.

Style-base. A variously-shaped portion at the base of the style which is persistent on the mature nutlet in some genera.

Terete. Circular in cross-section.

Tomentose. Thickly covered with short hairs.

Trigonous. Three-sided, with the margins blunt and rounded. Applied here to the culm and nutlet.

Triquetrous. Three-sided with the margins acute. Applied here to the culm and nutlet.

Umbel-like. Inflorescence in which the primary branches more-or-less arise from the same point, the inflorescence being subtended by 1-several involucral bracts.

Verruculose. Covered with small wart-like outgrowths.

Key to the genera of Cyperaceae in Reserva Ducke

1. Inflorescence comprising small units (spicoids) with 2 opposite, keeled, often ciliate scales (floral bracts) at the base often enclosing a further 2–6 scales, each unit subtended and usually hidden or partially hidden by a glume-like bract.
   2. Inflorescence umbel-like; stamens 7–8 per spicoid ..... 4. *Diplasia*
   2. Inflorescence paniculate or capitate; stamens 1–3 per spicoid
      3. Inflorescence capitate; spicoids with 4–6 floral bracts ..... 10. *Mapania*
      3. Inflorescence paniculate; spicoids with 2(–3) floral bracts ..... 8. *Hypolytrum*
1. Inflorescence various but not as above.
   4. All flowers unisexual.
      5. Female spikelets subtended at base by 3 sterile spikelets; nutlet very tightly enclosed by a delicate, membranous sac ..... 2. *Calyptrocarya*
      5. Female spikelets without sterile spikelets at base; nutlet not enclosed by a membranous sac.
         6. Contraligule present in leaf sheath apex; disk at base of nutlet not spongy ..... 13. *Scleria*
         6. Contraligule absent; disk at base of nutlet spongy ..... 1. *Becquerelia*
   4. At least some flowers bisexual.
      7. Glumes increasing in length towards the apex of the spikelet.
         8. Inflorescence paniculate (in Ducke species); perianth segments scabrid below, ciliate or fimbriate above ..... 11. *Pleurostachys*
         8. Inflorescence capitate (in Ducke species); perianth segments scabrid or rarely smooth ..... 12. *Rhynchospora*
      7. Glumes ± equal in length (but often with 1–3 smaller glumes at base of spikelet).
         9. Perianth segments present.
            10. Leaves reduced to bladeless sheaths; inflorescence a single spikelet ..... 5. *Eleocharis*
            10. Leaf blades present; inflorescence with more than one spikelet ..... 7. *Fuirena*
         9. Perianth segments absent.
            11. Glumes spirally arranged; style jointed with ovary and clearly demarcated from it ..... 6. *Fimbristylis*
            11. Glumes 2-ranked; style continuous with ovary and not demarcated from it.
               12. Stigmas 2; nutlet 2-sided ..... 9. *Kyllinga*
               12. Stigmas 3; nutlet 3-sided ..... 3. *Cyperus*

1. *Becquerelia*

Perennial **herbs**; rhizomatous or rarely stoloniferous. Culms triquetrous. **Leaves** basal and cauline, 3-ranked; ligule 0; contraligule absent. Involucral bracts leaf-like. **Inflorescence** paniculate; partial inflorescences corymbose or rarely capitate. **Spikelets** unisexual; male spikelets comprising *ca.* 5 glumes, the lower subtending a flower; female spikelets comprising *ca.* 10 sterile glumes and a single terminal flower. Perianth segments 0. Stamens 1 per flower. Stigmas 3. **Nutlets** depressed-globose, smooth, rugulose or tuberculate with a spongy cup-like disk at base.

Genus of five species, central and South America.

1.1 *Becquerelia cymosa* subsp. ***merkeliana*** (Nees) T. Koyama, Mem. N.Y. Bot. Gard. 17(1): 29. 1967.

Becquerelia merkeliana Nees, *in* Mart., Fl. bras. 2(1): 191. 1842.

Perennial. Culm 39 cm long, 6.5 mm wide, smooth. **Leaves**: blade linear, 68 cm long, 1.1–1.4 cm wide, gradually narrowed, acuminate, flat to v-shaped in cross-section; sheath 13–16 cm long, green to pale brown. Involucral bracts 7–43 cm long, the lowest bract longest. **Inflorescence** 40 × 5.5 cm; nodes 6, each subtending 1–2 corymbose partial inflorescences; partial inflorescences 3–4 × 4 cm, compound; primary branches 0.5–2 cm long; secondary branches 0.2–1 cm long, terminating in clusters of several spikelets. Male spikelets 1–2 below female spikelets, narrowly lanceolate, 3–3.5 × 0.2 mm. Female spikelets ovate, 3-5–4.1 × 1.3–1.5 mm. Anthers 1 mm long. **Nutlets** 2 × 1.8–2 mm, whitish, rugulose-reticulate.

Tropical South America.

17.IX.1958 (fl) *Coêlho, D.* 7 (INPA).

Additional specimen examined: BRAZIL. AMAZONAS: Igarapé de Tarumã *Assunção, P. A. C. L. 383* (INPA); Boa Vista road, 48 km N of Manaus, 21.IX.1980 *Lowe 3996* (INPA K).

2. *Calyptrocarya*

Perennial **herbs**; rhizomatous or stoloniferous. Culms trigonous to triquetrous. **Leaves** basal and cauline, 3-ranked; ligule 0, contraligule sometimes present. Involucral bracts leaf-like. **Inflorescence** capitate or cymose-paniculate with distant nodes each subtending a single partial inflorescence; partial inflorescence umbel-like, each with several rayed globose spikelet clusters. Spikelets unisexual or sterile. Male spikelets comprising several glumes. Female spikelets comprising a single, apparently terminal female flower, very tightly enclosed by a delicate, membranous sac. Sterile spikelets lateral, in 3 at the base of the female spikelet, each comprising a few empty glumes, the spikelets subtended by 3 glume-like bracteoles. Perianth segments 0. Stamen 1 per male flower. Stigmas 2–3. **Nutlets** 2-sided to terete-trigonous, surface bony, white.

Genus of eight species, central and South America.

Key to the species of *Calyptrocarya* in Reserva Ducke

1. Spikelet clusters up to 3 mm wide; nutlets up to 1.5 mm wide ..... 2. *C. glomerulata*
1. Spikelet clusters 5 mm or more wide; nutlets 1.8 mm or more wide.
   2. Leaf blade abruptly narrowed at apex, narrowed into a pseudopetiole towards base ..... 1. *C. bicolor*
   2. Leaf blade gradually narrowed at apex, not narrowed into a pseudopetiole towards base 2. ..... 3. *C. poepiggiana*

2.1 *Calyptrocarya bicolor* (H. Pfeiff.) T. Koyama, Mem. N.Y. Bot. Gard. 17(1): 43. 1967.

Becquerelia bicolor H. Pfeiff., Fedde, Repert. 18: 381. 1922.

Perennial. Rhizome short-creeping. Culms 3–12 cm long, 1–1.4 mm wide, triquetrous, scabrid towards apex. **Leaves**: blade linear, linear-elliptic, 7–20 cm long, 5–12 mm wide, abruptly narrowed at apex, acute, flat, green above, usually mid- to dark reddish below, narrowed below into a pseudopetiole towards base; sheath 1–4 cm long, dark reddish. Lowest involucral bract up to 17 cm long, upper bracts shorter. **Inflorescence** cymose-paniculate, 4–14 cm long, nodes 3–4; partial inflorescence with rays 0.5–2 cm long. Spikelet clusters 4–6 × 5–7 mm. **Nutlets** 2-sided, broadly obovate, 1.8–2 × 1.8–2 mm.

Tropical South America.

Forest.

11.II.1995 (fr) *Costa, M. A. S. et al. 149* (INPA); 13.V.1996 (fl) *Costa, M. A. S. et al. 512* (INPA); 6.VI.1988 (fl) *Santos, J. L. 952* (INPA K MG MO NY RB SP); 4.VI.1995 (fl) *Sothers, C. A. 495* (INPA); 28.IV.1994 (fl) *Vicentini, A. et al. 520* (INPA); 13.V.1996 (fl) *Costa, M. A. S. et al. 512* (INPA); 6.VI.1988 (fl) *Santos, J. L. 952* (INPA K MG MO NY RB SP); 4.VI.1995 (fl) *Sothers, C. A. 495* (INPA); 28.IV.1994 (fl) *Vicentini, A. et al. 520* (INPA).

Calyptrocarya bicolor is distinguished by having the leaf blade narrowed into a pseudopetiole towards its base and a distinct reddish coloration to the undersides of the leaves.

2.2 *Calyptrocarya glomerulata* (Brongn.) Urb., Symb. Ant. 2(1): 169. 1900.

Becquerelia glomerulata Brongn., *in* Duperry, Voy. Coq. 2: 163. 1829.

Calyptrocarya angustifolia Lindl. & Nees *ex* Kunth, Enum. Pl. 2: 364. 1837.

Calyptrocarya fragifera sensu Kunth, Enum. Pl. 2: 364. 1837 *non* (Rudge) Nees.

Calyptrocarya intermedia C.B. Clarke, Kew Bull. Add. Ser. 8: 66, 135. 1908.

Perennial. Rhizome short. Culms tufted, 7.5-9 cm long, 0.8–1 mm wide, triquetrous. **Leaves**: blade narrowly linear, up to 21 cm long, 2–3 mm wide, gradually acuminate at apex, flat, green above, green or brownish below; sheath 4–6.5 cm long, reddish-brown. Lowest involucral bract 20 cm long, upper bracts shorter. **Inflorescence** cymose-paniculate, 7–8 cm long, nodes 3–4; partial inflorescence with rays 0.5–0.7 cm long. Spikelet clusters 2 × 2–3 mm. **Nutlets** 2-sided, broadly obovate, 1–1.5 × 1.5 mm.

Southern Mexico to Brazil.

Forest.

6.VII.1993 (fl) *Ribeiro, J. E. L. S. et al. 899* (INPA K NY).

Calyptrocarya glomerulata can be recognised by its linear, gradually narrowed leaves, small spikelet clusters and small nutlets.

2.3 *Calyptrocarya poepiggiana* Kunth, Enum. Pl. 2: 364. 1837.

Calyptrocarya martii Nees, *in* Mart., Fl. bras. 2(1): 195. 1842.

Perennial. Rhizome short-creeping. Culms 3–12 cm long, 0.8–0.9 mm wide, triquetrous, scabrid towards apex. **Leaves**: blade narrowly linear, 11–40 cm long, 5–7 mm wide, gradually narrowed at apex, acute, flat, green above, usually mid- to dark reddish below, not narrowed into a pseudopetiole towards base; sheath 1–4 cm long, dark reddish. Lowest involucral bract up to 43 cm long, upper bracts shorter. **Inflorescence** cymose-paniculate, 7–15 cm long; nodes 3–4; partial inflorescence with rays 0.8–3.3 cm long. Spikelet clusters 4–6 × 5–6 mm. **Nutlets** 2-sided, broadly obovate, 2 mm × 1.8 mm.

Tropical South America, particularly the tropical Andean region.

Forest.

14.II.1996 (fr) *Campos, M. T. V. A. et al. 489* (INPA K MG NY SP).

Calyptrocarya poepiggiana also has linear, gradually narrowed leaves, but the spikelet clusters and nutlets are similar to *C. bicolor*.

3. *Cyperus*

Annual or perennial **herbs**; rhizomatous or stoloniferous. Culms terete to trigonous. **Leaves** basal, 3-ranked, rarely without blade;

ligule 0. Involucral bracts leaf-like. **Inflorescence** terminal, umbel-like and 1–3-times branched, with the ultimate branches terminating in 1 or more spikes or finger-like cluster of spikelets, more rarely spikes or spikelet clusters sessile or inflorescence capitate. Spikelets linear to oblong or elliptic, laterally flattened to subterete; axis straight or zigzag, deciduous or persistent. Glumes ± equal in length, 2-ranked, deciduous or persistent, sides membranous to chartaceous or coriaceous, nerves 0-several, keel acute to rounded. **Flowers** bisexual. Perianth segments 0. Stamens 1–3. Stigmas (1–)3; style continuous with ovary. **Nutlets** usually 3-sided, trigonous, sometimes triquetrous or dorsiventrally compressed.

About 500 species, ± cosmopolitan, but particularly abundant in the tropics.

Key to the species of *Cyperus* in Reserva Ducke

1. Spikelets in finger-like clusters; glumes ovate-orbicular ..... 1. *C. laxus*
1. Spikelets aggregated into spikes; glumes ovate to lanceolate.
   2. Culms papillose; spikelets dark coppery brown; nutlets 1.5 mm long ..... 2. *C. ligularis*
   2. Culms smooth or scabrid; spikelets greenish, yellowish or whitish; nutlets up to 1.1 mm long
      3. Culms smooth; spikelets whitish, in dense clusters within the spike ..... 3. *C. luzulae*
      3. Culms smooth to retrorsely scabrid; spikelets greenish or yellowish in loose clusters within the spike ..... 4. *C. surinamensis*

3.1 *Cyperus laxus* Lam., Ill. Gen. 1: 146. 1791; J. Raynal, Adansonia 2, 17(3): 277. 1978.

C. diffusus Vahl, Enum. Pl. 2: 321. 1805.

Perennial. Rhizome short. Culms ± tufted, 36 cm long, 1.7–1.9 mm wide, trigonous to subtriquetrous, smooth. **Leaves**: blade linear, 15–30 cm long, 5–5.4 mm wide, abruptly acute, flattish to plicate; sheath 4 cm long, pale green to rusty or purplish brown. Involucral bracts 4–12, unequal, the longest up to 50 cm. **Inflorescence** umbel-like, 1–2 times branched; primary branches 10–12, 2–12 cm long; secondary branches 0.5–1.5 cm long. Spikelets in open finger-like clusters of (1–)2–9, oblong, 3–11 × 1.5–2.5 mm. Glumes 6-20 per spikelet, ovate-orbicular, 1.5-2 × 1.5–2 mm, obtuse, mucronate, awn 0.2–0.5 mm long, sides membranous, indistinctly nerved, greenish tinged with pale or reddish-brown, keel greenish. Stamens 3; anthers 0.8–1 mm long. Stigmas 3. **Nutlets** ellipsoid, trigonous, 1.2–1.5 × 0.7–0.8 mm, pale brown becoming blackish brown, indistinctly puncticulate.

Pantropical.

Forest or forest margins.

26.IV.1981 (fl) *Lowe, J. 4105* (INPA).

Additional specimens examined: BRAZIL. RORAIMA: Boa Vista, Reserva Ecologica de Maracá 7.III.1987 *Harley 24735* (K); AMAZONAS: Manaus, near Praia Dourada 23.VII.1980 *Lowe 3949* (INPA, K).

Cyperus laxus is distinguished by spikelets in finger-like clusters and ovate-orbicular glumes.

3.2 *Cyperus ligularis* L., Syst. Nat 10, 2: 867. 1759; Nees *in* Mart., Fl. bras. 2(1): 42. 1842; Kük. *in* Engl., Pflanzenr. 4(20), 101 Heft: 474. 1936.

Mariscus ligularis (L.) Urb., Symb. Antill. 2(1): 165. 1900.

Perennial. Rhizome short. Culms ± tufted 50–100 cm long, 4–5 mm wide, trigonous, papillose. **Leaves**: blade linear, up to 80 cm long, 5–10 mm wide, long-acuminate, flattish to folded; sheath 12–19 cm long, mid-brown to dark reddish-brown. Involucral bracts 8, unequal, the longest up to 65 cm long. **Inflorescence** umbel-like, 1(–2)-times branched; primary branches up to 10, 1–6 cm long; secondary branches (when developed) up to 3 cm long. Spikes 4–7 per inflorescence branch, cylindric to subglobose, 1.1–3.5 cm long, the uppermost spike longest. Spikelets numerous, densely crowded, oblong-elliptic, 3–7 × 1–2.5 mm, dark coppery brown. Glumes 4–7 per spikelet, ovate, 2–

2.5 mm long, 1–2 mm wide, acute, very shortly mucronate, sides membranous, 4–5-nerved, dark brown with reddish tinge, keel greenish or brown. Stamens 3; anthers 0.5 mm long. Stigmas 3. **Nutlets** ellipsoid, trigonous, 1.5 × 0.6 mm, dark purplish brown, puncticulate.

Florida, W. Indies, tropical America, Africa, Indian Ocean islands.

Disturbed areas in forest.

26.X.1977 *Keel & Balick 203* (K NY); 14.XII.1966 (fl) *Prance, G. T. et al. 3637* (INPA K NY).

Additional specimens examined: BRAZIL. AMAZONAS: Manaus, Praia Dourada 23.V.1981 *Lowe 4193* (K); Manaus-Itacoatiara road, km 63 17.XII.1968 *Prance et al. 9058* (K).

Cyperus ligularis has papillose culms and spikes comprising numerous dark coppery brown spikelets.

3.3 *Cyperus luzulae* (L.) Retz., Obs. Bot. 4: 11. 1786; Kük. *in* Engl., Pflanzenr. 4(20), 101 Heft: 170. 1936.

Scirpus luzulae L., Syst. Nat. 10, 2: 868. 1759.

Perennial. Rhizome short. Culms tufted, 28–51 cm long, 1.6–2.8 mm wide, trigonous, smooth. **Leaves**: blade linear, 20–30 cm long, 3.5–4.5 mm wide, gradually acuminate, flattish to folded; sheath 3–7.5 cm long, pale to mid-brown. Involucral bracts 5–10, unequal, the longest up to 36 cm. **Inflorescence** umbel-like, once-branched; primary branches 6–11, 1.1–5 cm long. Spike 1 per inflorescence branch, ovoid to ovoid-cylindric, 0.8–1.5 cm long. Spikelets in numerous, densely crowded clusters within spike, ovate, 2– 4.5 × 1–2 mm, whitish. Glumes 6–20 per spikelet, deciduous, lanceolate to ovate-lanceolate, 1.5–2 × 0.4–0.8 mm, obtuse, mucronulate, sides membranous, 1–2-nerved, whitish, keel similar. Stamen 1; anther 0.7 mm long. Stigmas 3. **Nutlets** narrowly oblong-ellipsoid, trigonous to subterete, 1–1.1 × 0.3 mm, brown to blackish, ± smooth.

Subtropical and tropical America.

Open, damp places.

17.I.1995 (fl) *Costa, M. A. S. et al. 99* (INPA K MG MO NY R RB SP U); 8.VI.1995 (fl) *Costa, M. A. S. & Silva, C. F. 302* (BM G INPA K MBM MG UB UEC US); 29.XI.1976 (fl) *Mendonça, S. & Shima, D. 24* (INPA).

Additional specimens examined: BRAZIL. AMAZONAS: Boa Vista road, 48 km N of Manaus 21.IX.1980 *Lowe 3995* (K); road ZF2, 14 km off Boa Vista road, 62 km NNW of Manaus 21.VI.1981 *Lowe 4316* (K); Itacoatiara, 275 km E of Manaus 9.VI.1981 *Lowe 4257* (K).

Cyperus luzulae is recognisable by its numerous whitish spikelets occurring in densely crowded clusters in each spike.

3.4 *Cyperus surinamensis* Rottb., Descr. Pl. Rar.: 20. 1772; Nees *in* Mart., Fl. bras. 2(1): 21. 1842; Kük. *in* Engl., Pflanzenr. 4(20), 101 Heft: 174. 1936.

Annual or **perennial**. Rhizome short. Culms tufted, 26–43 cm long, 1.2–1.5 mm wide, trigonous to subterete, smooth to retrorsely scabrid. **Leaves**: blade linear, 13–30 cm long, 1.3–2.5 mm wide, gradually acuminate, folded; sheath 3–7 cm long, greenish to pale brown. Involucral bracts 5, unequal, the longest 14–18 cm long. **Inflorescence** umbel-like, 1-2-times branched; primary branches 6–12, 0.7–4 cm long; secondary branches when present 0.3–0.6 cm long. Spikes half-globose to ± globose, 0.6–0.8 × 0.8–1 cm. Spikelets 8–40 per spike, in loose clusters, lanceolate to linear-oblong, 5–7 × 1.7–1.8 mm, greenish to yellowish. Glumes 15–60 per spikelet, deciduous, lanceolate to ovate-lanceolate, 1.3–1.5 × 0.2–0.3 mm, obtuse to acute, mucronulate, sides membranous, 1-2-nerved, greenish to yellowish, keel similar. Stamen 1; anther 0.5 mm long. Stigmas 3. **Nutlets** narrowly ellipsoid, 0.8 × 0.2–0.3 mm, mid-brown, minutely papillose.

Subtropical and tropical America.

Moist, open areas.

8.VI.1995 (fr) *Costa, M. A. S. & Silva, C. F. 301* (INPA K MG MO NY R RB SP U).

Additional specimen examined: BRAZIL. AMAZONAS: Manaus, 8 Tr. A, Jardim Haydea 3.IV.1981 *Lowe 4064* (K).

Cyperus surinamensis is closely related to *C. luzulae* but differs in often having scabrid culms and greenish to yellowish spikelets that are in looser clusters within the spikes.

4. *Diplasia*

Robust, rhizomatous perennial **herbs**. Rhizome thick, woody. Culms loosely tufted, central, erect. **Leaves** basal and cauline, leathery; ligule 0. Involucral bracts leaf-like, unequal. **Inflorescence** umbel-like, 2–3-times branched. Spikes in clusters of 2–7 at tips of branches, sessile or shortly pedunculate, narrowly cylindric comprising many spirally imbricate, leathery, glume-like bracts (spicoid bracts) each subtending a partial inflorescence (spicoid) with a much reduced axis. Spicoids comprising a naked, terminal female flower and 5–6 scale-like floral bracts, the lowest 2 floral bracts opposite, keeled, ciliate on keel, the upper bracts ± connate, each subtending a male flower. Perianth segments 0. Stamens 1–3 per male flower. Stigmas 2. **Nutlets** ellipsoid, obtuse, slightly compressed, smooth.

Monotypic genus.

4.1 *Diplasia karataefolia* Rich. *in* Pers., Syn. Pl. 1: 70. 1805: Nees *in* Mart., Fl. bras. 2(1): 70. 1842.

Perennial. Culms to 3 m long, 6 mm wide, trigonous, smooth. **Leaves**: blade linear, up to 3 m long, 4 cm wide, gradually narrowed, acuminate leathery; sheath 10–12 cm long, mid-brown. Involucral bracts 5, the longest up to 50 cm long. **Inflorescence**: primary branches 7 or more, up to 16 cm long; secondary branches 1.5–5 cm long. Spikes 1.5–3.5 cm × 2–4.5 mm, pale to mid-brown. Spicoid bracts ovate, 5.4–5.5 × 3.2 mm, obtuse, pale to mid-brown, margins paler, keel greenish to brown. Spicoids ± equalling the spicoid bracts. Floral bracts 3.5–4 mm long, 1 mm wide. Stamens 7–8 per spicoid. **Nutlets** 6–6.2 × 4.2–5 mm, mid-brown.

Tropical South America.

Forest.

24.V.1967 (st) *Albuquerque, B. W. P. & Elias, J. 63* (INPA); 9.XII.1994 (fr) *Costa, M. A. S. & Nascimento, J. R. 42* (INPA); 12.X.1966 (fl) *Prance, G. T. et al. 2632* (INPA); 1.VII.1994 (fl) *Ribeiro, J. E. L. S. 1335* (K); 28.IV.1964 (fl) *Rodrigues, W. & Loureiro, A. 5801* (INPA); 3.II.1965 (fl) *Rodrigues, W. & Monteiro, O. P. 6853* (INPA); 29.I.1998 (fl) *Souza, M. A. D. et al. 541* (INPA).

Additional specimen examined: BRAZIL. AMAZONAS: *ca.* 20 km from Manaus 27.X.1989 *Bogner 2019* (K).

Diplasia karataefolia is unmistakable, being a very robust plant with large leathery leaves and an umbel-like inflorescence.

5. *Eleocharis*

Annual or perennial **herbs**. Rhizome short or creeping. Culms terete or angular, sometimes transversely septate. **Leaves** reduced to bladeless sheaths; ligule 0. Involucral bracts 1*2, glume-like. **Inflorescence** a single, terminal spikelet. Spikelet ovoid, ellipsoid or cylindric. Glumes several to many per spikelet, ± equal in length, usually spirally imbricate, rarely 2-ranked. **Flowers** bisexual. Perianth segments up to 8, bristle-like, sometimes 0. Stamens 1–3. Stigmas 2–3. **Nutlets** trigonous or biconvex, mostly obovate; surface smooth, reticulate (cancellate), pitted, longitudinally grooved or transversely ridged; style-base persistent on nutlets.

About 180 species occurring in tropical and temperate regions worldwide.

5.1 *Eleocharis filiculmis* Kunth, Enum. Pl. 2: 144. 1837; Svenson, Rhodora 39: 266. 1937.

Annual or perhaps short-lived perennial. Culms tufted, 20–26 cm long, 0.6–0.8 mm wide, 4-angled with 1–2 ± central channels down each side of culm. Sheaths 1.3–3 cm long, apex acute to subobtuse, dark reddish. Spikelets ellipsoid, to ellipsoid-cylindric, terete, 5–7 × 2–3 mm. Glumes many per spikelet, oblong, 1.8–1.9 mm long, 1 mm wide, obtuse to rounded, sides membranous with broad membranous margin, pale brown minutely reddish-striate, midrib mid-brown. Perianth segments 6–7, shorter than nutlet. Stamens 2;

anthers 0.9 mm long. Stigmas 3. **Nutlets** obovoid, trigonous, 0.9 × 0.5 mm, apex rounded, light brown; surface smooth, somewhat shiny; style-base pyramidal.

Tropical America.

Wet places.

17.I.1995 (fl) *Costa, M. A. S. & Nascimento, J. R. 101* (INPA K MG MO NY R RB SP U); 26.IV.1981 (fr) *Lowe, J. 4107* (INPA K UIH).

Eleocharis filiculmis can be distinguished by leaves that are reduced to bladeless sheaths, a single spikelet on each culm and nutlets with a prominent pyramidal style-base.

6. *Fimbristylis*

Annual or perennial **herbs**. Rhizome short creeping. Culms usually tufted, angled, trigonous or flattened. **Leaves** basal, bladed or reduced to bladeless sheaths; blades linear to filiform, often canaliculate, often cellular-reticulate on upper surface; ligule sometimes present, pubescent or membranous. Involucral bracts leaf-like, setaceous or glume-like. **Inflorescence** umbel-like and 1–3 times branched or capitate or a single spikelet. Spikelets mostly ovoid or ellipsoid, terete, angular or ± laterally flattened. Glumes few to many per spikelet, spirally arranged. **Flowers** bisexual. Perianth segments 0. Stamens 1–3. Stigmas 2–3; style jointed with ovary and clearly demarcated from it; style base not persistent on nutlets. **Nutlets** trigonous or biconvex, surface variously patterned.

Genus of 200 species mostly in the tropics and subtropics, with the highest number in S. Asia, Indo-China and Malesia.

6.1 *Fimbristylis dichotoma* (L.) Vahl, En. Pl. 2: 287. 1806.

Scirpus dichotomus L., Sp. Pl. 1: 50. 1753.

Annual or **short-lived perennial**. Rhizome short. Culms tufted, 18–50 cm long, 0.5–0.8 mm wide, trigonous, glabrous, smooth. **Leaves** basal; blade narrowly linear, 4–16 cm long, 1.3 mm wide, obtuse, flattish; sheath 2-12 cm long, sparsely pubescent; ligule a fringe of dense hairs. Involucral bracts 2-7, the longest 1–2 leaf-like, 2–8 cm long. **Inflorescence** umbel-like, 1–2 times branched, open, 2–8 × 1.5–5 cm; primary branches 2–5, 0.7–6 cm long. Spikelets 2–14 per inflorescence, solitary, ovoid to ovoid-ellipsoid, 3–7 mm long, 1.5–2.5 mm. Glumes many per spikelet, ± equal in length, spirally arranged, broadly ovate to suborbicular, 1.5–3 × 1.5–2.2 mm, subacute, mucronate, sides thinly chartaceous, nerves 0, mid-brown to dark reddish-brown, margins pale-hyaline, keel obtuse, greenish to pale brown. Stamen 1. Stigmas 2. **Nutlets** obovate to broadly obovate, biconvex, 0.7 × 0.6 mm, maturing cream or pale brown, deeply cancellate with 5–6 rows of transversely oblong epidermal cells on each side.

Tropical (India, type), subtropical and warm-temperate regions worldwide.

Open, damp places.

17.I.1995 (fl) *Costa, M. A. S. & Nascimento, J. R. 102* (INPA K MG MO NY R RB SP U); 26.IV.1981 (fl) *Lowe, J. 4104* (INPA).

Fimbristylis dichotoma is a common weedy species throughout the tropics. The best character for distinguishing it is the nutlet which has 5–6 rows of transversely oblong epidermal cells on each side. It also has an umbel-like inflorescence with spirally arranged glumes in each spikelet.

7. *Fuirena*

Annual or perennial **herbs**. Rhizome short or creeping. Culms (3–)4–5-angular, nodose. **Leaves** mostly cauline; blade pubescent or glabrous, 3–5-nerved; sheaths closed; ligule 0. Involucral bracts leaf-like, sheathing at base, equalling or longer than inflorescence. **Inflorescence** paniculate, with few to many clusters of sessile spikelets at few to several nodes. Spikelets with many glumes. Glumes ± equal in length, spirally imbricate, pubescent outside, usually shortly awned, 1–3-nerved, the lowest 1–3 empty. **Flowers** bisexual. Perianth segments 3–6 in 1–2 whorls each of 3 segments, outer whorl of simple bristles, sometimes absent, inner whorl of

bristles, blades or claws. Stamens 2–3. Stigmas 3; style continuous with ovary. **Nutlets** trigonous to triquetrous, apex beaked, base cuneate to stipitate, smooth to trabeculate.

Genus of *ca.* 30 species in the tropics, the largest number being in Africa.

7.1 ***Fuirena umbellata*** Rottb., Descr. & Ic. Rar.: 70. t.19 fig. 3. 1773; Nees *in* Mart., Fl. bras. 2(1): 107. 1842.

Perennial. Culms up to 60 cm long, 6–9 mm wide, pubescent below inflorescence. **Leaves** 5–7, cauline; blade lanceolate to linear-lanceolate, 8–12 cm long, 5–15 mm wide, acute, ciliate at base; sheath 2–5 cm long, usually glabrous. **Inflorescence** with 3–12 clusters of spikelets, peduncles whitish-pubescent. Spikelets ovoid or ovoid-ellipsoid, ± squarrose, 4–8 × 2 mm, acute, brownish-green or dark brownish-green. Glumes obovate to ovate-elliptic, 2–2.5 × 1.2–1.5 mm, rounded, shortly pubescent, awn 0.8–1.2 mm long, often pilose. Perianth segments 3, in 1 whorl only, obovate or oblong, membranous, truncate, subsessile with a very short claw at base. Anthers 0.5–0.7 mm long. **Nutlets** obovoid to ellipsoid, 0.8–1.2 × 0.6–0.7 mm, shiny, smooth to obscurely wrinkled.

Pantropical.

Open, damp or wet places.

7.IX.1996 *Assunção 384* (INPA K); 14.VI.1988 *Santos 926* (INPA K).

Fuirena umbellata is easily distinguished by its cauline leaves. In addition, the perianth segments are obovate or oblong, a characteristic seen in any other Cyperaceae described here.

8. ***Hypolytrum***

Stoloniferous or rhizomatous perennial **herbs**. Rhizome usually woody. Culms central or lateral, the latter with cataphylls at base. **Leaves** 3-ranked, basal or cauline; blade coriaceous, glabrous; pseudopetiole present or 0; ligule 0. Involucral bracts leaf-like, basal bract usually longest. **Inflorescence** usually paniculate, 1–2-times branched, more rarely capitate (not in Ducke taxa) with 1-many spikes. Spikes comprising many spirally imbricate glume-like bracts (spicoid bracts) each subtending a partial inflorescence (spicoid) with a much reduced axis. Spicoids comprising a naked, terminal female flower and 2(–3) scale-like floral bracts, all subtending a male flower, the lowest 2 floral bracts opposite, keeled. Perianth segments 0. Stamens 2 per spicoid, 1 per male flower. Stigmas 2–3. **Nutlets** sculptured, often with spongy conical apex.

About 50 species, pantropical.

8.1 ***Hypolytrum schraderianum*** Nees *in* Mart., Fl. bras. 2(1): 65. 1842; T. Koyama, Darwiniana 16(1–2): 56. 1970.

Perennial. Rhizome short-creeping. Culms central, 70–96 cm long, 2.2–3 mm wide, trigonous, smooth. **Leaves** basal and 2 cauline; blade linear, 90 cm long, 19–28 mm wide, gradually narrowed, 3-nerved; pseudopetiole absent; cauline sheaths 5–6 cm long, mid-brown to reddish-brown. Involucral bracts 2–3, leaf-like, the longest 25–50 cm long. **Inflorescence** an open panicle, compound, broadly ovoid, 12–16 × 14–16 cm, comprising up to 12 primary branches each subtending up to 6 secondary branches terminating in tertiary branches subtending 1–3 sessile or shortly talked spikes. Spikes ovoid, ellipsoid to narrowly cylindric, 4-9 × 1–3 mm, mid-brown. Spicoid bracts obovate, elliptic-obovate 1.5–1.7 × 0.9–1 mm, rounded, mid-brown. Spicoids ± equalling or slightly exceeding the spicoid bracts. Floral bracts 2, ± free, 1.4–1.8 mm long, keel ciliate. Stamens 2 per spicoid. Stigmas 3. **Nutlets** broadly ovoid to suborbicular, 1.5–2.1 by 1–1 mm, apex conical, irregularly longitudinally ridged.

Brazil, Colombia, Venezuela.

Forest.

16.III.1995 (fl) *Costa, M. A. S. et al. 163* (INPA K); 16.III.1995 (fl) *Costa, M. A. S. et al. 164* (NOK); 28.IV.1988 (bd) *Ramos, J. F. & Lima, R. P. 1887* (INPA K MG NY SP); 2.VI.1993 (fl) *Ribeiro, J. E. L. S. et al. 786* (INPA); 3.VI.1993 (fl) *Ribeiro, J. E. L. S. et al. 821* (INPA K); 26.IV.1994 (fr) *Vicentini, A. et al. 490* (INPA K MG MO NY RB SP).

Hypolytrum schraderianum is distinguished by its paniculate inflorescence, two floral bracts and two stamens per spicoid.

9. *Kyllinga*

Annual or perennial **herbs**. Rhizome short or horizontally creeping. **Leaves** basal, 3-ranked, the blades elongated or reduced; ligule 0. Involucral bracts leaf-like. **Inflorescence** capitate. Spikes 1-few, sessile, cylindric, ellipsoid or globose; axis short. Spikelets numerous, falling entire, crowded, bilaterally flattened. Glumes several, ± equal in length, 2-ranked, strongly laterally flattened, sides membranous to hyaline, nerves 0-several, keel strongly acute, sometimes winged, smooth, spinulose or serrulate. **Flowers** 1–5 per spikelet, bisexual or staminate in upper glume(s). Perianth segments 0. Stamens 2–3. Stigmas 2; style continuous with ovary. **Nutlets** 1–2 per spikelet, laterally biconvex with one margin facing the axis.

Genus of *ca.* 60 species in tropical, subtropical and warm-temperate regions with the highest species diversity in Africa.

Key to the species of *Kyllinga* in Reserva Ducke

1. Perennial; rhizome long-creeping; spikes 1 per inflorescence ..... 1. *K. brevifolia*
1. Annual; rhizome absent; spikes usually 2–3 per inflorescence ..... 2. *K. pumila*

9.1 *Kyllinga brevifolia* Rottb., Descr. Icon. Rar. Nov. Pl. 13, t. 4, fig. 3. 1773; Nees *in* Mart., Fl. bras. 2(1): 15. 1842.

Cyperus brevifolius (Rottb.) Hassk., Cat. Hort. Bogor. 24. 1884; Kük. *in* Engl., Pflanzenr. 4(20), 101 Heft: 600. 1936.

Perennial. Rhizome long-creeping. Culms rather distant in series along rhizome, 7–30 cm long, 1–1.5 mm wide, triquetrous, smooth. **Leaves**: blade narrowly linear, 2–17 cm long, 1–3 mm wide, acute, flattish-plicate; sheath 1–20 cm long, brownish or purplish brown. Involucral bracts 2–4, the longest 3–20 cm long, 1.7–2.4 mm wide, sometimes erect. **Inflorescence** capitate, globose. Spikes 1(–3), globose, 0.5–1 × 0.5–1 cm. Spikelets oblong-lanceolate to elliptic-lanceolate, 3–3.5 × 1 mm, 1(–2)-flowered. Glumes ovate-elliptic, 1–3.5 mm long, shortly cuspidate, sides membranous, 5–7-nerved, pale green to pale brown, keel sparsely spinulose, green. Stamens 1–2(–3); anthers 1 mm long. **Nutlets** 1–2 per spikelet, obovate or elliptic, 1–1.5 × 0.5–0.7 mm, brownish, minutely punctate.

Tropics, subtropics and warm temperate regions.

Open damp or wet places.

8.VI.1995 (fl) *Costa, M. A. S. & Silva, C. F. 303* (INPA K MG MO NY R RB SP UL); 26.IV.1981 (fl) *Lowe, J. 4099* (INPA K UIH); 14.XII.1966 (fl) *Prance, G. T. et al. 3638* (INPA).

Kyllinga brevifolia is a common pantropical weed and is recognised by its creeping rhizome with culms that are rather distant along the rhizome.

9.2 *Kyllinga pumila* Michx, Fl. bor.-amer. 1: 28. 1803; Nees *in* Mart., Fl. bras. 2(1): 20. 1842.

Cyperus densicaespitosus Mattf. & Kük. *in* Engl., Pflanzenr. 4(20), 101 Heft: 597. 1936.

Annual. Rhizome absent. Culms 14–30 cm long, 0.4–0.6 mm wide, trigonous to ± terete, smooth. **Leaves**: blade narrowly linear, 3–9 cm long, 0.7–1.7 mm wide, flattish to boated-shaped in cross section; sheath 2.5–5 mm long, dark reddish-brown. Involucral bracts 4, the longest 5–7 cm long, 0.6–1 mm wide. **Inflorescence** capitate, globose. Spikes usually 3, broadly ovoid to subglobose, 5 × 4 mm; spikelets lanceolate, 2 × 0.5 mm, 1-flowered. Glumes ovate-lanceolate, 1.5–2 × 1 mm, shortly cuspidate, sides membranous, sides 3-4-nerved, pale green, keel somewhat winged spinulose. Stamen 1; anthers 0.3 mm

long. **Nutlets** 1 per spikelet, elliptic-obovate, 1 × 0.5 mm, greenish-brown, minutely puncticulate.

Tropical America and Africa.

8.VI.1995 (fr) *Costa, M. A. S. & Silva, C. F. 305* (G INPA K MG MO NY R RB SP U).

Open, damp places.

Kyllinga pumila is an annual species without a rhizome and often has three spikes per inflorescence.

10. *Mapania*

Stoloniferous or rhizomatous perennial **herbs**. Rhizome woody. Culms central or lateral (arising from lower leaf axils or below the leaves), the latter with cataphylls at base. **Leaves** 3-ranked, basal or cauline; blade linear to oblong, coriacous; pseudopetiole present or 0; ligule 0. Involucral bracts leaf-like in capitate and centrally culmed species, otherwise glume-like. **Inflorescence** paniculate, capitate with few to many spikes (in Ducke taxa) or a single spike only. Spikes comprising few-many spirally imbricate glume-like bracts (spicoid bracts), each subtending a partial inflorescence with a much reduced axis (spicoid). Spicoid comprising a naked, terminal female flower and 4-6 scale-like floral bracts, the lowest 2 opposite, keeled, the lowest 3 subtending a male flower the remainder empty. Perianth segments 0. Stamens 1–3 per spicoid, 1 per male flower. Stigmas 2–3. **Nutlets** with a hard or succulent exocarp, smooth or sculptured, lateral costae or furrows 0 or 2–3.

Genus of 80 species, Sri Lanka and N. India, S. China, Indo-China, Malesia, north-eastern Australia and Polynesia; also in tropical Africa, S. Central America and N. South America.

Key to the species of *Mapania* in Reserva Ducke

1. Leaves reduced to bladeless sheaths; involucral bracts elliptic to elliptic-obovate ..... 3. *M. sylvatica*
1. Leaves with a linear blade; involucral bracts linear.
   2. Leaves more than 2 cm wide; inflorescence reddish-brown; nutlet without spongy apex and dark brown spot towards base ..... 1. *M. pycnocephala*
   2. Leaves up to 2 cm wide; inflorescence whitish; nutlet with spongy apex and dark brown spot towards base ..... 2. *M. pycnostachya*

10.1 *Mapania pycnocephala* subsp. *fluviatilis* (Sandwith) T. Koyama, Mem. N.Y. Bot. Gard. 17: 66. 1967; D. A. Simpson, Rev. gen. *Mapania*: 152. 1992.

Mapania fluviatilis Sandwith, Kew Bull. 1933: 495. 1933.

Perennial. Rhizome short. Culm central, 35–70 cm long, 1.9–4.5 mm wide, subtriquetrous, glabrous. **Leaves** basal; blade linear, rarely linear-oblong, 27–112 cm long, 2.1–7.6 cm wide, narrowed, acuminate, base narrowed into pseudopetiole, 1 (–3)-nerved; pseudopetiole 5–22 cm long; sheath 12–18 cm long, dark reddish-brown. Involucral bracts 3–4, leaf-like, linear, 8–89 × 0.2–7.7 cm, basal bract longest. **Inflorescence** capitate, half-globose to globose, 2–6.5 cm wide, mid-reddish-brown, with numerous spikes. Spikes linear to elliptic, up to 1.5 cm long, often indistinct. Spicoid bracts linear-lanceolate or lanceolate, 6.5–7.7 × 1.4–2.8 mm, acute, mid-reddish-brown. Spicoids shorter or ± equalling spicoid bracts. Floral bracts 4, free to ± connate, lower 2 bracts linear, 6.2–7.3 × 0.6–1.2 mm, keel usually narrowly winged, glabrous to sparsely hispid. Stamens 2 per spicoid, anthers linear, linear-oblong, 2.3–3 mm long; stigma branches 2. **Nutlets** obovoid to globose, 1–1.5 × 0.9–1.4 mm, rounded, apex apiculate, not spongy; surface smooth, light greenish or brown at first, becoming uniformly dark brown and without a dark brown spot towards base, often shiny, lateral costae 2, indistinct.

South America: Venezuela, Guyana, French Guiana and Brazil.

Forest.

30.VII.1996 (fl) *Luceño, M. & A. P. Mendes 01* (INPA).

Additional specimens examined: BRAZIL. AMAPÁ: Río Amapari, Serra do Navio, along trail to Río Araguary, 19.XI.1954 *Cowan 38439* (NY); Río Vila Nova, 8.XII.1976 *Ribeiro 1659* (NY UPS); Tumucumaque, 2.5 km NNW of Mitaraka, 1.IX.1972 *de Granville 1449* (CAY NY); AMAZONAS: Río Negro, São Gabriel de Cachoeira, 21.X.1978 *Madison et al. 6534* (AAU K NY); 40 km from São Gabriel 21.X.1978 *Nascimento 712* (NY UPS).

Mapania pycnocephala subsp. *fluviatilis* is distinguished by its reddish-brown inflorescence with numerous spikes and two stamens per spicoid. Material from Costa Rica to western Venezuela is assigned to subsp. *pycnocephala* which has shorter spicoid bracts and a nutlet surface that is shallowly rugulose.

10.2 *Mapania pycnostachya* (Benth.) T. Koyama, Mem. N.Y. Bot. Gard. 17: 61. 1967; D. A. Simpson, Rev. gen. *Mapania*: 165. 1992.

Diplasia pycnostachya Benth., J. Linn Soc. 15: 512. 1877.

Hypolytrum condensatum C.B. Clarke, Kew Bull. Add. Ser. 8: 50. 1908, *nom. superfl.*

Perennial. Rhizome short. Culm central, 35–50 cm long, 2.2–2.9 mm wide, trigonous, scabrid. **Leaves** basal; blade linear, 49–82 × 1.4–2 cm, gradually narrowed, acuminate, base gradually narrowed into pseudopetiole, 1-nerved; pseudopetiole 2.5–8 × 0.4–6 cm; sheath 5–7 cm long, greenish to reddish-brown. Involucral bracts 3(-4), leaf-like, linear, 5–67 × 0.2–2 cm , basal bract longest. **Inflorescence** capitate, globose, 1.5–2.5 cm in diam., whitish, with up to 20 spikes. Spikes ovate, 1 × 0.5 cm, usually indistinct. Spicoid bracts lanceolate, 6.8–8 cm × 1.9–2.7 mm, acute, light brown. Spicoids ± equalling spicoid bracts. Floral bracts 4, free, lower 2 bracts lanceolate, 6.8–8 × 0.9–1.1 mm, keel glabrous. Stamen 1 per spicoid, anther linear-oblong, 2–2.3 mm long, cream; stigma branches 2. **Nutlets** 2-sided, ovoid or ellipsoid, 3.5–4.5 × 1.5–1.9 mm, apex spongy, acute; surface smooth or slightly wrinkled, shiny, light brown, with a dark brown spot towards base, lateral costae absent.

South America: Southern Venezuela and northern Brazil.

Margins of streams in forest.

14.IX.1971 (fr) *Prance, G. T. et al. 14744* (F INPA K NY U US).

Mapania pycnostachya has a whitish inflorescence, one stamen per spicoid and a nutlet with a spongy section at the apex and distinct brown spot towards the base.

10.3 *Mapania sylvatica* Aubl. subsp. ***sylvatica***, Hist. Pl. Guiane Fr. 1: 47; 3: t.17. 1775; D. A. Simpson, Rev. gen. *Mapania*: 43. 1992.

Perennial. Rhizome short. Culm central, 21–60 cm long, 1.4–2.9 mm wide, terete to subtrigonous, glabrous. Leaves reduced to bladeless sheaths; sheaths 2.5–18 cm long, dark reddish. Involucral bracts 3(–4), leaf-like, narrowly elliptic or elliptic-obovate, 11–30 × 3.2–6 cm, ± equal in size. **Inflorescence** terminal, with 1–2, rarely more spikes. Spikes elliptic to oblong, rarely oblong-lanceolate, 1.2–2.7 × 0.8–1.4 cm, distinct. Spicoid bracts narrowly oblong, 5.5–6.5 × 1.4–2.2 mm, acute, often somewhat cucullate, often splitting longitudinally, reddish-brown. Spicoids ± equalling or exceeding spicoid bracts. Floral bracts 6, free, lowest 2 bracts linear or linear-lanceolate, 6.3–7.9 × 1.2–1.5 mm, acute, sometimes cucullate, reddish-brown, keel sparsely to densely ciliate. Stamens 3 per spicoid, anthers linear, linear-oblong, 1.3–2.4 mm long; stigma branches 3. **Nutlets** obovoid to subglobose, 1.5–2.5 × 1.1–1.5 mm, rounded, shortly apiculate; surface strongly longitudinally ridged, with connecting horizontal ridges, green at first, becoming dull olive brown or dark brown, lateral costae 3.

Northern South America.

Wet forest, often near to water.

19.I.1995 (fl) *Costa, M. A. S. & Nascimento, J. R. 111* (INPA K MG MO NY SP); 4.VIII.1994 (fr)

Ribeiro, J. E. L. S. & Silva, C. F. 1389 (INPA K MG MO NY RB SP); 1.XII.1956 (fl) *Rodrigues, W. & Chagas, J. 1470* (INPA); 8.X.1963 (fl) *Rodrigues, W. 5493* (INPA).

Mapania sylvatica subsp. *sylvatica* is an unusual species with leaves reduced to bladeless sheaths and elliptic to elliptic-obovate involucral bracts. The inflorescence usually has 1-2 spikes, there are six floral bracts per spicoid and the nutlet is obovoid to subglobose.

11. *Pleurostachys*

Perennial **herbs**. Rhizome short-creeping. Culms noded. **Leaves** mostly cauline, a few basal and often reduced to a bladeless sheath. Involucral bracts usually leaf-like. **Inflorescence** paniculate; partial inflorescences corymbose to umbel-like, rarely contracted. Spikelets small, usually terete. Glumes several to many, spirally imbricate or rarely distichous, the basal glumes small, empty, the remainder gradually inceasing in length towards the spikelet apex, with the middle 3–7 glumes subtending a flower and the upper few empty. Flowers bisxual. Perianth segments 3–6, upper part ciliate to fimbriate, lower part scabrid. Stamens 3. Stigmas 2. **Nutlets** biconvex, often rugose; style base persistent often thickened.

Genus of *ca.* 30 species, subtropical and tropical S. America.

11.1 *Pleurostachys sparsiflora* Kunth, Enum. Pl. 2: 286. 1837.

Nemochloa sparsiflora (Kunth) Nees *in* Mart., Fl. bras. 2(1): 151. 1842.

Perennial. Rhizome woody. Culms somewhat distant, usually hidden by cauline leaf sheaths, 17–37 cm long, 1.5–2.5 mm wide, trigonous, smooth. **Leaves**: blade linear, 27–35 cm long, 4–6 mm wide, gradually narrowed, acuminate, flat, green; sheath 3–3.5 cm long, green to pale brown. Involucral bracts leaf-like up 30 cm long. **Inflorescence** paniculate; nodes 6–8, distant, each subtending 1–2 partial inflorescences; partial inflorescences corymbose, simple to compound, 10–19 cm long; primary branches filamentous, 4-8 cm long; secondary branches 1–2.5 cm long. Spikelets 1–2 per inflorescence branch, obovoid, 2–3.5 × 1.3–2 mm, obtuse, mid-brown. Glumes ovate, 2 mm long, 1 mm wide, obtuse, membranous, mid-reddish-brown. **Nutlets** broadly ovate, 2.8–3 × 1.6–1.8 mm, rounded, mid-brown, surface irregular, style base conical, blackish.

Tropical South America.

Forest.

17.I.1995 (fl) *Costa, M. A. S. & Nascimento, J. R. 103* (INPA K MG MO NY R RB SP U); 17.V.1988 (fr) *Coêlho, D. & Lima, R. P. 52-D* (INPA K MG MO NY RB SP); 7.VIII.1995 (st) *Nee, M. 46211* (K).

Additional specimen examined: BRAZIL. PARÁ: Itatuba 17.XI.1978 *Silva et al. 3799* (K).

Pleurostachys sparsiflora is recognised by its corymbose partial inflorescences that have filamentous branches and small spikelets borne singly at the tips of the branches.

12. *Rhynchospora*

Annual or perennial **herbs**. Culms central. **Leaves** basal and/or cauline; blades linear to lanceolate; sheaths closed; ligule 0. Involucral bracts usually leaf-like. **Inflorescence** capitate or paniculate; partial inflorescences umbel-like or corymbose. Spikelets lanceolate, ovate to elliptic, flattened to terete. Glumes 5–9 (rarely more), 2-ranked or spirally imbricate, membranous to chartaceous, 1-nerved, the basal 2–3 glumes, empty and small, the remainder gradually inceasing in length towards the spikelet apex, with a single flower, the uppermost glume often empty. **Flowers** either all bisexual, the upper ones not maturing a nutlet, or lower 1-few bisexual and upper ones male, or unisexual with the lowest female and upper one(s) male. Perianth segments 0–6, rarely more, bristle-like, upwardly or retrorsely scabrid, rarely smooth. Stamens (1–)2–3. Stigmas 2 or style undivided. **Nutlets** biconvex, smooth, cancellate, rugose or sometimes spinose; style base persistent, variously-shaped.

Over 250 species in temperate and tropical regions, with the greatest concentration of species in tropical and subtropical South America.

12.1 *Rhynchospora pubera* (Vahl) Boeck subsp. ***pubera***, Linnaea 37: 528. 1872,.

Dichromena pubera Vahl subsp. *pubera*, Enum. Pl. 2: 241. 1806.

Perennial. Culms tufted, 7–28 cm long, 0.4–0.7 mm wide, terete to ± trigonous, smooth. **Leaves** basal; blade linear, up to 19 cm long, 1–2.5 mm wide, gradually narrowed, subacute, flattish to folded; sheaths up to 1–3 cm long, pale brown. Involucral bracts 4, leaf-like, greenish to whitish at base, the longest up to 8 cm long. **Inflorescence** capitate, ovoid to subglobose, 0.7–0.9 × 0.7–1 cm. Spikelets 2–6, lanceolate, ± terete, 0.7–0.8 cm × 2–3 mm, white. Glumes 8–10, ovate to lanceolate, 5.5–6 × 2.2–2.4 mm, white, keel often ciliolate. Perianth segments 0. Stamens 3; anthers 3 mm long. Stigmas 2. **Nutlets** lenticular, widely obovate, 2.5 mm long, 1.2 mm wide, mid- to very dark brown, transversely rugose; style-base very shallowly triangular.

Northern South America, mostly E. of Colombia and Peru.

Open, damp places.

8.VI.1995 (fl) *Costa, M. A. S. & Silva, C. F. 304* (INPA K MG MO NY RB SPU); 26.IV.1981 (fl) *Lowe, J.* 4101 (INPA).

Rhynchospora pubera subsp. *pubera* is distinguished by its white spikelets and the lenticular nutlets with a shallowly triangular style-base and transversely rugose surface. It is one of a number of species in the genus *Rhynchospora* that are insect-pollinated.

13. *Scleria*

Annual or perennial **herbs**. Rhizome usually woody, often knotted. Culms solitary or tufted, usually erect, sometimes climbing or scrambling. **Leaves** basal and/or cauline, the latter sometimes apparently in whorls; blade mostly linear; sheath closed, often 3-winged; ligule 0; contraligule usually present. **Inflorescence** usually paniculate, bearing a terminal and 0-several lateral partial inflorescences, occasionally reduced and spike-like or capitate. Spikelets unisexual or bisexual; bisexual spikelets with terminal female flower and 1-several lateral male ones; female spikelets with a single female flower and 1-several lateral glumes (reduced male flowers); male spikelets with several to many glumes. Glumes spirally arranged or 2-ranked. **Flowers** unisexual. Perianth segments 0. Stamens 1–3 per male flower. Stigmas 3; style continuous with the ovary, deciduous. **Nutlets** not spongy, not enclosed by a membranous sac, terete or subtrigonous, mostly globose, ovoid or subpyramidal, with bony pericarp and a stipe-like, 3-lobed or cup-like, rarely indistinct disk attached at the base.

Key to the species of *Scleria* in Reserva Ducke

1. Plants climbing or trailing; disk at nutlet base an irregular ring ..... 3. *S. secans*
1. Plants erect, not climbing; disk at nutlet base 3-lobed, the lobes rounded or fimbriate.
   2. Inflorescence spike-like; leaf blade 15 mm or more wide; disk-lobes fimbriate ... 1. *S. cyperina*
   2. Inflorescence elongated; leaf blade up to 5 mm wide; disk-lobes rounded ..2. *S. melaleuca*

13.1 *Scleria cyperina* Kunth, Enum. Pl. 2: 345. 1837.

Erect **perennial**. Rhizome creeping. Culms to 37 cm long, 1.5–2.5 mm wide, triquetrous, glabrous. **Leaves** cauline; blade linear, to 52 cm long, 15-17 mm wide, gradually narrowed, narrowly obtuse, flattish; sheath 7–9 cm long, pale brown to reddish-tinged; contraligule broadly obtuse, glabrous often with a broad, membranous apex. Lowest involucral bract leaf-like, up to 26 cm long; upper bracts indistinct, setaceous.

Inflorescence paniculate, but appearing spike-like, 8–10 × 4–8 cm; nodes 12–22, crowded or the lowermost one distant, each subtending a single partial inflorescence or the upper ones a single male spikelet. Spikelets female and male, solitary; female spikelets sessile, obovoid, 5–6 mm long; male spikelets pedunculate, oblong-lanceolate, 4–5 mm long, peduncle up 1 mm long. Female glumes elliptic-ovate, 5–7 × 2 mm, acute, sides coriaceous, very dark reddish, keel slightly paler or greenish. Stamen 1. **Nutlets** obovoid-globose, terete-trigonous, 3.2 × 2 mm, rounded, dark purplish above white below, indistinctly reticulate, rather shiny, sparsely pubescent below; disk 3-lobed, the lobes fimbriate.

Tropical South America.

Open areas.

20.I.1995 (fr) *Costa, M. A. S. & Nascimento, J. R. 113* (INPA K MG MO NY RB SP).

Additional specimen examined: BRAZIL. AMAZONAS: Manaus-Pôrto Velho highway, km 245 13.III.1974 *Prance et al. 20463* (INPA NY K).

Scleria cyperina has rather broad leaves and a crowded spike-like inflorescence. The disk-lobes at the nutlet base are fimbriate.

13.2 ***Scleria melaleuca*** Rchb. *ex* Schltdl. & Cham., Linnaea 6: 29. 1831; Nees *in* Mart., Fl. bras. 2(1): 178. 1842.

Scleria pratensis Lindl. *ex* Nees, *in* Mart., Fl. bras. 2,1: 179. 1842.

Erect **perennial**. Rhizome short-creeping. Culms to 19 cm long, 1 mm wide, subtriquetrous, glabrous to puberulent. **Leaves** mostly cauline; blade linear, 15-28 cm long, 5 mm wide, gradually narrowed, obtuse, flat to plicate; sheath 6–9 cm long, pale brown to reddish; contraligule shallowly rounded, pubescent. Lowest involucral bract leaf-like, up to 26 cm long, upper bracts rather indistinct, setaceous. **Inflorescence** elongated, narrowly paniculate, open, 14–26 × 2 cm; nodes 3–4, each subtending a single partial inflorescence; partial inflorescence sessile or shortly pedunculate, ovate-lanceolate, 2–8 cm long, decreasing in size towards apex. Spikelets female and male, solitary or in groups of 2–3; female spikelets sessile, obovoid, 3–3.5 mm long; male spikelets shortly pedunculate, oblong-lanceolate, 3.5 mm long. Female glumes elliptic-ovate, 3 × 2 mm, acute, sides coriaceous, dark reddish-brown, keel green. Stamen 1. **Nutlets** globose, terete, 2.5 × 2 mm, rounded, dark purplish above white below, smooth, shiny, sparsely pubescent below; disk 3-lobed, the lobes rounded.

Subtropical and tropical America, tropical Africa, Madagascar.

Open, damp areas.

8.VI.1995 (fr) *Costa, M. A. S. & Silva, C. F. 306* (INPA K MG MO NY R RB SP U).

Scleria melaleuca has narrow leaves and an elongated inflorescence. The disk-lobes are rounded.

13.3 ***Scleria secans*** (L.) Urb., Symb. Ant. 2(1): 169. 1900.

Schoenus secans L., Syst. Nat. 10,2: 1759.

Climbing or trailing **perennial**. Rhizome creeping, knotted. Culms up to 10 m long, 1.5–2.5 mm wide, triquetrous, glabrous to scabrid. **Leaves** cauline; blade linear, 28 cm long, 4-5 mm wide, gradually narrowed, acuminate, flat to plicate, margins sharply minutely toothed; sheath 3–5.5 cm long, pale to mid-brown, pubescent above; contraligule obtuse, pubescent. Lowest involucral bract leaf-like, up to 21 cm long, upper bracts leaf-like to setaceous. **Inflorescence** elongated, narrowly paniculate, open, 13–14 × 1– 2 cm; nodes 7–9, each subtending a single partial inflorescence; partial inflorescence sessile to pedunculate, 0.5–5 cm long. Spikelets female and male, solitary or sometimes male spikelets in groups of 2; female spikelets sessile, obovoid, 5–6 mm long; male spikelets shortly pedunculate, narrowly-lanceolate, 4 mm long. Female glumes broadly elliptic, 5 × 3 mm, acute, sides coriaceous, green or brown with dark reddish-brown margins, keel green. Stamen 1. **Nutlets** ovoid, terete-trigonous, 2.8 × 2.5 mm, rounded, white, smooth, shiny; disk forming an irregular ring.

Tropical America.

Open areas.

10.V.1988 (fr) *Coêlho, D. & Lima, R. P. 34-D* (INPA K).
Additional specimens examined: BRAZIL. AMAZONAS: 50 km NE of Manaus, 1.V.1981 *Lowe 4113* (INPA K); MINAS GERAIS: Serra do Espinhaço, Lapinha, 24.II.1968 *Irwin et al. 20768* (K NY).

Scleria secans is one of the few climbing species of Cyperaceae and may ascend up to 10 m. The minutely toothed leaf-margins easily lacerate the skin. The disk forms an irregular ring around the nutlet base.

Flora da Reserva Ducke, Amazonas, Brasil: Erythroxylaceae

Ghillean T. Prance[1]

Schulz, O. E. 1907. Erythroxylaceae. *In*: A. Engler (ed.). Das Pflanzenreich 4(134): 1-176.

Plowman, T. 1989. Erythroxylaceae. *In*: G. Harling & L. Andersson (eds.). Flora of Ecuador 36: 1-32.

Shrubs and **small trees**. **Leaves** alternate, glabrous, entire, petiolate. Stipules present, often large and persistent on twigs or caducous. **Flowers** hermaphrodite, borne solitary or in axillary fascicles, arising from the axils of small scarious bracteoles, pedicellate, actinomorphic, often heterostylous. Calyx lobes 5, valvate. Petals 5, free, alternate with sepals, imbricate in bud, usually with appendages on adaxial surface. Stamens 10, united at base to form a short tube; anthers longitudinally dehiscent. Ovary superior, 3(–2) locular, usually with only one locule developing, one ovule per loculus, pendulous, epitropous; styles 3–(2) free or connate at base; stigmas capitate. **Fruit** of small one-seeded drupes, with or without endosperm.

The family consists of 4 genera and about 260 species. Three genera are confined to tropical Africa and *Erythroxylum*, with 250 species, occurs in the Neotropics, Africa, Asia and Australia. Three species of *Erythroxylum* are known to occur in the Reserva Ducke.

The family is best known for the species *Erythroxylum coca* Lam., the source of cocaine. This is mainly a highland species of the Andean montane forest, but the lowland variety *ipadu* is cultivated by tribes in western Amazonia.

The family is closely related to the Linaceae and the Humiriaceae.

1. *Erythroxylum*

Erythroxylum P. Browne, Civ. Nat. Hist. Jamaica 1: 278. 1756.

Glabrous **shrubs** or **small trees**. Twigs compressed at apex and often bearing persistent, distichous, imbricated cataphylls and foliar stipules. Stipules intrapetiolar, bicarinate, often setulose at apex, persistent or caducous. **Leaves** entire, petiolate. **Flowers** small, solitary or in fascicles, arising from axils of persistent, small, scarious, cymbiform bracteoles, pedicellate, actinomorphic, heterostylous (and rarely unisexual). Petals with appendages on adaxial surface and with a 2-lobed ligule. Stamens 10, borne in two whorls of 5, the outermost alternating with the petals, the filaments united at base to form a short tube which surrounds the ovary. Ovary 3-locular, but with the single ovule in only one loculus, pendulous, anatropous, epitropous; styles 3, free or partly connate at base; stigmas capitate. **Fruit** a small, fleshy, single-seeded drupe.

Type species: *Erythroxylum areolatum* L.

Key to the species of *Erythroxylum* in Reserva Ducke

1. Stipules 8–30 mm long, tapering to a long point, usually persistent.
   2. Leaf laminas 15–26 cm long, stipules caducous and not fraying; calyx 4–6 mm long, the margins of lobes overlapping or touching at anthesis ..... 2. *E. macrophyllum*
   2. Leaf laminas 5.5–13 cm long, stipules persistent, becoming frayed and paleaceous; calyx 2 mm long, the margins of lobes not touching or overlapping ..... 3. *E. mucronatum*
1. Stipules obtuse, 3–5 mm long, caducous ..... 1. *E. citrifolium*

[1]Royal Botanic Gardens, Kew, Richmond, Surrey, TW 3AB, UK.

1.1 *Erythroxylum citrifolium* A. St.-Hil., Fl. bras. Mer.: 94. 1829.

Erythroxylum acutifolium Steud. *ex* Peyr., *in* Mart. Fl. bras. 12(1): 164. 1878.

Erythroxylum micranthum Bong. *ex* Peyr., *in* Mart. Fl. bras. 12(1):

Erythroxylum paraensis Peyr., *in* Mart. Fl. bras. 12(1): 164. 1878.

Erythroxylum duckei Huber, Bol. Mus. Goeldi 5: 416. 1909.

Erythroxylum micranthum Bong. *ex* Peyr., *in* Mart. Fl. bras. 12(1): 164. 1878.

Shrub or **tree** to 15 m tall; twigs smooth, with dark reddish to grey-brown bark. Cataphylls 5–7, scattered at base of shoots, caducous. **Leaf** laminas oblong-elliptic 7–14 × 2.5–4.5 cm, acuminate at apex, the acumen 2–10 mm long, subcuneate at base, subcoriaceous, glabrous on both surfaces; midrib prominent on both surfaces, the secondary nerves obscure above, prominulous beneath; petioles 4–6 mm long. Stipules 3–5 mm long, oblong-lanceolate, membranaceous, densely longitudinally striate-nerved, caducous. Bracteoles 0.5–2 mm long, lightly striate-nerved, acute or obtuse at apex. **Flowers** hermaphrodite, numerous in axils of leaves or cataphylls on mature twigs; pedicels 3–5 mm long, 5-ribbed. Calyx *ca.* 1.5 mm long, the lobes triangular to ovate-lanceolate. Staminal tube ½ as long to equalling calyx lobes, ± 1 mm long, filaments ± 2.5 mm long. **Drupe** 7–13 mm long, oblong, 4–5 mm diam., red. **Type**: *St. Hilaire 755*, Brazil, Goiás, Villa Boa, fl (holotype, P; isotypes, MPU P).

A widespread species from Nicaragua and Panama to Southeastern Brazil also in the Guianas, Peru and Ecuador.

28.IX.1995 (fl) *Sothers, C. A. & Pereira, E. C. 584* (INPA K MG MO NY RB SP U UB); 6.XII.1995 (fr) *Sothers, C. A. & Pereira, E. C. 693* (BM G IAN INPA K MBM SPF UEC US); 22.II.1996 (fr) *Sothers, C. A. et al. 796* (IAN INPA K MO NY RB SP U UB).

1.2 *Erythroxylum macrophyllum* Cav., Diss.: 401, t. 227. 1789.

Erythroxylum floribundum Mart., Beitr. Erythroxylon: 118. 1840.

Erythroxylum amplum Benth., London J. Bot. 2: 372. 1843.

Erythroxylum filipes Huber, Bol. Mus. Goeldi 5: 415. 109.

Shrub or **small tree** to 12 m tall; twigs with greyish bark. Cataphylls 4–10, scattered at base of new shoots similar to stipules. **Leaf** laminas oblong to oblong-elliptic, 15–20 × 5–12 cm, acuminate at apex, the acumen 5–10 mm long, cuneate at base, coriaceous, glabrous on both surfaces, drying ferrugineous beneath; midrib prominulous above, prominent beneath, secondary nerves prominulous on both surfaces; petioles 8–12 mm long. Stipules 8–20 mm long, lanceolate, tapered at apex to an acute point, often 2–3 setulose, longitudinally striate, scarious-membranaceous. Bracteoles persistent, 2–3 mm long, striate-nerved, acuminate, 1-setulose. **Flowers** hermaphrodite, numerous in axils of leaves or cataphylls; pedicels 4–12 mm long, 5-ribbed. Calyx 4–6 mm long, the lobes ovate to oblong-ovate, abruptly acuminate at apex. Staminal tube less than half length of calyx-lobes. **Drupe** 10–11 × 4.5–5.5 mm, red.

Type: *Stoupy s.n.*, French Guiana (holotype, MA).

A widespread species from Mexico to Bolivia and throughout the Guianas and Amazonia.

15.XI.1995 (fr) *Assunção, P. A. C. L. & Souza, M. A. D. 250* (INPA K MG MO NY RB SP U UB); 15.XII.1995 (bd) *Assunção, P. A. C. L. 297* (INPA K MG NY); 15.XII.1995 (bd) *Assunção, P. A. C. L.* 298 (INPA K MO); 18.XII.1975 (fr) *Coêlho, D. 733* (INPA); 19.I.1990 (fr) *Gentry, A. H. & Nelson, B. W. 69306* (INPA); 8.XII.1994 (fl) *Hopkins, M. J. G. et al. 1512* (INPA K MG NY); 29.XI.1976 (fl) *Lisboa,*

P. 855 (INPA); 28.XI.1994 (fl) *Nascimento, J. R. & Silva, C. F. 668* (G IAN INPA K NY RB SP U UFMT US); 13.XII.1963 (fl) *Rodrigues, W. & Coêlho, D.* 5601 (INPA); 3.I.1964 (fl) *Rodrigues, W. & Monteiro, O.P. 5656* (INPA); 27.III.1995 (fr) *Sothers, C. A. & Vicentini, A. 372* (INPA); 12.X.1995 (fr) *Sothers, C. A. & Pereira, E. C. 626* (BM G INPA K MBM MG SPF UEC US); 15.I.1996 (fr) *Sothers, C. A. 724* (INPA K); 21.XI.1997 (fl) *Sothers, C. A. & Assunção, P. A. C. L. 1048* (B GH IAN INPA K UEC); 8.II.1995 (fl) *Vicentini, A. et al. 856* (COL F INPA K MBM MG NY SPF UB VEN); 18.IX.1995 (fl) *Vicentini, A. & Silva, C. F. 1030* (BM INPA K).

1.3 *Erythroxylum mucronatum* Benth., London J. Bot. 2: 372. 1843.

Erythroxylum kirkianum O. E. Schulz, Fedde's Repert. Spec. Nov. Regni Veg. 30: 179. 1932.

Erythroxylum albertianum Kuhlmann & Rodrigues, Publ. Inst. Nac. Pesq. Amaz. Bot. 5: 3. 1957.

Shrub or **small tree** to 15 m tall; twigs with reddish brown or dark brown bark. Cataphylls 4–5, scattered at base of shoots, similar to stipules. **Leaf** laminas elliptic to oblong-elliptic, 5.5–13 × 2–5 cm, finely acuminate at apex, the acumen 8–12 mm long, cuneate at base, subcoriaceous, glabrous on both surfaces; midrib prominulous above, prominent beneath; secondary nerves prominulous on both surfaces; petioles 2–5 mm long. Stipules 10–30 mm long, persistent, lanceolate, tapered to apex to an acute point, usually 3-setulose, the setae finely filamentous, longitudinally striate, scarious-membranaceous. Bracteoles 1–2.5 mm long, acuminate at apex, 1-setulose, striate-nerved. **Flowers** hermaphrodite, numerous in axils of leaves or cataphylls; pedicels 2–5 mm long, 5-ribbed. Calyx *ca.* 2 mm long, the lobes narrowly triangular to ovate, acuminate at apex. Staminal tube ½-¾ as long as calyx lobes. **Drupe** 12–14 × 4–5 mm, red when mature, when immature drying subclavate.

Type: *Schomburgk 766*, Guyana, Potaro River, fl (holotype, K; isotypes, BM CGE K NY P W).

A widespread species from Colombia to the Guianas, Amazonia, Peru, Ecuador, Bolivia.

29.IX.1995 (fl) *Sothers, C. A. et al. 589* (COL F INPA K MG PUEFR UFMT VEN VIC); 6.XII.1995 (fr) *Sothers, C. A. & Pereira, E. C. 695* (BM G IAN INPA K MBM UB UEC US); 5.V.1995 (fr) *Vicentini, A. et al. 949* (IAN INPA K MO NY RB SP U UEC); 6.IX.1995 (fl) *Vicentini, A. et al. 1023* (IAN INPA K MO NY RB SP U UB); 18.IX.1995 (fl) *Vicentini, A. & Silva, C. F. 1029* (G INPA K MBM MG UEC US); 18.X.1995 (fl) *Vicentini, A. & Silva, C. F. 1087* (BM INPA K MG SPF).

Flora da Reserva Ducke, Amazonas, Brasil: Loganiaceae

D. Zappi[1]

Progel, A. 1868. Loganiaceae. *In*: C. A. F. Martius (ed.). Fl. bras. 6(1): 251-300.

Zappi, D. 1989. Flora da Serra do Cipó, Minas Gerais: Loganiaceae. Bol. Bot. Univ. São Paulo 11: 85-97.

Zappi, D. 1996. Loganiaceae. Flora fanerogâmica da Ilha do Cardoso 4: 9-13.

Zappi, D. 2005. Loganiaceae. *In*: M. G. L. Wanderley; G. J. Shepherd; T. S. Mehlem & A. M. Giulietti (eds.). Flora fanerogâmica do estado de São Paulo 4: 261-271.

Árvores, arbustos, lianas ou ervas. **Folhas** opostas ou verticiladas, estipuladas (estípulas às vezes interpeciolares relembrando Rubiaceae), lâmina simples, margem inteira, às vezes muito reduzida. **Inflorescências** axilares ou terminais, em panículas cimosas ou cimeiras escorpióides, ou reduzidas e então fasciculadas ou flores solitárias. **Flores** monoclinas, 4–5(–8)-meras, actinomorfas; cálice sinsépalo ou dialissépalo; corola gamopétala, tubulosa, prefloração valvar, imbricada ou contorta; androceu isostêmone, estames adnatos ao tubo da corola, alternos aos lobos; ovário súpero, bicarpelar e bilocular, cada lóculo com um a muitos óvulos de placentação axilar. **Fruto** cápsula septicida, septicida-loculicida ou baga.

Família extremamente heterogênea, com cerca de 25 gêneros de distribuição tropical e subtropical, raramente encontrada em regiões temperadas, possui 12 gêneros neotropicais, dos quais quatro são encontrados na Reserva Ducke, onde ocorrem 15 espécies.

Chave para os gêneros de Loganiaceae na Reserva Ducke

1. Ervas; inflorescências escorpióides ..... 3. *Spigelia*
1. Arbustos, árvores ou trepadeiras lenhosas; inflorescências corimbosas ou cimosas, nunca escorpióides.
   2. Arvoretas paquicaules; folhas cuneadas a espatuladas, mais de 30 cm compr.; pré-floração imbricada, flores 10-meras ..... 2. *Potalia*
   2. Arbustos a árvores ou trepadeiras lenhosas, ramificadas; folhas lanceoladas a elípticas, nunca ultrapassando 20 cm compr.; pré-floração valvar, flores 4–6-meras.
      3. Árvores ou arbustos eretos, desprovidos de gavinhas; folhas peninérveas; frutos capsulares, secos ..... 1. *Bonyunia*
      3. Trepadeiras lenhosas, com gavinhas; folhas 3–5-nérveas na base ou ligeiramente acima desta; bagas carnosas a lenhosas, indeiscentes ..... 4. *Strychnos*

1. *Bonyunia*

Progel, A. 1868. Loganiaceae. *In* C.A.F. Martius (ed.). Fl. bras. 6(1): 251-300.

O gênero consiste de 4–5 espécies na Amazônia brasileira, Guianas e noroeste da América do Sul.

1.1 *Bonyunia aquatica* Ducke, Arquiv. Inst. Biol. Veg., Rio de Janeiro 1: 211. 1935. **Fig. 1 g-i**

Árvores até 15 m alt., casca levemente rosada, castanha internamente, alburno creme; ramos castanho-avermelhados, glabros, os mais velhos lenticelados. Pecíolos 4–5 mm compr. **Lâmina foliar** largamente elíptica a oboval, 3,5–6,5 × 1,8–3,5 cm, cartácea, glabra, basalmente cuneada a arredondada, apicalmente obtusa a truncada, nervuras secundárias (4–)5(–6) de cada lado da nervura central. **Inflorescência** dicasióide, terminal, pedunculada, flores em grupos de 3, com a flor central séssil. Flores 5–6-meras, até 2 cm compr.; cálice tubuloso, 3–4 mm compr., apicalmente denteado; corola

[1]Royal Botanical Gardens, Kew, Richmond, Surrey, TW9 3AB, U.K.

valvar, roxa a alva, carnosa, serícea; tubo cilíndrico, lobos até 1 cm compr., lineares, fortemente revolutos na antese. **Cápsulas** biloculares, septicidas, ovóides, agudas no ápice, densamente tomentosas a glabrescentes quando maduras; numerosas sementes por lóculo, aladas, membranáceas.

Conhecida apenas no Amazonas.

Florestas inundáveis e beira de igarapés.

Na Reserva Ducke foi coletada apenas uma vez, com fruto.

11.VIII.1993 (fr) *Ribeiro 1103* (INPA K NY).

Espécimes adicionais estudados: AMAZONAS: Rio Curicuriary [Uaupés], 21.XII.1931, (fl, fr) *Ducke, A. s.n.* (RB 23760; K isótipo); *loc. cit.*, 17.XI.1936 (fl), *Ducke, A. 354* (K).

Bonyunia aquatica difere de *B. antoniaefolia* Progel e de *B. minor* N.E. Br. devido às suas folhas completamente glabras, e de *B. superba* M.R. Schomb. devido à características do cálice, que em *B. aquatica* apresenta-se muito menor e com lobos denteados a agudos, ao passo que, em *B. superba* o cálice é maior e possui lobos expandidos. Embora existam coletas de *B. minor* nas proximidades de Manaus, na Campina da Ponta Negra (*W. Rodrigues 8547*, INPA), esta espécie parece estar restrita ao habitat de "campina" ou "campinarana", habitat este cuja representatividade na área da Reserva Ducke é muito pequena, não havendo registros da espécie para a área da flora.

2. *Potalia*[1]

Progel, A. 1868. Loganiaceae. *In* C.A.F. Martius (ed.). Fl. bras. 6(1): 251-300.

Gênero monotípico ocorrendo nas Guianas, Amazônia brasileira e Peru. Estreitamente relacionado com *Anthocleista*, de ocorrência Paleotropical.

[1]Este gênero é considerado atualmente como parte de Gentianaceae (ver Struwe, L. & Albert, V. A. 2004. A monograph of neotropical Potalia Aublet (Gentianaceae: Potalieae). Syst. Bot. 29(3): 670-701. 2004.

2.1 *Potalia amara* Aubl., Hist. pl. Guiane 1: 394, tab. 151. 1775.

Arvoretas paquicaules atingindo 2 m alt., completamente glabras, ramos moles, ocos, não ramificados. Pecíolos até 2 cm compr. **Lâmina foliar** estreitamente cuneada a espatulada, 30–60 × 9–15 cm, membranácea, ligeiramente carnosa, base decurrente, aguda, ápice trusecon a apiculado, nervuras secundárias 14–20 de cada lado da nervura primária. **Inflorescências** dicasióides, terminais, curtamente pedunculadas, flores em grupos de 3, com a flor central séssil, com pares de brácteas triangulares em cada nó e subtendendo cada flor. **Flores** (não observadas, dados da literatura) 10-meras, curto pediceladas; cálice consistindo em dois pares de sépalas arredondadas de tamanhos diferentes, as mais internas mais longas, ca. 5 mm compr.; corola imbricada, carnosa, tubo cilíndrico, lobos patentes na antese. **Fruto** turbinado, mais largo e alvo na base, verde e mais estreito no ápice; numerosas sementes por lóculo, ovóides a aplanadas, cartilaginosas.

Na Reserva Ducke foi coletado apenas material em fruto.

4.VI.1993 (fr) *Ribeiro 834* (INPA K NY); 18.I.1996 (fr) *Pirani, J. R. 3653* (INPA); 3.I.1997 (fr), *Sothers 977* (INPA).

3. *Spigelia*

Guimarães, E. F. & Fontella-Pereira, J. 1969. Contribuição ao estudo do gênero *Spigelia* L. III. Loefgrenia 34: 1-18.

Gênero que compreende cerca de 40 espécies de distribuição neotropical, possui seu centro de diversidade nos campos rupestres do leste do Brasil.

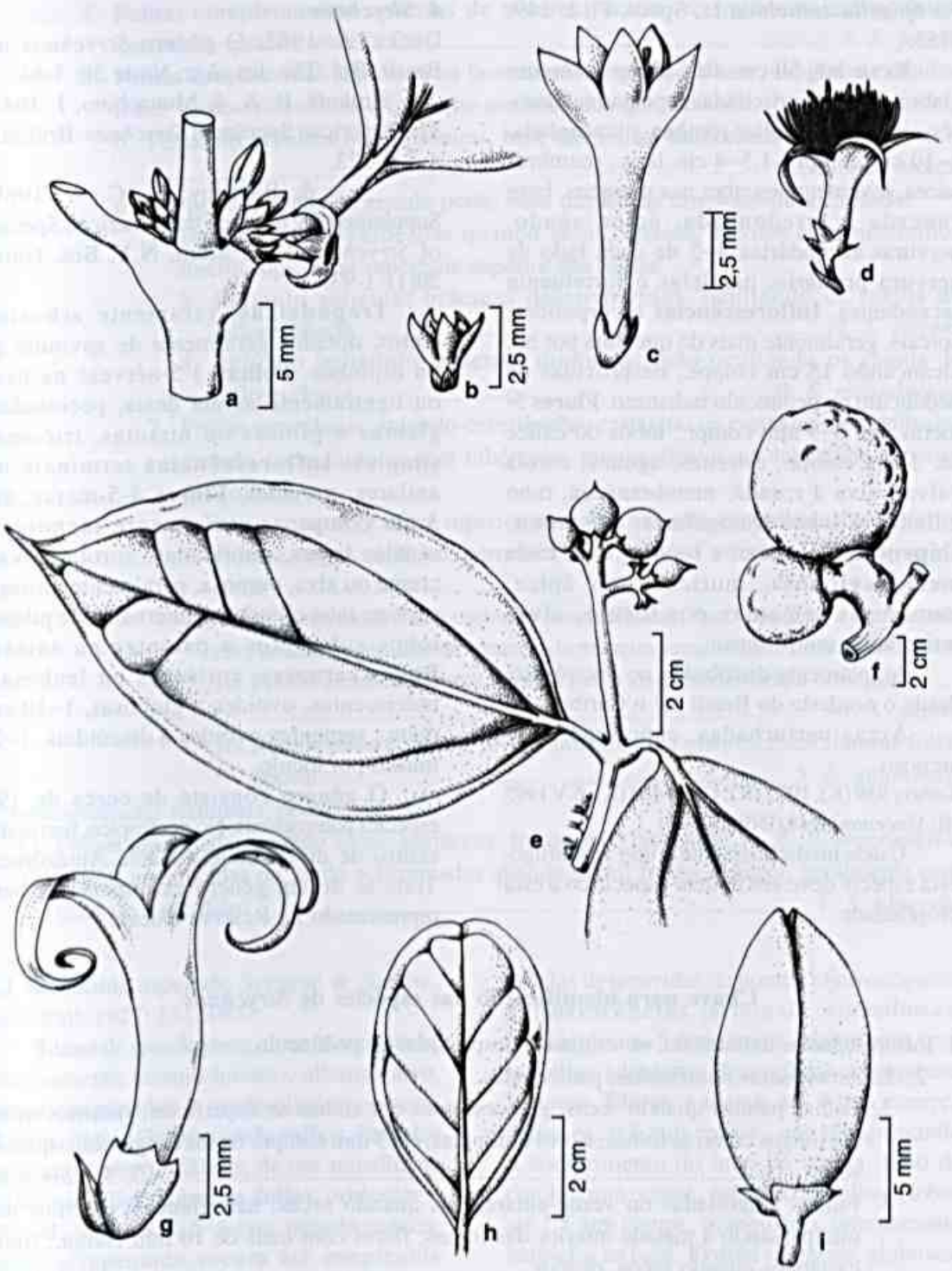

Figura 1 - a. *Strychnos cogens*, detalhe da inflorescência (*L. Coelho s.n.*, INPA 5202); b. *S. parviflora*, flor com tubo curto (*Spruce 2482*); c. *S. macrophylla*, flor com tubo longo, (*Ducke s.n.*, RB 22361); d. *S. guianensis*, flor com tubo intermediário (*Acevedo Rdgz. et al. 8248*); e. *S. macrophylla*, folhas e infrutescência (*Coelho & Mello s.n.*, INPA 3163); f. *S. jobertiana*, par de frutos (*E. Ferreira 135*); g–i, *Bonyunia aquática*, g. flor; h, folha; i. fruto (*Ducke s.n.*, RB 23760).

3.1 ***Spigelia anthelmia*** L., Speca. Pl. 1: 149. 1753.

Erva até 50 cm alt., completamente glabra. **Folhas** verticiladas (opostas na base), sésseis. Lâmina foliar rômbea a lanceolada, 4–10 cm compr., 1,5–4 cm larg., membranácea, levemente escabra nas margens, base cuneada a arredondada, ápice agudo, nervuras secundárias 4–5 de cada lado da nervura primária, paralelas e fortemente ascendentes. **Inflorescências** escorpióides, apicais, geralmente mais do que uma por nó, alcançando 15 cm compr., desprovidas de pedúnculo ou pedúnculo indistinto. **Flores** 5-meras, até 8–9 mm compr.; lobos do cálice ca. 3 mm compr., estreitos, agudos; corola valvar, alva a rosada, membranácea, tubo cilíndrico, lobos triangulares, sub-eretos. **Cápsulas** biloculares loculicidas, cada metade globosa, muricada no ápice; numerosas sementes por lóculo, alvo-reticuladas, reniformes.

Amplamente distribuída no neotrópico, desde o nordeste do Brasil até o Caribe.

Áreas perturbadas, capoeiras; solo arenoso.

Sothers 989 (K), 1072 (K); *Costa 484* (K); 5.V.1995 (fl) *Vincentini 948* (INPA K NY)

Usada medicinalmente como vermífugo, esta espécie deve seu epíteto específico a esta propriedade.

4. ***Strychnos***

Ducke, A. 1955. O gênero *Strychnos* no Brasil. Bol. Téc. Ins. Agr. Norte 30: 1-64.

Krukoff, B. A. & Monachino, J. 1943. The American Species of *Strychnos*. Brittonia 4: 248-323.

_____& Barneby, R. C. A. 1969. Supplementary notes on the American Species of *Strychnos* VIII. Mem. N.Y. Bot. Gard. 20(1): 1-93.

Trepadeiras, raramente arbustos eretos, dotados geralmente de gavinhas e/ ou espinhos. **Folhas** 3-5-nérveas na base ou ligeiramente acima desta, pecioladas, glabras a pilosas ou hirsutas, tricomas simples. **Inflorescências** terminais ou axilares, variadas. **Flores** 4-5-meras, até 3 cm compr. (normalmente menores); sépalas livres, imbricadas; corola valvar, creme ou alva, carnosa, geralmente pilosa a serícea; tubo cilíndrico, internamente piloso, lobos sub-eretos a patentes na antese. **Bagas** carnosas, coriáceas ou lenhosas, indeiscentes, ovóides a globosas, 1–10 cm diâm.; sementes ovóides a discóidais, 1–2-muitas por lóculo.

O gênero consiste de cerca de 190 espécies pantropicais. No neotrópico, tem como centro de diversidade a Bacia Amazônica. Trata-se de um gênero extremamente bem representado na Reserva Ducke.

Chave para identificação das espécies de *Strychnos*

1. Inflorescências axilares ou, se terminais, desprovidas de pedúnculo.
   2. Inflorescências ramificadas, paniculadas.
      3. Folhas pálidas quando secas, glaucescentes em ambas as superfícies; racemos quase tão longos como as folhas; flores diminutas, ca. 3 mm compr.; frutos enegrecidos quando secos ..... 10. *S. parviflora*
      3. Folhas amareladas ou verde-amareladas quando secas, não glaucas; racemos não ultrapassando a metade inferior das folhas; flores com mais de 10 mm compr.; frutos castanhos quando secos, opacos ..... 11. *S. peckii*
   2. Inflorescências congestas, densas, pouco ramificadas.
      4. Inflorescências subterminais e axilares; frutos lenticelados, lenhosos, atingindo 6 cm diâm., às vezes pareados no final dos ramos ..... 6. *S. jobertiana*
      4. Inflorescências todas axilares; frutos não lenticelados, coriáceos ou membranáceos, até 5 cm diâm., mas geralmente menores.

5. Folhas completamente cobertas de tricomas eretos, ferrugíneos; lâmina foliar amarelada quando seca ..... 3. *S. froesii*
5. Folhas com tricomas adpressos na face inferior, próximo à base, até glabras; lâmina foliar verde-acinzentada a castanho-avermelhada quando seca.
6. Pequenos arbustos ou trepadeiras, base das folhas subcordada a cordada ..... 12. *S. subcordata*
6. Arbustos a lianas de grande porte; base das folhas arredondada a cuneada.
7. Folhas cinza-esverdeadas quando secas, opacas, aréolas com tubérculos microscópicos na superfície superior das folhas.
8. Retículo saliente; brácteas desenvolvidas, ocultando os ramos da inflorescência ..... 2. *S. cogens*
8. Retículo indistinto; brácteas diminutas, não ocultando os ramos da inflorescência ..... 9. *S. melinoniana*
7. Folhas amareladas, amarelo-esverdeadas, castanhas ou castanho-avermelhadas quando secas, aréolas sem tubérculos microscópicos na superfície superior das folhas.
9. Folhas secas com a face superior amarela a amarelo-esverdeada, face inferior cinérea; fruto coriáceo, permanecendo globoso e tornando-se rugoso ao secar ..... 7. *S. krukoffiana*
9. Folhas secas castanhas a castanho-avermelhadas; fruto coriáceo a membranáceo, brilhante, geralmente secando de maneira semelhante a uma ameixa-seca.
10. Folhas e ramos glabros; lâmina foliar oval-lanceolada a orbicular ..... 4. *S. glabra*
10. Ramos pilosos, folhas levemente pilosas a glabrescentes; lâmina foliar oboval ..... 5. *S. guianensis*

1. Inflorescências terminais, pedunculadas.
11. Folhas amareladas quando secas, coriáceas; frutos até 3 cm diâm. ..... 8. *S. macrophylla*
11. Folhas enegrecidas ou verde-acinzentadas quando secas; frutos maiores, geralmente com mais de 5 cm diâm. ..... 1. *S. asperula*

4.1 *Strychnos asperula* Sprague & Sandw., Kew Bull. 1927: 131. 1927.

Liana de grande porte, tronco lenticelado, interiormente laranja-intenso, alburno alvo, ramos enegrecidos a verde-oliváceo escuro, glabros, mais pálidos quando velhos. Pecíolos ca. 7 mm compr., glabros, de cor semelhante à lâmina foliar. **Lâmina foliar** orbicular a oboval, 4–7,5 × 2,5–4 cm, membranácea, verde-acinzentado escura até enegrecida (especialmente nas folhas jovens), brilhante, glabra, base atenuada a arredondada, ápice acuminado, 3-nérveas, veias divergentes a ca. 5 mm acima da base, nervuras secundárias planas na face superior, retículo indistinto, aréolas desprovidas de pontos microscópicos. **Inflorescências** terminais, corimbosas, pedúnculos ca. 5 mm compr., multifloros, com tricomas adpressos, ferrugíneos e pequenas brácteas. **Flores** 4-meras, até 6 mm compr.; cálice ca. 0,8 mm compr., não ultrapassando o comprimento do tubo da corola; tubo da corola 5 mm compr., pubérulo a papiloso, lobos até 1,5 mm compr., triangulares, internamente barbados na base. **Frutos** solitários, globosos, muito duros, 5 cm diâm. ou mais, brilhantes, rugosos, exocarpo destacando-se do mesocarpo; muitas sementes discóides a subglobosas por fruto.

Amazônia brasileira.

Floresta de terra firme; solo argiloso.

Vicentini 707 (K)

Espécimes adicionais estudados: BRASIL. ACRE: Seringal S. Francisco, IX.1911, *Ule 4838* (K, isótipo); Sena Madureira, 17.9.1968, *Prance et al. 7593* (INPA); AMAZONAS: Rodovia Manaus-Itacoatiara, km 29, Res. CEPLAC, 24.12.1974, fr., *Prance & Ramos 23153* (K, INPA).

Pertencente à Secção *Longiflorae*, este táxon diferencia-se facilmente dos outros devido às suas inflorescências corimbosas, terminais, curtamente pedunculadas e através de seus frutos grandes, solitários. Pontos microscópicos espalhados em ambas as superfícies das folhas foram observados no material-tipo de *S. asperula*, no entanto o material proveniente da Reserva Ducke não apresenta esse caráter.

4.2 *Strychnos cogens* Bentham, J. Bot. 3: 241. 1841. **Fig. 1 a**

Liana de grande porte, tronco castanho-acinzentado, internamente creme e alburno crème, ramos acinzentados, os mais velhos com lenticelas arredondadas. Pecíolos até 7 mm compr., densamente pilosos, não muito mais escuros do que a lâmina foliar. **Lâmina foliar** oval a lanceolada, 8–12(–15) × 4–7 cm, cartácea, cinza-esverdeado quando seca, opaca, levemente pilosa a glabra, base arredondada a cuneada, ápice agudo a acuminado, 3-nérvea, veias divergentes a ca. 7 mm acima da base, nervuras secundárias impressas na face superior, retículo saliente, aréolas microscopicamente tuberculadas. **Inflorescências** axilares, em cimeiras sésseis, densas, 8–10-floras, ferrugíneas, brácteas encobrindo os ramos da inflorescência. **Flores** 5-meras, até 5 mm compr.; cálice ca. 2 mm compr., não ultrapassando o comprimento do tubo da corola; tubo da corola 2,5 mm compr., externamente glabro; lobos até 3 mm compr., triangulares, internamente barbados. **Frutos** solitários, arredondados, amassados e com aparência de ameixas secas quando prensados, ca. 2 cm diâm., lisos, brilhantes, exocarpo muito fino, destacando-se do mesocarpo; 1–2 sementes discóides por fruto.

Amazônia Brasileira e Guianas.

Floresta de terra firme; solo argiloso.

30.VI.1993 (fr.) *Ribeiro 946* (K); 12.III.1957 (fl.) *L. Coelho s.n.* (INPA 5202); 14.VIII.1957 (fr.) *W. Rodrigues 537* (INPA).

Coleções duvidosas (estéreis): 90 km NNE de Manaus, Distrito Agropeca. Suframa, BR 174, km 64, 2°25' S, 59°54' W, 8.XII.1989, *P. Kukle 164* (INPA) p.p., excl. frutos (Menispermaceae).

Espécimes adicionais estudados: BRASIL. AMAZONAS: Manaus, road to Aleixo, Aug.-Sept. 1936, *Krukoff 8001* (K).

Strychnos cogens pertence à Secção *Intermedia* e pode ser diferenciado das outras espécies através de suas folhas minutamente reticuladas e das aréolas dotadas de tubérculos microscópicos que conferem uma textura opaca característica às folhas.

4.3 *Strychnos froesii* Ducke, An. Acad. Bras. Ciên. 23: 209. 1951.

Liana de grande porte, tronco castanho escuro, finamente reticulado, internamente castanho-alaranjado, alburno amarelo com listras castanhas, ramos e gavinhas densamente recobertos por indumento ferrugíneo, glabrescentes quando velhos. Pecíolos até 7 mm compr., densamente ferrugíneos. **Lâmina foliar** orbicular, oboval, oval ou oblonga, 5–11 × 4–5,5 cm, cartácea, verde-amarelada quando seca, opaca, coberta em ambas as faces por tricomas ferrugíneos eretos, base arredondada até cuneada, ápice acuminado, 5(–7)-nérveas divergindo na basa ou ligeiramente acima desta, nervuras secundárias impressas na face superior, retículo indistinto, aréolas desprovidas de pontos ou tubérculos microscópicos. **Inflorescências** axilares, em cimeiras densas, sésseis, 9–16-floras, densamente ferrugíneas, brácteas encobrindo os ramos da inflorescência. **Flores** 4-meras, até 8 mm compr.; cálice ca. 2 mm compr., não ultrapassando o comprimento do tubo da corola; tubo da corola 7 mm compr., densamente ferrugíneo; lobos até 2 mm compr., curtamente triangulares, internamente barbados

apenas na base. **Frutos** 1(–2) por nó, arredondados, rígidos, coriáceos a lenhosos, não sofrendo modificações quando prensados, 2 cm diâm., negros, brilhantes, rugulosos, exocarpo indistinto do mesocarpo, ca. 2 mm de espessura; 1–3 sementes discóides por fruto.

Amazônia brasileira.

Floresta de terra firme; solo argiloso e arenoso.

5.XI.1994 (fl.) *Sothers 258* (INPA K NY); 10.II.1995 (fr) *Sothers 313* (INPA K); III.1957 (fr.) *Coelho s.n.* (INPA 1154); Estrada de Tarumã, 10.V.1953, *Fróes 29613* (INPA).

Coleções duvidosas (estéreis): Rodovia Itacoatiara, km 134, 7.IX.1974, *Monteiro P23126* (INPA) – determinado como *S. hirsuta* Spruce por Krukoff 1979, sendo que Ducke (1955) menciona que espécimes estéreis de *S. froesii* são frequentemente confundidos com *S. hirsuta*.

Strychnos froesii pretence à Secção *Longiflorae* e difere de outras espécies do gênero por apresentar indumento ferrugíneo denso, composto por tricomas curtos nos ramos, pecíolos e inflorescências, e tricomas longos, eretos, com base mais larga, em ambas as faces das folhas. As coleções citadas acima como duvidosas apresentam ramos recobertos por tricomas retos e longos.

4.4 *Strychnos glabra* Sagot *ex* Progel, *in* Mart. Fl. bras. 6(1): 275. 1868.

Liana, casca espessa, ritidomatosa, castanho-escura, internamente amarelo-alaranjada, alburno creme, ramos e gavinhas castanho-escuros a acinzentados, glabros ou pubérulos, mais pálidos e com lenticelas lineares quando velhos. Pecíolos até 8 mm compr., levemente híspidos, pouco mais escuros que a lâmina foliar. **Lâmina foliar** oval a orbicular, 4–8 × 3–4 cm, firmemente cartácea, castanho-acinzentada ou castanho-escura quando seca, brilhante, glabrescente, base arredondada, ápice acuminado a apiculado, 3-nérveas na base, peninérveas distalmente, nervuras secundárias salientes na face superior, retículo visível, aréolas com pontos microscópicos. **Inflorescências** axilares em cimeiras densas, sésseis, 6–8-floras, glabrescentes, brácteas pequenas. **Flores** 5-meras, até 5 mm compr.; cálice ca. 2 mm compr., não ultrapassando o comprimento do tubo da corola; tubo da corola 2,5 mm compr., glabro; lobos até 3 mm compr., estreitamente triangulares, internamente profusamente barbados. **Frutos** 1–2 por nó, arredondados a obovóides, subcoriáceos a membranáceos, quando secos às vezes amassados relembrando ameixas secas, 1–1,5 cm diam., lisos, castanho-escuros a enegrecidos, exocarpo fino; uma semente ovóide por fruto.

Amazônia brasileira e Guianas.

Em beira de rios e em mata de várzea; solo arenoso ou argiloso.

25.V.1995 (fl.) *Ribeiro 1634* (INPA, K, NY); 13.XI.1957, *E. Ferreira 173* (INPA); Manaus, margem do Igarapé da Cachoeira Grande do Tarumã, 27.XII. 1954, *W. Rodrigues 449* (INPA).

Estéril (*S.* cf. *glabra*): Res. Ducke, 28.VII.1976, *Oliveira s.n.* (INPA 59620).

Espécimes adicionais estudados: BRASIL. AMAZONAS: Manaus, Col. João Alfredo, 5.I.1942, *Krukoff 859* (K); 1.III.1946, *Ducke 1925* (K).

Strychnos glabra pertence à Secção *Intermedia* e é próxima de *S. guianensis* e *S. subcordata*, das quais pode ser diferenciada através de sua venação, que tende ao padrão peninérveo. Na Reserva Ducke esta espécie é frequentemente associada a uma galha foliar em formato de drusa, o que auxilia na sua pronta identificação, mesmo em estado vegetativo.

4.5 *Strychnos guianensis* (Aubl.) Mart., Syst. Mat. Med. Bras., 121. 1843. **Fig. 1 d**

Trepadeiras pequenas a médias, atingindo 10 m tall, ramos curtamente velutinos, pubérulos passando a glabrescentes, lisos e cinza-claros a acastanhados quando velhos. Pecíolos até 7 mm compr., usualmente mais curtos, pubescentes. **Lâmina foliar** oval a oboval, 2,5–6,5 × 1,5–3 cm, cartácea (talvez levemente suculenta quando fresca), castanho-avermelhado escura a castanho-acinzentada quando seca, discolorr, opaca, com alguns tricomas alvos, adpressos, passando a

glabrescente, base cuneada, ápice acuminado a obtuso, 3-nérveas na base, nervuras secundárias ligeiramente salientes na face superior, retículo indistinto, aréolas desprovidas de pontos ou tubérculos microscópicos. **Inflorescências** axilares, em cimeiras 6-floras subsésseis, dotadas de tricomas adpressos avermelhados e pequenas brácteas. **Flores** 5-meras, até 4 mm compr.; cálice 1,5 mm, não ultrapassando o comprimento do tubo da corola; tubo da corola 2 mm compr., glabro; lobos até 2 mm compr., triangulares, internamente dotados de tricomas longos. Frutos em pequenos grupos de 1–4 por nó, globosos, subcoriáceos a membranáceos, amassados quando secos, assemelhando-se a ameixas secas, 1–1,5 cm diam., lisos, enegrecidos, exocarpo fino; 1(–2) sementes mais ou menos discóides por fruto.

Amazônia brasileira e Guianas.

Em floresta de várzea e de terra firme; solo arenoso ou argiloso.

Manaus, Rio Tarumã, 8.III.1946, *Ducke 1926* (K); Cachoeira Baixa Tarumã, 24.III.1971, *Prance et al. 11617* (K)

Espécimes adicionais estudados: BRASIL. AMAZONAS: Distrito Agropecuário, Res. 1501, 2°24'S 59°43'W, 5.XII.1988, *Boom et al. 8740* (K); ibidem, BR 174, km 72, 2°19'S, 60°5'W, 13.II.1992, Nee 42550 (INPA); Manaus-Itacoatiara Hwy, Rio Urubu, nr. Ferry, 3.IV.1967, *Prance et al. 4728* (K); Rio Preto, 29.V.1964, *W. Rodrigues & Coelho 5846* (INPA); along Cuiuini River, 0°46'S, 62°13'W, 13.VIII.1996, *Acevedo Rdgz. et al. 8248* (INPA).

S. guianensis pertence à Secção *Intermedia*, sendo representada por uma série de populações polimórficas, tendo outrora englobado táxons hoje em dia (Krukoff & Barneby 1969) reconhecidos como espécies, como por exemplo *S. glabra* e *S. subcordata*. Na região de Manaus *S. guianensis* apresenta folhas pequenas, obovais, através das quais efetuamos a sua distinção.

4.6 *Strychnos jobertiana* Baillon, Adansonia 12: 367. 1879. **Fig. 1 f**

Liana até 18 m alt., tronco creme, levemente acastanhado ou acinzentado, internamente castanho-claro a esverdeado, alburno creme, levemente listrado, ramos castanho-avermelhados, tornando-se cinza-claros na maturidade. Pecíolos até 1 cm compr., às vezes pilosos, levemente mais escuros do que a lâmina foliar. **Lâmina foliar** oval-lanceolada a oblonga, 8–17 × 3,5–7 cm, firmemente cartácea, olivácea até verde-acinzentado quando seca, moderada-mente brilhante, glabra, base arredondada a cuneada, ápice acuminado, 3-nérvea na base, nervuras secundárias salientes na face superior, retículo visível, aréolas desprovidas de pontos ou tubérculos microscópicos. **Inflorescências** axilares a subterminais, sésseis, densas, multifloras, hispídulas, brácteas pequenas. **Flores** 4-meras, 8–9 mm compr.; cálice 1 mm compr., não ultrapassando o comprimento do tubo da corola; tubo da corola 6–7 mm compr., glabro; lobos até 2 mm compr., triangulares, internamente dotados de pequena quantidade de tricomas. **Frutos** solitários ou, mais frequentemente, em pares, globosos, lenhosos, 4–5(–7) cm diam., ásperos, com lenticelas alvas, exocarpo e mesocarpo indistinguíveis, mais de 5 mm de espessura; muitas sementes mais ou menos discóides por fruto.

Amazônia brasileira.

Geralmente em floresta de terra firme; solo argiloso.

16.II.1995 (fr) *Hopkins 1556* (INPA NY); 16.XII.1996 (fl) *Sothers 966* (INPA K); 3.VI.1993 (fr) *Ribeiro 825* (INPA, K, NY); 3.X.1957 (fr) *E. Ferreira 135* (INPA).

Espécimes adicionais estudados: BRASIL. AMAZONAS: Rodovia Manaus-Itacoatiara, km 31, CEPLAC, XI.1973, *Steward & Ramos P 17673* (K); km 133, 15.VII.1974, fr., *W. Rodgrigues & Loureiro 9519* (INPA); Manaus-Caracaraí Road, km 148, 26.IX.1973, fl, *Bisby et al. P 18127* (INPA); Vaupés, Rio Negro, Jauareté, 19.X.1945, fl, *Froes 21215* (K).

Espécime estéril (*S.* cf. *jobertiana*): CEPLAC, Manaus Itacoatiara Rd, km 29, 19.IX.1974, *Prance & Ehrendorfer 22730* (INPA).

Strychnos jobertiana pretence à Secção *Longiflorae* e pode ser facilmente distinguido das outras espécies através de seus

frutos, geralmente pareados e extremamente lenhosos, alvos a acinzentados. A nervação secundária saliente na face superior também é útil na sua identificação, sendo a única espécie do gênero na Reserva Ducke a apresentar essa característica.

4.7 *Strychnos krukoffiana* Ducke, Trop. Woods 90: 27. 1947.

Liana até 8 m alt., caule e ramos fissurados. Pecíolos até 1 cm compr., híspidos, mais escuros do que a lâmina foliar. **Lâmina foliar** oblonga a largamente elíptica, 6–12 × 3,5–5 cm, coriácea, amarelo-esverdeada e brilhante na face superior quando seca, cinérea e glaucescente na face inferior, glabra ou com tricomas eretos muito curtos na face inferior, base arredondada, ápice curtamente acuminado, 5(–7)-nérvea divergindo ca. 5 mm acima da base, nervuras secundárias marcadamente impressas na face sperior, retículo indistinto, aréolas desprovidas de pontos ou tubérculos microscópicos. **Inflorescências** axilares, cimosas, sésseis, multifloras, híspidas, bracteadas. **Flores** (não observadas, dados da literature) 4-meras, até 6 mm compr.; cálice ca. 0,8 mm compr., não ultrapassando o comprimento do tubo da corola, tubo da corola 4 mm compr., lobos até 2 mm compr. **Frutos** 1–2(–3) por nó, depresso-globosos, lenhosos, ca. 2,5 cm diâm., quebradiços, minutamente rugosos e brilhantes, enegrecidos, exocarpo e mesocarpo indistitnos, ca. 1,5 mm espessura; 4 sementes discóides por fruto.

Endêmica de Manaus.

Floresta de terra firme.

Reserva 1501, km 41, 2°24'-2°25' S, 59°43'-59°45' W, 50-125 m, 7.XII.1988, *B. Boom et al. 8778* (INPA, K).

Strychnos krukoffiana pertence à Secção *Longiflorae*, tendo permanecido pouco conhecida após a perda da única planta conhecida durante os anos cinqüenta, antes que Ducke pudesse descrever os seus frutos (Ducke 1955). A descrição completa dos mesmos é aqui apresentada pela primeira vez, sendo que algumas características dos mesmos (dureza, brilho, microestrutura) são úteis para diferenciar *S. krukoffiana* de outras espécies ocorrentes na Reserva Ducke.

4.8 *Strychnos macrophylla* Barb. Rodr., Vellosia, ed. 2, 1: 33. 1891. **Fig. 1 c, e**

Liana de grande porte, tronco acinzentado, longitudinalmente fissurado, ramos adpresso-pilosos quando jovens. Pecíolos até 10 mm compr., pilosos, mais escuros do que a lâmina foliar. **Lâmina foliar** amplamente oval a arredondada, 6–20 × 4–9 cm, coriácea quando atinge a maturidade, amarelo-ocráceo até castanho-clara quando seca, brilhante na face superior, pilosa ao longo das nervuras quando jovem, base arredondaada a cuneada, ápice abruptamente acuminado, 3(–5)-nérvea, às vezes divergindo 10 mm acima da base e alternadamente, nervuras secundárias levemente salientes até canaliculadas na face superior, retículo indistinto a visível, aréolas desprovidas de pontos ou tubérculos microscópicos. **Inflorescência** terminal, pedunculada, subcorimbosa, multiflora, tricomas adpressos, ferrugíneos, brácteas inconspícuas. **Flores** 5-meras, até 12 mm compr.; cálice 1,5–2 mm compr., não ultrapassando o comprimento do tubo da corola; tubo da corola 8 mm compr., curtamente piloso até papiloso; lobos até 2,5 mm compr., ovais, internamente pilosos na base. **Frutos** ovóides a arredondados, apiculados, lenhosos, até 3 cm diam., opacos, alvosa castanho-claros, lenticelados, exocarpo e mesocarpo indistinguíveis, até 1,5 mm espessura; 2 sementes oblongas até discóides por fruto.

Conhecida apenas da região de Manaus. CEPLAC, km 29 Rodovia Manaus-Itacoatiara, 19.IX.1974, *Prance & Ehrendorfer 22731* (INPA, K); Manaus, Cachoeirinha, 14.IX.1929, *Ducke s.n.* (RB 22361, INPA); estrada do Crespo, 4.III.1945, *Lemos Fróes 20566* (K); BR 17, km 3, 21.XII.1955, *Coelho & Mello s.n.* (INPA 3163); estrada do Aleixo, III.1945, *Lemos Fróes 20488* (K); Mauá Road, 23.III.1971, *Prance et al. 11539* (K).

Strychnos macrophylla pertence à Secção *Longiflorae*, sendo suas características diagnósticas a inflorescência apical, as folhas

coriáceas amareladas quando secas e os seus frutos rígidos, opacos e apiculados. Trata-se de uma das espécies integrantes de um complexo envolvendo a amplamente distribuída *S. rondetelioides* Spruce e *S. barnhardtiana* Krukoff, conhecida apenas do alto Rio Solimões, nas proximidades de São Paulo de Olivença, e a diferenciação entre essas espécies baseia-se em caracteres presentes nos frutos. Infelizmente material frutífero desses três táxons é extremamente escasso para permitir um julgamento mais apurado a respeito do reconhecimento e/ou sinonimização desses táxons.

4.9 *Strychnos melinoniana* Baill., Bull. Soca. Linn. Paris 1: 256. 1880.

Liana de grande porte, até 20 m alt., ramos e gavinhas acinzentadas, com lenticelas verticais na maturidade. Pecíolos até 1 cm compr., glabros, mais escuros que a lâmina foliar. **Lâmina foliar** oval a lanceolada, elíptica ou oblonga, 8–16 × 3,5–7 cm, coriácea, ocre até castanho-clara quando seca, brilhante na face superior, sub-glauca inferiormente, base arredondada a atenuada, ápice agudo, 3–5-nérvea, par superior de nervuras divergindo aproximadamente 1 cm acima da base, nervuras secundárias salientes a canaliculadas na face inferior, retículo visível, aréolas com pontos microscópicos. **Inflorescências** axilares, subsésseis, multifloras, densas, pubérulas a densamente curto-ferrugíneas, brácteas não ocultando a ramificação. **Flores** 5-meras, 6–7 mm compr.; cálice 1 mm compr., não ultrapassando o comprimento do tubo da corola; tubo da corola 3 mm compr., glabro; lobos até 3 mm compr., estreitamente triangulares, completamente cobertos internamente por tricomas longos, alvos. **Frutos** em cachos densos de ambos os lados do ramo, estreitamente obovóides, amassados quando secos, com aparência de ameixas secas, até 2 cm diâm., rugosos, negros, exocarpo delgado, indistinto do mesocarpo; 1–2 sementes discóides por fruto.

Amazônia brasileira e Guianas.

Floresta de terra firme.

Estrada Manaus-Caracaraí, km 57, 15.IX.1977, *C.A. D.A. Mota* 673 (INPA)

Coleções duvidosas (estéreis): Reserva Ducke, 11.IV.1967, *Prance et al. 4794, 4801* (INPA).

Espécimes adicionais estudados: BRASIL. AMAZONAS: Borba, BR 230, 3 km E Sucunduri, 6°50'S, 59°00'W, 6.V.1985, *A. Henderson et al. 305* (K); PARÁ: Rodovia Belém-Brasília km 93, 29.VIII.1959, *Kuhlmann & Jimbo 163* (K). British Guiana, Essequibo River, Moraballi Creek, 26.IX.1929, *Sandwith 342* (K).

Strychnos melinoniana pertence à Secção *Longiflorae*, e pode ser facilmente distinguido através dos seus frutos ovóides, de exocarpo delgado, pendendo em cachos densos na maturidade.

4.10 *Strychnos parviflora* Spruce *ex* Benth., Jour. Linn. Soc. 1: 107. 1856. **Fig. 1 b**

Liana de grande porte, atingindo 40 m alt., tronco liso, ramos acinzentados, adpressamente pubérulos a glabrescentes. Pecíolo até 12 mm compr., pubérulo, mais escuro que a lâmina foliar. **Lâmina foliar** oboval a largamente-elíptica, 8–17 × 3,5–7,5 cm, coriácea, creme-amarelado clara quando seca e brilhante na face superior, glauca e creme-pálida na face inferior, glabra, base arredondada, ápice abruptamente acuminado, 3(–5)-nérvea, nervuras secundárias impressas a planas na face superior, retículo indistinto, aréolas com tubérculos microscópicos na face superior. **Inflorescências** axilares, paniculadas, bem desenvolvidas, quase tão longas quanto as folhas, pedunculadas, multifloras, densamente curtamente velutinas, brácteas arredondadas. **Flores** 5-meras, até 3 mm compr., cálice ca. 0,7 mm compr., ultrapassando o comprimento do tubo da corola, tubo da corola 0,5 mm compr., seríceos; lobos da corola oblongos, internamente alvo-barbados. **Fruto** elipsóide, às vezes apiculado, rígido, até 4 cm diam., exocarpo mole, carnoso, enrugado, mesocarpo lignificado, castanho-escuro até enegrecidos (freqüentemente com uma tonalidade glauca), opaco; até 4 sementes discóides por fruto.

Cipó-cravo

Amazônia brasileira e Peru.

Floresta de terra firme e de várzea, próximo de cursos d'água.

Manaus, Igarapé do Passarinho, 18.X.1957, *E. Ferreira 149/57* (INPA); Igarapé do Mariano, BR 17, km 30, 4.II.1957, *J. Chagas s.n.* (INPA 5572); l.cit., 4.VII.1957, *L. Coelho s.n.* (INPA 5571).

Espécimes adicionais estudados: AMAZONAS: Rio Uaupés, IX.1852, *Spruce 2482* (K, holótipo); Vaupés, Jauareté, 23.X.1945, *Lemos Fróes 21269* (K); Rio Negro, Serra Cabary, 500 m alt., 2.XII.1945, *L. Fróes 21461* (K); Esperança (mouth of Javary), 23.IX.1942, *Ducke 1110* (K); São Paulo de Olivença, 26.X.1936-11.XII.1936, *Krukoff 9079, 9087, 9104, 9115* (K).

Strychnos parviflora pertence à Secção *Breviflorae*, e a combinação incomum de inflorescências axilares muito ramificadas e folhas creme-amareladas diferencia esta espécie das outras. De acordo com Ducke (1955), *S. parviflora* pode ser reconhecido facilmente, mesmo em estado estéril, devido ao seu odor característico de cravo-da-índia, refletido por seu nome vernacular. Os frutos são chamados de "pitomba" e consumidos por crianças na Amazônia (Ducke 1955).

4.11 *Strychnos peckii* B.L. Robinson, Proc. Am. Acad. 49: 504. 1913.

Trepadeira de grande porte atingindo 30 m alt., tronco fissurado, castanho-acinzentado, ramos castanho-escuros, por vezes curtamente pilosos. Pecíolos até 14 mm compr., curtamente pilosos quando jovens, secando mais escuros do que a lâmina foliar. **Lâmina foliar** elíptica a oblonga, 10–20(–24) × 3,5–8 (–15) cm, coriácea a subcoriácea, secando amarela a verde-olivácea, fosca, concolora, glabra (ou pubescente ao longo das nervuras quando jovem), base arredondada a cuneada, ápice acuminado, 5-nérvea, par superior de nervuras divergindo ca. 1 cm acima da base, nervuras secundárias planas a levemente impressas na face superior, retículo visível, aréolas com pontos microscópicos na face superior, sobretudo acompanhando as nervuras. **Inflorescências** axilares, sésseis, paniculadas, não ultrapassando metade do comprimento das folhas, multifloras, curtamente adpresso-pilosas, ferrugíneas, brácteas inconspícuas. **Flores** 5-meras, até 12 mm compr.; cálice 0,5–0,7 mm compr.; tubo da corola 8 mm compr., mais largo na base, curtamente adpresso-piloso; lobos até 2,5 mm compr., ovados a triangulares, barbados internamente. **Frutos** 1(–3) por nó, globosos, lignificados, até 7 cm diâm., foscos, lenticelados, castanho-amarelado claros, exocarpo e mesocarpo indistintos, até 3 mm de espessura; numerosas sementes discóides por fruto.

Desde Belize até as Guianas e Amazônia brasileira, alcançando o estado do Mato Grosso.

Floresta de terra firme e de igapó.

Manaus, Igarapé do Passarinho, 22.X.1956, *L. Coelho & Chagas s.n.* (INPA 4289); Igarapé do Mariano, Br 17, km 30, 4.VII.1957, *L. Coelho s.n.* (INPA 5570); Reserva Florestal Ducke, 11.IV.1967, *Prance et al. 4802* (INPA)

Coleções duvidosas (estéreis): Reserva Ducke, 11.IV.1967, *Prance et al. 4794, 4801, 4803* (INPA); 1.XI.1972, *W. Rodrigues 9182* (INPA).

Espécimes adicionais estudados: BRASIL. PARÁ: Bragança, 13.X.1923, *Ducke s.n.* (INPA 18538, K); Belém, 17.XI.1922, *Ducke s.n.* (INPA 18536, K); AMAZONAS: Barcelos, 13.VI.1905, *Ducke 7175* (INPA 22360, K); São Paulo de Olivença, II.1936, *Krukoff 7627, 7629, 7631* (K); loc.cit., I.1936, *Krukoff 7581* (K).

Strychnos peckii pertence à Secção *Longiflorae*, e pode ser diferenciada das outras espécies através de suas folhas de grandes dimensões (especialmente em espécimes estéreis), lâmina normalmente secando amarelada, e frutos lignificados, fortemente lenticelados, que relembram os frutos de *S. jobertiana*. *S. peckii* parece próximo de *S. erichsonii* M.R. Schomb., sendo freqüentemente erroneamente identificado como esta espécie, no entanto *S. erichsonii* possui frutos macios e menores.

4.12 *Strychnos subcordata* Spruce *ex* Benth., Journ. Linn. Soca. 1: 106. 1856.

Arbusto ereto de 1,5 m alt. ou trepadeira de pequeno porte, tronco acinzentado, ramos castanho-escuros, pilosos. Pecíolos até 2 mm compr., alvo-pilosos. **Lâmina foliar** oval a arredondada, (1–)2–7 × (0,5)1,2–2,5(–3,5) cm, membranácea, secando verde-acinzentada a castanho-escura, fosca até brilhante na face superior, alvo-pilosa especialmente nas nervuras e na face inferior, base subcordada a cordada, ápice agudo, 3-nérvea, nervuras às vezes divergindo 5 mm acima da base, nervuras secundárias levemente salientes na face superior, retículo indistinto até visível, aréolas desprovidas de pontos ou tubérculos microscópicos. **Inflorescências** axilares, sésseis, 3–6-floras, densamente híspido-ferrugíneas, brácteas inconspícuas. **Flores** 4-meras, até 4 mm compr.; cálice ca. 1 mm compr., ultrapassando o comprimento do tubo da corola; tubo da corola 8 mm compr., glabro; lobos até 3 mm compr., ovais, base dos lobos barbada. **Frutos** globosos, secando de modo semelhante a ameixas-secas, até 2 cm diam., castanho-escuros e moderadamente brilhantes, exocarpo fino, minutamente tuberculado; 1(–2) sementes discóides por fruto.

Murta-da-mata.

Amazônia brasileira.

Floresta de terra firme e mata secundária, solo argiloso.

Reserva Ducke, 27.V.1976, *Aluísio s.n.* (INPA 71739); l..cit., 11.IV.1967, *Prance et al. 4793* (INPA).

Espécimes adicionais estudados: BRASIL. AMAZONAS: São Paulo de Olivença, VII.1936, *Krukoff 7807* (K); Manaus, estrada do Aleixo, Campus do INPA, 30.III.1984, *Cid et al. 4291* (INPA); l.cit.., 12.XII.1974, *Gentry 13222* (INPA); Aleixo, road to Porto Mauá, 23.IV.1970, *W. Rodrigues 8858* (INPA); Igarapé do Franco, 17.X.1958, *D. Coelho 12* (INPA); Mauá Road, 24.III.1971, *Prance et al. 11578* (INPA).

Strychnos subcordata pertence à Secção *Intermedia*, sendo relacionado com *S. glabra* e *S. guianensis*, das quais difere através do seu porte, indumento e de suas folhas subcordadas de dimensões diminutas.

Espécies pouco conhecidas, mas provavelmente presentes na área de estudo (espécimes estéreis).

Strychnos cf. ***amazonica*** Krukoff – Reserva Ducke, 11.IV.1967 (fr) *Prance 4799, 4797* (INPA).

As coleções acima apresentam folhas fortemente acuminadas, secando enegrecidas, com nervuras terciárias paralelas e conspícuas, e foram identificadas por Krukoff como *S. amazonica*, cujo tipo é proveniente do Peru (*Schunke 131*, NY, US, A, K!). Apesar da coloração enegrecida tais espécimes coletados na Reserva Ducke apresentam certa semelhança com *S. peckii*.

Strychnos cf. ***toxifera*** Schomb. *ex* Benth. – Manaus-Caracaraí Rd, km 50, 25.VII.1975, *Prance et al. 23569* (INPA, NY).

Este espécime parece-se ligeiramente com *S. froesii*, no entanto seus ramos apresentam tricomas eretos, híspidos, e o indumento em suas folhas é longo e uniforme, especialmente na face adaxial. Krukoff determinou o espécime como *S. toxifera*, embora esta espécie não tenha sido observada na Reserva Ducke até o presente momento.

Flora da Reserva Ducke, Amazonas, Brasil: Malvaceae

Gerleni Lopes Esteves[1]

Schumann, K. 1891. Malvaceae I. *In*: C. F. P. Martius & A. G. Eichler (eds.). Fl. bras. 12(3): 253-457, tabs. 51-80.
Gürke, M. 1892. Malvaceae II. *In*: C. F. P. Martius & A. G. Eichler (eds.). Fl. bras. 12(3): 457-586, tabs. 81-114.

Ervas a subarbustos. Indumento constituído predominantemente de tricomas estrelados. **Folhas** simples, alternas, pecioladas, estipuladas; lâminas inteiras a sublobadas, geralmente palmatinérveas. **Inflorescências** racemosas, multifloras a unifloras. **Flores** grandes, vistosas, monoclínas, actinomorfas; epicálice geralmente presente, com bractéolas livres entre si; cálice gamossépalo, 5-lobado, prefloração valvar; pétalas 5, livres entre si, imbricadas, adnatas à base do tubo estaminal, com ou sem mancha basal; androceu monadelfo; tubo estaminal com partes livres de estames diversamente distribuídas; anteras monotecas; gineceu com 1-muitos carpelos; ovário (1–)2-muitos lóculos, (1–)2-muitos óvulos por lóculo; estiletes concrescidos até certa altura, separando-se em tantos ramos quanto são os carpelos ou em número dobro ao de carpelos; estigmas capitados. **Frutos** esquizocárpicos; mericarpos trígonos, múticos, rostrados ou aristados, nervado-reticulados; sementes reniformes ou obovóides; endosperma ausente ou abundante, embrião curvo ou reto, cotilédones em geral dobrados.

Família com mais de 100 gêneros e cerca de 2.500 espécies distribuídas nas regiões tropicais e subtropicais, especialmente na América do Sul, com alguns representantes em regiões temperadas. Caracteriza-se pelo hábito predominantemente herbáceo, indumento na maioria constituído de tricomas estrelados, flores em geral com epicálice, filetes concrescidos em tubo, com anteras monotecas e frutos capsulares ou esquizocárpicos.

A família possui importância econômica, incluindo espécies com potenciais ornamental, medicinal e alimentício, utilizadas como fonte de madeira e de fibras na indústria têxtil, cordoaria e na aniagem.

Na Reserva Ducke está representada por *Pavonia cancellata* e *Sida rhombifolia*.

Chave para os táxons de Malvaceae da Reserva Ducke

1. Ervas prostradas; flores com epicálice; ramos do estilete 10; carpelos 5 .. 1. *Pavonia cancellata*
1'. Ervas a subarbustos eretos; flores sem epicálice; ramos do estilete 10–12; carpelos 10–12 ..... 2. *Sida rhombifolia*

1. *Pavonia*

Pavonia Cav., Diss. 2 (app.2), 1786; 3:132, t.45-49, 1787.

Ervas com indumento constituído de tricomas estrelados e simples. **Folhas** com lâminas inteiras. **Flores** solitárias; epicálice com 4-muitas bractéolas, esverdeadas; cálice cupuliforme, menor que o epicálice; pétalas obovadas, com mancha basal; tubo estaminal menor que as pétalas, parte livre dos estames distribuídas ao longo de todo tubo, anteras reniformes; ramos do estilete em número dobro ao de carpelos. **Mericarpos** 5, obovóides, face dorsal convexa, faces laterais planas, rostrados; sementes reniformes.

Gênero com cerca de 271 espécies distribuídas no novo e velho mundo. No continente americano ocorrem aproximadamente 223 espécies, desde os Estados Unidos, estendendo-se pela América Central e pelas Antilhas, até o Uruguai.

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1.1 *Pavonia cancellata* (L.) Cav. Diss. 3: 135. 1787.

Ervas prostradas; ramos hirsutos, tricomas simples, patentes, esparsos; ramos floridos em geral ascendentes. **Folhas** com lâminas de 3,7–5,2 cm compr., 2,6–3,2 cm larg., oval-triangulares, ápice agudo, base sagitada a cordada, margem irregularmente serreada, 5–7 nervuras basais, faces adaxial e abaxial com tricomas simples, adpressos; pecíolos 1,5–2,5 cm compr., com tricomas simples, patentes; estípulas 3–4 mm compr., filiformes. **Flores** solitárias; pedicelos articulados 1,2–1,7 cm abaixo do epicálice; bractéolas do epicálice 11–14, 1,2–1,3 cm compr., filiformes, longamente ciliadas; cálice 5–9 mm compr., lobos ovais, ciliados; pétalas 2–2,5 cm compr., amarelas, mancha basal vinácea; tubo estaminal 9–10 mm compr., vináceo. **Mericarpos** 3-rostrados, face dorsal reticulada, verrucosa, faces laterais lisas, curtamente aladas; rostros com tricomas simples, retrorsos, rostro central ereto, rostros laterais divergentes; sementes pubérulas, vináceas.

Distribuição neotropical, desde o sul dos Estados Unidos (México) até a Região Sudeste do Brasil, com grande representação na América do Sul. Áreas alteradas, solo argiloso.

Floresce e frutifica o ano todo.

10.IX.1994 (fl) Vicentini *et al. 674* (INPA).

Espécie com grande variabilidade na morfologia das folhas e nos tipos de indumento e de tricomas. Caracteriza-se pelo hábito prostrado, epicálice com bractéolas filiformes e longamente ciliadas e pelas pétalas amarelas com mancha basal vinácea. *Pavonia cancellata* assemelha-se à *P. humifusa* A. St.-Hil., espécie com distribuição no Brasil e na Bolívia e distinta pela forma e indumento das folhas e pelo comprimento das pétalas e do tubo estaminal.

2. *Sida*

Sida L. Sp. pl. 683. 1753.

Subarbustos eretos; ramos com tricomas estrelados. **Folhas** com lâminas inteiras. **Inflorescências** racemosas; **flores** sem epicálice; cálice 10-angulado, plicado no botão; pétalas obovadas; tubo estaminal menor que a corola, partes livres de estames distribuídas na porção apical do tubo; ramos do estiletes em número igual ao de carpelos. **Mericarpos** 5-muitos, obovóides, rostrados, porção basal nervado-reticulada, indeiscente, porção apical lisa, deiscente ou indeiscente; sementes obovóides, hilo apical, côncavo.

Gênero com cerca de 150 espécies com distribuição nas Américas, África, Asia e na Austrália.

2.1 *Sida rhombifolia* L., Sp. pl. 2:684, 1753.

Subarbustos ca. 80 cm alt.; ramos pubescentes. **Folhas** com lâminas de 2–3,5 cm compr., 0,8–1,5 cm larg., as apicais menores, subromboidais, ápice agudo, base arredondada, margem crenado-serreada na metade apical, lisa na metade basal, 3–5 nervuras basais, face adaxial glabrescente, face abaxial tomentosa, tricomas estrelados; pecíolos 3–6 mm compr.; estípulas 4–6 mm compr., filiformes. **Inflorescências** axilares, glomeruliformes, multifloras; cálice 4–5 mm compr., fortemente 10-nervado na base, externamente pubescente, tricomas estrelados, lobos ciliados; pétalas 6–8 mm compr., amarelas; tubo estaminal 2–4 mm compr., amarelo; ramos do estilete 10–12. **Mericarpos** 10–12, reticulados, curtamente 2-rostrados; rostros ca. 0,5 mm compr., paralelos, com tricomas estrelados; sementes 1,5–2 mm compr., castanhas, pilosas ao redor do hilo

Distribuição pantropical, menos comumente em regiões temperadas. Áreas alteradas, solo argiloso.

Floresce e frutifica o ano todo

30.IV.1996 (fl, fr) *Costa & Assunção 500* (INPA).

A espécie caracteriza-se principalmente pelo cálice 10-nervado na base, com as nervuras proeminentes e pelos mericarpos em número de 10–12, com dois rostros apicais, pequenos e paralelos entre si.

Flora da Reserva Ducke, Amazonas, Brasil: Meliaceae

T. D. Pennington[1]

Meliaceae, Ventenat, Tab. Règ. Vég. 3: 159-166. 1799.
Candolle, C. 1878. *In* Martius, Fl. bras. 11(1): 165.
Pennington, T. D. 1981. Fl. Neotrop. 28: 1-470.

Trees or **treelets**. Indumentum usually simple, less frequently stellate or of malpighiaceous hairs. Stipules absent. **Leaves** spirally arranged, usually pinnate, rarely trifoliolate or unifoliolate. Leaflets entire, venation usually eucamptodromous. **Inflorescence** usually axillary, usually paniculate with cymose branchlets (thyrsoid). **Flowers** bisexual or unisexual, plants monoecious, dioecious or polygamous. Calyx usually shallowly 3–5-lobed, or less frequently sepals free. Petals 4–7, free or partially united, aestivation imbricate or valvate. Filaments rarely completely free, usually partly or completely united to form an urceolate, cyathiform or cylindrical staminal tube, with or without appendages, anthers 5–10, hairy or glabrous, inserted apically on the filaments or on the margin of the staminal tube, or within the throat of the tube. Nectary (disk) intrastaminal or absent. Ovary 2–10-locular, loculi 1-ovulate, 2-ovulate or multiovulate. Style-head capitate, conical or lobed. **Fruit** a loculicidal or septifragal capsule. **Seed** either winged, and then attached to a large woody columella, or unwinged and then with a fleshy or corky arillode or sarcotesta.

About 140 species in the Neotropics with a further 350–400 in Africa and Asia. They mostly occur in undisturbed lowland rain forest with only a few species in montane areas up to 2500 m altitude. The greatest species diversity is found from the Guianas, across Amazonia to western Brazilian Amazonia and Peru, with lesser centres in the Caribbean islands and coastal Brazil. This treatment includes the twenty-nine species which are found in the vicinity of Manaus, 19 of which occur in the Reserva Ducke.

The illustrations are adapted from Flora Neotopica 28 with permission from the New York Botanical Garden.

Key to the genera of Meliaceae in the Manaus area

1. Ovary loculi with 1–2 ovules, fruit a loculicidal capsule.
   2. Anthers inserted at apex of filaments or on margin of staminal tube ..... 1. *Trichilia*
   2. Anthers inserted within the throat of the staminal tube ..... 2. *Guarea*
1. Ovary loculi with 3-many ovules, fruit a septifragal capsule.
   3. Staminal tube of completely united filaments, anthers 8–10, inserted within the throat of staminal tube, seeds large, angular, woody, not winged ..... 3. *Carapa*
   3. Stamens 5, filaments free, but adnate to an androgynophore below, anthers inserted apically on the filaments, seeds small, with a papery wing ..... 4. *Cedrela*

1. *Trichilia*

Trichilia P. Browne, Hist. Jamaica 278. 1756.

Trees or **treelets**. Indumentum usually of simple hairs, less frequently of stellate, dibrachiate or malpighiaceous hairs. **Leaves** usually pinnate, less frequently trifoliolate or unifoliolate, leaflets sometimes glandular-punctate and -striate. **Flowers** usually unisexual (plant dioecious), in axillary thyrsoid panicles. Calyx usually shallowly 4–6-lobed, or sepals free. Petals 4–5(–6), free or partially united, imbricate or valvate. Filaments completely united to form a staminal tube, usually with a toothed or lobed margin, or

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partly free and then with or without 2 terminal lobes or appendages; anthers 5–10, inserted on the margin of the staminal tube or apically on the filaments, hairy or glabrous. Nectary usually a fleshy annulus surrounding the base of the ovary, or absent. Ovary 2–3-locular, loculi with 1–2 collateral or superposed ovules; style-head usually capitate. **Fruit** a 2–3-valved loculicidal capsule, valves leathery to woody, loculi 1–2-seeded. **Seed** fleshy, partly or completely surrounded by a thin or fleshy arillode, or rarely with a complete sarcotesta. Embryo with usually collateral or rarely superposed cotyledons.

About 80 species in tropical America, 14 in Africa and 2 in the Indo-Malayan region. Fifteen species occur in the environs of Manaus, including 10 in Reserva Ducke.

Key to the species of *Trichilia* of the Manaus area

1. Young shoots and inflorescence with minute stellate indumentum.
   2. Petiolule 4–5 mm long, leaflets often lanceolate, pericarp *ca.* 0.5 mm thick, seed surrounded by free arillode ..... 2. *T. mazanensis*
   2. Petiolule 5–10 mm long, leaflets often broadly oblong, pericarp 1.5–2 mm thick, seed with a fleshy sarcotesta ..... 1. *T. euneura*
1. Indumentum of simple or dibrachiate hairs.
   3. Petals imbricate, free.
      4. Staminal tube of completely united filaments ..... 6. *T. septentrionalis*
      4. Staminal tube of partially united filaments.
         5. Twigs with numerous pale lenticels, inflorescence 6–15 cm long, with wide-spreading branches, petals 1.5–2.5 mm long, ovary glabrous ..... 3. *T. micrantha*
         5. Twigs without numerous pale lenticels, inflorescence 1–4 cm long, little-branched, petals 3.5–6 mm long, ovary pubescent.
            6. Leaflets 7–9, sepals 5, petals 5, stamens 10, capsule 2.5–3 cm long, puberulous, drying greyish-brown ..... 4. *T. rubra*
            6. Leaflets (3–)5, sepals 4, petals 4, stamens 8, capsule 1–2 cm long, densely pubescent, drying pale greenish-brown ..... 5. *P. pallida*
   3. Petals valvate, usually partially fused.
      7. Leaflets dimorphic or heteromorphic, lowest pair much reduced and often a different shape, sometimes vestigial.
         8. Petals free.
            9. Reduced basal leaflets linear or linear subulate, leaves 1–5-foliolate, leaflet base not asymmetrical ..... 13. *T. areolata*
            9. At least some of reduced basal leaflets with expanded blade, leaves 6–10-foliolate, leaflet base usually asymmetrical ..... 14. *T. inaequilatera*
         8. Petals partially united (1/4 to 2/3 of their length).
            10. Leaflets 7–11, 14–25 cm long, secondary veins 20–30 pairs ..... 11. *T. bullata*
            10. Leaflets 5–7, 3.2–15 cm long, secondary veins 9–12 pairs.
               11. Leaflets 3.2–7 cm long, petals *ca.* 2 mm long, anthers 7(–8) .... 10. *T. micropetala*
               11. Leaflets 9–15 cm long, petals *ca.* 3 mm long, anthers 9(–10) ..... 12. *T. pleeana*
      7. Leaflets not dimorphic or heteromorphic.
         12. Leaves 1-foliolate ..... 15. *T. singularis*
         12. Leaves 3-8-foliolate.
            13. Lower leaflet surface with sparse medifixed closely appressed hairs (lens), ovary 2-locular ..... 15. *T. singularis*
            13. Lower leaflet surface without medifixed hairs, ovary 3-locular.

14. Leaflets 6–8, petals *ca.* 2 mm long ..... 7. *T. cipo*
14. Leaflets 4–5, petals 3.5–5 mm long.
15. Petals fused for 2/3 to 3/4 of their length, remaining erect, anthers 5–7(–8), capsule 3.5–4.5 cm long ..... 8. *T.* aff. *poeppigii*
15. Petals fused *ca.* 1/5 of their length, reflexed, anthers 10, capsule 2–3.5 cm ..... 9. *T.* aff. *schomburgkii*

1.1 *Trichilia euneura* C. DC., *in* A. & C. de Candolle, Monogr. Phan. 1: 673. 1878; Pennington & Styles, Fl. Neotrop. 28: 42, fig. 3. 1981. **Fig. 1 a-c**

Young shoots stellate-puberulous at first, soon glabrous, greyish-brown. **Leaves** pinnate, 12–15 cm long, petiole semiterete, rhachis more or less terete, subglabrous. Leaflets 5–6, alternate, 10–15×4–6.8 cm, the lowest leaflets smaller than the upper, broadly oblong to elliptic, apex obtusely cuspidate to narrowly attenuate, base acute, obtuse or truncate, glabrous above, minutely and sparsely peltate-stellate or stellate puberulous below, glandular-punctate and -striate; venation eucamptodromous, midrib sunken on the upper surface, secondaries 9–12 pairs, straight and more or less parallel, intersecondaries absent, tertiaries oblique. Petiolule 5–10 mm long, channelled above. **Inflorescence** axillary, 3–6 cm long, a densely-flowered thyrse, minutely stellate-puberulous. Pedicel *ca.* 1 mm long. **Flowers** unisexual (plant dioecious). Sepals 5, 1–2 mm long, free, imbricate, finely stellate-puberulous. Petals 5, 4–5 mm long, free, imbricate, stellate-puberulous outside, glabrous inside. Stamens 8, partially fused (1/3 to 1/2 their length) into an urceolate or cyathiform staminal tube 3–4 mm long, filaments terminated by 2 acute appendages about equalling the anthers, pubescent on both surfaces; anthers 0.5–1 mm long, sparsely hairy; antherodes of female flower slender, without pollen. Nectary minute or absent. Ovary ovoid, 3-locular, loculi with 2 collateral ovules, densely stellate-pubescent. **Capsule** 2.7–3.8 cm long, ellipsoid to obovoid, apex and base acute, smooth, densely stellate-puberulous, 3-valved, valves remaining erect. **Seed** solitary, 2.5–3.2 cm long, completely surrounded by a fleshy sarcotesta.

Field characters: Tree to 25 m high and 30 cm diameter, bole slightly fluted at the base, bark greyish, lenticellate, scaling in rather long slender pieces, slash without exudate. Flowers sweetly scented, with greenish-cream corolla and bright yellow anthers. Fruit and seed (sarcotesta) orange. Flowering in central Amazonia from July to September.

From Amapá and the Guianas across Amazonia to Peru, also in Venezuela, where it is confined to lowland rain forest on terra firme. *s.d.* (fl) *Pennington, T. D. et al. 9933* (FHO INPA K). AMAZONAS: Presidente Figueiredo, Represa de Balbina on R. Uatumã, *Thomas et al. 5260* (INPA K).

Trichilia euneura is closely related to *T. mazanensis* and shares the same geographical range. They are the only species in central Amazonia with an indumentum of stellate hairs. *Trichilia euneura* differs from *T. mazanensis* in its narrow elliptic or lanceolate leaflets, straight and more or less parallel secondary veins (arcuate and convergent in *T. mazanensis*), oblique tertiary veins (reticulate in *T. mazanensis*), and seed with fused sarcotesta (seed of *T. mazanensis* with free arillode). The species are also separated by their ecology, *T. euneura* occurring on non-flooded land while *T. mazanensis* is confined to flooded (várzea) and igapó forest and river margins.

1.2 *Trichilia mazanensis* Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser. 13(3): 742. 1949; Pennington & Styles, Fl. Neotrop. 28: 45, fig. 3. 1981. **Fig. 1 d-f**

Young shoots finely stellate-puberulous at first, soon glabrous, lenticellate. **Leaves** pinnate, 9–15 cm long, petiole and rhachis semiterete, subglabrous. Leaflets 7-9, alternate, 7–12 × 3–5 cm, elliptic to lanceolate, apex narrowly

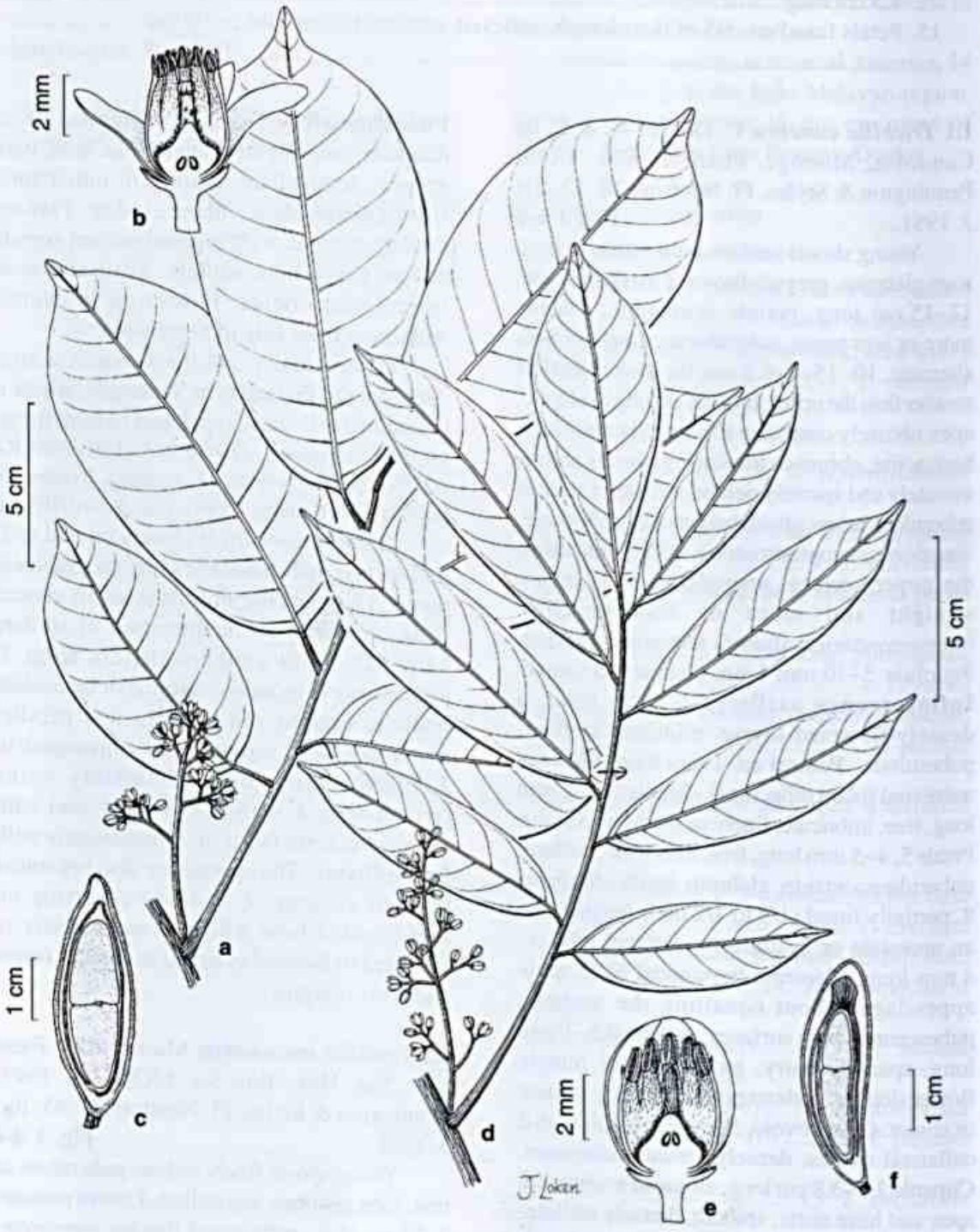

Figure 1 - a-c. *Trichilia euneura* - a. habit; b. male flower (*Pennington 9933*); c. fruit and seed (*Oldeman B2989*). d-f. *T. mazanensis* - d. habit, e. male flower (*Schunke 136*); f. fruit and seed (*Silva et al. 1706*).

attenuate, base obtuse to narrowly attenuate, glabrous, glandular-punctate and rarely-striate; venation eucamptodromous, midrib flat on the upper surface, secondaries 8–9 pairs, steeply arcuate-ascending, convergent, intersecondaries short or absent, tertiaries reticulate, conspicuous on both surfaces, Petiolule 4–5 mm long, slightly channelled. **Inflorescence** axillary, 2–6 mm long, thyrsoid, stellate-puberulous. Pedicel 1–2 mm long. **Flowers** unisexual (plant dioecious). Sepals 5, 1–5 mm long, more or less free, slightly imbricate, stellate puberulous. Petals 5, 4–5 mm long, free, imbricate, stellate-puberulous outside, glabrous inside. Stamens 9–10, partially fused (1/2 to 2/3 their length) into an areolate or cyathiform staminal tube 1.5–3.5 mm long, filament apex rounded or terminated by two short acute lobes about 1/3 of the length of the anther, hispid inside the tube, sparser indumentum outside; anthers 0.7–1 mm long, hairy; antherodes of female flower slender, without pollen. Nectary represented by small annular swelling around the base of the ovary. Ovary broadly ovoid, 3-locular, loculi with 2 collateral ovules, densely pubescent with a mixture of stellate and simple hairs. **Capsule** 2.5–3.5 cm long, ovoid, obovoid or ellipsoid, apex rounded, base rounded or tapered, smooth, densely puberulous with a mixture of simple and stellate hairs, 3-valved, valves remaining erect. **Seed** solitary, 2–3 cm long, surrounded by a free arillode which covers the seed except for a small area near the base.

Field characters: Tree to 20 m high with greenish-yellow flowers. The fruit matures greenish-yellow and the seed is surrounded by an orange arillode. Flowering in central Amazonia from December to March with the fruit maturing in July to August.

Trichilia mazanensis is confined to igapó and várzea forest, and its known distribution extends from Venezuela to southern Amazonian Brazil and Amazonian Peru.

Not recorded from Reserva Ducke.

AMAZONAS: Município de Manaus, junction of R. Negro and R. Solimões, *Ferreira 289* (INPA K).

Trichilia mazanensis and *T. euneura* form an isolated pair of species within *Trichilia*. Their differences are discussed under the latter.

1.3 *Trichilia micrantha* Benth., *in* Hooker's J. Bot., Kew Gard. Misca. 3: 369. 1851; Pennington & Styles, Fl. Neotrop. 28: 69, fig. 8. 1981. **Fig. 2**

Young shoots appressed puberulous, soon becoming glabrous, with numerous conspicuous pale lenticels. **Leaves** imparipinnate, 8–20 cm long, petiole semiterete, rhachis flattened or terete, subglabrous; often with flat, oblong, extra-floral nectaries on the lower surface of petiole and rhachis. Leaflets 7–9, opposite, 7–17 × 2.8–7.5 cm, elliptic to broadly oblong, apex narrowly attenuate to obtusely cuspidate, base obtuse to narrowly attenuate, glabrous above, puberulous to glabrous below, some-times glandular-punctate and striate; venation eucamptodromous or brochidodromous, midrib raised on the upper surface, secondaries 12–18 pairs, shallowly ascending, arcuate, parallel or slightly convergent, intersecondaries moderate to long, higher order venation obscure. Petiolule 2–5 mm long, subglabrous. **Inflorescences** 6-15 cm long, usually clustered around the shoot apex in the axils of caducous undeveloped leaves, paniculate with widely spreading branches, puberulous. Pedicel *ca.* 1 mm long. **Flowers** unisexual (plant monoecious or dioecious). Sepals 5, *ca.* 0.5 mm long, free or slightly fused, slightly imbricate, ciliate. Petals 5, 1.5–2.5 mm long, free, imbricate, glabrous. Stamens 10, partially fused (1/4 to 1/3 of their length) into a cyathiform or urceolate staminal tube 1–1.5 mm long, filament apex rounded or with 2 short appendages, densely hairy on both surfaces in the upper half; anthers *ca.* 0.5 mm long, hairy; antherodes of female flower shrunken, without pollen. Nectary a thick fleshy annulus surrounding the base of the ovary, glabrous. Ovary 3-locular, loculi uniovulate, glabrous. **Capsule** 1–2 cm long, broadly ellipsoid, apex obtuse, smooth, sericeous, tomentose or glabrous, 3-valved. **Seeds** 1–3, 0.8–1.5 cm long, completely surrounded by a thin fleshy arillode.

Field characters: Tree to 25 m high and 25 cm diameter. In central Amazonia there are two co-existing forms of this species, which differ in bole and fruit characters. Both are present in Reserva Ducke.

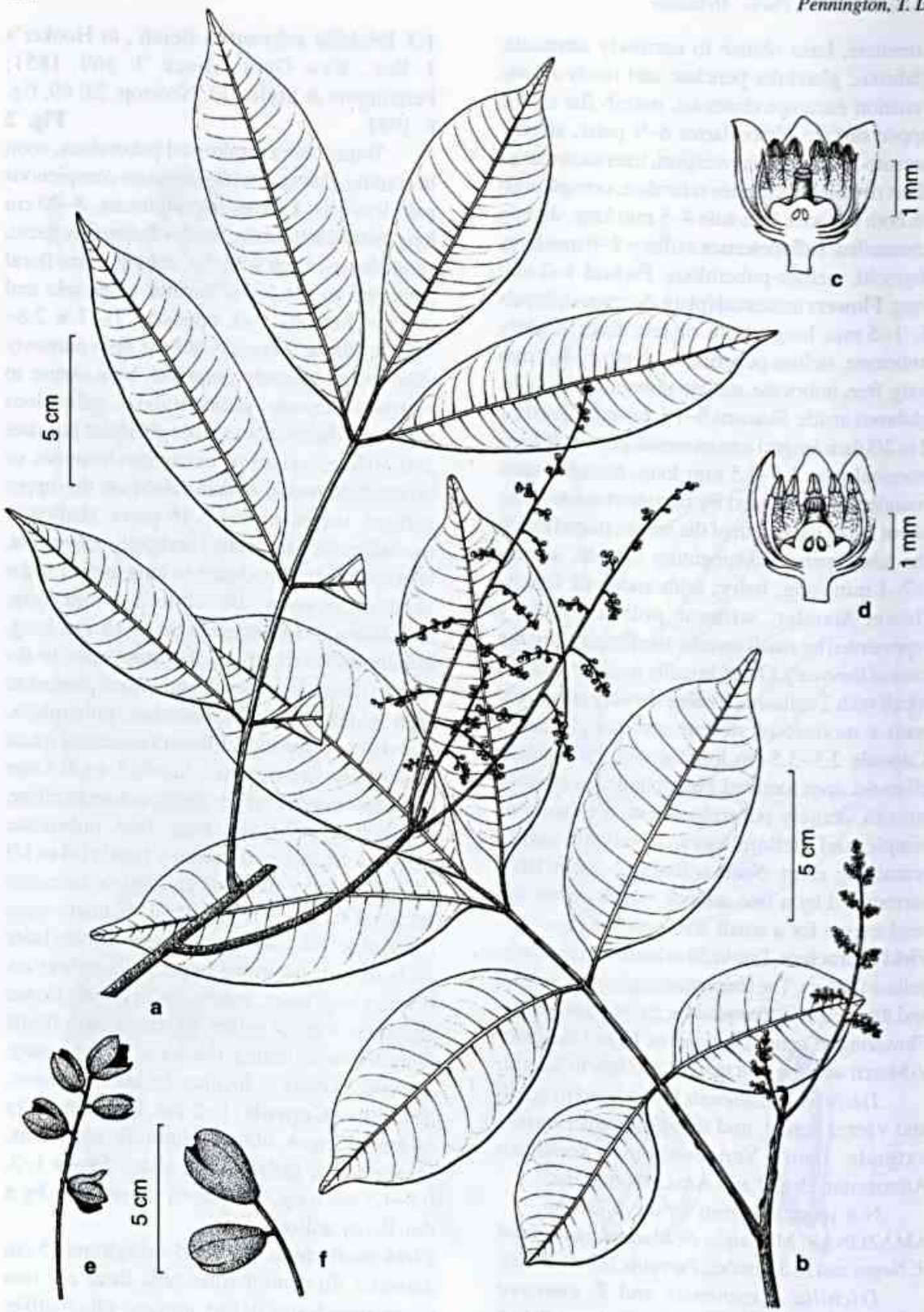

Figure 2 - *Trichilia micrantha* - a. habit (*Pennington 9923*); b. habit; c. male flower (*Pennington 9932*); d. female flower (*Breteler 4771*); e. fruit (*Spruce 2286*); f. fruit (*Steyermark & Rabe 96274*).

Form 1 has a round bole with smooth brown bark, extra-floral nectaries on the leaf petiole and rhachis, broad, elliptic subcoriacious leaves and a sericeous fruit.

Form 2 has a fluted bole, scaling bark, no extra-floral nectaries, narrower oblong chartaceous leaflets and glabrous fruit.

Although quite distinct in central Amazonas, elsewhere in the range the distinctions break down and for this reason they are not given formal recognition. See Fl. Neotrop. 28: 72-73 (1981) for further discussion of this variation pattern.

The flowers of *T. micrantha* are greenish-white, with yellow anthers, and the fruit is yellowish with an orange-red arillode. Flowering in central Amazonas is recorded in March, April and July.

From northern Venezuela across Amazonia to Colombia, Peru and Bolivia. It is a species of non-flooded lowland forest. 10.VII.1995 (fr) *Costa, M. A. S. et al. 311* (G INPA K MBM MG R U UB US); 19.VI.1965 (fl) *Loureiro, A. & Coêlho, D. INPA 15523* (INPA); 28.IV.1988 (bd) *Ramos, J. F. 1885* (BM COL INPA K MEXU MG SPF UEC VEN); 5.VII.1993 (fl) *Ribeiro, J. E. L. S. et al. 1021* (INPA K MG MO NY RB SP); 15.V.1963 (fl) *Rodrigues, W. & Coêlho, D. 5220* (INPA); 30.IV.1965 (fl) *Rodrigues, W. & Coêlho, D. 6913* (INPA); 27.IV.1965 (fl) *Rodrigues, W. & Monteiro, O. P. 6919* (INPA); 25.V.1995 (fr) *Sothers, C. A. 472* (INPA K MG MO NY RB SP); 26.VII.1995 (fr) *Sothers, C. A. & Assunção, P. A. C. L. 530* (BM COL IAN INPA K SPF UEC UFMT VEN); 26.VII.1995 (fr) *Sothers, C. A. & Assunção, P. A. C. L. 531* (B F ICN INPA K MG P PUEFR VIC); 26.III.1996 (fl) *Sothers, C. A. & Silva, C. F. 835* (B F IAN INPA K PPUEFR UFMT); 3.V.1968 (fl) *Souza, J. A. INPA 21217* (INPA); 27.VI.1968 (fr) *Souza, J. A. 29* (INPA); 21.VIII.1968 (fr) *Souza, J. A. 103* (INPA); 15.III.1995 (fl) *Vicentini, A. & Pereira, E. C. 905* (G IAN INPA K MBM R U UB US).

In spite of its variation *T. micrantha* is an easily recognized plant. The twigs have conspicuous white lenticels, the leaves dry a characteristic dark colour, the inflorescences are clustered together around the shoot apex, and the flowers have a prominent annular nectary surrounding the glabrous ovary and the ovary loculi are uniovulate.

1.4 *Trichilia rubra* C. DC. *in* Mart., Fl. bras. 11(1): 203. 1878; Pennington & Styles, Fl. Neotrop. 28: 75, fig. 9. 1981. **Fig. 3**

Trichilia guianensis Klotzsch *ex* C. DC. *in* A. & C. DC., Monogr. Phan. 1: 657. 1878.

Young shoots appressed puberulous at first, soon glabrous. **Leaves** imparipinnate, 9–12 cm long, petiole and rhachis semiterete, glabrous. Leaflets 7–9, opposite, 7–12 × 2–4 cm, oblong or elliptic, apex narrowly attenuate, base acute or narrowly attenuate, glabrous, sometimes glandular-punctate and -striate; venation eucamptodromous or brochidodromous, midrib slightly raised on the upper surface, secondaries 10–12 pairs, arcuate, convergent, impressed on the upper surface, intersecondaries long, tertiaries obscure, reticulate. Petiolule 4–6 mm long, slightly channelled, glabrous. **Inflorescence** axillary, 1–4 cm long, often several clustered on a short axillary shoot, sparsely puberulous. Pedicel *ca.* 1 mm long. **Flowers** unisexual (plant dioecious). Sepals 5, *ca.* 1 mm long, united for about 1/2 of their length, glabrous. Petals 5, 3.5–4 mm long, free, imbricate, glabrous. Stamens 10, partially fused (1/3 to 2/3 of their length) into a cyathiform or urceolate staminal tube 2.5–3 mm long, filaments apex rounded or with 2 short lobes, tube barbate in the throat; anthers *ca.* 0.75 mm long, with scattered hairs, antherodes of female flower slender, without pollen. Nectary absent. Ovary ovoid, 3-locular, loculi 1-ovulate, densely pubescent, style-head discoid. **Capsule** 2.5–3 cm long, ovoid or ellipsoid, apex and base obtuse to acute, smooth, puberulous, 3-valved, valves sometimes strongly reflexed. **Seed** solitary, 1.4–2.2 cm long, completely surrounded by a thin fleshy arillode.

Field characters: Tree to 25 m high, often flowering as a small treelet. Flowers scented, yellowish-green. Flowering in Reserva Ducke in December.

Throughout the Amazon region to the Guianas in the north and Peru and Bolivia in the west. The species is confined to riverbanks and forest on periodically or permanently flooded land.

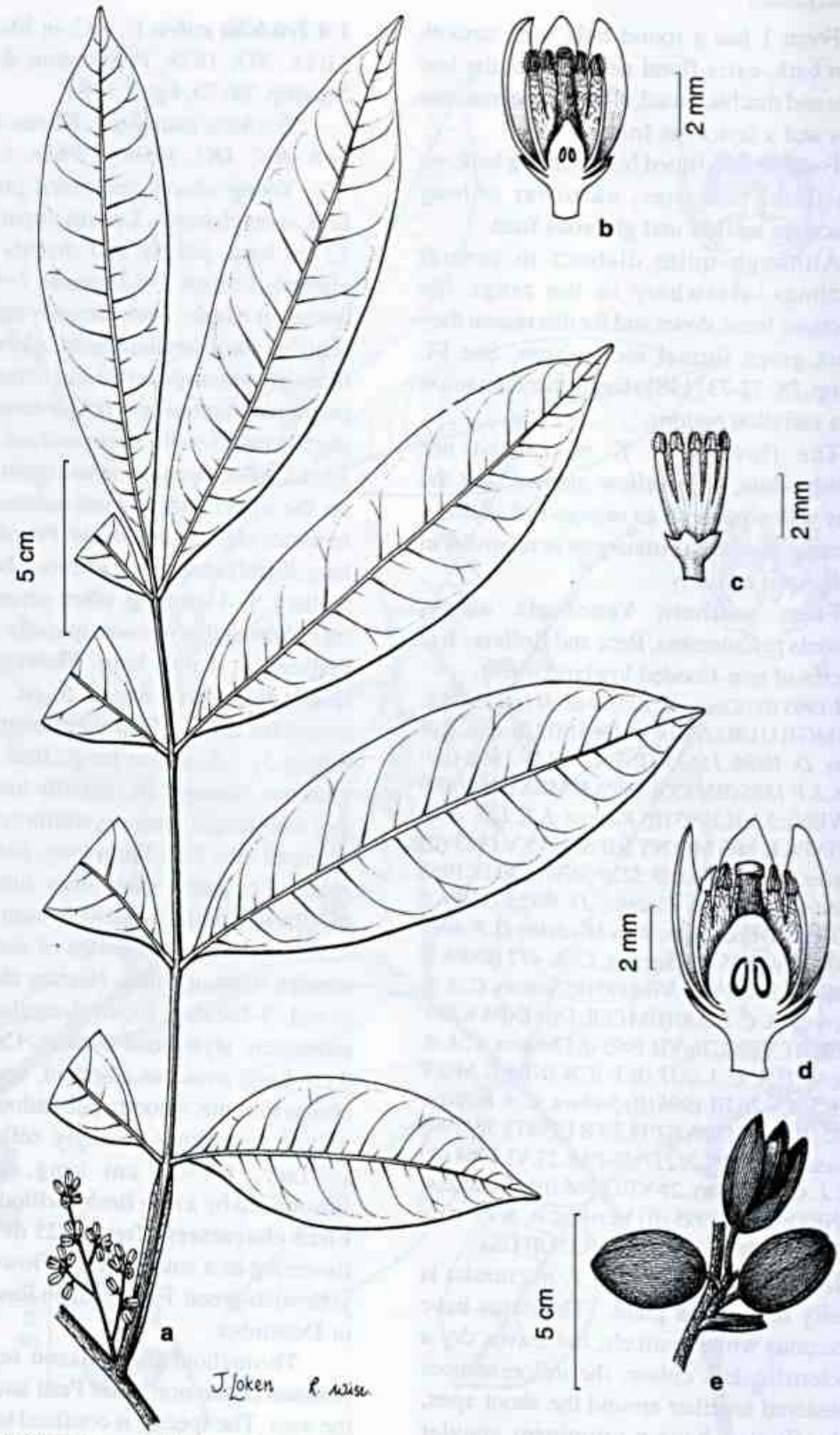

Figure 3 - *Trichilia rubra* - a. habit; b. male flower; c. staminal tube (*FDBG D344*); d. female flower (*Persaud 176*); e. fruit (*Blanco 410*).

10.XII.1993 (fl) *Vicentini, A. et al. 395* (INPA K MG MO NY SP).

Trichilia rubra is fairly isolated among the Amazonian *Trichilia* species with partially free staminal filaments. It lacks the lenticellate twigs of *T. micrantha* and its inflorescence is shorter and flowers larger. *Trichilia pallida* has 4-merous flowers and also differs in the presence of an annular disk, 2-ovulate ovary locules and in having fewer leaflets which tend to dry pale green.

1.5 *Trichilia pallida* Sw., Prodr. Veg. Ind. Occa. 67. 1788; Pennington & Styles, Fl. Neotrop. 28: 95, figs. 13, 14. 1981.

Trichilia macrophylla Benth., Hooker's J. Bot. Kew Gard. Misc. 3: 369. 1851.

Young shoots shortly pubescent at first, soon glabrous, lenticellate. **Leaves** imparipinnate, sometimes with a few trifoliolate, 3–10 cm long, petiole and rhachis semiterete, puberulous to glabrous. Leaflets (3–)5, opposite, 8.5–14 × 3–6.5 cm, lower pair usually smaller than upper pair, variable in shape, from elliptic to oblanceolate or ovate, apex narrowly attenuate, base narrowly attenuate to obtuse, often asymmetrical, glabrous, sometimes sparsely glandular-striate; venation eucamptodromous or sometimes brochidodromous in the upper third, midrib flat or slightly raised on the upper surface, secondaries 9–11 pairs, arcuate, convergent, intersecondaries mostly absent, tertiaries oblique to reticulate. Petiolule 3–4 mm long, glabrous. **Inflorescence** axillary, 1–3 cm long, a small fasciculate thyrse, sparsely puberulous. Pedicel *ca.* 0.5 mm long (above articulation). **Flowers** unisexual (plant dioecious). Sepals 4, *ca.* 1 mm long, fused for most of their length, sparsely puberulous outside. Petals 4, 5–6 mm long, apex acute, free, imbricate, subglabrous. Stamens 8, partially fused (1/3 to three quarters of their length) into a cyathiform or cylindrical staminal tube 4–4.5 mm long, filaments terminated by 2 slender appendages more or less equalling the anthers, glabrous outside, barbate or glabrous in the throat; anthers *ca.* 1 mm long, glabrous, antherodes of female flower slender, without pollen. Nectary annular, surrounding the base of the ovary, pubescent. Ovary 3-locular, loculi with 2 obliquely superposed ovules, stiffly pubescent. **Capsule** 1–2 cm long, ovoid to ellipsoid, densely pubescent with golden hairs, 3-valved, valves wrinkling horizontally on drying and sometimes reflexed. **Seed** usually 1 in each valve, 0.5–1 cm long, with an arillode covering most of the surface.

Field characters: Tree to 25 m high and 30 cm diameter, but often flowering as a small treelet, unbuttressed, bole sometimes fluted at the base, cylindrical above. Bark reddish brown, scaling and with lenticels in long vertical rows, slash pale whitish brown and fibrous. Flowers with pale green corolla and greenish-cream stamens. Capsule maturing yellowish-green, the seeds black and shining, partially surrounded by the red arillode. Flowering in central Amazonia has been recorded in April, August and December.

Throughout tropical America from Mexico to Paraguay and northern Argentina, in lowland and montane rain forest up to 2000 m altitude. In drier areas it is found in gallery forest.

14.VIII.1996 (fr) *Assunção, P. A. C. L. et al. 368* (G INPA K MG MO NY R RB SP U); 9.VIII.1996 (fr) *Hopkins, M. J. G. et al. 1602* (BM INPA K MBM MG UB US VEN); 12.XII.1968 (fl) *Prance, G. T. et al. 9044* (INPA); 12.IX.1997 (fl) *Pruski, J. F. et al. 3255* (INPA); 7.IV.1994 (fl) *Ribeiro, J. E. L. S. et al. 1255* (INPA K MG MO NY RB SP); 29.XI.1963 (fl) *Rodrigues, W. 5549* (INPA); 2.I.1964 (fr) *Rodrigues, W. & Monteiro, O. P. 5652* (INPA); 29.XII.1964 (fr) *Rodrigues, W. & Monteiro, O. P. 6816* (INPA); 3.II.1965 (fr) *Rodrigues, W. & Monteiro, O. P. 6854* (INPA); 11.V.1966 (fl) *Rodrigues, W. & Coêlho, D. 7832* (INPA); 27.IX.1994 (fl) *Sothers, C. A. et al. 177* (INPA); 18.XII.1996 (fl) *Sothers, C. A. & Silva, C. F. 963* (G IAN INPA K MBM R U UB US).

A very distinctive species with (3–)5 leaflets drying pale cream, the short fasciculate inflorescence, 4-merous flowers, acutely tipped petals and small capsule with golden-brown indumentum.

1.6 *Trichilia septentrionalis* C. DC., *in* Mart. Fl. bras. 11(1): 220. 1878; Pennington & Styles, Fl. Neotrop. 28: 126, fig. 21. 1981. **Fig. 4**

Young shoots finely puberulous, indumentum persisting, without lenticels. **Leaves** imparipinnate, 17–25 cm long, petiole broadened and narrowly winged below, semiterete above, rhachis semiterete, finely puberulous. Leaflets 7–9, opposite or subopposite, 10–16 × 4.5–7 cm, the lowest leaflets smaller than the upper, broadly oblong to elliptic, apex narrowly attenuate, base narrowly cuneate to obtuse or rounded, upper surface glabrous, lower surface finely puberulous to glabrous, often faintly glandular-punctate and striate; venation eucamptodromous, midrib flat or slightly raised on the upper surface, secondaries 15–17 pairs, parallel, slightly arcuate, inter-secondaries absent, tertiaries oblique. Petiolule 5–8 mm long, puberulous. **Inflorescence** axillary, 18–25 cm long, a narrow, branched panicle, puberulous. Pedicel 0–0.5 mm long. **Flowers** unisexual (plant monoecious or ? dioecious). Sepals 5, 1.5–2.5 mm long, free, strongly imbricate, puberulous, ciliate. Petals 5(–7), 3–5 mm long, free, strongly imbricate, appressed puberulous to sericeous outside, glabrous inside. Stamens (8–)10, completely fused into a cyathiform or cylindrical staminal tube 2–4 mm long, margin with (8–)10 subulate appendages alternating with the anthers, sparsely hairy to barbate in the upper half; anthers 1–1.3 mm long, glabrous; antherodes of female flower shrunken, without pollen. Nectary annular, glabrous. Ovary, ovoid or conical, 3-locular, loculi 1-ovulate, pubescent, style-head minutely lobed. **Capsule** 2–3 cm long, oblong, ellipsoid or obovoid, apex rounded, base tapered, smooth, densely puberulous, 3-valved, valves opening widely and sometimes reflexing. **Seed** 1–2, 1–2 cm long, with a fleshy arillode which covers most of the seed.

Field characters: Tree to 25 m high and 25 cm diameter, bole sometimes fluted at the base. Bark grey to greyish-brown, longitudinally cracked and slightly scaling. The sweetly scented flowers are greenish-cream and the fruit ripens reddish, with the seeds surrounded by a red arillode. Flowering in central Amazonas in April with the fruit ripening in July.

From Costa Rica across the whole of northern South America, from the foothills of the Andes in Peru to Maranhão. Usually found in lowland rain forest but ascending to 2000 m altitude in montane rain forest in Venezuela. 22.III.1994 (fr) *Hopkins, M. J. G. et al. 1406* (INPA K MG MO NY RB SP); 11.VII.1994 (bd) *Nascimento, J. R. & Pereira, E. C. 532* (INPA K MG MO NY RB SP); 14.IX.1987 (fr) *Pruski, J. F. 3245* (INPA K MBM MG SPF UEC UFMT); 13.II.1964 (fr) *Rodrigues, W. & Monteiro, O. P. 5732* (INPA); 22.IV.1964 (fr) *Rodrigues, W. & Loureiro, A. 5777* (INPA); 28.V.1964 (fl) *Rodrigues, W. & Loureiro, A. 5821* (INPA); 16.VI.1964 (fr) *Rodrigues, W. & Loureiro, A. 5914* (INPA); 17.VII.1968 (fl) *Souza, J. A. 46* (INPA); 13.V.1994 (fr) *Vicentini, A. et al. 550* (G IAN INPA K R U UB).

Local name: Jitó.

Trichilia septentrionalis is distinctive in the field on account of the pale green leaf undersurface, the rather prominent parallel secondary venation, and the large erect, axillary panicles.

1.7 *Trichilia cipo* (A. Juss.) C. DC. *in* Mart., Fl. bras. 11(1): 214. 1878; Pennington & Styles, Fl. Neotrop. 28: 152, fig. 27. 1981. **Fig. 5**

Moschoxylum cipo A. Juss., Mém. Mus. Hist. Nat. 19: 239, 280. 1831.

Young shoots finely appressed puberulous at first, becoming glabrous, slightly scaling. **Leaves** pinnate, 10–20 cm long, petiole and rhachis semiterete, sparsely appressed puberulous. Leaflets 6–8, alternate to subopposite, 8.5–15 × 3–6.2 cm, the lowest leaflets smaller than the upper, elliptic, apex narrowly attenuate, base narrowly attenuate to obtuse, glabrous, sometimes glandular-punctate and -striate; venation eucamptodromous or brochidodromous, midrib flat or slightly raised on the upper surface, secondaries 10–12 pairs, straight or slightly arcuate, more or less parallel, intersecondaries moderate to long, tertiaries reticulate. Petiolule 1–2 mm long, subglabrous. **Inflorescence** axillary, 20–35 cm long, a lax-branched, narrowly pyramidal thyrse, sparsely puberulous to subglabrous. Pedicel 0.5–1 mm long.

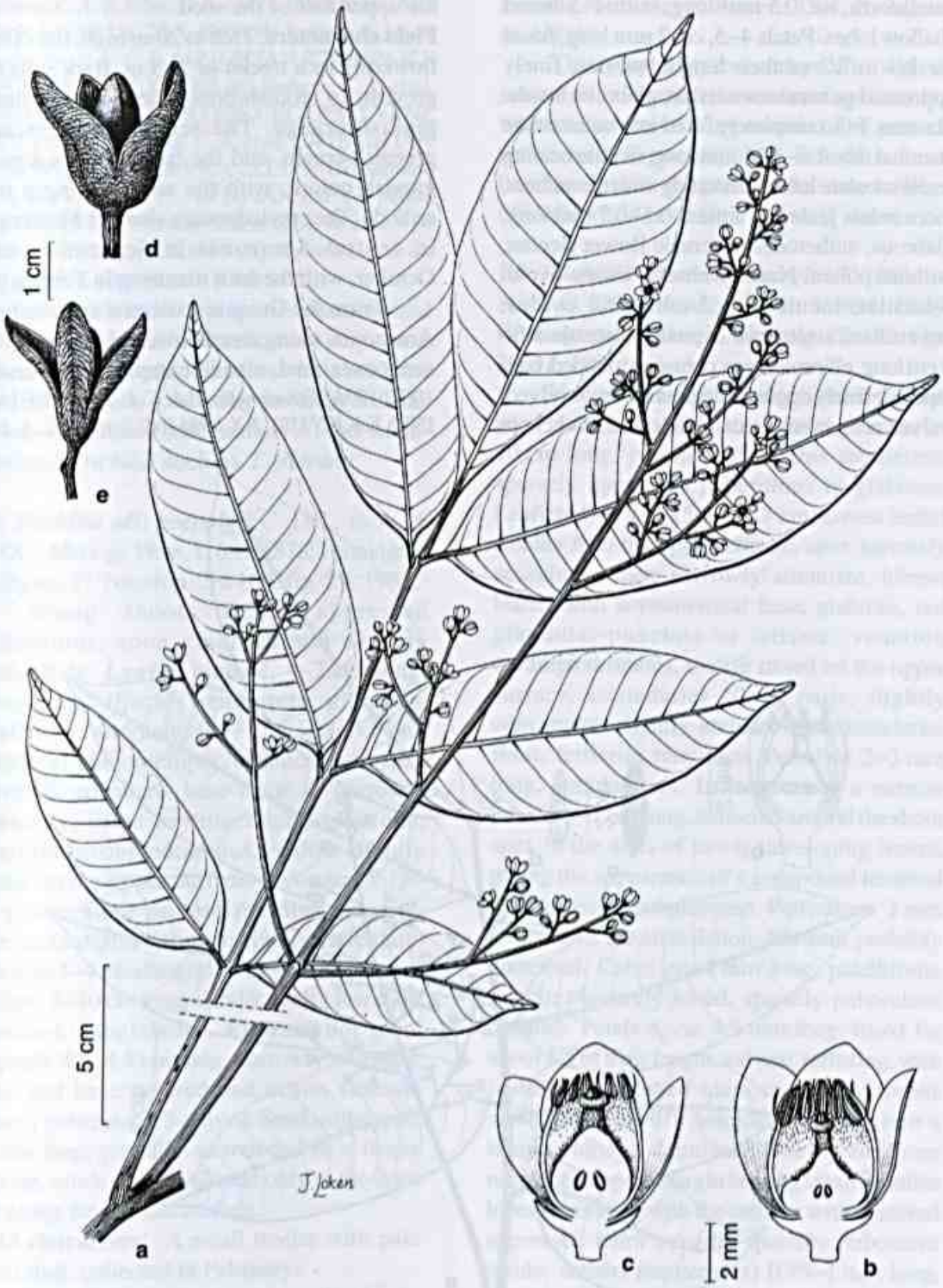

Figure 4 - *Trichilia septentrionalis* - a. habit (*Pennington et al. 9927*); b. male flower; c. female flower (*Pennington et al. 9929*); d. fruit (*Fendler 138*); e. fruit (*Osmarino 37133*).

Flowers unisexual (plant dioecious). Calyx patelliform, *ca.* 0.5 mm long, with 4–5 broad shallow lobes. Petals 4–5, *ca.* 2 mm long, fused for 1/3 to 2/3 of their length, valvate, finely appressed puberulous outside, glabrous inside. Stamens 7–8, completely fused into an urceolate staminal tube 1.5–1.75 mm long, margin bearing small subulate lobes alternating with the anthers, more or less glabrous, anthers 0.5–0.7 mm long, glabrous, antherodes of female flower slender, without pollen. Nectary absent. Ovary ovoid, 3-locular, loculi with 2 collateral ovules, puberulous, style-head capitate. **Capsule** 1.5–2 cm long, ellipsoid, apex obtuse or rounded, base tapered, finely appressed puberulous, 3-valved, valves remaining erect. **Seeds** 1–2, 1–1.5 cm long, with a fleshy arillode which covers only the upper half of the seed.

Field characters: Tree to 20 m high, but often flowering as a treelet of 2–3 m. Bark smooth greyish- to reddish-brown, lenticellate, slash pinkish-orange. The scented flowers are greenish-cream, and the fruit matures a pale greyish colour, with the seed bearing a red arillode. The cotyledons are also red. Flowering in central Amazonas in September and October, with the fruit maturing in February.

From the Guianas to central and western Amazonia, along riverbanks and in low-lying areas over sand, also in campinarana forest. 10.XI.1994 (fl) *Assunção, P. A. C. L. 77* (ACRE IAN INPA K K NY US); 5.X.1994 (bd) *Sothers, C. A. 203*

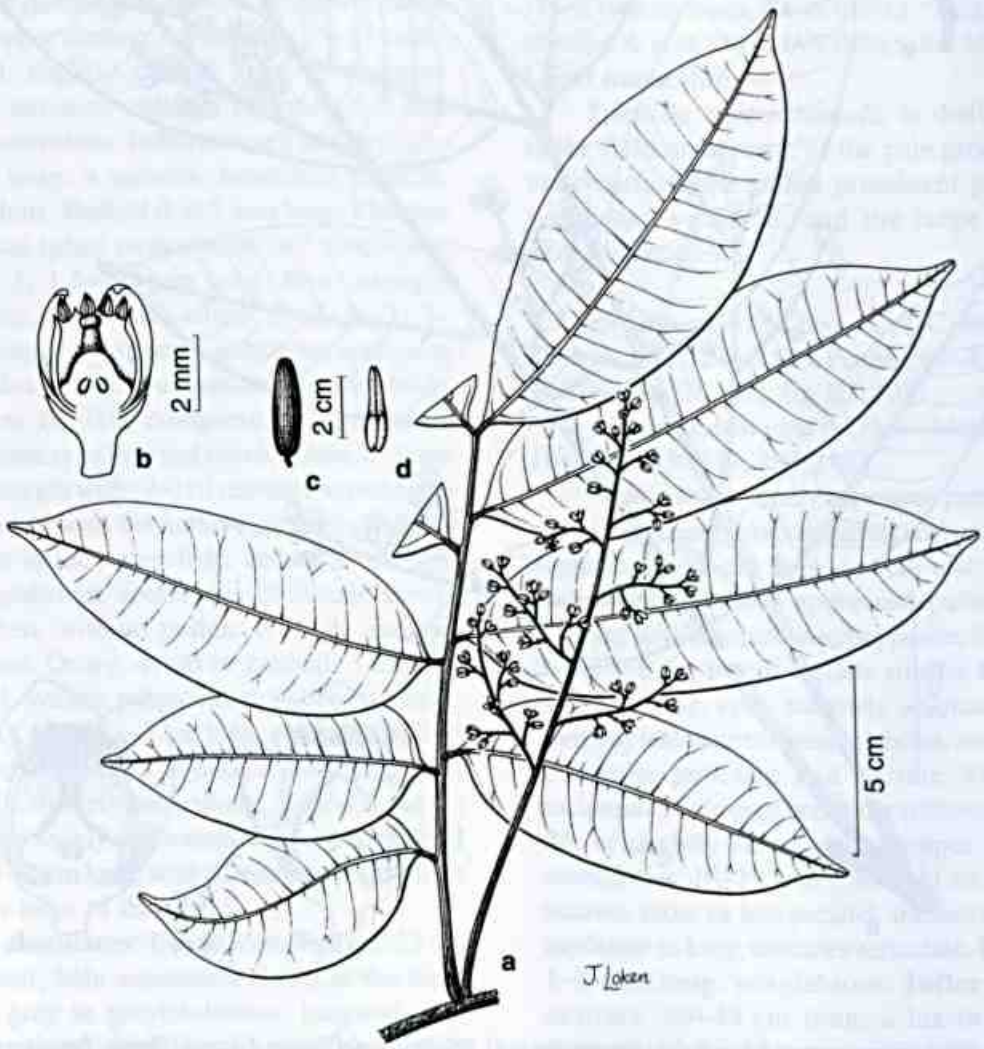

Figure 5 - *Trichilia cipo* - a. habit; b. flower; c. fruit; d. seed with apical arillode (*Prance & Pennington 1973*).

(BM INPA K MBM MG UB US); 27.X.1994 (fl) *Sothers, C. A. & Silva, C. F. 247* (G INPA K MG MO NY R RB SP U); 27.X.1995 (fl) *Sothers, C. A. & Assunção, P. A. C. L. 652* (GH IAN ICN INPA K S UPCB VIC W); 7.XI.1995 (fl) *Sothers, C. A. et al. 670* (COL F INPA K MG SPF UEC UFMT VEN); 7.XII.1995 (fl) *Sothers, C. A. et al. 704* (B GH IAN ICN INPA K P PUEFR VIC); 23.I.1996 (fr) *Sothers, C. A. & Pereira, E. C. 784* (G IAN INPA K MBM UB US); 18.IX.1997 (bd) *Souza, M. A. D. et al. 416* (INPA K MEXU); 5.II.1995 (fr) *Vicentini, A. et al. 852* (INPA K MG MO NY R RB SP U).

A rather nondescript species characterized by the long slender inflorescence, very small flowers and smooth puberulous fruit, with the seed only partially covered by the fleshy arillode. It lacks the reduced basal leaflets of other small-flowered *Trichilia* such as *T. pleeana*.

1.8 *Trichilia* aff. *poeppigii* C. DC., *in* A. & C. DC., Monogr. Phan. 1: 685. 1878; Pennington & Styles, Fl. Neotrop. 28: 162, fig. 29. 1981.

Young shoots finely appressed puberulous, soon glabrous and densely lenticellate. **Leaves** pinnate, 4–7 cm long, petiole and rhachis semiterete, glabrous. Leaflets 5, alternate, 9.5–12.5 × 3–3.5 cm, elliptic to oblong-elliptic or lanceolate, apex narrowly attenuate, base acute to narrowly attenuate, often asymmetrical, glabrous; venation brochidodromous, midrib slightly raised on the upper surface, secondaries 11–13 pairs, more or less parallel, arcuate, intersecondaries long, tertiaries reticulate. Petiolule 3–4 mm long, glabrous. **Inflorescence** axillary, 8–10 cm long, slender, with a few short branches, subglabrous. **Flowers** not seen. **Capsule** 3.5–4.5 cm long, narrowly ellipsoid, apex and base tapered and acute, smooth, densely puberulous, 3-valved. **Seed** solitary, *ca.* 1.8 cm long, partially surrounded in a fleshy arillode, while it is developed only at the apex and along the adaxial surface.

Field characters: A small treelet with pale green fruit, collected in February.

Known only from a single collection in central Amazonian Brazil, where it occurs in lowland rain forest on non-flooded land.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus, Distrito Agropecuário, Fazenda Porto Alegre, Reserve 3304, *Pacheco et al. 214* (K).

This plant may be conspecific with *T. poeppigii* (a western Amazonian species) but without flowers it is impossible to be sure. It shares with *T. poeppigii* the lack of reduced basal leaflets on the petiole, the same number of leaflets and both fruit and seed structure.

1.9 *Trichilia* aff. *schomburgkii* C. DC., *in* A. & C. DC., Monogr. Phan. 1: 695. 1878; Pennington & Styles, Fl. Neotrop. 28: 165, figs. 30, 31. 1981.

Young shoots appressed puberulous at first, soon glabrous, lenticellate. **Leaves** pinnate, 6–10 cm long, petiole and rhachis semiterete, sparsely appressed puberulous to glabrous. Leaflets 4–5, 9.5–15 × 3–5.7 cm, lowest leaflet smaller than the upper, elliptic, apex narrowly acuminate, base narrowly attenuate, lowest leaflet with asymmetrical base, glabrous, not glandular-punctate or -striate; venation eucamptodromous, midrib raised on the upper surface, secondaries 10–11 pairs, slightly convergent, slightly arcuate; intersecondaries short, tertiaries reticulate. Petiolule 2–3 mm long, subglabrous. **Inflorescence** a narrow panicle 5–7 cm long, clustered around the shoot apex in the axils of newly developing leaves, giving the appearance of a compound terminal inflorescence, subglabrous. Pedicel *ca.* 1 mm long above the articulation. **Flowers** probably unisexual. Calyx *ca.* 1 mm long, patelliform, margin obscurely lobed, sparsely puberulous outside. Petals 5, *ca.* 4.5 mm long, fused for about 1/5 of their length, valvate, reflexing, with scattered appressed hairs outside, glabrous inside. Stamens 10, completely united into a staminal tube *ca.* 4 mm long, tube tapering from near base to apex, margin bearing small subulate lobes alternating with the anthers, with scattered appressed hairs outside, sparsely pubescent inside; anthers (antherodes) 0.75–1 mm long, slender, not dehisced, without pollen, glabrous. Nectary absent. Ovary conical, 3-locular, loculi with 2 collateral ovules densely stiff hairy, style-head capitate. **Fruit** not seen.

Field characters: Tree to 12 m high with reddish-brown scaling bark, inner bark laminated, brown. The flowers have a green corolla and white staminal tube. Flowering in July.

14.XII.1995 (fl) *Assunção, P. A. C. L. & Pereira, E. C. 262* (INPA K MG MO NY R RB SP U); 21.I.1998 (fl) *Gomes, F. P. & Pereira, E. C.Silva, C. F. 9* (K); 7.VII.1993 (fl) *Ribeiro, J. E. L. S. et al. 1049* (COL F INPA K MG SPF UFMT VEN); 2.I.1998 (fl) *Souza, M. A. D. et al. 548* (BM G IAN INPA K MBM UB UEC US).

This plant is undoubtedly closely related to *T. schomburgkii* and shares the same inflorescence and floral structure. It differs principally in lacking the characteristic reduced basal leaflets of *T. schomburgkii*, and its leaflets are generally smaller. Further flowering and fruiting material are required before it can be placed with certainty.

1.10 *Trichilia micropetala* T. D. Penn., Fl. Neotrop. 28: 172, fig. 32. 1981. **Fig. 6**

Young shoots puberulous, becoming glabrous, with a few lenticels. **Leaves** pinnate, 2.5–4 cm long, petiole and rhachis semiterete, puberulous. Leaflets 5, alternate, 3.2–7 ×1.5–3 cm, elliptic, apex narrowly acuminate, base narrowly attenuate, with 2 additional pairs of greatly reduced leaflets clasping the base of the petiole, these 0.6–1 cm long, suborbicular, subglabrous or minutely puberulous below, sometimes glandular-punctate and -striate, venation mostly brochidodromous, midrib raised on the upper surface, secondaries 9–10 pairs, arcuate, convergent, intersecondaries short to moderate, tertiaries reticulate. Petiolule 1–1.5 mm long, puberulous. **Inflorescence** axillary, *ca.* 10 cm long, a much branched panicle, sparsely puberulous. Pedicel *ca.* 1 mm long above the articulation. **Flowers** unisexual (plant dioecious). Calyx patelliform, *ca.* 0.75 mm long, with 5 obtuse lobes, subglabrous. Petals 4, *ca.* 2 mm long, fused to about halfway, valvate, sparsely appressed puberulous outside. Stamens 7(–8), completely fused in a staminal tube *ca.* 1 mm long, the margin bearing subulate appendages alternating with the anthers, glabrous outside, sparse long hairs in the throat; anthers 0.5–0.6 mm long, glabrous; antherodes of female flower shrunken, without pollen. Disk (nectary) absent. Ovary broadly ovoid, 3-locular; loculi with 2 collateral ovules, appressed puberulous, style-head capitate. **Fruit** unknown.

Field characters: Tree to 20 m high, often flowering as a small treelet. Bark rough, lenticellate, scaling in irregular pieces. Flowers greenish-white. Flowering in central Amazonia in November and December.

Known from Pará, Amapá and central Amazonia where it occurs in rainforest on non-flooded land.

5.XII.1995 (fl) *Costa, M. A. S. et al. 437* (BM INPA K K MBM MG NY UB UEC US VEN); 9.XI.1995 (fl) *Sothers, C. A. & Silva, C. F. 674* (G INPA K MG MO R RB SP U).

Trichilia micropetala is easily recognized by its small leaves with dimorphic leaflets and the small flowers. The nearest relative is *T. lecointei*, which has not yet been recorded from central Amazonia. The latter has larger leaves with more numerous leaflets with an asymmetrical base and large flower with more or less free petals.

1.11 *Trichilia bullata* T. D. Penn., Fl. Neotrop. 28: 179, fig. 35. 1981. **Fig. 7 a-c**

Young shoots shortly tomentose, indumentum persistent. **Leaves** imparipinnate, 15–35 cm long, petiole and rhachis semiterete, crisped-pubescent. Leaflets 7–11 opposite or subopposite, 14–25 × 4–7.5 cm, oblong, apex narrowly acuminate, base acute to rounded or truncate, with 2 additional pairs of greatly reduced leaflets clasping the base of the petiole, these varying in shape from orbicular to subulate, 0.5–3.5 cm long; midrib pubescent above, lamina glabrous, lamina sparsely short-pubescent below, glandular-punctate and -striate, venation eucamptodromous, midrib slightly raised on upper surface, secondaries 20–30 pairs, parallel, slightly arcuate, intersecondaries short or absent, tertiaries few, oblique to reticulate. Petiolule 2–5 mm long, shortly pubescent. **Inflorescence** axillary, 30–60 cm long, a narrow panicle, pubescent. Pedicel 1–1.5 mm long. Calyx cyathiform, 1.5–2.5 mm long, 4–5-lobed, pubescent. Petals 4–5, *ca.*

6 mm long, fused for 1/3 to 2/3 of their length, valvate, appressed puberulous outside, glabrous inside. Stamens 7–10, completely fused in a cylindrical staminal tube 4–4.5 mm long, the margin bearing subulate or lanceolate appendages alternating with the anthers, glabrous outside, sparsely pilose inside; anthers 0.8–1 mm long, glabrous. Nectary absent. Ovary conical, 3-locular, loculi with 2 collateral ovules, pubescent, style-head capitate or truncate. **Fruit** unknown. **Field characters**: Tree to 15 m high with greyish, finely fissured bark. Flowers greenish-white, in November and December.

Central and western Amazonian Brazil, where it occurs in non-flooded rain forest.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus, *Francisco & Dionísio 3173* (FHO INPA); Humaitá *Krukoff 6908* (A BM F G K MO S); Manaus to Porto Velho, km 510, *Pennington et al. 9968* (FHO INPA K MO).

Trichilia bullata is related to *T. schomburgkii*, but distinguished from it by the short dense indumentum on the young parts and lower leaf surface, by the numerous parallel secondary veins and narrow inflorescence.

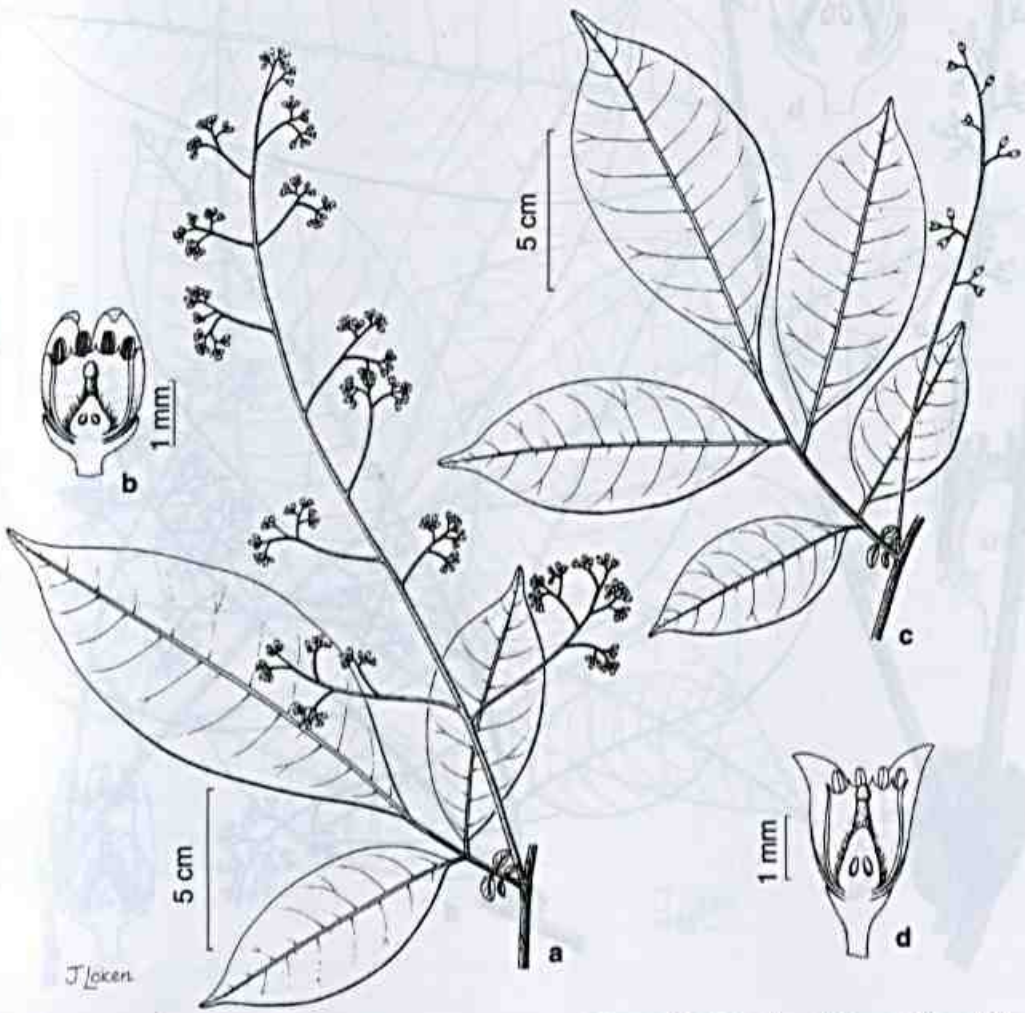

Figure 6 - *Trichilia micropetala* - a. habit with male inflorescence (*Pires et al. 51223*); b. male flower (*Pires & Cavalcante 52659*); c. habit with female inflorescence; d. female flower (*Egler & Irwin 46479*)

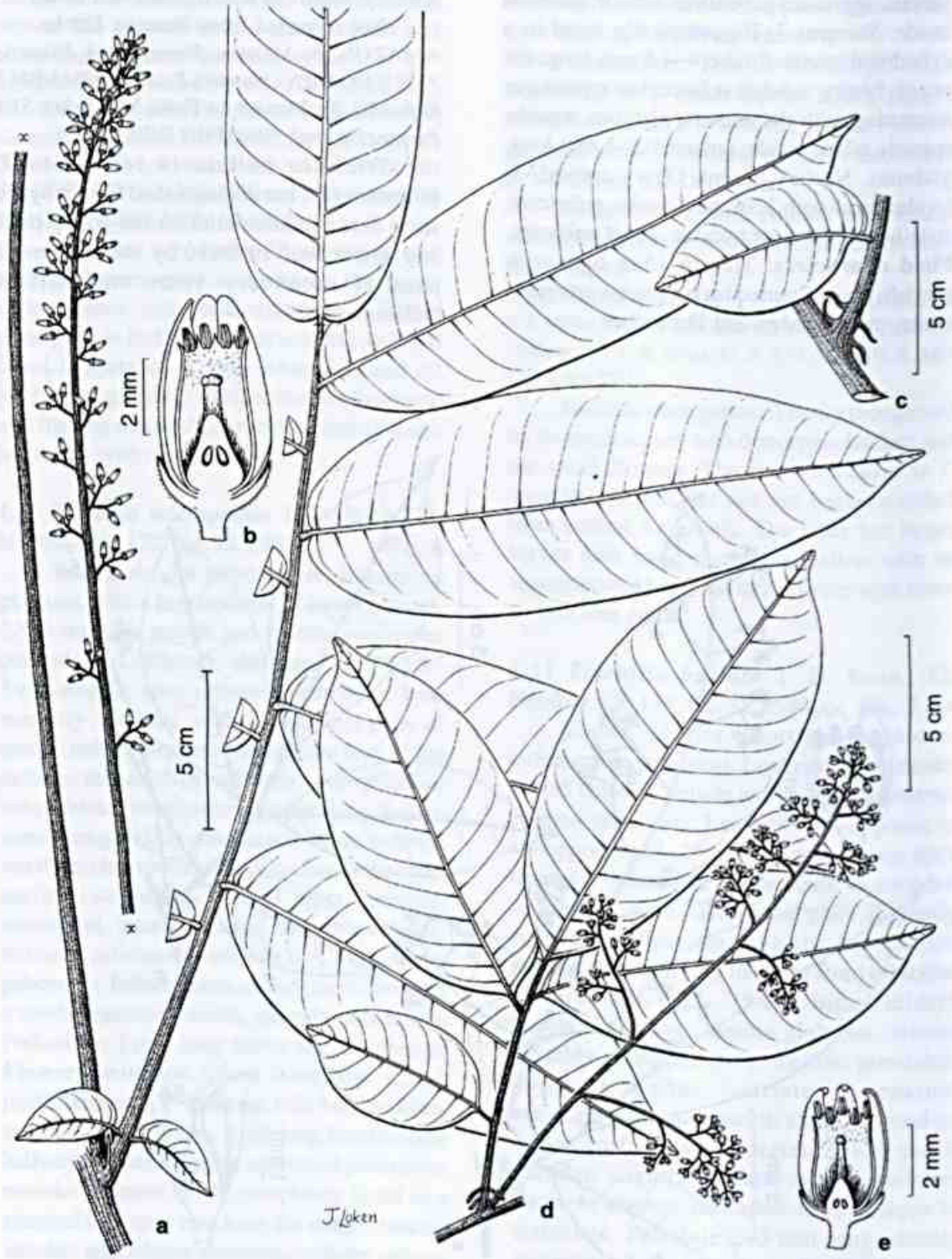

Figure 7 - a-c. *Trichilia bullata* - a. habit; b. flower (*Krukoff 7213*); c. reduced basal leaflets (*Pennington et al. 9987*). d-e. *T. areolata* - d. habit; e. flower (*Coêlho & Mello 3007*).

1.12 *Trichilia pleeana* (A. Juss.) C. DC., *in* Mart., Fl. bras. 11(1): 215. 1878; Pennington & Styles, Fl. Neotrop. 28: 198, fig. 27. 1981.

Fig. 8

Moschoxylum pleeanum A. Juss., Mém. Mus. Hist. Nat. 19: 239, 281. 1831.

Young shoots sparsely appressed puberulous at first, soon glabrous, with pale lenticels. **Leaves** pinnate, 10–15 cm long, petiole and rhachis slightly flattened and expanded below the leaflet insertion, glabrous. Leaflets 5–7, alternate, 9–15 × 3.5–5 cm, elliptic to oblanceolate, apex acuminate, base acute to narrowly attenuate, with 2–3 additional pairs of greatly reduced leaflets near the base of the petiole, these 0.5–2 cm long, ovate with an asymmetrical base to subulate, glabrous, glandular-punctate and -striate; venation eucamptodromous to brochido-dromous, midrib prominent on the upper surface, secondaries 10–12 pairs, slightly arcuate, slightly convergent, intersecondaries short to moderate, tertiaries reticulate. Petiolule 3–5 mm long, subglabrous. **Inflorescence** axillary, 15–20 cm long, a much-branched thyrse, subglabrous. Pedicel 0.5–1.5 mm long. **Flowers** unisexual (plant dioecious). Calyx patelliform or cyathiform, *ca.* 1 mm long, deeply 5-lobed, sparsely puberulous outside. Petals 5, *ca.* 3 mm long, fused for 1/4 to 1/2 of their length, valvate, with scattered minute appressed hairs outside, glabrous inside. Stamens 9–10, completely fused in a staminal tube 1.5–

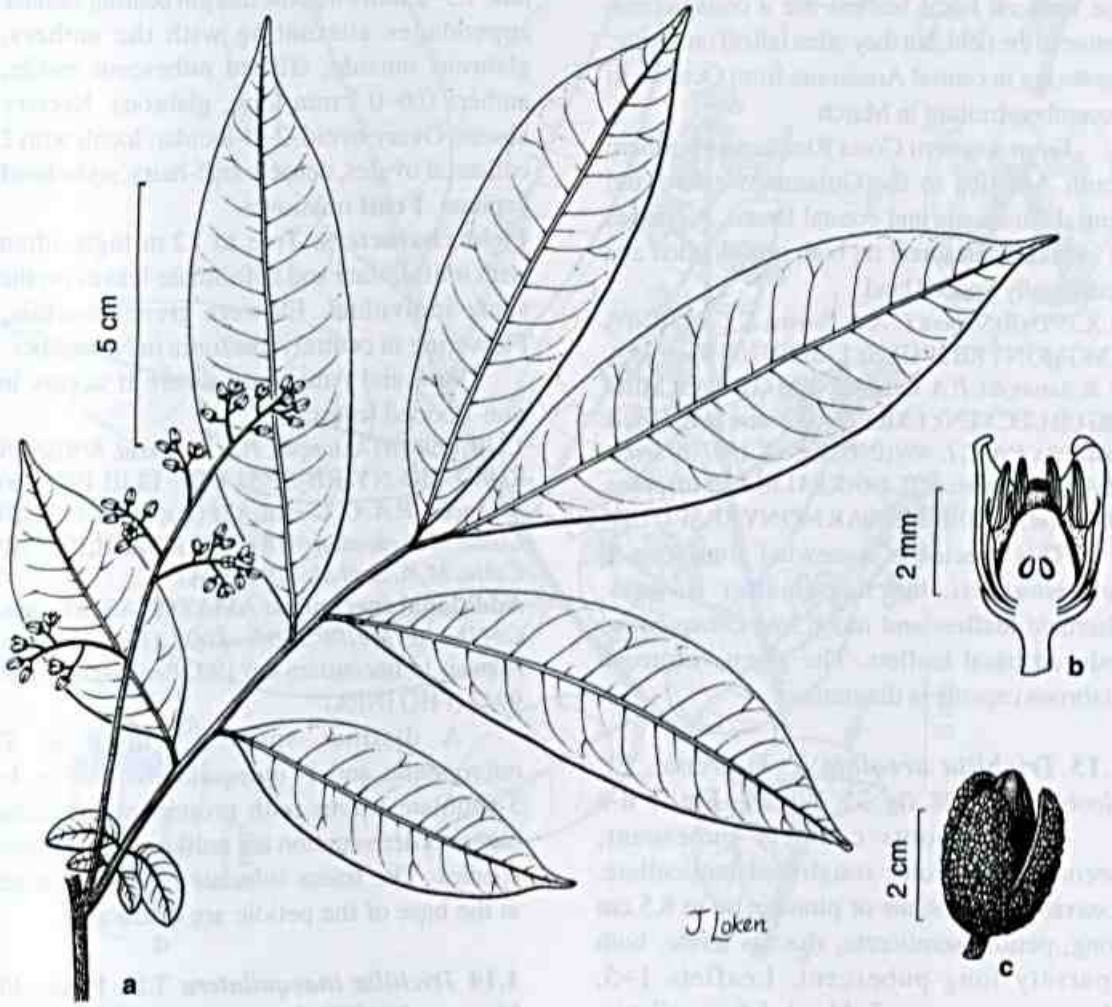

Figure 8 - *Trichilia pleeana* - a. habit (*FDBG 5799*); b. flower (*Ule 6618*); c. fruit (*Pennington et al. 10168*).

2 mm long, the margin bearing subulate lobes alternating with the anthers, glabrous outside, pubescent inside; anthers *ca.* 1 mm long, glabrous; antherodes of female flower slender, without pollen. Nectary absent. Ovary ovoid, 3-locular, loculi with 2 collateral ovules, puberulous, style-head capitate. **Capsule** 1.5–3 cm long, ovoid to globose, verrucose, glabrous, 3-valved, valves remaining erect. **Seeds** 1–2, 1–1.5 cm long, completely surrounded by a soft fleshy arillode.
Field characters: Tree to 30 m high, larger specimens with small buttresses and bole fluted near base. Bark grey, scaling in long thin irregular sheets exfoliating from the base. Flowers greenish-yellow and ripe fruit a dark glossy green. The seed is surrounded by an orange arillode. The reduced basal leaflets are a conspicuous feature in the field, but they often fall off on drying. Flowering in central Amazonia from October to December, fruiting in March.

From southern Costa Rica across northern South America to the Guianas, western and central Amazonia and coastal Brazil. A species of lowland rain forest on both non-flooded and periodically flooded land.
11.X.1995 (fl) *Sothers, C. A. & Pereira, E. C. 622* (INPA K MG MO NY RB SP U US); 1.XII.1997 (fl) *Souza, M. A. D. & Assunção, P. A. C. L. 468* (BM G INPA K MBM MG UB UEC VEN); 1.XII.1997 (fl) *Souza, M. A. D. de & Assunção, P. A. C. L. 469* (INPA K); 9.X.1997 (fl) *Souza, M. A. D. & Pereira, E. C. 490* (K); 11.III.1998 (fr) *Souza, M. A. D. et al. 560* (IAN INPA K MO NY RB SP U UB).

This species is somewhat similar to *T. schomburgkii*, but has smaller flowers, alternate leaflets and much less conspicuous reduced basal leaflets. The green verrucose glabrous capsule is diagnostic.

1.13 *Trichilia areolata* T. D. Penn., Fl. Neotrop. 28: 208, fig. 35. 1981. **Fig. 7 d-e**

Young shoots coarsely pubescent, becoming glabrous, rough and lenticellate. **Leaves** 1–3-foliolate or pinnate, up to 8.5 cm long, petiole semiterete, rhachis terete, both sparsely long-pubescent. Leaflets 1–5, alternate to opposite, 7–14 × 4–5.5 cm, elliptic, apex obtusely cuspidate to shortly attenuate, base cuneate to obtuse, with 1-2 additional pairs of vestigial linear-subulate leaflets at the base of the petiole, these 0.5–1 cm long; coarsely pubescent with scattered hairs on the lower surface, glandular-punctate and -striate; venation eucamptodromous, midrib raised on the upper surface, secondaries 7–15 pairs, arcuate, parallel or slightly convergent, intersecondaries mostly absent, tertiaries forming a prominent reticulum. Petiolule 3–4 mm long. **Inflorescence** axillary, 10–20 cm long, an irregularly branched panicle, coarsely pubescent. Pedicel 0.5–1.5 mm long. Calyx cyathiform, 1–1.5 mm long, 5-toothed, subglabrous. Petals 5, 3–3.5 mm long, free, valvate, strigillose outside, glabrous inside. Stamens 9–10, completely fused in a staminal tube 1.5–2 mm long, the margin bearing slender appendages alternating with the anthers, glabrous outside, crisped pubescent inside; anthers 0.6–0.7 mm long, glabrous. Nectary absent. Ovary ovoid, 2–3-locular, loculi with 2 collateral ovules, densely stiff-hairy, style-head capitate. **Fruit** unknown.
Field characters: Tree to 12 m high, often with unifoliolate and trifoliolate leaves on the same individual. Flowers greenish-white. Flowering in central Amazonia in November.

Pará and Amazonas where it occurs in non-flooded forest.
13.III.1998 (fr) *Assunção, P. A. C. L. et al. 819* (INPA K MG MO NY RB SP U UB); 13.III.1998 (fr) *Assunção, P. A. C. L. et al. 821* (K); 24.XI.1997 (fl) *Costa, M. A. S. et al. 818* (INPA); 24.XII.1997 (fl) *Costa, M. A. S. et al. 819* (INPA).
Additional specimens: AMAZONAS: Manaus, *Coêlho & Mello 3003, 3007* (FHO INPA); Manaus to Itacoatiara km 190, *Pennington et al. 9948* (FHO INPA).

A distinct species related to *T. micropetala* and *T. inaequilatera*, but its 1–5-foliolate leaves with prominent reticulate higher order venation are unlike either of those species. The linear-subulate reduced leaflets at the base of the petiole are distinctive.

1.14 *Trichilia inaequilatera* T.D. Penn., Fl. Neotrop. 28: 209, fig. 44. 1981. **Fig. 9**

Young shoots coarsely pubescent, becoming glabrous, lenticellate and scaling.

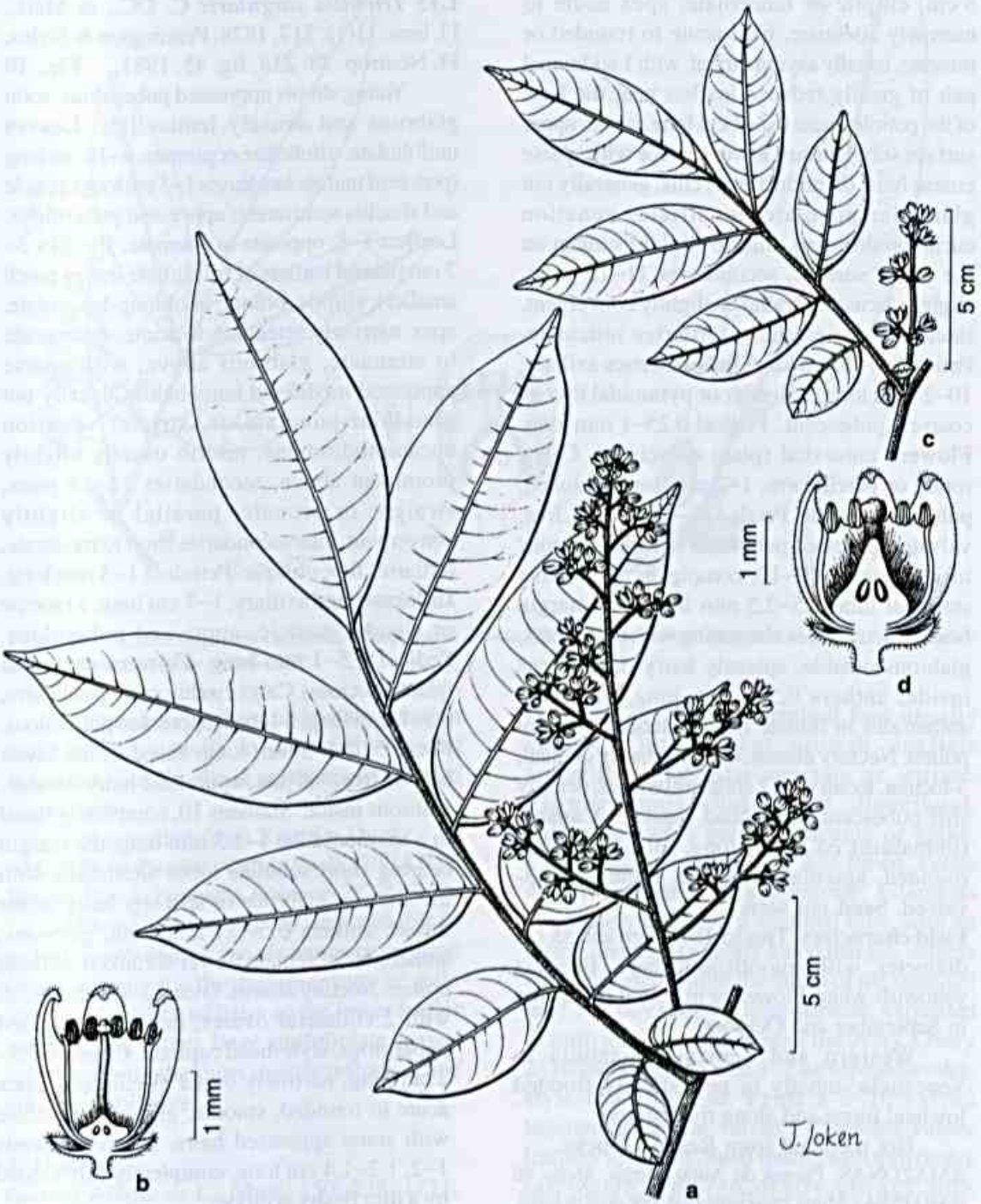

Figure 9 - *Trichilia inaequilatera* - a. habit with male inflorescence (*Wurdack & Adderley 43002*); b. male flower (*Revilla 518*); c. habit with female inflorescence; d. female flower (*Revilla 517*).

Leaves pinnate, 6–16 cm long, petiole and rhachis semiterete, coarsely pubescent. Leaflets 6-10, alternate to opposite, 7–15 × 2.5–5 cm, elliptic or lanceolate, apex acute to narrowly attenuate, base acute to rounded or truncate, usually asymmetrical, with 1 additional pair of greatly reduced leaflets near the base of the petiole, these 0.7–2 cm long, ovate; upper surface subglabrous, lower surface with sparse coarse hairs on midrib and veins; generally not glandular-punctate or -striate; venation eucamptodromous, midrib slightly sunken on the upper surface, secondaries 11–15 pairs, slightly arcuate, parallel or slightly convergent, intersecondaries short, tertiaries reticulate. Petiolule 0–2 mm long. **Inflorescence** axillary, 10–20 cm long, a slender or pyramidal thyrse, coarsely pubescent. Pedicel 0.25–1 mm long. **Flowers** unisexual (plant dioecious). Calyx rotate or patelliform, 1–2 mm long, 5-lobed, pubescent outside. Petals 5, 2–4 mm long, free, valvate, appressed pubescent outside, glabrous inside. Stamens 8–10, completely united in a staminal tube 1.5–2.5 mm long, the margin bearing acute lobes alternating with the anthers, glabrous outside, sparsely hairy or glabrous inside; anthers 0.5–1 mm long, glabrous; antherodes in female flower slender, without pollen. Nectary absent. Ovary broadly conical, 3-locular, loculi with 2 collateral ovules, densely stiff-pubescent, style-head capitate. **Capsule** (immature) *ca.* 1 cm long, ellipsoid, apex rounded, apiculate, smooth, tomentose, 3-valved. **Seed** not seen.

Field characters: Tree to 25 m high and 35 cm diameter, with smooth grey bark. Flowers yellowish-white. Flowering in central Amazonas in September and October.

Western and central Amazonia to Venezuela, mostly in periodically flooded lowland forest and along riverbanks.

Not recorded from Reserva Ducke.

AMAZONAS: Paraná do Autaz-Mirim, *Mello 46* (FHO INPA); Município Fonte Boa, Foz do Rio Juruá, *Cid et al. 7370* (INPA K); Humaitá, *Krukoff 8485* (A BM F K MO NY P).

Trichilia inaequilatera is related to *T. areolata*, but differs from it in the more numerous leaflets with an asymmetrical base, and in the shape and size of the reduced basal leaflets.

1.15 *Trichilia singularis* C. DC., *in* Mart., Fl. bras. 11(1): 217. 1878; Pennington & Styles, Fl. Neotrop. 28: 218, fig. 45. 1981. **Fig. 10**

Young shoots appressed puberulous, soon glabrous and densely lenticellate. **Leaves** unifoliolate, trifoliolate or pinnate, 6–18 cm long (petiole of unifoliolate leaves 1–3 cm long), petiole and rhachis semiterete, appressed puberulous. Leaflets 1–8, opposite to alternate, 10–20 × 3–7 cm (lateral leaflets of trifoliolate leaves much smaller), elliptic, oblong or oblong-lanceolate, apex narrowly attenuate to acute, base acute to attenuate, glabrous above, with sparse appressed medifixed hairs below, usually not glandular-punctate or -striate; venation eucamptodromous, midrib usually slightly prominent above, secondaries 12–18 pairs, straight or arcuate, parallel or slightly convergent, intersecondaries short to moderate, tertiaries few, oblique. Petiolule 1–3 mm long. **Inflorescence** axillary, 1–7 cm long, a raceme or slender panicle, appressed puberulous. Pedicel 0.5–1 mm long. **Flowers** unisexual (plant dioecious). Calyx cyathiform or patelliform, 0.5–1 mm long, 5-lobed, appressed puberulous. Petals 5, 2.5–3 mm long, fused in the lower half or free, valvate, appressed hairy outside, glabrous inside. Stamens 10, completely fused in a staminal tube 1–1.5 mm long, the margin bearing short subulate lobes alternating with the anthers, glabrous or sparsely hairy in the throat; anthers 0.5–0.7 mm long, glabrous; antherodes of female flower shrunken, without pollen. Nectary absent. Ovary 2-locular, loculi with 2 collateral ovules, densely appressed puberulous, style-head capitate. **Capsule** 1.5–2 cm long, narrowly ovoid to ellipsoid, apex acute to rounded, smooth, granular-papillose with some appressed hairs, 2-valved. **Seeds** 1–2, 1.2–1.4 cm long, completely surrounded by a thin fleshy arillode.

Field characters: Treelet or small tree to 10 m high with smooth reddish bark. Flowers greenish-white. Flowering in central Amazonas July to October.

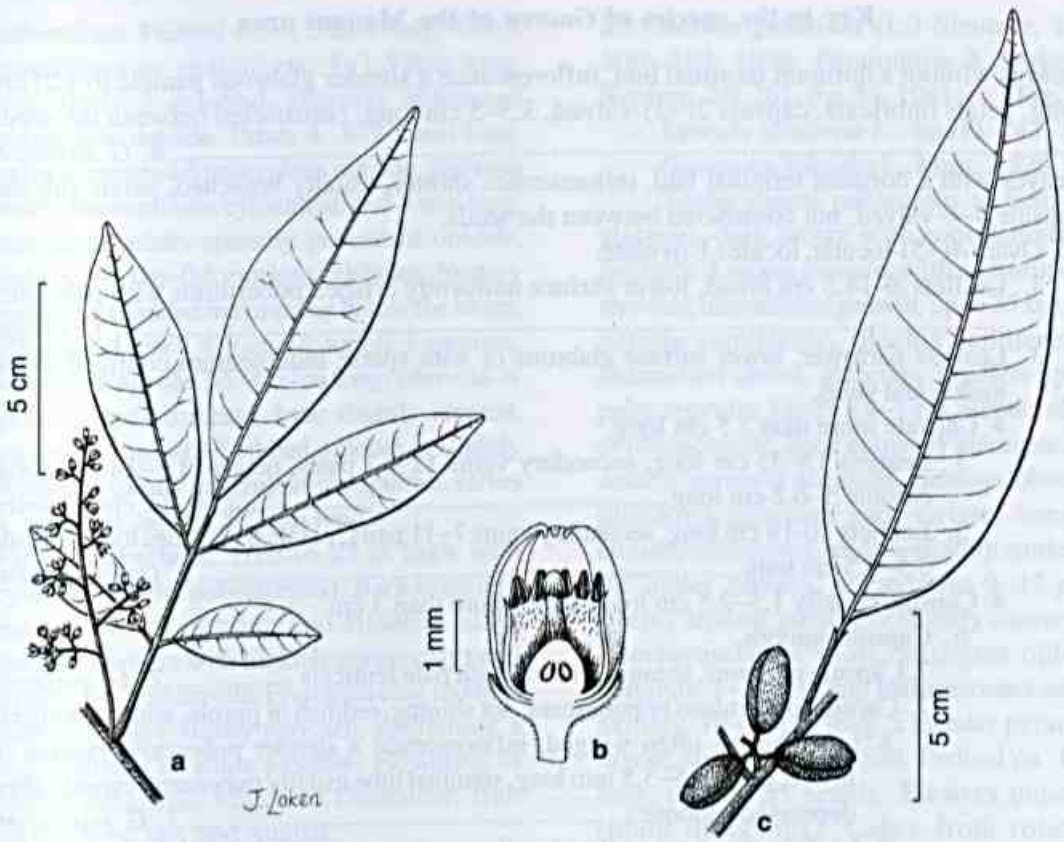

Figure 10 - *Trichilia singularis* - a. habit (*Aristeguieta & Zabala 7069*); b. male flower (*Prance et al. 2573*); c. unifoliolate leaf and fruit (*Dahlgren & Sella 208*).

Common on the flood plain of the Amazon and Orinoco, usually in seasonally flooded forest but occasionally in permanently flooded igapó forest.

Not recorded from Reserva Ducke.

AMAZONAS: Paraná do Careiro, *Ducke 2019* (A NY); Manaus, Furo do Paracuuba, *Rodrigues 27736* (FHO).

Although this species is very variable in its leaf morphology, it can always be recognized (with a lens) by the indumentum of pale appressed medifixed hairs on the lower leaflet surface. The rather large unifoliolate leaves combined with the short slender inflorescence are also distinctive.

2. *Guarea*

Guarea Allam. *ex* L., Mant. 150: 228. 1771, *nom. cons.* Huber, J., Bol. Mus. Paraense Hist. Nat. 3: 241. 1902.

Trees or **treelets**. Indumentum of simple hairs. **Leaves** pinnate, nearly always (except *G. silvatica*) with a terminal bud usually showing intermittent growth, leaflets sometimes glandular-punctate or -striate. **Flowers** unisexual (plant dioecious). **Inflorescence** a panicle, raceme or spike. Calyx shallowly to deeply 3–7-lobed. Petals 4–6, free, nearly always valvate. Filaments completely united in a staminal tube, with an entire, crenate or slightly lobed margin; anthers 8–12, inserted within the throat of the staminal tube. Nectary short- to long-stipitate, expanded to form a collar at the base of the ovary. Ovary 2–10-locular, loculi with 1–2 superposed ovules, style-head discoid. **Fruit** a 2–10-valved loculicidal capsule, valves 1–2-seeded, valves leathery to woody. **Seed** fleshy, with thin fleshy sarcotesta. Embryo nearly always with superposed cotyledons.

About 45 species in tropical America and 5 in Africa. Ten species occur in the vicinity of Manaus, of which 8 occur in Reserva Ducke.

Key to the species of *Guarea* of the Manaus area

1. Leaves without a dormant terminal bud, inflorescence a slender glabrous panicle to 120 cm long, petals imbricate, capsule 2(–3)-valved, 3.5–5 cm long, constricted between the seeds ..... 8. *G. silvatica*
1. Leaves with a dormant terminal bud, inflorescence shorter, usually branched, petals valvate, capsule 4–6-valved, not constricted between the seeds.
   2. Ovary 4(–5)-locular, locules 1-ovulate.
      3. Leaflets 8–14.5 cm broad, lower surface uniformly crisped puberulous with pale hairs ..... 7. *G. crispa*
      3. Leaflets narrower, lower surface glabrous or with sparse indumentum confined to the midrib and veins.
         4. Capsule more than 3.5 cm long.
            5. Leaflets 15–35 cm long, secondary veins 12–17 pairs, petals 11.5–14 mm long, capsule 5–6.2 cm long ..... 6. *G. cinnamonea*
            5. Leaflets 10-18 cm long, secondary veins 7–11 pairs, petals 5–7.5 mm long, capsule 3.5–4.5 cm long ..... 1. *G. convergens*
         4. Capsule usually 1.5–2.5 cm long, never more than 3 cm.
            6. Capsule smooth.
               7. Capsule glabrous, shining, brown, with pale lenticels ..... 2. *G. guidonia*
               7. Capsule puberulous or pubescent, not shining, reddish or purple, without lenticels
                  8. Leaf rhachis often winged, inflorescence a slender pubescent, raceme or thyrse, calyx 1.5–3.5 mm long, staminal tube usually pubescent, capsule often depressed-globose ..... 3. *G. pubescens*
                  8. Leaf rhachis never winged, inflorescence pyramidal, lax-branched and lax-flowered, glabrous, calyx 1–1.5 mm long, staminal tube glabrous, capsule ellipsoid, never depressed-globose ..... 4. *G. scabra*
            6. Capsule ribbed or tuberculate.
               9. Leaves 35–75 cm long, capsule globose to ovoid, contracted at the base into a stipe *ca.* 0.5 cm long ..... 5. *G. humaitensis*
               9. Leaves 9–30 cm long, capsule often depressed-globose, without a stipe, leaves 9–30 cm long ..... 3. *G. pubescens*
   2. Ovary 4–6-locular, loculi with 2 superposed ovules.
      10. Leaflet lamina crisped puberulous below, secondary veins 10–15 pairs, flowers subtended by a bracteole 4–6 mm long, capsule smooth, shortly velutinous ..... 9. *G. trunciflora*
      10. Leaflets coarsely pubescent below, indumentum confined to midrib and veins, secondary veins 16–20 pairs, flowers not subtended by bracteoles 4–6 mm long, capsule longitudinally ribbed ..... 10. *G. carinata*

2.1 *Guarea convergens* T.D. Penn., Fl. Neotrop. 28: 260, fig. 53. 1981. **Fig. 11 a-c**

Young shoots appressed pubescent at first, soon glabrous, becoming cracked and shallowly fissured. **Leaves** pinnate with a terminal bud showing intermittent growth, up to 50 cm long, petiole semiterete, rhachis terete or channelled above, subglabrous. Leaflets 3–12 pairs (the lower pairs falling), opposite, 10–18 × 4–6 cm, mostly elliptic, apex shortly and narrowly attenuate, base acute to narrowly attenuate, glabrous, not glandular-punctate or -striate; venation eucamptodromous, midrib sunken on the upper surface, secondaries 7–11 pairs, arcuate, convergent, intersecondaries short to moderate, tertiaries oblique to reticulate. Petiolule 2–5 mm long, sparsely pubescent. **Inflorescence** axillary, 5–10 cm long, a slender pyramidal thyrse,

puberulous. Pedicel 0.5–1.5 mm long. Calyx patelliform or cyathiform, 1–1.5 mm long, irregularly 3–4-lobed, sparsely appressed puberulous outside. Petals 4, 5–7.5 mm long, valvate, appressed puberulous outside, glabrous inside. Staminal tube cylindrical, 4–5.5 mm long, margin undulate, sparsely pubescent outside; anthers 7–8, 0.6–0.8 mm long, glabrous. Nectary stipitate, expanded into a collar below the ovary, glabrous. Ovary 4-locular, loculi 1-ovulate, strigose. **Capsule** 3.5–4.5 cm long, obovoid or globose, apex truncate, base slightly tapered, valves obscurely 6–7-ribbed, smooth or slightly verrucose, mostly puberulous or papillose, valves 4, 1-seeded. **Seed** 1.5–2 cm long.

Field characters: Tree to 25 m high with cylindrical bole, unbuttressed. Bark brown or reddish brown, scaling and fissured, slash reddish. Flowers with pinkish-purple calyx and cream-coloured corolla. Fruit maturing reddish, with a leathery-fleshy pericarp, containing a small amount of white exudate. Flowering in central Amazonia March to December, fruit known from July and August.

Known only from central Brazilian Amazonia, where it is a tree of non-flooded rain forest.

12.XII.1996 (fl) *Assunção, P.A. C.L. & Silva, C.F. 438* (BM G INPA K MBM MG UB UEC US VEN); 17.X.1995 (fr) *Costa, M.A.S. & Assunção, P.A. C.L. 384* (BM G INPA K MBM MG R U UB VEN); 28.III.1957 (fl) *Coêlho, L. INPA 5214* (INPA); 7.IX.1994 (fl) *Nascimento, J.R. et al. 590* (GH IAN ICN INPA K P S UPCB VIC); 13.IX.1995 (fr) *Ribeiro, J.E.L.S. & Pereira, E.C. 1698* (INPA K K MG MO NY RB SP US); 16.V.1963 (fl) *Rodrigues, W. & Coêlho, D. 5226* (INPA); 4.VI.1995 (fl) *Sothers, C.A. et al. 482* (INPA K MG MO NY R RB SP U); 13.XII.1996 (fl) *Sothers, C.A. & Pereira, E.C. 956* (B COL F IAN INPA K PUEFR SPF UFMT); 23.VII.1968 (fr) *Souza, J.A. 50* (INPA).

The floral morphology of *G. convergens* is similar to that of *G. guidonia*, both sharing a 4-locular ovary with 1-ovulate loculi. However, the fruit is quite distinct, being red in colour, 3.5–4.5 cm long, papillose or puberulous, with the valves obscurely ribbed. The capsule of *G. guidonia* is shining brown with prominent pale lenticels, 1.5–2.5 cm long, glabrous and smooth.

2.2 *Guarea guidonia* (L.) Sleumer, Taxon 5(8): 194. 1956; Pennington & Styles, Fl. Neotrop. 28: 261, fig. 53. 1981. **Fig. 11 d**

Samyda guidonia L., Sp. Pl. 443. 1753.
Guarea trichilioides L., Mant. 2: 228. 1771.

Young shoots puberulous at first, soon glabrous, dark brown with conspicuous pale lenticels. **Leaves** pinnate, with a terminal bud showing intermittent growth, up to 35 cm long, petiole semiterete, rhachis semiterete or channelled above, glabrous. Leaflets up to 9 pairs, opposite, 12–25 × 4–7 cm, elliptic, oblong or oblanceolate, apex narrowly attenuate, base acute to narrowly attenuate, glabrous, obscurely glandular-punctate and -striate; venation eucamptodromous, midrib slightly sunken on the upper surface, secondaries 9–12 pairs, steeply arcuate, parallel or slightly convergent, intersecondaries short, tertiaries oblique. Petiolule, 1–5 mm long. **Inflorescence** usually axillary, 10–25 cm long, a slender pyramidal thyrse, sparsely pubescent. Pedicel *ca.* 1 mm long, or flowers sessile. **Flowers** unisexual (plant dioecious). Calyx from rotate to cyathiform, 1–2.5 mm long, 3–4-lobed, sparsely appressed puberulous outside. Petals 4, 5.5–7.5 mm long, valvate, appressed puberulous outside, glabrous inside. Staminal tube cylindrical, 3.5–7 mm long, margin truncate or undulate, glabrous, anthers 8, 0.75–1.25 mm long, glabrous, antherodes of female flower narrow, without pollen. Nectary stipitate, expanded into a collar below the ovary, glabrous. Ovary 4-locular, loculi 1-ovulate, pubescent. **Capsule** 1.5–2.5 cm long, globose to obovoid, apex truncate, base usually contracted into a short stipe, smooth, shining, glabrous, usually with conspicuous pale lenticels, 4-valved, valves 1-seeded, leathery. **Seed** 1–1.5 cm long.

Field characters. Tree to 25 m high, often flowering when much smaller, and in open situations it may be much-branched from near the base. Bark smooth, brown and lenticellate in young specimens, becoming fissured with age. The flowers are cream-coloured and the fruit matures smooth, shining, brown or reddish-brown with conspicuous pale lenticels. *Guarea guidonia* flowers and fruits throughout the year.

Greater Antilles, and from Nicaragua southwards throughout the whole of tropical South America to coastal Brazil, Paraguay and Argentina. It is typically found along riverbanks and in periodically flooded forest, but in the wetter areas of western Amazonia it occurs in high forest on non-flooded sites.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus, Ilha do Careiro, *Prance & Ramos 23300* (FHO).

The most widespread and common species of *Guarea*, easily recognized by the cream-coloured (not pink) flower with 4 petals, 8 stamens, 4-locular ovary with 1 ovary in each locule, and the characteristic shining brown fruit with pale lenticels.

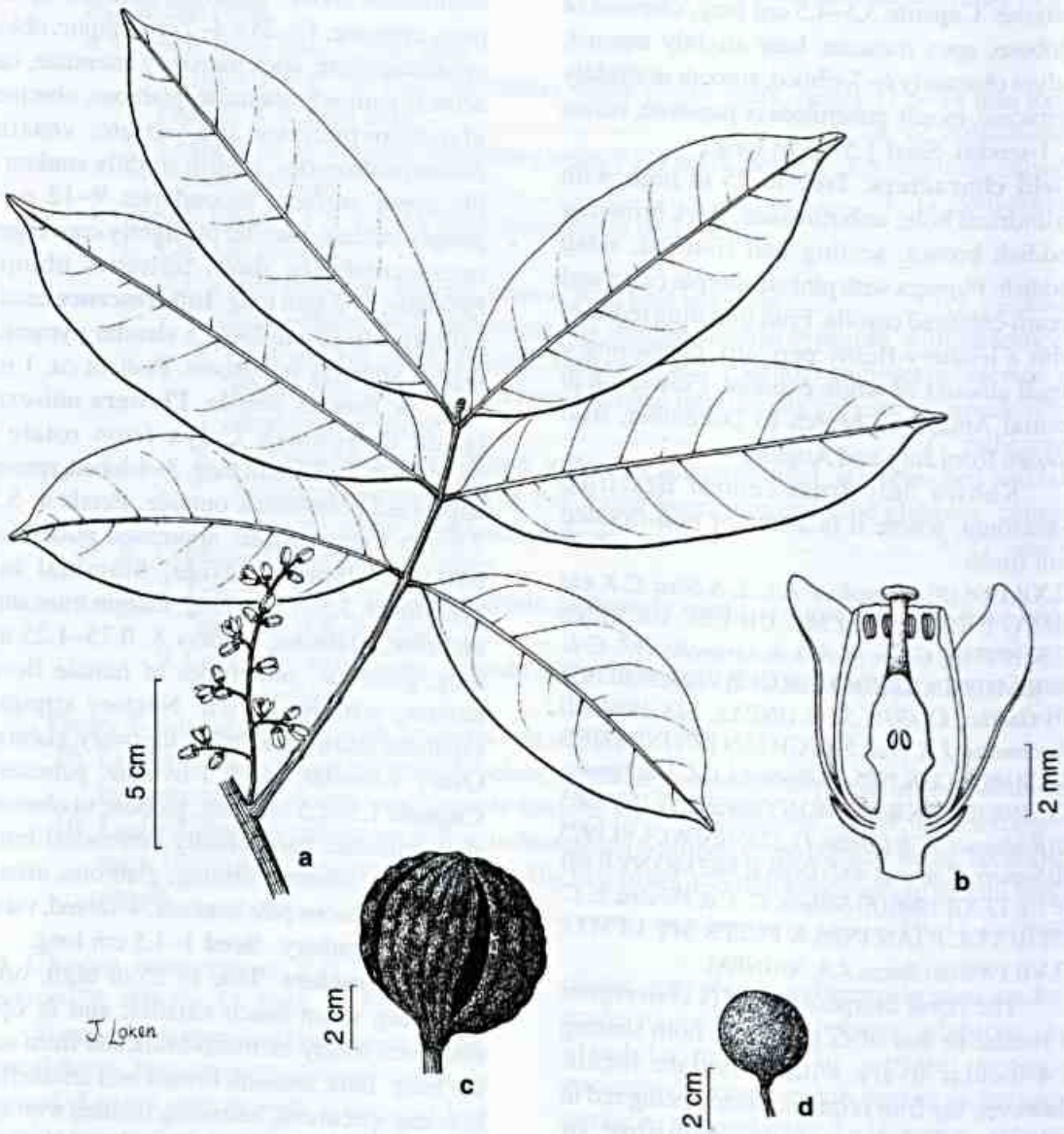

Figure 11 - a-c. *Guarea convergens* - a. habit; b. flower (*Pennington et al. 9967*); c. fruit (*Pennington et al. 9917*). d. *G. guidonia* - fruit (*Williams 9975*).

2.3 *Guarea pubescens* (Rich.) A. Juss., Mem. Mus. Hist. Nat. 19: 241, 286. 1831; Pennington & Styles, Fl. Neotrop. 28: 293, fig. 59. 1981.

Trichilia pubescens Rich., Actes Soca. Hist. Nat. Paris 1: 108. 1792.

Young shoots pubescent at first, becoming glabrous, greyish-white, sometimes thickened and suberous. **Leaves** pinnate with a terminal bud showing intermittent growth, to 30 cm long, petiole and rhachis semiterete or narrowly winged, often channelled above, pubescent at first, becoming glabrous. Leaflets 2–7 pairs, opposite, 9–30 × 3–10 cm, elliptic, oblong or oblanceolate, apex narrowly attenuate, base acute to narrowly attenuate, pubescent or glabrous, sometimes glandular-punctate or -striate; venation eucamptodromous, midrib flat or slightly raised on the upper surface, secondary veins 8–14 pairs, straight or arcuate, parallel or slightly convergent, intersecondaries short or absent, tertiaries oblique. Petiolule 1–5 mm long. **Inflorescence** axillary, ramiflorous or cauliflorous, 2–15 cm long, a slender raceme or thyrse, pubescent to glabrous. Pedicel 1–2.5 mm long. Calyx patelliform or cyathiform, 1.5–3.5 mm long, irregularly 3–5-lobed, sparsely appressed puberulous outside, glabrous inside. Petals 4, 7–9 mm long, appressed puberulous outside, glabrous inside. Staminal tube cylindrical, 5–7 mm long, margin undulate, glabrous; anthers 8, 0.75–1 mm long, glabrous. Nectary stipitate, expanded into a collar below the ovary, glabrous. Ovary 4-locular, loculi 1-ovulate, densely strigose. **Capsule** 1.2–2 cm long, depressed globose or globose, base tapered or truncate, valves 4, obscurely 3-ribbed and often minutely tuberculate between the ribs, puberulous or pubescent; valves 1-seeded. **Seed** 0.8–1.5 cm long, shaped like the segment of an orange.

Key to the subspecies of *Guarea pubescens*

1. Leaflets usually broadly elliptic or oblanceolate, midrib flat or sunken on the upper surface, upper lamina with minute raised dots, petiole and rhachis unwinged, capsule often globose and minutely tuberculate; twigs often suberous. ..... *G. pubescens* subsp. *pubescens*
1. Leaflets usually narrowly elliptic or lanceolate, midrib raised on the upper surface, upper lamina without raised dots, petiole and rhachis narrowly winged, capsule depressed globose, irregularly ribbed, twigs not suberous. ..... *G. pubescens* subsp. *pubiflora*

2.3a *Guarea pubescens* (Rich.) A. Juss. subsp. ***pubescens***; Pennington & Styles, Fl. Neotrop. 28: 295, fig. 59. 1981. **Fig. 12 d-m**

Field characters. A small treelet with beige fissured bark, often unbranched. The twigs often develop strongly suberized bark. Flowers with pinkish calyx and greenish-white corolla. Fruit maturing dull red or purple. Flowering in December, fruit in March and June.

From the Guianas & Amapá across Amazonia to Peru, Ecuador and Colombia, where it occurs in lowland rain forest on non-flooded land.

13.XII.1995 (fl) *Brito, J. M. et al. 17* (K); 19.VI.1965 (fr) *Loureiro, A. & Coêlho, D. INPA 15521* (INPA); 10.XI.1987 (bd) *Nelson, B. W. INPA 191145* (INPA K MG NY SP); 21.III.1995 (fr) *Sothers, C. A. et al. 351* (INPA); 9.VIII.1995 (fl) *Sothers, C. A. et al. 551* (INPA K MG MO NY RB SP U UB).

2.3b *Guarea pubescens* subsp. ***pubiflora*** (A. Juss.) T.D. Penn., Pennington & Styles, Fl. Neotrop. 28: 298, fig. 59. 1981. **Fig. 12 a-c**

Guarea pubiflora A. Juss., Mém. Mus. Hist. Nat. 19: 241, 287. 1831.

Field characters: A small treelet to 10 m high, often with adventitious aerial roots when subject to flooding. Flowers with reddish-purple calyx and often with pink corolla. The mature fruit has a fleshy reddish-purple pericarp, with seeds surrounded by an orange sarcotesta.

Central Brazilian Amazonia to southern Venezuela, where it is found along riverbanks in periodically and permanently flooded forest.

Not recorded from Reserva Ducke.

AMAZONAS: R. Negro, Cuieiras, *Pires et al.* 37324 (FHO,INPA); R. Manacapurú, *Rodrigues* 423 (FHO INPA); mouth of R. Negro, *Spruce* 1686 (BM G GH GOET K M NY OXF P).

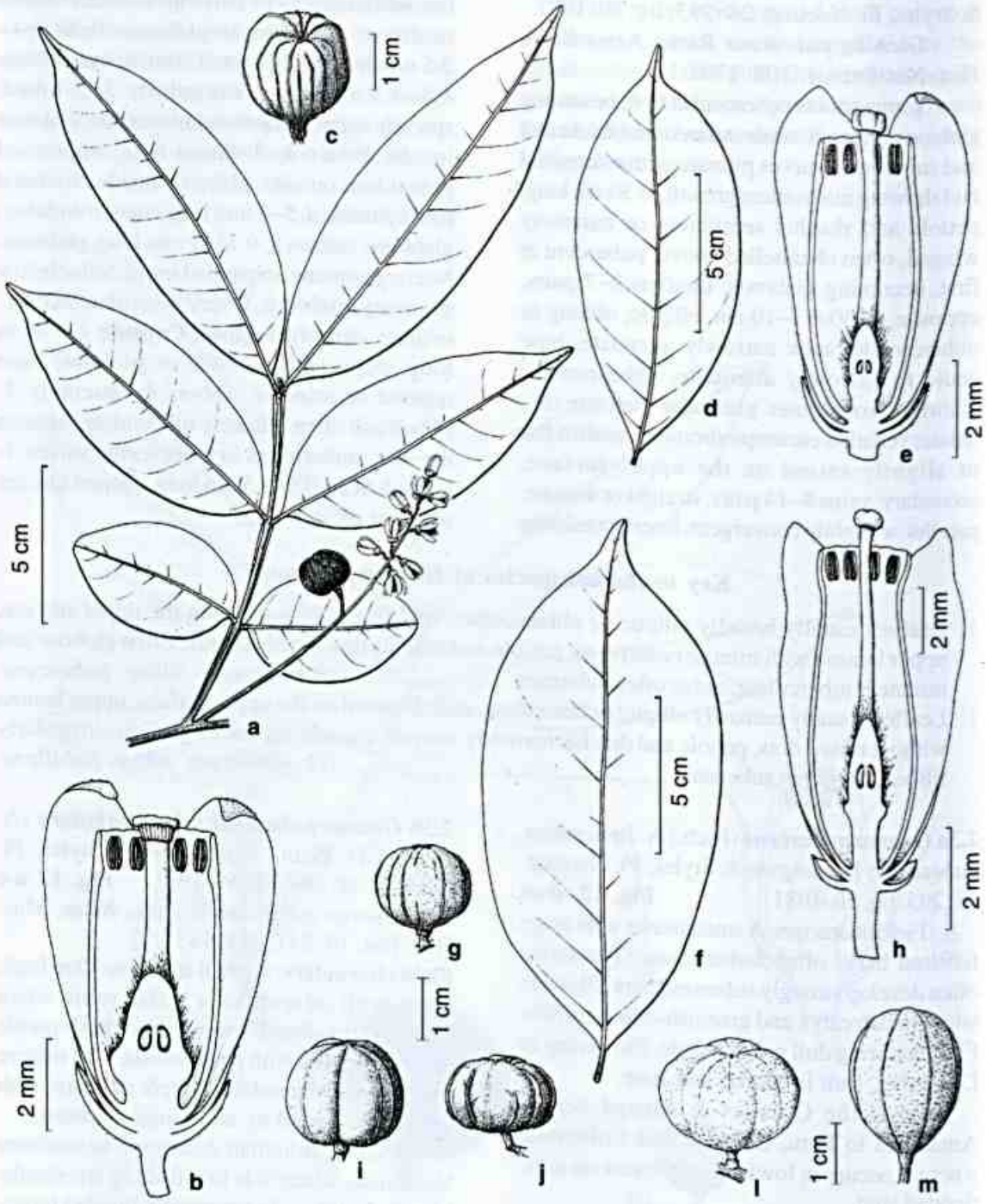

Figure 12 - a-c. *Guarea pubescens* subsp. *pubiflora* - a. habit (*Schultes & Lopez 8917*); b. flower (*Spruce 1909*); c. fruit (*Pennington et al. 9981*). d-m. *Guarea pubescens* subsp. *pubescens* - d. leaflet; e. flower (*Gleason 443*); f. leaflet; g. fruit (*Prance et al. 4203*); h. flower (*Huber 4622*); i-m. fruits (left to right: *Sastre 1498*, *Rodrigues 773*, *Berlin 413*, *Mori et al. 8173*)

Guarea pubescens is close to *G. guidonia* but can be distinguished from it by the closely parallel oblique tertiary venation, densely strigose ovary and the structure and indumentum of the capsule.

2.4 *Guarea scabra* A. Juss., Mém. Mus. Hist. Nat. 19: 241, 285. 1831; Pennington & Styles, Fl. Neotrop. 28: 304. 1981.

Young shoots minutely appressed puberulous at first, soon glabrous, slightly suberous. **Leaves** pinnate with a terminal bud showing intermittent growth, to 35 cm long, petiole and rhachis semiterete, subglabrous. Leaflets 3–6 pairs, opposite, 9–15 × 3–5 cm, elliptic, apex narrowly attenuate or acuminate, base narrowly cuneate or attenuate, glabrous, not glandular-punctate or -striate; venation eucamptodromous, midrib sunken on the upper surface, secondaries 9–12 pairs, arcuate and convergent, intersecondaries absent, tertiaries oblique, obscure. Petiolule 3–5 mm long. **Inflorescence** axillary and on smaller branches, 5–12 cm long. Calyx patelliform, 1–1.5 mm long, irregularly 4-lobed, subglabrous. Petals 4, 6–9 mm long, valvate, finely appressed puberulous outside, glabrous inside. Staminal tube cylindrical, 5–8 mm long, margin undulate, glabrous; anthers 8, 0.75–1.25 mm long, glabrous. Nectary stipitate, expanded to form a collar below the ovary, glabrous. Ovary 4-locular, loculi 1-ovulate, strigose. **Capsule** *ca.* 1.5 cm long, ellipsoid to subglobose, valves 4, smooth, pubescent, valves 1-seeded.

Field characters: Tree to 15 m high and 15 cm diameter; the bole sometimes fluted at the base. Bark mid-brown, scaling in rather long plates. Flowers with reddish calyx, and cream-coloured corolla and staminal tube. Flowering in central Amazonia in July and October, fruit in August.

From Amapá and the Guianas across Amazonia to the Brazil Peru frontier, in lowland mixed forest on non-flooded land.

16.VIII.1995 (fr) *Costa, M. A. S. et al. 346* (INPA K MG MO NY R RB SP U); 31.VII.1997 (fl) *Ribeiro, J. E. L. S. et al. 1901* (G INPA K MG MO NY RB SP U UB); 1.X.1968 (fl) *Souza, J. A. 200* (INPA).

Guarea scabra could be confused with *G. convergens* in the vegetative state, except that its leaves tend to dry a dark brown colour. Otherwise the inflorescence and fruit provide distinguishing features. The inflorescence of *G. scabra* is subglabrous, widely branched and lax-flowered, while that of *G. convergens* has obvious indumentum and is more slender and densely-flowered. The fruit of *G. scabra* is smaller than that of *G. convergens*.

2.5 *Guarea humaitensis* T. D. Penn., Fl. Neotrop. 28: 306, fig. 62. 1981. **Fig. 13 a-c**

Young shoots stout, puberulous at first, becoming glabrous. **Leaves** pinnate with a dormant terminal bud, 35–75 cm long, petiole semiterete, rhachis terete, puberulous at first, becoming glabrous. Leaflets 5–7 pairs, opposite, 20–28 × 6–9 cm, oblong, elliptic or oblanceolate, apex acute to acuminate, base usually acute to narrowly cuneate, slightly coriaceous, glabrous above, puberulous on the veins below, or glabrous; not glandular-striate or -punctate; venation eucamptodromous, midrib impressed on the upper surface, secondaries 11–16 pairs, rather steeply ascending, straight, parallel, intersecondaries absent, tertiaries oblique, parallel. Petiolule 3–10 mm long. **Inflorescence** axillary or in the axils of fallen leaves, 10–30 cm long, a rather slender and lax-flowered thyrse, puberulous. Pedicel 0.5–1 mm long. **Flowers** unisexual (plant dioecious). Calyx cyathiform, 2–3 mm long, irregularly 3–4-lobed, appressed puberulous outside, glabrous inside. Staminal tube cylindrical, 8–11 mm long, margin undulate, glabrous; anthers 8–9, 1.3–1.6 mm long, glabrous; antherodes in female flower shrunken, without pollen. Nectary stipitate, expanded into a collar beneath the ovary, glabrous. Ovary 4(–5)-locular, loculi 1-ovulate, densely strigose. **Capsule** 1.8–3 cm long, globose to ovoid, contracted at the base into a stipe *ca.* 0.5 cm long, valves 4(–5), with 3–5 narrow longitudinal wrinkled ribs, puberulous; valves 1-seeded. **Seed** *ca.* 1 cm long, surrounded by an orange sarcotesta.

Field characters: A little branched tree to 20 m high. Bole cylindrical, bark shallowly

fissured and scaling in irregular pieces, mid-brown. The leaves have a dormant, non-active terminal bud, with all the leaflets unfolding in a single period of growth (*cf. G. cinnamomea*). The flowers are fragrant, with reddish calyx and cream-coloured corolla and staminal tube. The mature capsule is red, with a thin leathery-fleshy pericarp. Flowering from September to January, and fruit maturing January to March.

At present known only from central Brazilian Amazonia where it occurs in non-flooded mixed rain forest.

Local name: Jitó.

11.XII.1993 (fl) *Assunção, P. A. C. L. & Vicentini, A. 1* (INPA K MG NY SP); 6.III.1998 (fr) *Assunção, P. A. C. L. et al. 809* (IAN INPA K MO NY RB SP); 27.XII.1963 (fl) *Rodrigues, W. & Coêlho, D. 5620* (INPA); 11.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7560* (INPA); 6.X.1994 (bd) *Sothers, C. A. 213* (INPA K); 31.X.1995 (fl) *Sothers, C. A. & Silva, C. F. 659* (G INPA K MBM MG MO R RB U).

This species has a similar floral structure *as G. convergens* and *G. guidonia*, but the flowers are larger, and the leaves much longer and with larger leaflets. The stipate capsule with small wrinkled ribs on the valves is also distinctive. It is also close in leaf and floral morphology to *G. cinnamomea*. See there for further comment.

2.6 *Guarea cinnamomea* Harms, Notizbl. Bot. Gart. Berlin-Dahlem 13: 504. 1937; Pennington & Styles, Fl. Neotrop. 28: 307, fig. 62. 1981. **Fig. 13 d-e**

Young shoots stout, puberulous at first, soon glabrous. **Leaves** pinnate, with a terminal bud with intermittent growth, 15–110 cm long, petiole and rhachis semiterete when young, becoming terete, glabrous. Leaflets 2–11 pairs, opposite, 15–35 × 7–11.5 cm, mostly broadly oblong, apex obtusely cuspidate or narrowly attenuate, base broadly cuneate to rounded, coriaceous, glabrous on the upper surface, minutely puberulous on midrib and veins below; not glandular-punctate or -striate; venation eucamptodromous, midrib sunken on the upper surface, secondaries 12–17 pairs, parallel, straight, intersecondaries absent, tertiaries oblique and parallel. Petiolule 7–10 mm long. **Inflorescence** axillary and in the axils of fallen leaves, 3–12 cm long, thyrsoid or racemose, few-flowered, puberulous. Pedicel 1–1.5 mm long. Calyx cyathiform, 2.5–3 mm long, irregularly 4–5-toothed or margin truncate, minutely puberulous outside. Petals 4–5, 11.5–14 mm long, valvate, densely appressed pubescent outside, glabrous inside. Staminal tube cylindrical, 9–10 mm long, margin undulate, glabrous; anthers 7–9, 1.5–2 mm long, glabrous. Nectary stipitate, expanded into a collar below the ovary, glabrous. Ovary 4–6-locular, loculi 1-ovulate, densely appressed puberulous. **Capsule** 5–6.2 cm long, ovoid or obovoid, tapering gradually into a short stout stipe, valves 4–6, smooth or faintly ribbed, puberulous or papillose; valves 1-seeded. **Seed** 2.3–2.6 cm long, shaped like the segment of an orange.

Field characters: Tree to 20 m high and 25 cm diameter with massive twigs bearing large terminal clusters of leaves often 1 m in length. The bark is brown, soft and rather suberous, scaling in irregular longitudinal pieces. Flowers with cream-coloured corolla and staminal tube, and fruit maturing bright red. The fleshy-leathery pericarp is eaten by birds. Flowering in central Amazonia in May and June, fruit ripening in September.

Central and western Amazonia, extending to Peru, in lowland rain forest on non-flooded land.

11.IV.1957 (fr) *Albuquerque, B. W. P.* INPA 5531 (INPA); 9.V.1957 (fl) *Albuquerque, B. W. P.* INPA 5559 (INPA); 27.VIII.1974 (st) *Pennington, T. D. et al.* 9925 (INPA); 22.IV.1964 (fr) *Rodrigues, W. & Loureiro, A.* 5775 (INPA).

This species can be confused with *G. humaitensis* when sterile or in flower, but it differs in its much larger, smooth capsule, and in the active terminal bud of the leaves (dormant and non-active in *G. humaitensis*). The two species grow side by side in the vicinity of Manaus, but they have different flowering seasons.

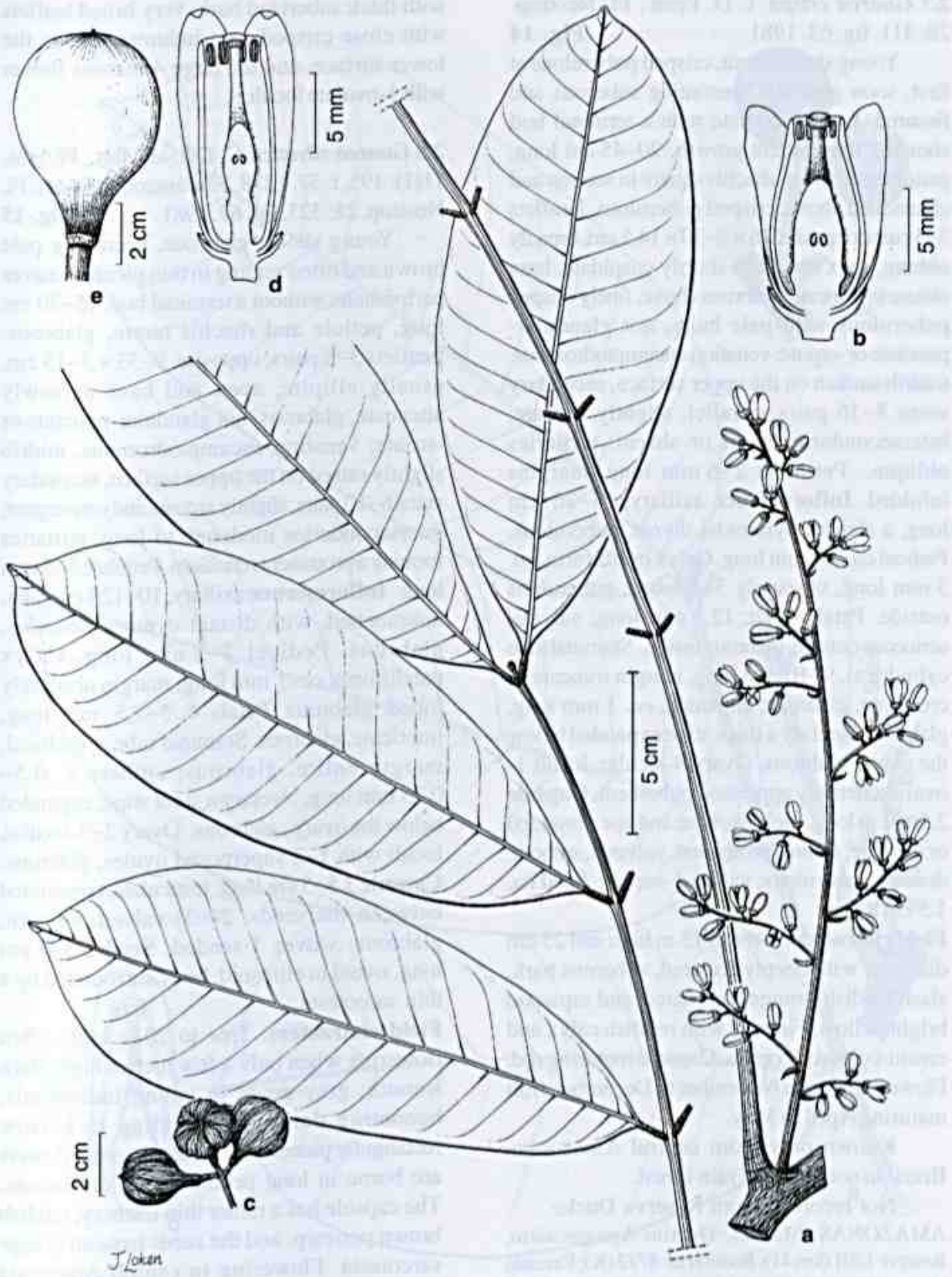

Figure 13 - a-c. *Guarea humaitensis* - a. habit (*Pennington et al. 9995*); b. flower (*Pennington et al. 9989*); c. fruit (*Rodrigues & Coêlho 16863*). d-e. *Guarea cinnamomea* - d. flower (*Byron 5559*); e. fruit (*Pennington et al. 9928*).

2.7 *Guarea crispa* T. D. Penn., Fl. Neotrop. 28: 311, fig. 63. 1981. **Fig. 14**

Young shoots stout, crisped puberulous at first, soon glabrous, becoming suberous and fissured. **Leaves** pinnate with a terminal bud showing intermittent growth, 20–45 cm long, petiole semiterete, rhachis square in section and channelled above, crisped puberulous. Leaflets 3–5 pairs, opposite, 16 × 8–30 × 14.5 cm, broadly oblong, apex obtuse to shortly cuspidate, base obtuse to truncate, glabrous above, finely crisped puberulous with pale hairs, not glandular-punctate or -striate; venation eucamptodromous, midrib sunken on the upper surface, secondary veins 8–16 pairs, parallel, slightly arcuate, intersecondaries short or absent, tertiaries oblique. Petiolule 2–6 mm long, margins infolded. **Inflorescence** axillary, 14–26 cm long, a slender pyramidal thyrse, puberulous. Pedicel *ca.* 1.5 mm long. Calyx cyathiform, *ca.* 3 mm long, obscurely 3–4-lobed, puberulous outside. Petals 4, *ca.* 12.5 mm long, valvate, sericeous outside, glabrous inside. Staminal tube cylindrical, 9–10 mm long, margin truncate or crenulate, glabrous; anthers 8, *ca.* 1 mm long, glabrous. Nectary a thick stipe expanded below the ovary, glabrous. Ovary 4-locular, loculi 1-ovulate, densely appressed pubescent. **Capsule** 2.5–3 cm long, globose, base and apex rounded or truncate, sutures prominent, valves 4, smooth, densely puberulous; valves 1-seeded. **Seed** *ca.* 1.5 cm long.

Field characters: Tree to 15 m high and 25 cm diameter with deeply fissured, suberous bark, slash reddish-orange, laminated, and sapwood bright yellow. Flowers with reddish calyx and cream-coloured corolla. Capsule maturing red. Flowering season November to December, fruit maturing April to May.

Known only from central Amazonian Brazil in non-flooded rain forest.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus, Distrito Agropecuário, Reserve 1501 (km 41), *Boom et al. 8712* (K); Fazenda Porto Alegre, Reserve 3304, *Pacheco et al. 223* (INPA K).

Guarea crispa is a distinctive and easily recognized species because of its massive twigs with thick suberized bark, very broad leaflets with close crisped pale indumentum on the lower surface, and the large 4-merous flower with 1-ovulate loculi.

2.8 *Guarea silvatica* C. DC. *in* Mart., Fl. bras. 11(1): 195, t. 57. 1878. Pennington & Styles, Fl. Neotrop. 28: 323, fig. 67. 1981. **Fig. 15**

Young shoots glabrous, becoming pale brown and often scaling in thin pieces. **Leaves** paripinnate, without a terminal bud, 15–30 cm long, petiole and rhachis terete, glabrous. Leaflets 3–5 pairs, opposite, 9–33 × 3–13 cm, usually elliptic, apex and base narrowly attenuate, glabrous, not glandular-punctate or -striate; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 6–10 pairs, slightly arcuate and convergent; intersecondaries moderate to long, tertiaries forming a prominent reticulum. Petiolule 3–5 mm long. **Inflorescence** axillary, 10–120 cm long, unbranched, with distant cymose fascicles, glabrous. Pedicel 2–5 mm long. Calyx patelliform, *ca.* 1 mm long, margin obscurely lobed, glabrous. Petals 4, 5–7.5 mm long, imbricate, glabrous. Staminal tube cylindrical, margin entire, glabrous; anthers 8, 0.5–0.75 mm long. Nectary a stout stipe, expanded below the ovary , glabrous, Ovary 2–3-locular, loculi with 1–2 superposed ovules, glabrous. **Capsule** 3.5–5 cm long, testiculate, constricted between the seeds, 2(–3)-valved, smooth, glabrous; valves 1-seeded. **Seed** 2.5–3 cm long, ovoid to ellipsoid, bony surrounded by a thin sarcotesta.

Field characters: Tree to 20 m high, often flowering when only a few metres high. Bark smooth, grey-green in young individuals, becoming darker and scaling in narrow rectangular pieces. The creamish-green flowers are borne in long pendulous inflorescences. The capsule has a rather thin leathery, reddish brown pericarp, and the seeds have an orange sarcotesta. Flowering in central Amazonia from August to December with the fruit maturing from March to May.

Found in a broad swathe from the Guianas and Maranhão across Amazonia to the foothills

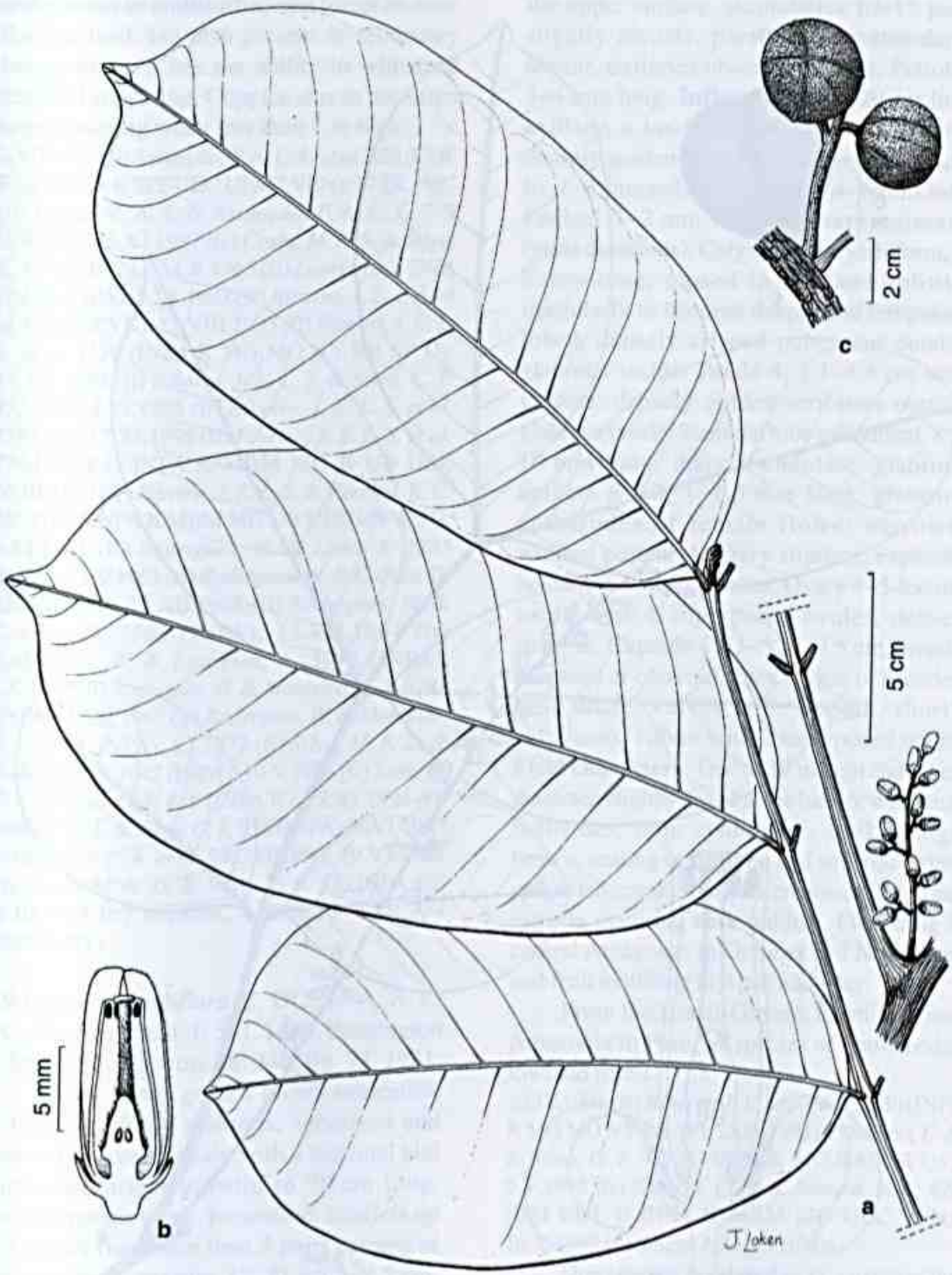

Figure 14 - *Guarea crispa* - a. habit; b. flower (*Prance et al. 3061*); c. fruit (*Rodrigues & Coêlho 2455*).

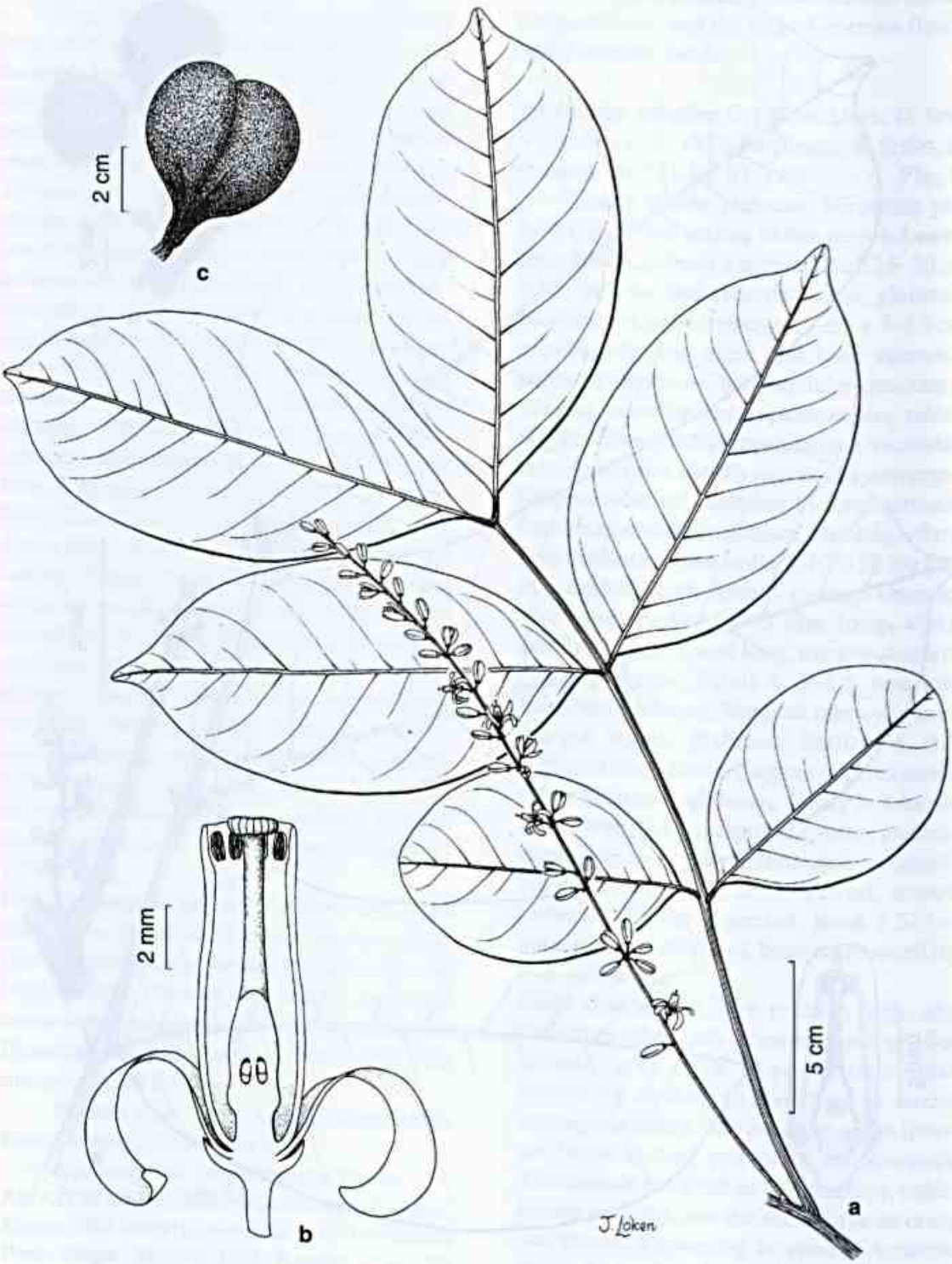

Figure 15 - *Guarea silvatica* - a. habit (*Pennington et al. 9900*); b. flower (*Pennington et al. 9977*); c. fruit (*Croat 20757*).

of the Andes in Peru. A component of the understorey in undisturbed rain forest on non-flooded land, but also present in secondary forest, where it has the ability to withstand repeated coppicing. Coppice shoots are often seen flowering when less than 1 m high.
2.VII.1996 (fl) *Assunção, P. A. C. L. et al. 328* (COL F IAN INPA K SPF UEC UFMT VEN); 17.IX.1997 (fl) *Costa, M. A. S. & Assunção, P. A. C. L. 779* (INPA K); 25.XI.1997 (fr) *Costa, M. A. S. & Silva, C. F. 808* (INPA); 14.X.1965 (fl) *Loureiro, A. INPA 16182* (INPA); 5.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 862* (INPA K); 13.VIII.1993 (fl) *Ribeiro, J. E. L. S. et al. 1139* (INPA K MG MO NY RB SP U); 14.XII.1994 (fl) *Ribeiro, J. E. L. S. & Silva, C. F. 1523* (K); 8.IV.1995 (fr) *Ribeiro, J. E. L. S. et al. 1594* (K); 17.XI.1995 (fl) *Ribeiro, J. E. L. S. et al. 1763* (BM G INPA K MBM MG R UB US); 26.III.1997 (fr) *Ribeiro, J. E. L. S. & Pereira, E. C. 1873* (BM INPA K MBM MG UB UEC US VEN); 6.XI.1961 (fl) *Rodrigues, W. & Lima, J. 2735* (INPA); 15.V.1963 (fr) *Rodrigues, W. & Coêlho, D. 5216* (INPA); 13.XII.1963 (fl) *Rodrigues, W. & Coêlho, D. 5600* (INPA); 15.VII.1964 (fr) *Rodrigues, W. & Loureiro, A. 5946* (INPA); 6.X.1964 (fl) *Rodrigues, W. & Monteiro, O. P. 6748* (INPA); 1.XII.1967 (fr) *Rodrigues, W. & Monteiro, O. P. 8322* (INPA); 1.I.1972 (fl) *Silva, M. F. da & Rodrigues, W. 1042* (INPA); 10.V.1995 (fr) *Sothers, C. A. & Silva, C. F. 456* (INPA K); 28.XI.1996 (fl) *Sothers, C. A. & Silva, C. F. 935* (INPA); 6.VI.1997 (fr) *Sothers, C. A. et al. 1015* (INPA); 19.VI.1995 (fr) *Souza, M. A. D. & Silva, C. F. 33* (INPA K); 11.III.1994 (fr) *Vicentini, A. & Silva, C. F. 424* (INPA K NY).

2.9 *Guarea trunciflora* C. DC., *in* A. & C. DC., Monogr. Phan. 1: 571. 1878; Pennington & Styles, Fl. Neotrop. 28: 340, fig. 71. 1981.

Young shoots golden-brown tomentose at first, becoming glabrous, suberized and fissured. Leaves pinnate with a terminal bud with intermittent growth, to 70 cm long, petiole, rhachis terete, tomentose. Leaflets up to 12 pairs (not more than 5 pairs present at any one time), opposite, 12–21 × 5.5–9.5 cm, broadly oblong or elliptic, apex obtuse or rounded, base acute to rounded, glabrous above, crisped puberulous below, hairs intermixed with minute red papillae (lens); venation eucamptodromous, midrib sunken on the upper surface, secondaries 10–15 pairs, slightly arcuate, parallel, intersecondaries absent, tertiaries obscure, oblique. Petiolule 3–4 mm long. **Inflorescence** 3–20 cm long, axillary, a lax-branched pyramidal thyrse, densely golden-pubescent, flowers subtended by 1–3 lanceolate bracteoles 4–6 mm long. Pedicel 1–2 mm long. **Flowers** unisexual (plant dioecious). Calyx deeply cyathiform, 7–8 mm long, closed in bud and splitting irregularly to become deeply and irregularly lobed, densely crisped pubescent outside, glabrous inside. Petals 4, 1.1–1.4 cm long, valvate, densely golden-sericeous outside, glabrous inside. Staminal tube cylindrical, 8.5–10 mm long, margin undulate, glabrous; anthers 8–10, 1–1.5 mm long, glabrous; antherodes of female flower narrower, without pollen. Nectary stipitate, expanded below the ovary, glabrous. Ovary 4–5-locular, loculi with 2 superposed ovules, densely strigose. **Capsule** 4 × 3–5.5 × 3.5 cm, broadly ellipsoid or obovoid, apex obtuse or rounded, base acute, valves 4–5, smooth, shortly velutinous; valves with 2 superposed seeds. **Field characters**: Tree to 30 m high and 30 cm diameter, slightly fluted at the base or with small buttresses, bole cylindrical. Bark orange-brown, scaling or fissured and suberous, slash yellowish-cream. Flowers cream-coloured and capsule maturing dark reddish. Flowering in central Amazonas in October and November, and fruit maturing in April and May.

From the Brazil-Guyana frontier, across Amazonia to Peru. A species of non-flooded lowland forest.
29.IV.1995 (fr) *Ribeiro, J. E. L. S. et al. 1620* (INPA K MG MO NY RB SP); 25.IV.1995 (fr) *Sothers, C. A. & Silva, C. F. 411* (G INPA K MG R U UB US); 6.V.1995 (fr) *Sothers, C. A. & Pereira, E. C. 426* (BM COL E INPA K MBM MG UEC VEN); 16.X.1968 (fl) *Souza, J. A. 221* (INPA).

This species is related to *G. carinata* but differs from it in the much finer crisped indumentum on the lower leaf surface, by the longer calyx which splits irregularly and by the smooth, shortly velutinous capsule.

2.10. *Guarea carinata* Ducke, Trop. Woods 76: 16. 1943; Pennington & Styles, Fl. Neotrop. 28: 342, fig. 72. 1981. **Fig. 16**

Young shoots coarsely pubescent to tomentose, soon becoming glabrous, suberous and longitudinally fissured. **Leaves** pinnate with a terminal bud showing intermittent growth, to 60 cm long, petiole semiterete, rhachis terete, tomentose or pubescent at first, becoming glabrous. Leaflets to 10 pairs, opposite, 12–25 × 6–9 cm, usually oblong or elliptic, apex attenuate to obtuse or rounded, base acute to truncate, upper surface glabrous or with pubescent midrib, lower surface coarsely pubescent on midrib and veins, sparser on the lamina, not glandular-punctuate or -striate; venation eucamptodromous or brochidodromous, midrib sunken on the upper surface, secondary veins 16–20 pairs, parallel, slightly arcuate, intersecondaries short, tertiaries oblique. Petiolule 2–6 mm long. **Inflorescence** axillary or in the axils of fallen leaves, 2–10 cm long, a rather densely-flowered slender panicle, tomentose. Pedicel 1–2 mm long. **Flowers** unisexual (plant dioecious). Calyx cyathiform, 3–

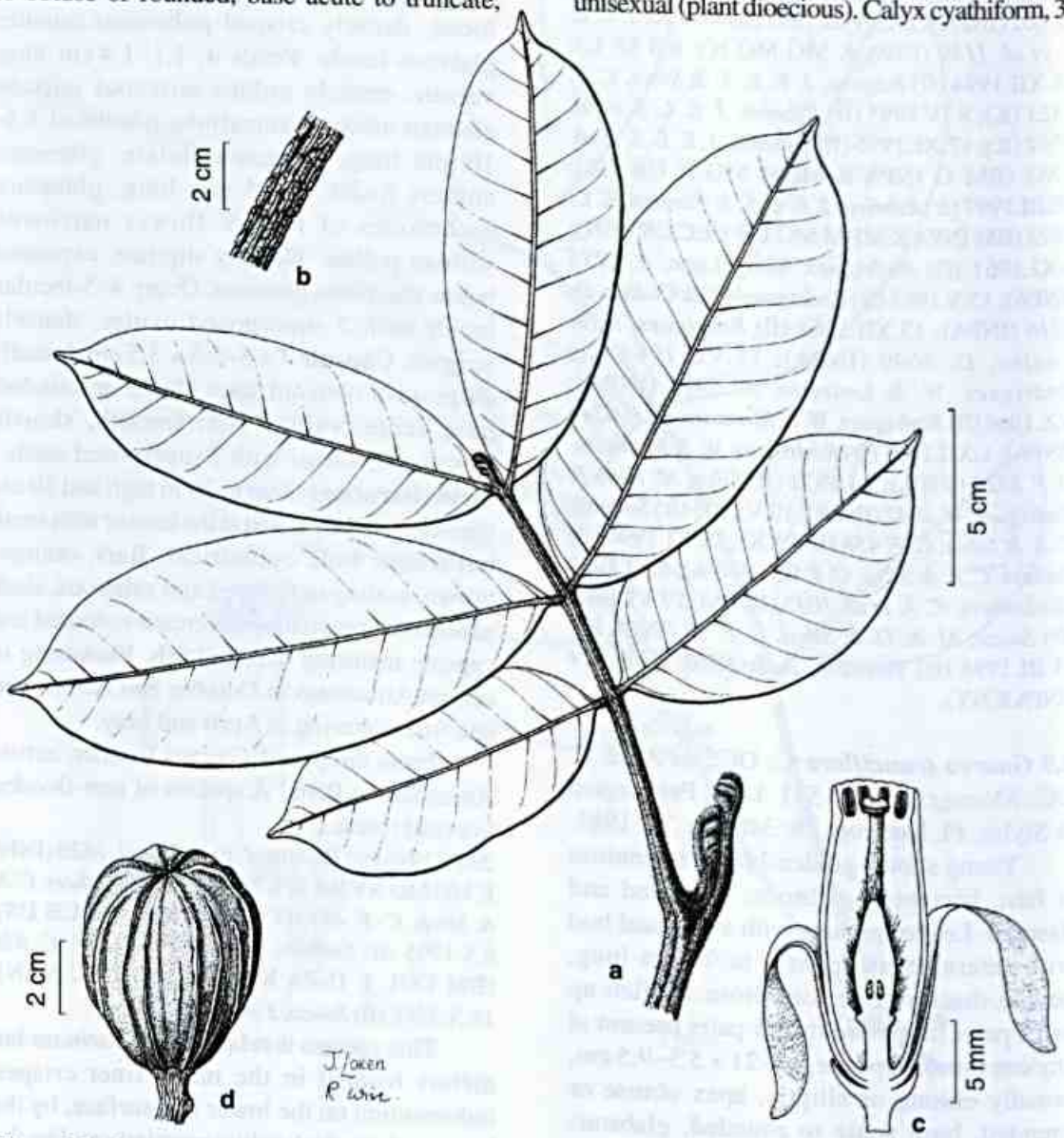

Figure 16 - *Guarea carinata* - a. habit (*Pennington et al. 10078*); b. young branch with suberized bark (*Pennington et al. 9930*); c. flower (*Prance et al. 2244*); d. fruit (*Pennington et al. 9975*).

7 mm long, shortly 4-lobed, densely pubescent outside. Petals 4, 1.4–1.7 cm long, valvate, densely golden-strigose outside, glabrous inside. Staminal tube cylindrical, 1.1–1.3 cm long, margin undulate, glabrous; anthers 8–11, 1.5–1.8 mm long, glabrous; antherodes of female flower narrower, without pollen. Nectary a stout stipe, expanded to form a collar below the ovary, glabrous. Ovary usually 5–6-locular, loculi with 2 superposed ovules, densely strigose. **Capsule** 3–5 cm long, depressed globose to obovoid, apex truncate, base rounded or tapered, valves usually 5–6, shallowly or prominently 3-ribbed, the central rib often branched and anastomosing with the others, tomentose to pubescent; valves with 2 superposed seeds. **Seed** *ca.* 1.5 cm long, surrounded by a thin sarcotesta.

Field characters: Tree to 20 m high with soft suberous brown bark, scaling in thin irregular pieces. The twigs and branches also become suberized. Flowers with green or reddish calyx and cream-coloured corolla and staminal tube. The large purplish carinate capsule is very conspicuous in the field. Flowering in central Amazonia from July to September, with the fruit maturing from October to January.

Known from scattered collections extending from Surinam and Pará across Amazonia to the Brazil-Peru frontier. It is confined to undisturbed mixed forest on non-flooded land.

(st) *Pennington, T. D. et al. 9922* (FHO INPA K); 9.IX.1966 (fl) *Prance, G. T. et al. 2244* (INPA); 15.X.1963 (fr) *Rodrigues, W. 5498* (INPA); 3.V.1968 (fl) *Souza, J. A. INPA 21218* (INPA).

AMAZONAS: Manaus-Itacoatiara, km 65, Egler Reserve, *Pennington et al. 9936* (FHO INPA K); Manaus, CEPLAC Reserve, *Pennington et al. 9930* (FHO INPA K).

This species is closest to *G. trunciflora*. See there for further comment. The large carinate purple fruit is most distinctive.

3. *Cedrela*

Cedrela P. Browne, Civil & Nat. Hist. Jamaica 158, tab. 10, fig. 1. 1756. Earle Smith, Fieldiana Bot. 29: 295. 1960.

Trees. Shoot apex bearing a cluster of scale-leaves. Indumentum of simple hairs. **Leaves** usually paripinnate. **Flowers** unisexual (plant monoecious), in large terminal, much branched thyrses. Calyx lobed to near base, cup-shaped, or shallowly toothed. Petals 5, free, imbricate, adnate 1/3 to 1/2 their length to a columnar androgynophore (nectary) by a medium keel. Stamens 5, free but adnate to andro-gynophore below. Ovary 5-locular, borne at the apex of the gynophore, loculi with 8–4 ovules; style-head discoid. **Fruit** a woody septifragal capsule, opening from the apex by 5 valves, with a woody central columella. **Seeds** with a terminal wing, attached by the seed end to the apex of columella and winged towards the base of the capsule.

About 14 species confined to the Neotropics; 2 species in central Amazonia, 1 species recorded from Reserva Ducke.

Key to the species of *Cedrela* in the Manaus area

1. Leaflets 6–12 pairs, lower lamina generally glabrous, terminal cymules of inflorescence open, lax; petals greenish-white, capsule 2–3.5 cm long. ..... 2. *C. odorata*
1. Leaflets 11–18 pairs, lower lamina generally velutinous to villose, terminal cymules of inflorescence crowded and congested, petals with a pinkish tinge outside; capsule 6–10 cm long. ..... 1. *C. fissilis*

3.1 *Cedrela fissilis* Vell., Fl. Flum. 72 text. 1825, tab. 68. 1835; C. DC., *in* Mart., Fl. bras. 11(1): 223, tab. 65, fig. 2. 1878; Pennington & Styles, Fl. Neotrop. 28: 361, fig. 76. 1981.

Fig. 17 a-d

Young shoots subglabrous, smooth, with pale lenticels. **Leaves** paripinnate, 25–65 cm long, petiole and rhachis terete, tomentose or pubescent at first, becoming glabrous. Leaflets 11–18 pairs, opposite, lanceolate, asymmetrical, apex narrowly acuminate, base obtuse, rounded or truncate, asymmetrical, usually velutinous or pilose below, venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 14–17 pairs; slightly arcuate

and convergent, intersecondaries short to moderate, tertiaries reticulate. Petiolule 1–1.5 mm long. **Inflorescence** terminal, 50–80 cm long, widely branched, ultimate cymules usually congested. Pedicel 1–2 mm long. Calyx cyathiform, shallowly lobed, 1.5–2.5 mm long, densely pubescent. Petals 5, 8–10 mm long, free, imbricate, densely tomentose on both surfaces. Stamens 5, filaments 1.5–2.5 mm long, glabrous, anthers 1.5 mm long. Ovary globose, 5-locular, loculi 8–12-ovulate; pistillode in male flower slender, with vestigial ovules. **Capsule** 6–10 cm long, obovoid, pendulous, 5-valved, valves woody, dark brown with dense pale lenticels, glabrous, columella with 5 prominent broad wings. **Seeds** 2.5–4.5 cm long (including wing), dark brown.

Field characters: Tree to 35 m high and 1 m diameter, bark greyish-brown, deeply fissured, with the ridges scaling, slash pink, fibrous. Flowers with greenish petals with pink tinge at the apex. The fruit matures in central Amazonas in April. Most parts of the tree smell of garlic when crushed.

From Costa Rica southwards, throughout tropical South America to coastal Brazil and northern Argentina. It is usually found on well-drained soils in lowland mixed forest up to 800 m altitude.

8.IV.1988 (fr) *Santos, J. L. & Lima, R. P. 891* (INPA K MG MO NY RB SP U).

Local names & uses: *Cedro*. The timber is similar to but darker than that of *C. odorata*, and lacks the characteristic scent of the latter. It is however often mixed with *C. odorata* and highly valued for joinery due to the ease with which it can be worked, and for plywood veneer.

3.2 *Cedrela odorata* L., Syst. Pl. ed. 10, 940. 1759; Pennington & Styles, Fl. Neotrop. 28: 374, figs. 76, 76A. 1981. **Fig. 17 e-h**

Young shoots usually glabrous, with conspicuous lenticels. **Leaves** paripinnate, 25–60 cm long, petiole semiterete, rhachis terete, puberulous at first. Leaflets 6–12 pairs, usually opposite, ovate, oblong-lanceolate or lanceolate, apex acute to acuminate, base asymmetrical, acute to rounded, usually glabrous or with sparse indumentum midrib and veins below; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 14–15 pairs, slightly arcuate and convergent, intersecondaries short to moderate, tertiaries reticulate. Petiolule 0–2 cm long. **Inflorescence** terminal, 15–40 cm long, a widely branched panicle, cymules lax, puberulous. Pedicel 1–2 mm long. Calyx cyathiform or broadly tubular, 2–3 mm long, puberulous or glabrous. Petals 5, 7–8 mm long, free, imbricate, pubescent on both surfaces. Stamens 5, filaments 2–3 mm long, glabrous, anthers *ca.* 1.5 mm long. Ovary ovoid, 5-locular, loculi with 10–14 ovules, glabrous; pistillode in male flower slender, with vestigial ovules. **Capsule** 2–3.5 cm long, ellipsoid to obovoid, pendulous, 5-valved, valves thinly woody, grey-brown or brown with prominent pale lenticels, columella with 5 broad wings. **Seeds** 2–3 cm long (including wing), light brown.

Field characters: Deciduous tree to 35 m high and 1.5 m diameter, with small buttresses, bole cylindrical with greyish-brown fissured bark, the ridges scaling. Slash pink, fibrous, bitter. The crushed branches, leaves and fruit often smell strongly of garlic*a*. Flowers scented, with greenish-cream corolla.

Mexico and Central America, Greater and Lesser Antilles and throughout tropical South America to northern Argentina. Predominantly found in dry and moist lowland forest, both deciduous and evergreen. It attains its greatest development in the non-seasonal rain forests of the Andean foothills in Ecuador where it becomes a huge tree. Elsewhere in drier seasonal climates it may only be a small tree with a twisted bole. It is frequently found in secondary vegetation and because of its value for timber it is always protected. Its latitudinal range is from sea level to 1200 m.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus to Caracaraí, km 184, *Pennington et al. 9965* (FHO).

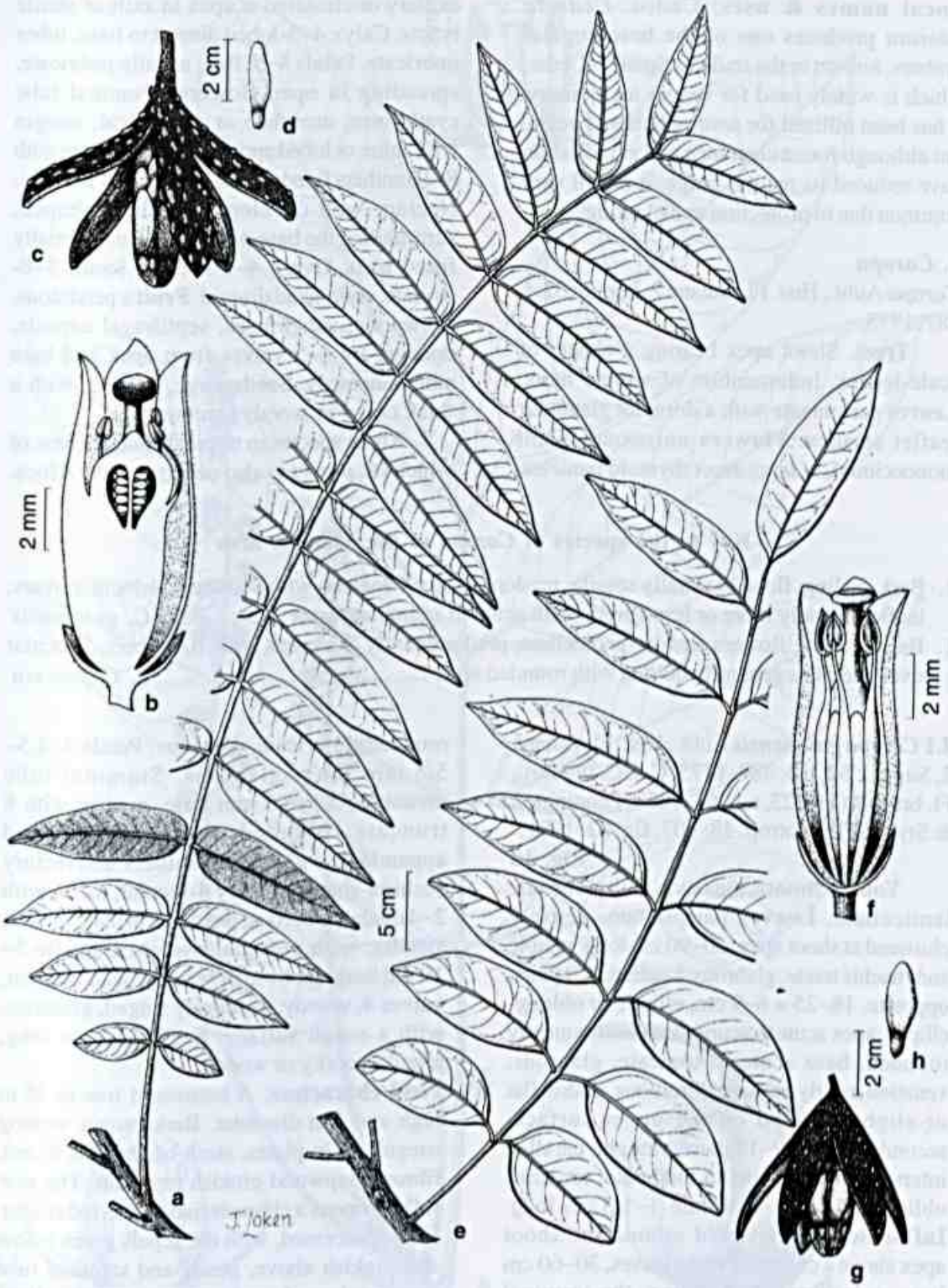

Figure 17 - a-d. *Cedrela fissilis* - a. branchlet; b. female flower (*Ramalho 409*); c. fruit; d. seed (*Reitz 6389*). e-h. *Cedrela odorata* - e. branchlet; g. fruit; h. seed (*Styles 171*); f. male flower (*Chaplin 407*).

Local names & uses: Cedro. *Cedrela odorata* produces one of the best tropical timbers, known in the trade as Spanish Cedar, which is widely used for veneer and joinery. It has been utilized for several hundred years, but although forest clearance and exploitation have reduced its natural range, it is still very common due to protection and planting.

4. *Carapa*

Carapa Aubl., Hist. Fl. Guiane 2, Suppl.: 32, t. 387. 1775.

Trees. Shoot apex bearing a cluster of scale-leaves. Indumentum of simple hairs. **Leaves** paripinnate with a dormant glandular leaflet at apex. **Flowers** unisexual (plant monoecious), in large erect thyrsoid panicles, axillary or clustered at apex in axils of sterile bracts. Calyx 4–5-lobed almost to base, lobes imbricate. Petals 4–5, free, usually imbricate, spreading in open flowers. Staminal tube cyathiform, urceolate or cylindrical, margin with entire or lobed appendages alternating with 8–10 anthers fixed within the throat of the tube. Nectary well-developed, cushion-shaped, surrounding the base of the ovary and partially fused to it. Ovary 4–5-locular, loculi 3–8-ovulate, style-head discoid. **Fruit** a pendulous, subwoody, subglobose, septifragal capsule, opening by 4–5 valves from apex and base simultaneously. **Seeds** large, angular, with a thick corky or woody sarcotesta.

Three species in tropical America, one of which (*C. procera*) also occurs in West Africa.

Key to the species of *Carapa* of the Manaus area

1. Bark scaling, flowers usually sessile, predominantly 4-merous with 8 anthers, 4-locular ovary, leaflets usually more or less elliptic with acute to acuminate apex ..... 1. *C. guianensis*
1. Bark smooth, flowers slender-pedicellate, predominantly 5-merous with 10 anthers, 5-locular ovary, leaflets generally oblong with rounded apex ..... 2. *C. procera*

4.1 *Carapa guianensis* Aubl., Hist. Fl. Guiane 2, Suppl. : 32, tab. 387. 1775. C. DC. *in* Mart., Fl. bras. 11(1): 223, tab. 64. 1878; Pennington & Styles, Fl. Neotrop. 28: 407, fig. 83. 1981.

Fig. 18

Young shoots massive, subglabrous, lenticellate. **Leaves** paripinnate, densely clustered at shoot apex, 50–90 cm long, petiole and rhachis terete, glabrous. Leaflets 5–9 pairs, opposite, 18–25 × 6–9 cm, elliptic or oblong-elliptic, apex acute to acuminate, less frequently rounded, base acute to truncate, glabrous; venation mostly eucamptodromous, midrib flat or slightly raised on the upper surface, secondary veins 9–12 pairs, straight, parallel, intersecondaries short to moderate, tertiaries oblique, obscure. Petiolule 1–1.5 cm long. **Inflorescence** clustered around the shoot apex above a cluster of scale-leaves, 30–60 cm long, a lax-branched thyrse, the terminal cymules densely clustered, with scurfy pubescence. Pedicel 0–2 mm long. Calyx 1–2 mm long, 4-lobed to near the base, lobes rounded, imbricate, glabrous. Petals 4, 4.5–5.5 mm long, glabrous. Staminal tube urceolate, 3.5–4.5 mm long, margin with 8 truncate, rounded or variously lobed appendages, glabrous; anthers 8. Nectary cushion-shaped. Ovary 4-locular, loculi with 2–4 ovules, glabrous; pistillode in male flowers slender, with vestigial ovules. **Capsule** 5–10 cm long, globose or weakly quadrangular, valves 4, woody, obscurely ridged, glabrous, with a rough surface. **Seeds** 4–5 cm long, angular, corky or woody.

Field characters: A buttressed tree to 35 m high and 1 m diameter. Bark brown, scaling irregularly in plates, slash bright pink to red, fibrous, sapwood pinkish to cream. The new foliage opens a characteristic wine-red colour. Flowers scented, with the sepals green below and pinkish above, petals and staminal tube cream-coloured, and nectary orange-yellow. The capsule and ripe seeds are both brown. Flowering in central Amazonia July to October, with the fruit taking up to a year to mature.

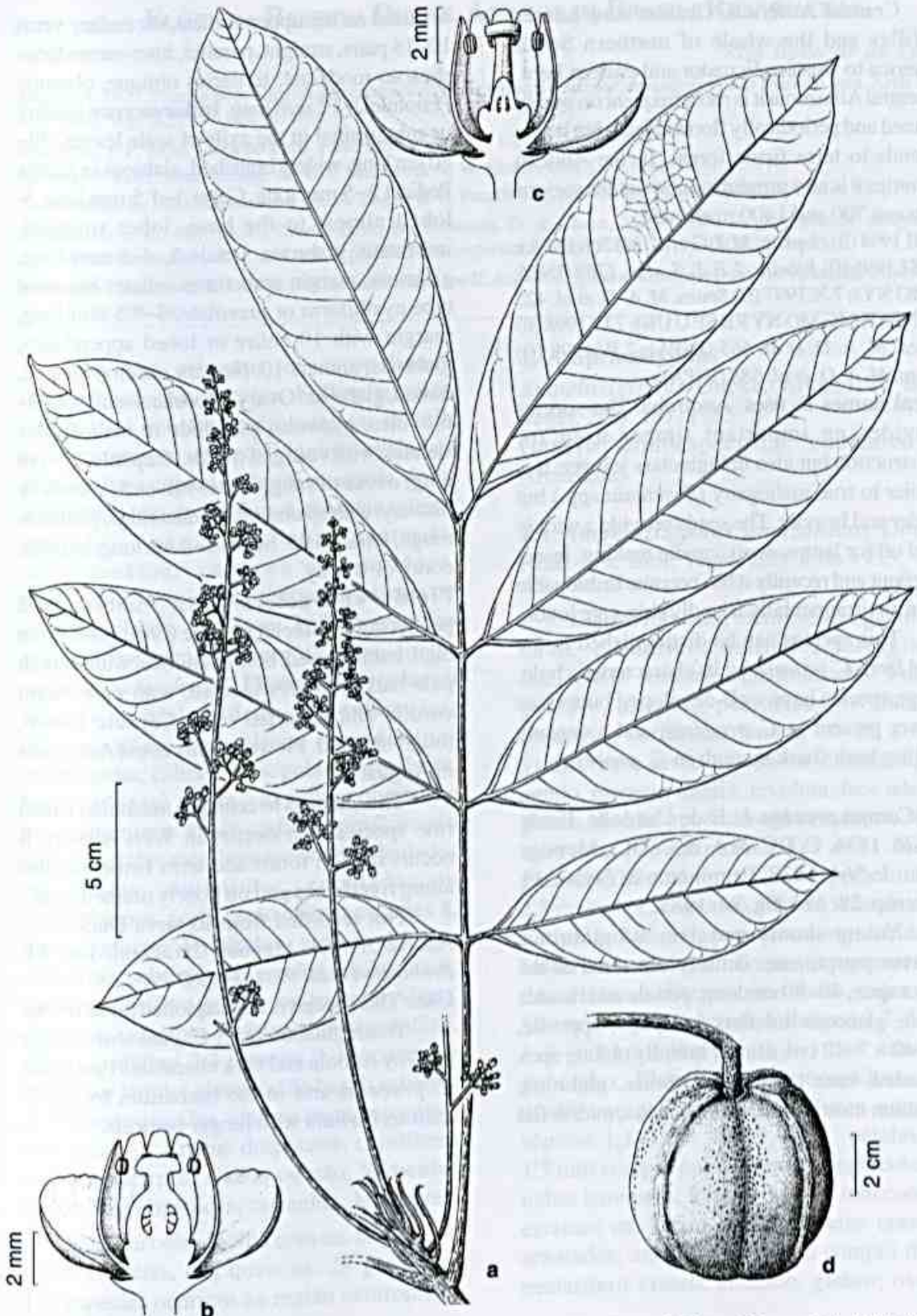

Figure 18 - *Carapa guianensis* - a. habit (*Prance et al. 1378*); b. female flower; c. male flower (*Prance et al. 1644*); d. fruit (*Frões 1728*).

Central America, Greater and Lesser Antilles and the whole of northern South America to western Ecuador and eastern Peru. In central Amazonia it is most frequent on poorly drained and periodically flooded land, but it also extends to terra firme forest. In the Andean countries it is also present in submontane regions between 700 and 1400 m altitude.

8.VII.1994 (fl) *Hopkins, M. J. G. et al. 1452* (K INPA); 23.XI.1995 (fl) *Ribeiro, J. E. L. S. et al. 1768* (INPA K MG NY); 7.X.1997 (fl) *Souza, M. A. D. et al. 425* (G INPA K MG MO NY RB SP U UB); 7.IV.1998 (fl) *Souza, M. A. D. et al. 665* (INPA); 7.IV.1998 (fl) *Souza, M. A. D. et al. 688* (INPA).

Local names & uses: Andiroba. The species provides an important timber used for construction but also in high class joinery. It is similar to true mahogany (*Swietenia* spp.) but harder and heavier. The seeds provide a widely used oil for lamps, soap, candle making, insect repellant and recently it has become fashionable as an environmentally friendly skin-care lotion.

This species can be distinguished in the field from *C. procera* by its characteristic bole. Large species have well-developed buttresses (never present in *C. procera*), and a densely scaling bark (bark smooth in *C. procera*).

4.2 *Carapa procera* A. P. de Candolle, Prodr. 1: 626. 1824; C. DC. *in* A. & C. DC., Monogr. Phan. 1: 564. 1878; Pennington & Styles, Fl. Neotrop. 28: 414, fig. 84. 1981.

Young shoots massive, subglabrous. **Leaves** paripinnate, densely clustered at the shoot apex, 40–90 cm long, petiole and rhachis terete, glabrous. Leaflets 5–8 pairs, opposite, 20–40 × 7–12 cm, usually broadly oblong apex rounded, base rounded or obtuse, glabrous; venation mostly eucamptodromous, midrib flat or raised on the upper surface, secondary veins 10–18 pairs, straight, parallel, inter-secondaries short to moderate, tertiaries oblique, obscure. Petiolule 2–12 mm long. **Inflorescence** axillary or subterminal in the axils of scale leaves, 30–80 cm long, widely branched, glabrous or scurfy. Pedicel 2–5 mm long. Calyx 1–1.5 mm long, 5-lobed almost to the base, lobes rounded, imbricate, glabrous. Petals 5, 4–8 mm long, glabrous, margin sometimes ciliate. Staminal tube cyathiform or urceolate, 3–4.5 mm long, margin with 10 entire or lobed appendages, glabrous; anthers 10. Nectary cushion-shaped, ribbed, glabrous. Ovary 5-locular, loculi with 3–6 ovules, glabrous; pistillode in male flower slender, with vestigial ovules. **Capsule** 7–9 cm long, ovoid to subglobose, valves 5, woody or leathery, with an obscure median ridge, glabrous, rough, lenticellate. **Seeds** 3–4 cm long, angular, corky or woody.

Field characters: An unbranched pachycaulous treelet to large forest giant 30 m high, unbuttressed, bole cylindrical with smooth pale bark. Flowers scented, with pale cream corolla and staminal tube. Capsule brown, rough-skinned. Flowering in central Amazonia in August.

The Guianas to central Amazonian Brazil (the species also occurs in West Africa). It occurs in high forest and terra firme but also along riverbanks and on poorly drained land.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus-Caracaraí km 61, *Pennington et al. 9931* (FHO INPA).

Uses: This species is also exploited for its timber.

Distinguished from *C. guianensis* in the field by its bole and bark characters (see under *C. procera*) and in the herbarium by the 5-merous flowers with longer pedicels.

Flora da Reserva Ducke, Amazonas, Brasil: Rhamnaceae

Rita Baltazar de Lima[1]

Ducke, A. 1935. Plantes nouvelles ou peu connues de la région amázonienne; *Ampelozizyphus* Ducke n. gen. Arch. Inst. Biol. Veg. 2(2):157-158. pl. 1-2.

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Rodriguez-Carraquero, H. A. 1980. Studies in Rhamnaceae II. *Ampelozizyphus amazonicus* Ducke in Venezuela. Phytologia 45(3): 285-286.

Árvores, arbustos, ervas ou lianas, inermes ou espinescentes. **Folhas** simples, alternas ou opostas, pecioladas ou sésseis, rudimentares ou ausentes; lâmina ovalada a elíptica, base cordada, obtusa ou aguda, ápice acuminado, agudo ou obtuso, margem inteira, crenada, serreada ou denteada, membranácea, cartácea ou coriácea, trinérvea a peninérvea. Estípulas laterais ou intrapeciolares, decíduas. **Inflorescências** axilares ou terminais, em dicásios, tirsos, umbelas ou fascículos. **Flores** pediceladas ou sésseis, diclamídeas, pentâmeras, actinomorfas, monoclinas e/ou diclinas estaminadas; cálice com sépalas triangulares, face adaxial com nervura mediana proeminente e ápice caloso, prefloração valvar; pétalas membranáceas, unguiculadas ou sésseis, convolutas, cuculadas ou conchiformes, prefloração aberta; estames 5, livres, opostos às pétalas, anteras ditecas, dorsifixas, sub-rotundas a oblongas, latrorsas; disco nectarífero crasso ou membranáceo, glabro a velutino; ovário súpero a ínfero, glabro a velutino, 2-3-carpelar, 2-3-locular, um óvulo por lóculo, placentação basal; estiletes 2-3, livres ou unidos, glabros ou pubescentes; estigmas 1-3. **Frutos** drupáceos, capsulares ou esquizocarpos, alados ou não. **Sementes** geralmente elipsóides, castanhas, brilhantes.

Família cosmopolita com ca. 58 gêneros e 900 espécies, dos quais ca. 28 gêneros e 170 espécies ocorrem na região neotropical.

1. Ampelozizyphus

Ampelozizyphus Ducke, Arch. Inst. Biol. Veget. 2(2): 157. 1935.

Gênero monoespecífico, endêmico da Amazônia.

1.1 *Ampelozizyphus amazonicus* Ducke, Arch. Inst. Biol. Veget. 2(2): 158. 1935.

Fig. 1

Lianas robustas, inermes, sem gavinhas; caule cilíndrico, estriado, ferrugíneo, lenticelado lenticelas acastanhadas. **Folhas** grandes, alternas, pecioladas, ovaladas a oblongas, coriáceas; lâmina 10–22 × 6,2–11 cm, base arredondada ou obtusa, ápice agudo, margem inteira, revoluta, face adaxial glabra, abaxial pubérula a glabrescente, 3(–5) nervuras proeminentes nas duas faces, partindo 0,3–0,5 cm da base; pecíolo 1,3–2,5 cm compr., cilíndrico, sulcado ventralmente. Estípulas laterais, precocemente decíduas. **Inflorescências** multifloras, ferrugíneas, em tirsos laxos, axilares ou terminais, raque 42–50 cm compr.; brácteas folhosas, 2,7–6,3 × 1,3–3,3 cm, pecíolo 0,4–1 cm compr., pubérulas. **Flores** crassas, monoclinas, 3–4 mm compr.; pedicelo 1–2 mm compr.; sépalas 1,1–1,5 × 1,2–1,4 mm; pétalas ca. 1,5 mm compr., conchiformes, unguiculadas, unhas laminares, longas, 0,4–0,5 mm compr.; estames ca. 1 mm compr., filetes crassos, achatados; anteras ca. 0,3 mm compr.; disco nectarífero crasso, crenado, glabro; ovário

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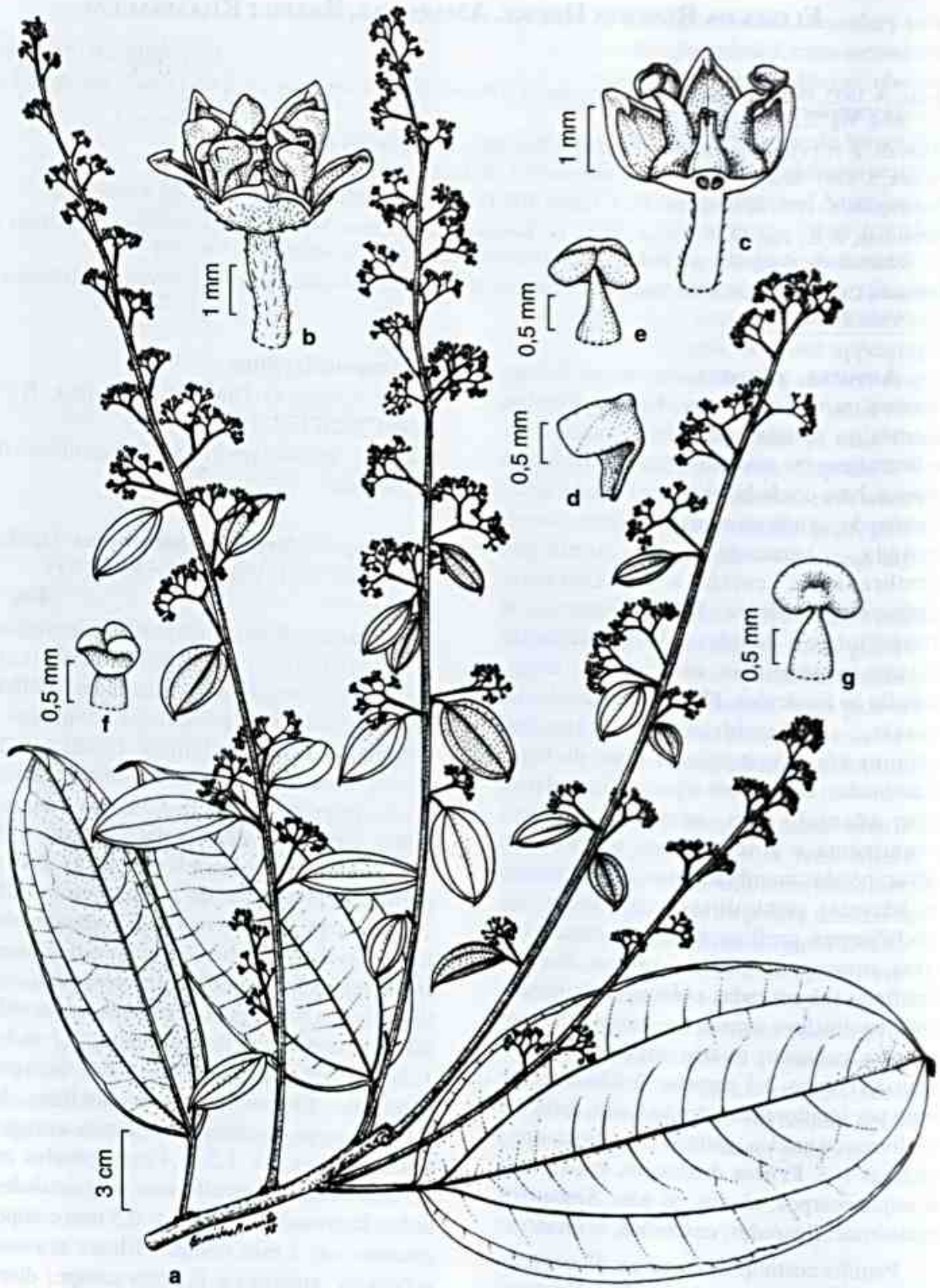

Figura 1 - *Ampelozizyphus amazonicus*: a. hábito; b. flor inteira; c. flor em corte logitudinal; d. pétala; e-g. estame (*M. A. D. Souza & C. F. Silva 163*).

semi-ínfero, 3-carpelar, 3-locular, 3 óvulos, um em cada lóculo; estiletes 3, crassos, curtos, livres apenas no ápice; estigmas obtusos. **Frutos** capsulares, obovados, angulosos, glabros; frutos imaturos ca. 2 cm compr., pedicelo ca. 0,5 cm compr. Sementes ovaladas, castanhas, brilhantes, 1,2-1,3 × 1 cm.

A espécie é endêmica da América do Sul, com distribuição na amazônia brasileira, venezuelana, colombiana e peruana, expandindo-se até o Equador. No Brasil, ocorre nos estados do Amazonas, Pará e Roraima, sendo encontrada em florestas de terra firme.

Floresce de outubro a dezembro e frutifica de novembro a fevereiro.

Nome regional: saracura-mirá, cervejeira.

8.II.1996 (fr) *Lima, R. et al. 1359* (INPA K MG NY SPF); 9.II.1996 (fr) *Lima, R. et al. 1360* (INPA); 13.XI.1997 (fl) *Martins, L. H. P. & Silva, C. F. 58* (G INPA K MBM MG SPF); 19.XI.1997 (fl) *Ribeiro, J. E. L. S. et al. 1949* (IAN INPA K MO RB SPF U UB); 3.I.1969 (fl) *Souza, J. A. 309* (INPA); 16.XI.1995 (fl) *Souza, M. A. D. & Silva, C. F. 163* (BM INPA K PUEFR SPF UEC UFMT US VEN); 18.XII.1997 (fl) *Souza, M. A. D. et al. 515* (INPA K NY SPF); 8.XII.1993 (fl) *Vicentini, A. et al. 392* (INPA K MG NY SPF); 1.XI.1995 (fl) *Vicentini, A. et al. 1117* (G INPA K MG MO RB SP SPF U).

Ampelozizyphus é um gênero monoespecífico, originalmente descrito por Ducke (1935), que o incluiu na tribo Zizypheae. Posteriormente, Suessenguth (1953), considerando a morfologia do fruto, o transferiu para a tribo Rhamneae. Mais recentemente, Richardson et al. (2000), estudando a filogenia da família Rhamnaceae, com base em sequenciamento molecular, propuseram a inclusão de uma nova tribo nesta família, a tribo Ampelozizypheae, para melhor posicionar este gênero.

A espécie *Ampelozizyphus amazonicus* possui potencial medicinal, que tem sido utilizado na medicina popular. A infusão da raspa da raiz é usada na região amazônica para a cura de resfriado e da malária.

Flora da Reserva Ducke, Amazonas, Brasil: Sapotaceae

T. D. Pennington[1]

Sapotaceae Jussieu, A. L., Gen. Pl 151. 1789.

Miquel, F. A. W. 1863. *In*: Martius, Fl. bras. 7: 38-117.

Pennington, T. D. 1990. Sapotaceae. Fl. Neotrop. 52: 1-770.

Pennington, T. D. 1991. The genera of Sapotaceae. Royal Botanic Gardens, Kew & New York Botanical Garden. 295p.

Trees and **shrubs**, with latex in the trunk, branches and fruit. Indumentum of malpighiaceous hairs. Stipules present or absent. **Leaves** spirally arranged, alternate and distichous or rarely opposite or verticillate, simple, entire. **Inflorescence** fasciculate, fascicles usually solitary, axillary or ramiflorous or rarely cauliflorous, occasionally several on short leafless axillary shoots. **Flowers** bisexual or unisexual (plant monoecious or dioecious). Sepals 4–6 in a single imbricate whorl, or 2 whorls of 3 sepals and then the outer whorl valvate. Corolla cyathiform or tubular, less frequently rotate, gamopetalous, tube shorter than, equalling or exceeding the lobes; lobes 4–6(–9), entire, lobed or divided into 3 segments, the 2 lateral segments entire, or shallowly or deeply divided. Stamens 4–6(–9), fixed in the upper or lower half of the corolla tube, or rarely free, opposite the corolla lobes, included or exserted; anthers often extrorse. Staminodes 0-6, in a single whorl alternating with the stamens or fixed in the corolla lobe sinus. Disk annular or absent. Ovary superior, 1–5(–8)-locular, loculi 1-ovulate. **Fruit** a berry or occasionally a drupe, pericarp leathery or fleshy. **Seeds** 1-several, usually with a smooth shining testa, usually free or occasionally adherent to the pericarp. Seed scar adaxial or basi-ventral, narrow or broad or sometimes extending to cover most of the seed surface. Embryo with plano-convex cotyledons and no endosperm or with thin foliaceous cotyledons and copious endosperm.

About 400 species in the Neotropics, *ca.* 350 in Africa and *ca.* 350 in tropical Asia and the Pacific. The Sapotaceae are mostly denizens of primary lowland rainforest and their greatest diversity is found in a broad swathe from Venezuela and the Guianas across Brazilian Amazonia to the foothills of the Andes in Colombia, Ecuador and Peru, and also in coastal Brazil. One hundred and two species are described in this account, which includes all species found in the vicinity of Manaus. Seventy one species have been recorded from Reserva Ducke.

Collections in this account from the Smithsonian/INPA Biological Dynamics of Forest Fragments Project (*ca.* 2°20' – 2°25' S, 59°45' – 60°05'W) situated 50–120 km north of Manaus are cited as "PDBFF" (Projeto Dimâmica Biológica de Fragmentos Florestais). The numbers of sterile collections refer to marked trees within several different reserves, distributed in 3 large cattle ranches.

The majority of the illustrations are adapted from Flora Neotopica 52 with permission from the New York Botanical Garden.

Key to the genera of Sapotaceae of the Manaus area

1. Calyx of 2 whorls of 3 sepals, those of the outer whorl valvate, corolla lobes divided into 3 segments ..... 1. *Manilkara*
1. Calyx a single whorl of 4-6 imbricate sepals, corolla lobes simple.
   2. Stipules present, well developed, leaving a conspicuous scar.
      3. Flowers long-pedicellate, pedicels and calyx reddish, staminodes present, seed with dull rough testa, scar broad, covering 2/3 of seed surface ..... 3. *Chromolucuma*

[1]Royal Botanical Gardens. Kew, Richmond, Surrey, TW9 3AB, United Kingdom.

3. Flowers sessile, calyx greenish, staminodes absent, seed with smooth shining testa, scar narrow ..... 8. *Ecclinusa*

2. Stipules absent (except *Pouteria stipulifera* and *P. flavilatex* which have minute caducous stipules).
   4. Staminodes present, as many as the corolla lobes.
      5. Venation craspedodromous or brochidodromous, often with secondary and tertiary veins closely parallel and leaves appearing finely striate, seed laterally compressed, with copious endosperm ..... 2. *Micropholis*
      5. Venation variable, but not closely parallel and leaves never finely striate, seed shape variable, seed usually without endosperm.
         6. Leaves spirally arranged, corolla and staminodes not carnose, stamens nearly always included, stamens and staminodes not inflexed against the style ..... 6. *Pouteria* (major part)
         6. Leaves alternate and distichous, corolla tube and staminodes carnose, stamens exserted, stamens and staminodes strongly inflexed ..... 4. *Sarcaulus*
   4. Staminodes absent, or if present then fewer than the corolla lobes.
      7. Corolla tubular, or campanulate, globose, or cyathiform, stamens included.
         8. Ovary usually 2-locular, embryo with plano-convex cotyledons and included radicle, endosperm absent ..... 6. *Pouteria* (minor part)
         8. Ovary 5-locular, embryo with thin foliaceous cotyledons, radicle exserted, copious endosperm present ..... 7. *Chrysophyllum*
      7. Corolla rotate, stamens exserted.
         9. Ovary unilocular, loculi with 2 basal ovules, seed scar basal or basi-ventral ..... 10. *Diploön*
         9. Ovary 2-5-locular, loculi uniovulate, ovules axile, seed scar adaxial.
            10. Leaves spirally arranged, usually minutely punctate on lower surface (lens), filaments not geniculate at the apex, not strongly narrowed below anther insertion, ovary 2-3-locular, fruit a berry ..... 5. *Elaeoluma*
            10. Leaves often opposite or verticillate, not punctate, filaments geniculate at the apex and strongly narrowed below anther insertion, ovary 5-locular, fruit a drupe ..... 9. *Pradosia*

1. *Manilkara*

Manilkara Adanson, Fam. Pl. 2: 166. 1763. *Nom. cons.*

Unarmed **trees** with sympodial branching. Small caducous stipules present or absent. Leaves spirally arranged, clustered at the shoot apex. Venation brochidodromous, secondary veins straight, parallel, ascending, looping below the margin and sometimes forming a submarginal vein; higher order venation parallel to the secondaries. **Inflorescence** axillary and in the axils of leaf scars. **Flowers** fasciculate, bisexual. Calyx of 2 whorls of 3 more or less free sepals, the outer whorl valvate. Corolla tube much shorter than the lobes, lobes 6, divided to the base into 3 segments; median segment erect, narrow, clawed, clasping the stamen; 2 lateral segments spreading, equalling or slightly exceeding the median segment, entire or deeply divided. Stamens 6 in a single whorl inserted at the top of the corolla tube, free or partly fused to the staminodes; anthers extrorse. Staminodes 6, alternating with the stamens, lanceolate, apex often lobed or irregularly toothed. Ovary usually 6-locular, puberulous or glabrous; style exserted. **Fruit** 1-several-seeded, smooth or scaly, glabrous, fleshy. **Seed** ellipsoid to obovoid, strongly laterally compressed, with a hard shining woody testa; scar narrowly

elongate, basiventral or adaxial; embryo vertical with foliaceous cotyledons and an exserted radicle; endosperm copious.

About 30 species in the Neotropics, *ca.* 20 in Africa, and *ca.* 12 in Asia and the Pacific. Three species in Reserva Ducke.

Key to the species of *Manilkara* of the Manaus area

1. Leaf undersurface without obvious appressed indumentum ..... 2. *M. bidentata*
1. Leaf undersurface with finely closely appressed or scurfy, whitish, yellowish or golden indumentum, often forming a pellicle
   2. Leaves 5–8.5(–12) cm broad, usually broadly oblong or oblong-elliptic, secondary veins *ca.* 30–35 pairs; petiole 3.5–6.5 cm long; ovary puberulous ..... 3. *M. huberi*
   2. Leaves 3–4.5 cm broad, oblanceolate, secondary veins *ca.* 16 pairs; petiole 5–8 mm long; ovary glabrous ..... 1. *M. cavalcantei*

1.1 *Manilkara cavalcantei* Pires & Rodrigues *ex* T. D. Penn., Fl. Neotrop. 52: 52, figs. 3, 5. 1990. **Fig. 1 a-b**

Stipules present, 1.5–2 mm long. **Leaves** 6–12 × 3–4.5 cm, oblanceolate, apex obtuse to emarginate, base narrowly attenuate, upper surface glabrous, lower surface with dense, closely appressed scurfy, yellowish-brown indumentum, midrib sunken on the upper surface, secondary veins *ca.* 16 pairs. Petiole 5–8 mm long, channelled, subglabrous. **Fascicles** axillary, 10-20-flowered. Pedicel 1–1.2 cm long, puberulous. Sepals 3–3.5 mm long, puberulous outside. Corolla glabrous, 2.5–3 mm long, tube *ca.* 0.5 mm long, median segment of corolla lobes narrowly boat-shaped, lateral segments equalling the median segment, narrowly lanceolate. Staminal filaments *ca.* 1.25 mm long, free; anthers *ca.* 0.8 mm long. Staminodes 0.5–1 mm long, apex irregularly toothed or lobed. Ovary glabrous. **Fruit** *ca.* 2.5 × 1 cm, narrowly ellipsoid; smooth, glabrous. **Seed** solitary, *ca.* 2.2 × 0.6 × 0.4 cm, laterally compressed, testa smooth, pale, not shining; scar basiventral, *ca.* 1.3 × 0.2 cm.

Field characters: Tree 15–20 m high, with fissured bark, small buttresses and sticky white latex from the slash. Flowers white to cream-coloured, mature fruit orange. Flowering in April, fruiting in May.

Brazil (Amazonas, Pará) in non-flooded lowland rainforest.

Local names: Maparajuba, Massaranduba.

22.XII.1994 (fl) *Nascimento, J. R. et al. 696* (BM G IAN INPA K MBM UB UEC US); 23.IV.1968 (fr) *Souza, J. A. INPA21202* (INPA); 7.III.1980 (st) *Souza, J. A. 17* (INPA); 10.V.1994 (fr) *Vicentini, A. et al. 527* (INPA K MG MO NY RB SP).

Manilkara cavalcantei has the same closely appressed indumentum on the lower leaf surface as *M. huberi*, but it differs from that species in its oblanceolate leaves, with fewer secondary veins, and shorter petiole.

It is closest to *M. paraensis*, which is not yet recorded from Amazonas (known only from Pará, Mato Grosso and Maranhão). It differs in its sunken midrib, more curved secondary veins, longer pedicels, free filaments and poorly developed staminodes.

1.2 *Manilkara bidentata* (A.DC.) Chev., Rev. Int. Bot. Appl. Agric. Trop. 12: 270. 1932; Pennington, T. D., Fl. Neotrop. 52: 58, fig. 7. 1990. **Fig. 1 c-g**

Mimusops bidentata A. DC. *in* A. P. Candolle, Prodr. 8: 204 (1844).

Stipules absent. **Leaves** 7–20 × 2.5–6 cm, elliptic, oblong or oblanceolate, glabrous, or occasionally with a waxy cuticular covering; midrib slightly raised on the upper surface; secondary veins 12–25 pairs. Petiole 1.5–3.5 cm long, not or only slightly channelled, glabrous. **Fascicles** axillary, 5–20-flowered. Pedicel 1–2.5 cm long, glabrous. Sepals 4–6 mm long, glabrous. Corolla glabrous, 3.5–6 mm long, tube 0.5–1 mm long, median segment of corolla lobes elliptic or subulate,

lateral segments equalling the median segment, lanceolate and entire to deeply divided into 2 linear parts. Staminal filaments 1.5–2.5 mm long, usually free; anthers 1-2 mm long. Staminodes 1–3.5 mm long, very variable in form. Ovary glabrous. **Fruit** 1–3 cm long, ellipsoid or globose, smooth, glabrous. **Seeds** 1–2, 0.9–2.5 cm long, strongly laterally compressed, often with an abaxial crest, testa smooth, shining; scar basiventral or adaxial, 0.4–1.2 × 0.1–0.2 cm.

Field characters: A tree whose size varies according to situation. In rainforest it can reach 40 m high and 1–2 m diam., whereas in drier situations, as in campina, it may flower at only a few metres high. Bark greyish-brown and deeply fissured, with a reddish slash and copious sticky white latex. Flowers greenish-white, slightly fragrant, fruit ripening reddish-purple or black. Deciduous for a short period before flowering, with flowers and new leaves opening together. Flowering in the dry season mostly July to October, fruiting in January.

West Indies, Guianas to southern Amazonian Brazil, occurring in periodically flooded and non-flooded forest, and in campina forest on white sand.

Local names: Massaranduba.

17.XII.1993 (fr) *Assunção, P. A. C. L. 06* (COL IAN INPA K SPF); 19.V.1978 (st) *Coêlho, L. 791* (INPA); 9.VII.1976 (fl) *Haroldo INPA57813* (INPA); 5.II.1976 (fr) *Mello, F. et al. INPA54752* (INPA); 29.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 928* (G IAN INPA K R U UB US); 21.I.1965 (fr) *Rodrigues, W. & Monteiro, O. P. 6840* (INPA); 23.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7608* (INPA); 15.VII.1966 (fl) *Rodrigues, W. & Monteiro, O. P. 8174* (INPA); 19.VII.1966 (fl) *Rodrigues, W. & Monteiro, O. P. 8197* (INPA); 19.VII.1966 (fl) *Rodrigues, W. & Monteiro, O. P. 8198* (INPA); 3.VIII.1963 (fr) *Rodrigues, W. 9576* (INPA); 15.VI.1988 (fl) *Santos, J. L. & Lima, R. P. 933* (INPA K MG MO NY R RB SP U); 15.VI.1988 (fr) *Santos, J. L. & Lima, R. P. 945* (INPA K MG MO NY RB SP); 6.VIII.1968 (fl) *Souza, J. A. INPA21318* (INPA); 25.VI.1976 (fl) *Souza, J. A. INPA57827* (INPA); 25.VII.1968 (fl) *Souza, J. A. 65* (INPA); 29.X.1968 (fr) *Souza, J. A. 239* (INPA); 4.XII.1993 (fr) *Vicentini, A. & Assunção, P. A. C. L. 387* (BM INPA K MBM MG UEC VEN); 13.IX.1994 (fr) *Vicentini, A. et al. 689* (B F INPA K MG P PEUFR UFMT VIC).

Manilkara bidentata is represented in central Amazonia only by subsp. *surinamensis*. This subspecies has a wide geographical and ecological range and a correspondingly variable morphology, especially in leaf size, leaf shape, flower size, staminode length and lobing, and fruit size. The lack of leaf indumentum distinguishes it from the other *Manilkara* species in Reserva Ducke.

1.3 *Manilkara huberi* (Ducke) Chev., Rev. Int. Bot. Appl. Agric. Trop. 12: 276, fig. 11. 1932; Pennington, T. D., Fl. Neotrop. 52: 80, fig. 11. 1990. **Fig. 1 h-j**

Mimusops huberi Ducke, Arch. Jard. Bot. Rio de Janeiro 2: 14. 1918.

Stipules absent. **Leaves** 15–23 × 5–8 cm, usually oblong-elliptic, elliptic or oblanceolate, apex usually obtuse or rounded, upper surface glabrous, lower surface minutely and densely appressed scurfy-puberulous with pale yellowish or whitish hairs forming a pellicle; midrib usually slightly prominent, but recessed on the upper surface, secondary veins 30–35 pairs, conspicuous below. Petiole 3.5–6.5 cm long, not or only slightly channelled at the apex, glabrous. **Fascicles** axillary, 10–15-flowered. Pedicel 2–4 cm long, appressed puberulous. Sepals 5–5.5 mm long, appressed puberulous outside. Corolla glabrous, 4.5–5.5 mm long, tube 1–1.5 mm long, median segment of corolla lobes narrowly boat-shaped, lateral segments equalling or slightly exceeding the median segment, narrowly lanceolate, entire. Staminal filaments *ca.* 2 mm long, shortly fused with the staminodes; anthers 1–1.5 mm long. Staminodes 1.5–2.5 mm long, narrowly oblong, apex toothed or lobed. Ovary appressed puberulous. **Fruit** 2.5 × 2.5–3.5 × 2.8 cm, ovoid or globose, smooth, glabrous. **Seed** not seen.

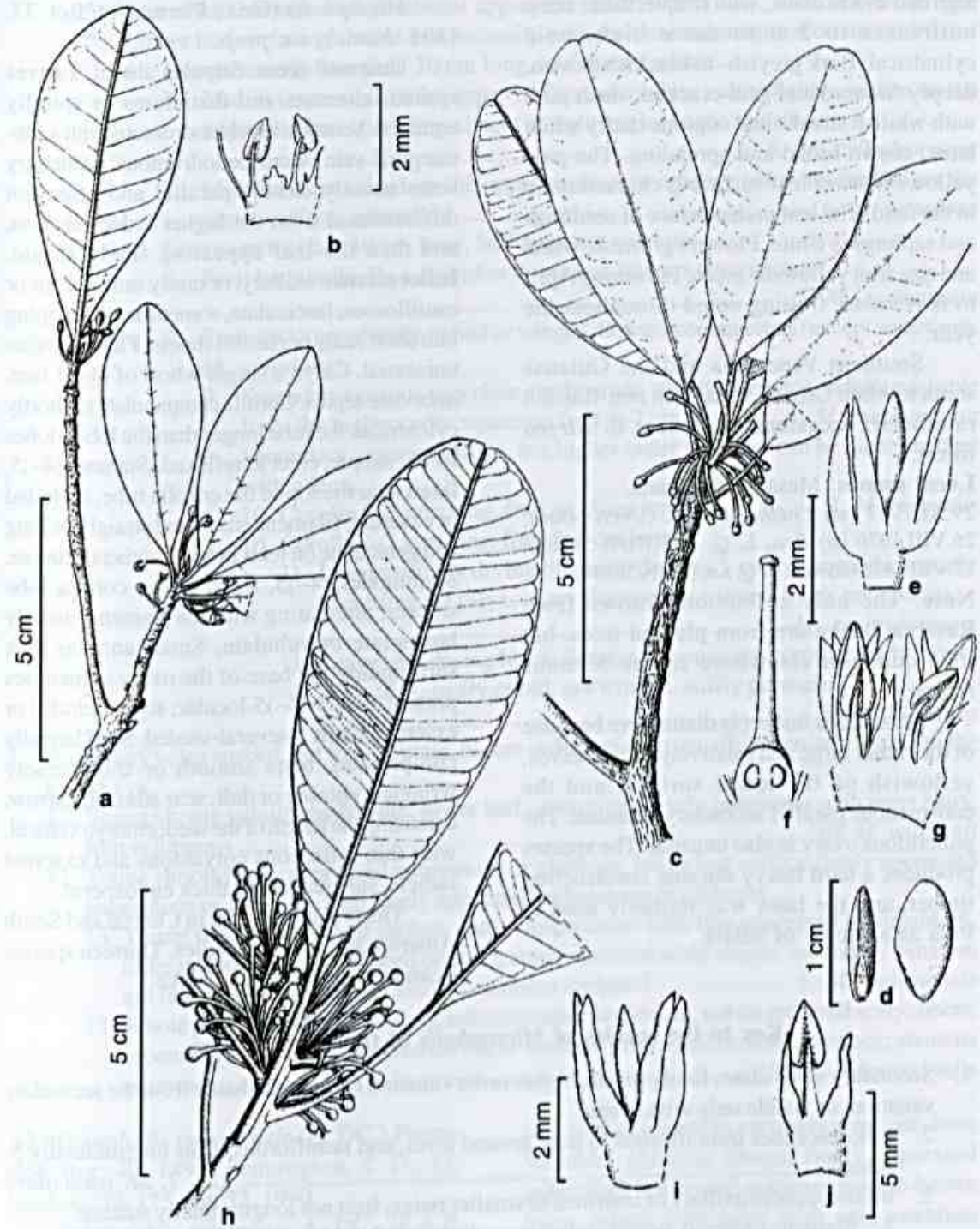

Figura 1 - a-b. *Manilkara cavalcantei* - a. habit; b. stamens & staminodes (*Fróes 31690*). c-g. *Manilkara bidentata surinamensis* - c. habit (*Kubitzki et al. 79-233*); d. seed (*Bernardi s.n. Tree 8/50*); e. part corolla; f. ovary; g. stamens & staminodes (*Maguire et al. 36525*). h-j. *Manilkara huberi* - h. habit (*Mori & Pipoly 15431*); i. corolla lobe; j. stamen & staminodes (*M.G. Silva & Bahia 3164*).

Field characters: Large tree reaching 50 m high and 2–3 m diam., with simple, thick, steep buttresses to 2 m or more high, bole cylindrical. Bark greyish- to blackish-brown, deeply fissured and grid-cracked, slash pink with whitish streaks and copious sticky white latex, crown broad and spreading. The pale yellowish lower leaf surface is characteristic in the field. The leaf undersurface of seedlings and saplings is white. Flowers greenish-white and ripe fruit yellowish-green. Flowering April to November, fruiting noted throughout the year.

Southern Venezuela and the Guianas south to Mato Grosso, usually in non-flooded rainforest, occasionally present in *várzea* forest.

Local names: Massarandubarana.

29.XI.1957 (st) *Coêlho, D. s.n.* (INPA 6006); 26.VIII.1976 (st) *Reis, L. Q. s.n.* (INPA 58585); 27.VIII.1976 (st) *Reis, L. Q. s.n.* (INPA 58598).

Note: The only collections known from Reserva Ducke are from planted trees, but it is common elsewhere in the Manaus region.

Manilkara huberi is distinctive because of the rather large and relatively broad leaves, yellowish on the lower surface, and the conspicuous parallel secondary venation. The puberulous ovary is also unusual. The species produces a hard heavy durable construction timber, and the latex was formerly used in Pará as a source of balata.

2. *Micropholis*

Micropholis (Gris.) Pierre, Not. Bot. 37. 1891. *Nom. cons. prop.*

Unarmed **trees**. Stipules absent. **Leaves** spaced, alternate and distichous or spirally arranged. Venation brochidodromous with a submarginal vein or craspedodromous, secondary veins usually closely parallel and often not differentiated from the higher order venation, and then the leaf appearing finely striate. **Inflorescence** axillary, or rarely ramiflorous or cauliflorous, fasciculate, sometimes developing into short scaly persistent shoots. **Flowers** often unisexual. Calyx a single whorl of (4–)5 free, imbricate sepals. Corolla campanulate to shortly cylindrical, the tube longer than the lobes; lobes (4–)5, simple, erect to reflexed. Stamens (4–)5, fixed near the top of the corolla tube, included or exserted; filaments short and straight or long and geniculate (at least in bud); anthers extrorse. Staminodes (4–)5, fixed in the corolla lobe sinuses, alternating with the stamens, usually lanceolate or subulate. Small annular disk surrounding the base of the ovary sometimes present. Ovary (4–)5-locular; style included or exserted. **Fruit** 1-several-seeded. **Seed** laterally compressed, testa smooth or transversely wrinkled, shining or dull; scar adaxial, narrow, extending the length of the seed; embryo vertical, with thin foliaceous cotyledons and exserted radicle, surrounded by thick endosperm.

Thirty eight species in Central and South America and the West Indies. Thirteen species in and around Reserva Ducke.

Key to the species of *Micropholis* of the Manaus area

1. Secondary veins close, finely striate, higher order venation indistinguishable from the secondary venation, or visible only with a lens.
   2. Inflorescences truncifloroous to near ground level, and ramiflorous; fruit longitudinally 5-sulcate ..... 7. *M. trunciflora*
   2. Inflorescences axillary or confined to smaller twigs, fruit not longitudinally sulcate.
      3. Stamens exserted, corolla lobes spreading or reflexed.
         4. Mature leaves persistently rufous-brown appressed puberulous on the lower surface, corolla more than 10 mm long. ..... 11. *M. splendens*
         4. Mature leaves glabrous or with some residual indumentum along the lower midrib, corolla *ca.* 4 mm long ..... 12. *M. obscura*

3. Stamens included, corolla lobes erect.
   5. Lower leaf surface with persistent appressed indumentum ..... 9. *M. humboldtiana*
   5. Lower leaf surface glabrous (occasionally with residual indumentum on the midrib).
      6. Leaves usually less than 10 cm long, leaf apex caudate.
         7. Midrib impressed on the upper surface, secondary veins slightly sunken on the upper surface, spreading almost at right angles to the midrib ..... 8. *M. cylindrocarpa*
         7. Midrib flat or raised on the upper surface, secondary veins not sunken on the upper surface, ascending ..... 6. *M. venulosa*
      6. Leaves more than 10 cm long, leaf apex not caudate.
         8. Fruit longitudinally 4-ribbed or 4-winged, flowers tetramerous ..... 5. *M. acutangula*
         8. Fruit not longitudinally ribbed or winged, flowers pentamerous (except sometimes *M. venulosa*).
            9. Secondary venation very close, finely striate, steeply ascending, indistinguishable from the higher order venation; fruit 4–7 cm long ..... 4. *M. melinoniana*
            9. Secondary venation striate, but higher order venation can be distinguished with a lens.
               10. Corolla 5–6 mm long, fruit *ca.* 5 cm long ..... 2. *M. mensalis*
               10. Corolla 2–3 mm long, fruit 2–3 cm long.
                  11. Leaves usually drying blackish, flowers 5-merous, corolla scarcely exceeding the calyx; ovary flattened or winged, finely puberulous ..... 3. *M. casiquiarensis*
                  11. Leaves not drying black, flowers 4–5-merous, corolla clearly longer than calyx, ovary ovoid, not winged, stiffly pubescent ..... 6. *M. venulosa*

1. Secondary veins spaced, not finely striate, higher order venation usually reticulate, visible to the naked eye.
   12. Young shoots velutinous-hirsute, lower leaf surface uniformly pubescent with erect hairs, fruit velutinous ..... 10. *M. williamii*
   12. Young shoots finely appressed puberulous or glabrous, lower leaf surface finely appressed puberulous or glabrous, fruit finely appressed puberulous or glabrous.
      13. Young shoots, lower leaf surface and inflorescences with fine appressed indumentum, older inflorescences produced on short, stout, recurved scaly shoots, secondary venation not obviously prominent or sunken; stamens included ..... 1. *M. guyanensis*
      13. Whole plant essentially glabrous, inflorescences fasciculate, not on recurved scaly shoots, secondary venation impressed on upper surface, prominent on lower surface; stamens exserted ..... 13. *M. submarginalis*

2.1 *Micropholis guyanensis* (A. DC.) Pierre, Not. Bot. 40. 1891; Pennington, T. D., Fl. Neotrop. 52: 175, fig. 32. 1990.

Sideroxylon guyanense A. DC., *in* A.P. de Candolle, Prodr. 8: 182. 1844.

Young shoots finely appressed puberulous. **Leaves** alternate and distichous or spirally arranged, 6–15 × 2.5–8.5 cm, elliptic, oblong-elliptic or oblanceolate, apex obtusely cuspidate to narrowly attenuate, base variable, glabrous above, finely appressed puberulous below with golden or reddish-brown hairs, which turn paler with age; venation brochidodromous with a submarginal vein, midrib usually sunken on the upper surface, secondary veins 15–25 pairs, often obscure, parallel; higher order venation finely reticulate and usually impressed on the upper surface.

Petiole 1–2 cm long, channelled. **Fascicles** axillary, 2–15-flowered, usually developing into stout, recurved, densely scaly shoots up to 1 cm long, which persist on old wood. Pedicel 2–5 mm long. **Flowers** unisexual (plant dioecious). Sepals 5, 2–3 mm long, appressed puberulous on both surfaces. Corolla 2.5–3 mm long, shortly and broadly tubular to campanulate, tube exceeding the lobes, glabrous. Stamens 5, included; anthers absent in female flowers. Staminodes 5, 0.5–1 mm long, lanceolate to oblong. Annular pubescent disk usually present around the base of the ovary in male flowers, obscure or absent in female. Ovary pubescent, 5-locular. **Fruit** 1.5–2.5 cm long, ellipsoid, smooth, finely puberulous to glabrous. **Seed** solitary, 1–2.3 cm long, laterally compressed, testa smooth, shining; scar adaxial, 1–2 mm wide.

Southern Central America, West Indies, South America to Peru, Bolivia and coastal Brazil.

Key to the subspecies of *Micropholis guyanensis*

1. Leaves usually 5–12 × 2.5–5 cm, usually narrowly elliptic or oblanceolate 2–4 times as long as broad, base narrowly attenuate, cuneate or acute; lower leaf surface with appressed indumentum, venation obscure, midrib sunken, petiole *ca.* 1–1.5 cm long ..... 1a. *Micropholis guyanensis* subsp. *guyanensis*
1. Leaves 10–15 × 6–8.5 cm, broadly elliptic or broadly oblong-elliptic, often about twice as long as broad, base obtuse or rounded, lower leaf surface with appressed indumentum, venation obscure, midrib sunken, petiole usually *ca.* 2 cm long ..... 1b. *Micropholis guyanensis* subsp. *duckeana*
1. Leaves 9–13.5 × 4.5–5.5 cm, elliptic to oblanceolate, 2–4 times as long as broad, base attenuate, lower leaf surface more or less glabrous, secondary and higher order venation easily visible, midrib flat; petiole 1–1.5 cm long ..... 1c. *Micropholis guyanensis* subsp. 3

2.1a *Micropholis guyanensis* (A. DC.) Pierre subsp. ***guyanensis***; Pennington, T. D., Fl. Neotrop. 52: 175, fig. 32. 1990. **Fig. 2 a-c**

Field characters: Tree to 25 m high and 50 cm diam., with steep simple buttresses, base of trunk often fluted, bark brown or reddish-brown, finely fissured, with pink or orange slash, with sticky white latex. The pale buff or reddish leaf undersurface is conspicuous. Flowers cream-coloured to pale greenish, scented. Fruit ripening purplish-black. Flowering June-August, fruit maturing December. This species flowers as a small tree 2–3 m high in campinarana forest.

Southern Central America, West Indies, N and W South America to Amazonia and Bolivia, in seasonal evergreen rainforest, usually on non-flooded land, and in gallery forest in the drier areas of Central Brazil. It also occurs in campinarana forest.

Local name: Rosadinha.

4.VI.1993 (fl) *Ribeiro, J. E. L. S. et al. 847* (G IAN INPA K R U); 4.VII.1993 (bd) *Ribeiro, J. E. L. S. et al. 1001* (INPA K MG MO NY RB SP U); 15.VIII.1996 (fl) *Sothers, C. A. & Assunção, P. A. C. L. 895* (COL F IAN INPA K SPF UEC UFMT VEN).

2.1b *Micropholis guyanensis* subsp. ***duckeana*** (Baehni) T. D. Penn.; Pennington, T. D., Fl. Neotrop. 52: 180, fig. 32. 1990. **Fig. 2 d**

Pouteria duckeana Baehni, Candollea 18: 161. 1962.

Field characters: Tree to 22 m high and 30 cm diam., with small buttresses. Bark scaly, brown; slash reddish, with white sticky latex. Flowers yellowish-green, fruit maturing green or black, often with an easily removed ferrugineous indumentum. The fruit is sweet and edible. Flowering May to July, fruit maturing December.

Amazonian Brazil, Peru and Colombia to Venezuela and the Guianas, in non-flooded rainforest over clay and white sand.

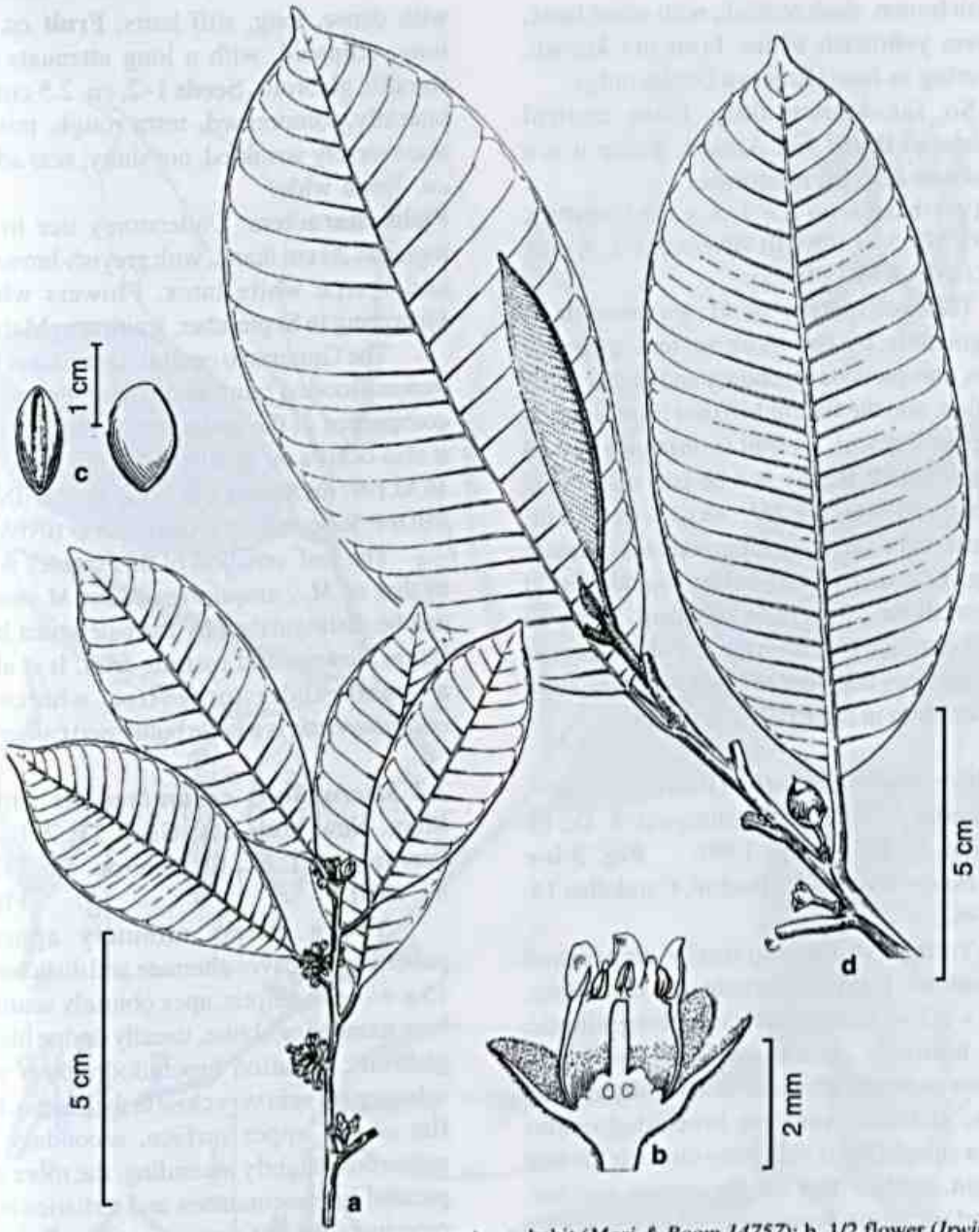

Figura 2 - a-c. *Micropholis guyanensis* subsp. *guyanensis* - a. habit (*Mori & Boom 14757*); b. 1/2 flower (*Irwin et al. 14091*); c. seed (*Steyermark et al. 125697*). d. *Micropholis guyanensis* subsp. *duckeana* - d. habit (*Prance et al. 8234*).

Local name: Rosadinha.

5.VIII.1994 (fl) *Hopkins, M. J. G et al. 1475* (BM INPA K MBM MG UB US); 4.VI.1993 (fl) *Ribeiro, J. E. L. S. et al. 847* (G IAN INPA K R U); 5.VI.1993 (fl) *Ribeiro, J. E. L. S. et al. 867* (INPA K MG MO RB); 29.VI.1993 (bd) *Ribeiro, J. E. L. S. et al. 923* (BM IAN INPA K MBM); 4.VII.1993 (bd) *Ribeiro, J. E. L. S. et al. 1001* (INPA K MG MO NY RB SP U); 12.VIII.1993 (fl) *Ribeiro, J. E. L. S. et al. 1112* (GH IAN ICN INPA K P VIC); 15.VIII.1996 (fl) *Sothers, C. A. & Assunção, P. A. C. L. 895* (COL F IAN INPA K SPF UEC UFMT VEN); 23.V.1995 (fl) *Vicentini, A. & Silva, C. F. 964* (GH ICN INPA K MG S UPCB VIC W).

2.1c *Micropholis guyanensis* (A. DC.) Pierre subsp. ***3***.

Field characters: Tree to 30 m high and 35 cm diam., with simple or branched concave buttresses to 75 cm high. Bark finely fissured,

greyish brown, slash reddish, with white latex. Flowers yellowish-white. Fruit not known. Flowering in June (Reserva Ducke only).

So far known only from central Amazonian Brazil and Amapá, where it is a tree of non-flooded rainforest.

4.VI.1993 (bd) *Ribeiro, J. E. L. S. et al. 835* (INPA K MG NY SP); 5.VI.1993 (fl) *Ribeiro, J. E. L. S. et al. 870* (G INPA K MG UB US).

This subspecies of *M. guyanensis* is recognizable by the more or less glabrous leaves, conspicuous secondary and higher order venation, and the flat midrib (not impressed on the upper surface). Its fruit is unknown and its status doubtful. It may just be part of a single widespread species (*M. guyanensis*) but, whereas there are many intermediates between subsp. *guyanensis* and subsp. *duckeana*, at present all the collections of subsp. 3 can be clearly distinguished from the rest of the species. Although only collected twice in Reserva Ducke it is common in the PBDFF reserves.

2.2 *Micropholis mensalis* (Baehni) Aubrév., Adansonia 3: 21. 1963; Pennington, T. D., Fl. Neotrop. 52: 191, fig. 36. 1990. **Fig. 3 b-e**

Pouteria mensalis Baehni, Candollea 14: 64. 1952.

Young shoots sparsely appressed puberulous. **Leaves** alternate and distichous, 8–11 × 3.2–4.5 cm, elliptic or oblong-elliptic, apex narrowly acuminate to caudate, base acute or narrowly attenuate, usually drying pale green, glabrous; venation brochidodromous with a submarginal vein very close to the leaf margin, midrib flat on the upper surface, secondary veins numerous, wide-spreading, slightly stronger than the parallel intersecondaries and tertiaries, the leaf appearing striate. Petiole 5–8 mm long, channelled. **Fascicles** axillary and below the leaves, 1–3-flowered. Pedicel 5–7 mm long. **Flowers** probably bisexual. Sepals 5, 3–5 mm long, appressed puberulous outside, with a glabrous margin. Corolla 5–6.5 mm long, tubular, lobes 5, *ca.* 1.5 mm long, glabrous. Stamens 5, included. Staminodes 5, *ca.* 1.5 mm long, lanceolate. Disk absent. Ovary 5-locular, with dense, long, stiff hairs. **Fruit** *ca.* 5 cm long, ellipsoid, with a long attenuate apex, smooth, glabrous. **Seeds** 1–2, *ca.* 2.5 cm long, laterally compressed, testa rough, minutely transversely wrinkled, not shiny; scar adaxial, *ca.* 3 mm wide.

Field characters: Understorey tree to 12 m high and 20 cm diam., with greyish-brown bark and scarce white latex. Flowers whitish. Flowering in September, fruiting in March.

The Guianas to central Amazonian Brazil in non-flooded rainforest where it occurs as a component of the understorey. In the Guianas it also occurs on granitic outcrops.

19.XI.1997 (fr) *Ribeiro, J. E. L. S. et al. 1953* (INPA K). PBDFF: Reserva km 41, *Oliveira A49* (INPA K).

The leaf venation of this species is close to that of *M. casiquiarensis*, but *M. mensalis* can be distinguished by the pale green leaves, larger flowers and rostrate fruit. It is always a small understorey tree whereas *M. casiquiarensis* is a large buttressed canopy tree.

2.3 *Micropholis casiquiarensis* Aubrév., Mem. New York Bot. Gard. 23: 211. 1972; Pennington, T. D., Fl. Neotrop. 52: 193, fig. 36. 1990. **Fig. 3 a**

Young shoots minutely appressed puberulous. Leaves alternate and distichous, 7–15 × 4–7 cm, elliptic, apex obtusely acuminate, base rounded or obtuse, usually drying blackish, glabrous; venation brochidodromous with a submarginal vein very close to the margin, midrib flat on the upper surface, secondary veins numerous, slightly ascending, the more or less parallel intersecondaries and tertiaries equally prominent, the leaf appearing striate. Petiole 0.6–1.1 cm long, channelled. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 0.5–1 cm long. **Flowers** ? bisexual. Sepals 5, 2–2.5 mm long, slightly swollen at the base and abruptly contracted into the pedicel, appressed puberulous on both surfaces. Corolla 2.5–3 mm long, campanulate or broadly tubular, lobes 5, shorter than the tube, glabrous. Stamens 5, included. Staminodes 5, 0.75–1 mm long, narrowly lanceolate. Disk absent. Ovary 5-locular, flattened or slightly winged at the base,

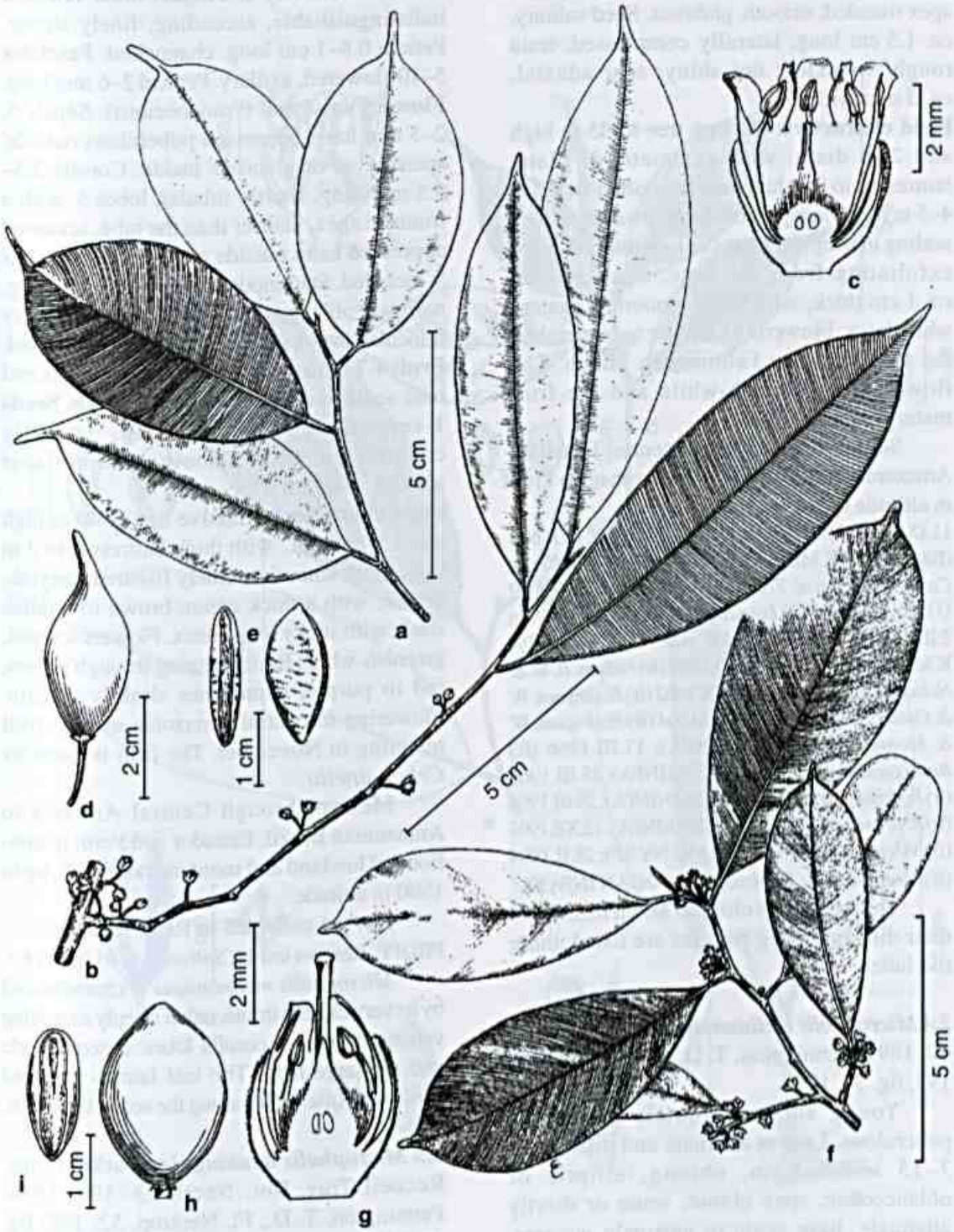

Figura 3 - a. *Micropholis casiquiarensis* - a. habit (*Maguire et al. 36522*). b-e. *Micropholis mensalis* - b. habit; c. 1/2 flower (*Maguire 24452*); d. fruit; e. seed (*Tillett et al. 45192*). f-i. *Micropholis melinoniana* - f. habit (*Silva & Bahia 3132*); g. 1/2 flower (*Lissot 75/50*); h. fruit (*Granville 4267*); i. seed (*Petrov 121*).

puberulous. **Fruit** *ca.* 2.5 × 1.5 cm, ellipsoid, apex rounded, smooth, glabrous. **Seed** solitary, *ca.* 1.5 cm long, laterally compressed, testa rough, wrinkled, not shiny; scar adaxial, *ca.* 5 mm wide.

Field characters: Canopy tree to 35 m high and 2 m diam. with symmetrical plank buttresses to 2 m high and bole often fluted to 4–5 m high, bark greyish-brown to dark brown, scaling in irregular plates or longitudinal strips exfoliating from the base, slash brown, *ca.* 1 cm thick, with small amount of watery white latex. Flowering October to November, the fruit maturing February to March. The flowers are greenish-white and the fruit matures reddish-black.

Southern Venezuela to central Brazilian Amazonia, in non-flooded rainforest, up to 1100 m altitude in Venezuela.

11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F. 644* (BM G INPA K MBM MG UEC US); 17.IX.1997 (fl) *Costa, M. A. S. et al. 776* (IAN INPA K MO NY RB SP U UB); 6.X.1965 (fl) *Loureiro, A. INPA16142* (INPA); 2.III.1995 (fr) *Nascimento, J. R. et al. 770* (G IAN INPA K MBM MO R RB U); 14.VI.1980 (fr) *Nelson, B. W. & Nelson, S. P. 427* (INPA); 12.IX.1962 (fr) *Rodrigues, W. & Coêlho, D. 4452* (INPA); 3.I.1964 (fr) *Rodrigues, W. & Monteiro, O. P. 5660* (INPA); 17.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7588* (INPA); 25.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7626* (INPA); 29.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7640* (INPA); 12.XII.1993 (fr) *Vicentini, A. 401* (INPA K MG NY SP); 28.II.1994 (fr) *Vicentini, A. & Pereira, E. C. 410* (IAN INPA K).

This species is close to *M. mensalis* and their distinguishing features are listed under the latter.

2.4 *Micropholis melinoniana* Pierre, Not. Bot. 40. 1891; Pennington, T. D., Fl. Neotrop. 52: 193, fig. 37. 1990. **Fig. 3 f-i**

Young shoots minutely appressed puberulous. **Leaves** alternate and distichous, 7–15 × 2.8–5 cm, oblong, elliptic or oblanceolate, apex obtuse, acute or shortly attenuate, base acute to narrowly cuneate, glabrous; venation craspedodromous or sometimes brochidodromous with a submarginal vein very close to the margin, midrib flat or only slightly sunken on the upper surface, secondary and higher order venation indistinguishable, ascending, finely striate. Petiole 0.8–1 cm long, channelled. **Fascicles** 5–10-flowered, axillary. Pedicel 2–6 mm long. **Flowers** unisexual (?monoecious). Sepals 5, 2–3 mm long, appressed puberulous outside, sparsely so or glabrous inside. Corolla 2.5–3.5 mm long, shortly tubular, lobes 5, with a truncate apex, shorter than the tube, scattered appressed hairs outside or glabrous. Stamens 5, included. Staminodes 5, 0.75–1.25 mm long, narrowly oblong, glabrous. Disk absent. Ovary 5-locular, ovoid, pubescent, style long, exserted. **Fruit** 4-7 cm long, broadly ellipsoid, apex and base acute or obtuse, smooth, glabrous. **Seeds** 1-several, 2.5–2.6 cm long, laterally compressed, testa smooth, shining; scar adaxial, 4–6 mm wide.

Field characters: Massive tree to 40 m high and 1.5 m diam., with thick buttresses to 2 m high. Bark smooth to finely fissured, greyish-brown, with a thick cream-brown to reddish slash, with sticky white latex. Flowers scented, greenish-white. Fruit maturing through yellow, red to purple, sometimes slightly sulcate. Flowering in central Amazonia in July, fruit maturing in November. The fruit is eaten by *Cebus apella*.

Mexico through Central America to Amazonian Brazil, Ecuador and Peru, in non-flooded lowland and montane rainforest, up to 1500 m altitude.

Not yet collected in Reserva Ducke.

PBDFF: Reserva km 41, *Spironello 105* (INPA K).

Micropholis melinoniana is characterized by its very closely striate, rather steeply ascending venation, truncate corolla lobes, exserted style and the large fruit. The leaf lamina on dried specimens often splits along the secondary veins.

2.5 *Micropholis acutangula* (Ducke) Eyma, Recueil Trav. Bot. Néerl. 33: 198. 1936; Pennington, T. D., Fl. Neotrop. 52: 195, fig. 37. 1990. **Fig. 4 a-c**

Sideroxylon acutangulum Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 159. 1925.

Young shoots closely appressed puberulous, soon glabrous. **Leaves** alternate

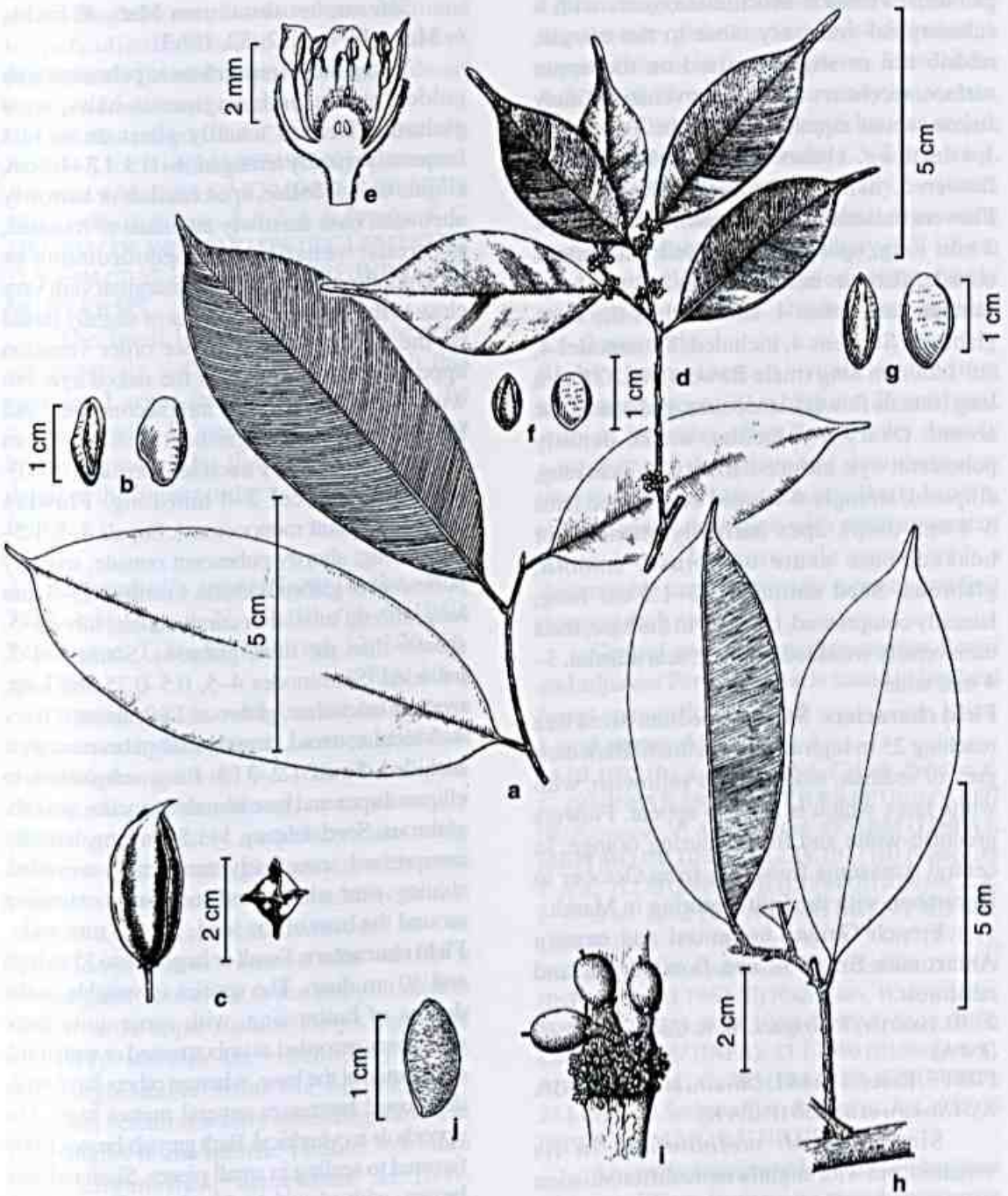

Figura 4 - a-c. *Micropholis acutangula* - a. habit; b. seed (*Silva 57840*); c. fruit (*Jangoux & Bahia 114*). d-g. *Micropholis venulosa* - d. habit (*Heringer et al. 5482*); e. 1/2 flower (*Wurdack & Adderley 43434*); f. seed (*Daly et al. 1923*); g. seed (*Huashikat 2082*). h-j. *Micropholis trunciflora* - h. habit (*Ducke 2216*); i. fruits (*Solomon 3582*); j. seed (*Diaz & Jaramillo 1275*).

and distichous, 8–12 × 3–6.2 cm, elliptic to broadly oblong, apex shortly and narrowly attenuate or acute, base acute or obtuse, glabrous; venation brochidodromous with a submarginal vein very close to the margin, midrib flat or slightly raised on the upper surface, secondary and tertiary venation finely striate, about equally prominent. Petiole 1–1.4 cm long, channelled. **Fascicles** 5–10-flowered, axillary. Pedicel 5–7 mm long. **Flowers** unisexual (? dioecious). Sepals 4, 1.5–3 mm long, sparsely appressed puberulous outside, glabrous inside. Corolla 2–4 mm long, campanulate, lobes 4, shorter than the tube, glabrous. Stamens 4, included. Staminodes 4, *ca.* 1.25 mm long (male flowers), *ca.* 0.5 mm long (female flower), lanceolate, glabrous. Disk absent. Ovary 3–4-locular, ovoid, densely pubescent; style included. **Fruit** 3–4.7 cm long, ellipsoid, strongly 4-winged or 4-ribbed (ribs 3–4 mm deep), apex narrowly attenuate or beaked, base acute or obtuse, smooth, glabrous. **Seed** solitary, 1.2–1.5 cm long, laterally compressed, tapering to the base, testa transversely wrinkled, shining; scar adaxial, 3–4 mm wide.

Field characters: Small to medium-sized tree reaching 25 m high and 35 cm diam. Bark dark grey or reddish, striate, slash yellowish, with white latex which is slow to appear. Flowers greenish-white and fruit maturing orange. In central Amazonia flowering from October to December, with the fruit maturing in March.

French Guiana to central and eastern Amazonian Brazil in non-flooded lowland rainforest.

23.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7607* (INPA).

PDBFF: Reserva Km 41, *Oliveira et al. 287* (INPA K); *Oliveira et al. 256* (INPA K).

Similar to *M. melinoniana* in its venation, but with slightly more differentiation between secondary and higher order venation, and also differing in its 4-merous flowers and winged fruit.

2.6 *Micropholis venulosa* (Mart. & Eichl.) Pierre, Not. Bot. 40. 1891; Pennington, T. D., Fl. Neotrop. 52: 196, fig. 37. 1990. **Fig. 4 d-g**

Sideroxylon venulosum Mart. & Eichl., *in* Mart., Fl. bras. 7: 52. 1863.

Young shoots puberulous to pubescent with golden brown or ferrugineous hairs, soon glabrous. **Leaves** usually alternate or less frequently spirally arranged, 4–11 × 1.3–4.5 cm, elliptic or lanceolate, apex caudate or narrowly attenuate, base narrowly attenuate to rounded, glabrous; venation craspedodromous or brochidodromous with a submarginal vein very close to the margin, midrib flat or slightly raised on the upper surface, higher order venation appearing finely striate to the naked eye, but with a lens the parallel intersecondaries and tertiaries can be distinguished. Petiole 3–7 mm long, channelled. **Fascicles** axillary, 5–10-flowered. Pedicel 2–4 mm long. **Flowers** unisexual (plant monoecious). Sepals 4–5, 1.5–2 mm long, shortly pubescent outside, sparsely pubescent or glabrous inside. Corolla 1.25–3 mm long, shortly tubular or campanulate, lobes 4–5, shorter than the tube, glabrous. Stamens 4–5, included. Staminodes 4–5, 0.5–0.75 mm long, ovate or lanceolate, glabrous. Disk absent. Ovary 4–5-locular, ovoid, densely stiff-pubescent; style included. **Fruit** 1.2–3 cm long, subglobose to ellipsoid apex and base rounded to acute, smooth, glabrous. **Seed** solitary, 1–1.5 cm long, laterally compressed, testa finely transversely wrinkled, shining; scar adaxial and sometimes extending around the base of the seed, 1.5–2.5 mm wide.

Field characters: Small or large tree to 35 m high and 40 cm diam. The species is variable in the degree of buttressing, with some quite large specimens recorded as unbuttressed or with trunk only fluted at the base, whereas others have well-developed buttresses several metres high. The upper bole is cylindrical. Bark greyish-brown, finely fissured to scaling in small pieces. Slash reddish-brown, with plentiful white latex. Flowers pale green and fruit maturing yellowish. Flowering recorded in central Amazonia in May, July, August, September, November, December and March, and mature fruit in November and December.

Costa Rica and Panama and tropical South America east of the Andes, including coastal Brazil. Ecologically variable, occurring in non-flooded forest, but also commonly found in periodically flooded *várzea* forest, permanently flooded igapó forest and in dwarf campina forest over white sand.
9.I.1995 (fl) *Assunção, P.A. C. L. 122* (G IAN INPA K MBM R U UB US); 13.XII.1995 (fr) *Nascimento, J. R. et al. 686* (INPA K MG MO NY R RB SP U); 20.XI.1996 (fl) *Ribeiro, J. E. L. S. & Pereira, E. C. 1862* (BM COL INPA K MG SPF UEC UFMT VEN); 31.V.1994 (fl) *Vicentini, A. et al. 565* (INPA K MG MO NY RB SP).

The small leaves with a caudate apex are generally sufficient to distinguish this species. Larger-leaved species might be confused with *M. acutangula*, but they can be distinguished by the fine differences in detail of the higher order venation and by the fruit.

2.7 *Micropholis trunciflora* Ducke, Bol. Técn. Inst. Agron. N. 19: 19, fig. 6. 1950; Pennington, T. D., Fl. Neotrop. 52: 200, fig. 39. 1990. **Fig. 4 h-j**

Young shoots with brown tomentose evanescent indumentum. **Leaves** alternate and distichous, 10–17 × 3–6.5 cm, elliptic, oblong-elliptic or oblong, apex narrowly attenuate to obtusely cuspidate, base acute or narrowly attenuate, glabrous or with some residual tomentum along the midrib below; venation craspedodromous or brochidodromous sometimes with a submarginal vein close to the margin, midrib sunken on the upper surface, leaves finely and minutely striate, the secondary veins indistinguishable from the higher order venation, venation widely spreading almost at right angles to the midrib. Petiole 7–10 mm long, channelled, tomentose at first. **Fascicles** 2–10-flowered, axillary and on the small and large branches and densely clustered on large woody protuberances on the trunk to almost ground level. Pedicel 3–4 mm long, shortly tomentose. **Flowers** unisexual (plant monoecious). Sepals 4-5, 1.5–2.5 mm, long, pubescent outside, glabrous inside. Corolla 2.5–3 mm long (female), 4–4.5 mm long (male), tubular, lobes 4–5, shorter than the tube, glabrous. Stamens 4–5, included; stamens absent in female flowers. Staminodes 4–5, 0.5–0.75 mm long, narrowly lanceolate, glabrous. Disk absent. Ovary 5-locular, ovoid, densely pubescent. **Fruit** 1.3-2 cm long, ellipsoid to globose, longitudinally 5-sulcate, apex acute to rounded, apiculate, base acute to rounded, glabrous. **Seed** solitary, 1.3–1.5 cm long, laterally compressed, testa finely transversely wrinkled, shining; scar adaxial, 1.5–2 mm wide.
Field characters: A small or medium understorey tree to 20 m high and 25 cm diam., with an irregular often fluted bole, densely covered with large woody protuberances bearing the inflorescences. Bark brown, slightly scaly, slash pink with small amount of white latex. Flowers pale green with a disagreeable smell in the early morning and fruit ripening dark purplish.

Central and western Amazonian Brazil and adjacent Peru, where it is found in lowland forest on non-flooded land.
Local name: Abiurana.
14.III.1995 (fr) *Assunção, P. A. C. L. & Pereira, E. C. 193* (INPA K MG MO NY R RB SP U); 9.IV.1997 (fr) *Assunção, P. A. C. L. et al. 495* (BM G INPA K MBM MG UB UEC US); 2.IV.1971 (fl) *Prance, G. T. et al. 11278* (INPA); 10.II.1994 (fl) *Ribeiro, J. E. L. S. et al. 1202* (INPA K MG MO NY RB SP); 19.VII.1993 (fl) *Rodrigues, W. 5381* (INPA); 24.XII.1963 (fl) *Rodrigues, W. & Coêlho, D. 5613* (INPA); 20.XII.1963 (fl) *Rodrigues, W. & Coêlho, D. 5640* (INPA); 4.III.1966 (fl) *Rodrigues, W. & Coêlho, D. 7541* (INPA); 23.I.1996 (fl) *Sothers, C. A. & Pereira, E. C. 783* (BM INPA K MG UEC); 23.I.1996 (fl) *Sothers, C. A. & Pereira, E. C. 789* (G INPA K MBM MG R U UB US).

An easily recognized species on account of the cauliflory from many protuberances on the trunk, the leaves with midrib deeply sunken on the upper surface and with wide-spreading finely striate venation and sulcate fruit.

2.8 *Micropholis cylindrocarpa* (Poepp. & Endl.) Pierre, Not. Bot. 40. 1891; Pennington, T. D., Fl. Neotrop. 52: 211, fig. 39. 1990.

Fig. 5 a-b

Sideroxylon cylindrocarpon Poepp. & Endl., Nov. Gen. Spec. Pl. 3: 72. 1845.

Young shoots appressed puberulous, soon glabrous. **Leaves** alternate and distichous, 5–10 × 1.8–2.7 cm, elliptic or oblong-elliptic, apex caudate, base acute or narrowly cuneate, glabrous; venation craspedodromous or brochidodromous and then sometimes with a submarginal vein close to the leaf margin, midrib sunken on the upper surface, secondary veins shallowly ascending, finely striate and indistinguishable from the higher order venation. Petiole 3–8 mm long, channelled, appressed puberulous. **Fascicles** 1–2-flowered, axillary and below the leaves. Pedicel 1–2 mm long, puberulous. Sepals 5, *ca.* 2.5 mm long, shortly appressed pubescent outside, scattered appressed hairs inside. Corolla *ca.* 3.5 mm long, shortly cylindrical, lobes 5, shorter than the tube, glabrous. Stamens 5, included. Staminodes 5, *ca.* 1 mm long, subulate, glabrous. Disk absent. Ovary 4-locular, ovoid, stiffly hairy. **Fruit** 2–2.5 cm long, ellipsoid, apex acute and apiculate, base rounded, smooth, glabrous. **Seed** solitary, 1.1–2 cm long, laterally compressed, testa finely transversely wrinkled, shining; scar adaxial, *ca.* 2 mm wide.

Field characters: Small understorey tree to 15 m high and 30 cm diam., sometimes with a fluted bole. Bark finely striate, greyish, slash brown, with scarce sticky white latex. The fruit matures reddish-purple. Apparently flowering and fruiting throughout the year.

Amazonian Peru to central Amazonian Brazil. A component of the forest understorey on non-flooded land.

9.IV.1997 (fr) *Assunção, P. A. C. L. et al. 493* (INPA K MG MO NY RB SP); 6.XII.1996 (fl) *Hopkins, M. J. G. et al. 1613* (IAN INPA K MO NY RB SP U UB); 21.XI.1964 (fl) *Rodrigues, W. & Monteiro, O. P. 6760* (INPA).

PDBFF: Fazenda Esteio, *Pereira et al. s.n. PDBFF 1301.2411* (INPA K); PBDFF Reserva km 41, *Spironello A275* (INPA K).

2.9 *Micropholis humboldtiana* (Roem. & Schult.) T. D. Penn., Fl. Neotrop. 52: 212. 1990.

Fig. 5 c-d

Chrysophyllum humboldtianum Roem. & Schult., Syst. Veg. 4: 813. 1819.

Young shoots appressed pubescent with ferrugineous hairs, becoming glabrous. **Leaves** alternate and distichous, 4.5–8.5 × 2.5–4 cm, broadly lanceolate or oblong-lanceolate, apex caudate, base rounded, glabrous above, densely and finely appressed sericeous below, indumentum ferrugineous turning silvery-white with age; venation craspedodromous, leaf margin slightly revolute, midrib sunken on the upper surface, secondary venation widely spreading, finely striate, indistinguishable from the higher order venation. Petiole 4–7 mm long, ferrugineous-pubescent at first. **Fascicles** 1–2-flowered, axillary. Pedicel 2–3 mm long, ferrugineous pubescent. Sepals 5, 2.5–4 mm long, appressed pubescent outside, glabrous inside. Corolla 3.5–5 mm long, shortly cylindrical, lobes 5, shorter than the tube, glabrous. Stamens 5, included. Staminodes 5, *ca.* 1 mm long, narrowly lanceolate, glabrous. Disk absent. Ovary 5-locular, ovoid, shortly pubescent. **Fruit** *ca.* 1 cm long, ellipsoid, apex shortly beaked, subglabrous. **Seed** not seen.

Field characters: Small tree to 12 m high and 10 cm diam., with reddish slash. Flowers greenish-white, fruit maturing dark wine-red. Flowering June to November, young fruit from August.

Southern Venezuela, along the drainage of the R. Negro to central Amazonian Brazil. A tree of flooded igapó forest and periodically flooded savanna.

Not recorded from Reserva Ducke.

AMAZONAS: R. Cueiras, Repartimento, *Rodrigues 6097* (INPA); Manaus, *Schwacke 3* (R); Rio Negro, Jerusalém, *Froés 21087* (K).

The leaf shape and venation are somewhat similar to *M. cylindrocarpa* but *M. humboldtiana* differs in its revolute leaf margin and the rounded leaf base, and sericeous indumentum on the lower surface. The species also differ in their ecological preferences.

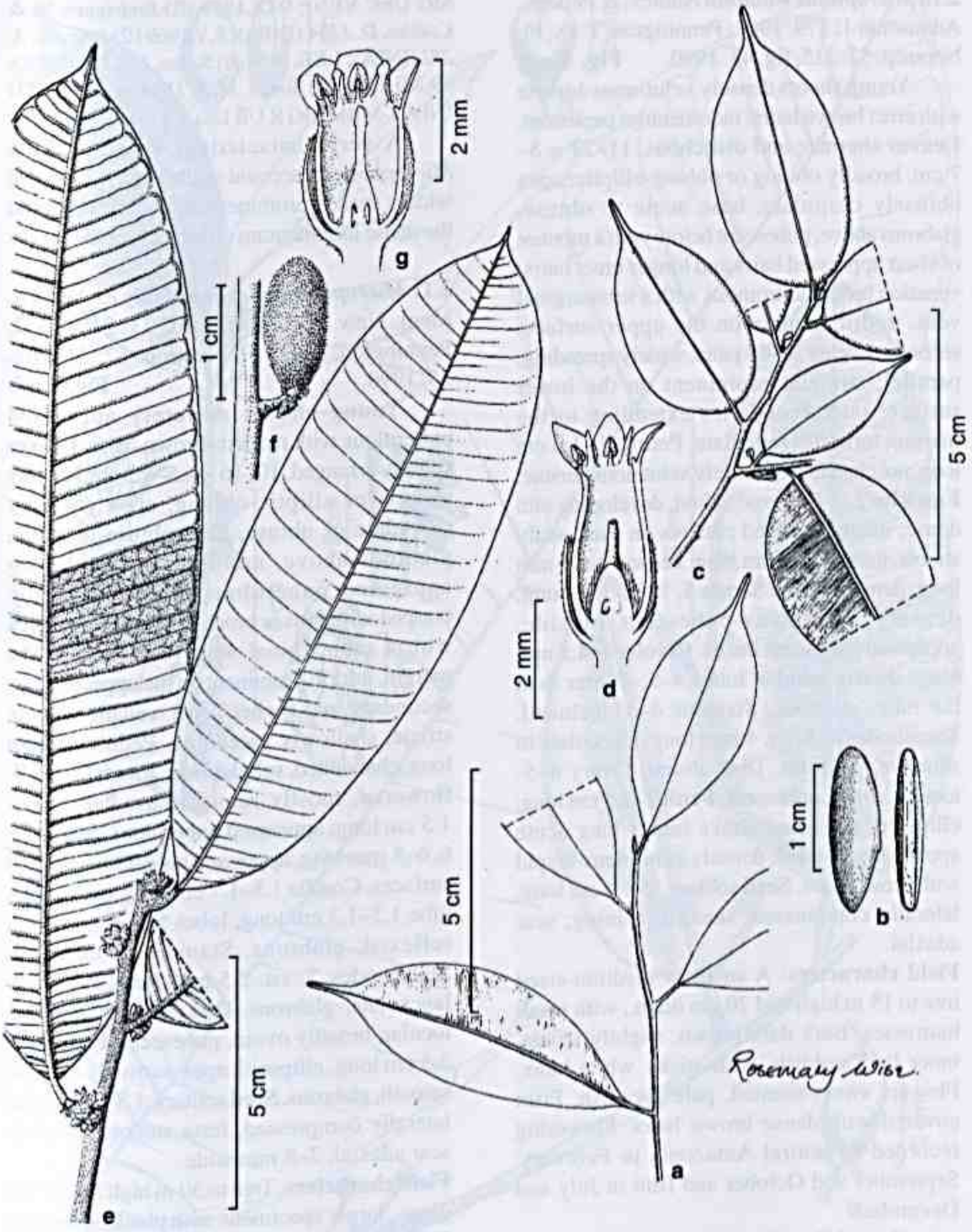

Figura 5 - a-b. *Micropholis cylindrocarpa* - a. habit (*Killip & Smith 29021*); b. seed (*Diaz & Jaramillo 1221*). c-d. *Micropholis humboldtiana* - c. habit; d. 1/2 flower (*Fróes 21087*). e-g. *Micropholis williamii* - e. habit (*Prance et al. 22683*); f. fruit (*Amaral et al. 221*); g. 1/2 flower (*Rodrigues & Coêlho 1284*).

2.10 ***Micropholis williamii*** Aubrév. & Pellegr., Adansonia 1: 179. 1962; Pennington, T. D., Fl. Neotrop. 52: 215, fig. 43. 1990. **Fig. 5 e-g**

Young shoots densely velutinous-hirsute with erect brown hairs, indumentum persistent. **Leaves** alternate and distichous, 11–22 × 5–7 cm, broadly oblong or oblong-elliptic, apex obtusely cuspidate, base acute to obtuse, glabrous above, pubescent below with a mixture of short appressed hairs and longer erect hairs; venation brochidodromous with a submarginal vein, midrib sunken on the upper surface, secondary veins 30–40 pairs, widely spreading, parallel, straight, prominent on the lower surface; intersecondaries extending to the margin; tertiaries reticulate. Petiole 1–1.5 cm long, not channelled, densely velutinous-hirsute. **Fascicles** 2–5-flowered at first, developing into dense, many-flowered clusters on short scaly shoots, these 0.5–1 cm long. Pedicel *ca.* 1 mm long, densely hairy. Sepals 5, 3–3.5 mm long, densely velutinous-pubescent outside, appressed pubescent inside. Corolla 4–4.5 mm long, shortly tubular, lobes 4–5, shorter than the tube, glabrous. Stamens 4–5, included. Staminodes 4–5, *ca.* 1 mm long, lanceolate to subulate, glabrous. Disk absent. Ovary 4–5-locular, ovoid, pubescent. **Fruit** 2–2.5 cm long, ellipsoid, narrowed above into a long acute apex, base rounded, densely velutinous-hispid with brown hairs. **Seed** solitary, 1–1.5 cm long, laterally compressed, smooth, shining; scar adaxial.

Field characters: A small or medium-sized tree to 15 m high and 20 cm diam., with small buttresses. Bark dark brown, slightly striate, inner bark reddish, with sticky white latex. Flowers sweet-scented, pale greenish. Fruit covered with dense brown hairs. Flowering recorded in central Amazonia in February, September and October and fruit in July and December.

Central Brazilian Amazonia (Amazonas and Pará) in forest on non-flooded sites.

23.VII.1996 (fr) *Assunção, P. A. C. L. 453* (INPA K MG MO NY RB SP U); 21.IX.1997 (fl) *Assunção, P. A. C. L. et al. 676* (IAN INPA K MO NY RB SP); 9.II.1994 (fr) *Ribeiro, J. E. L. S. et al. 1199* (INPA K MG UEC VEN); 9.IX.1959 (fl) *Rodrigues, W. & Coêlho, D. 1284* (INPA); 8.V.1969 (fl) *Souza, J. A. 281* (INPA); 1.XII.1969 (fr) *Souza, J. A. 301* (INPA); 19.XII.1996 (fr) *Souza, M. A. D. et al. 301* (BM G INPA K MBM MG R UB US).

A very characteristic species within *Micropholis* on account of the large leaves with widely spaced prominent secondary veins and the dense indumentum on all parts of the plants.

2.11 ***Micropholis splendens*** Gilly *ex* Aubrév., Mem. New York Bot. Gard. 23: 210. 1972; Pennington, T. D., Fl. Neotrop. 52: 219, fig. 35. 1990. **Fig. 6 a-b**

Young shoots minutely appressed puberulous with reddish-brown hairs. **Leaves** spirally arranged, 10–16 × 4.5–6.2 cm, broadly elliptic or elliptic-oblong, apex obtusely cuspidate or obtuse, base obtuse to acute, glabrous above, minutely golden-brown appressed puberulous below; venation craspedodromous or brochidodromous and then with a submarginal vein very close to the margin, midrib prominent on the upper surface, secondary and higher order venation finely striate, shallowly ascending. Petiole 1–2 cm long, channelled, subglabrous. **Fascicles** 5–10-flowered, mostly ramiflorous. Pedicel 1–1.5 cm long, appressed puberulous. Sepals 5–6, 6–8 mm long, appressed puberulous on both surfaces. Corolla 1.5–1.7 cm long, cylindrical, tube 1.2–1.3 cm long, lobes 5, 3–4 mm long, reflexed, glabrous. Stamens 5, exserted. Staminodes 5, *ca.* 2.5 mm long, narrowly lanceolate, glabrous. Disk absent. Ovary 5-locular, broadly ovoid, pubescent. **Fruit** 2.5–3.5 cm long, ellipsoid, apex narrowly beaked, smooth, glabrous. **Seed** solitary, 1.8–2 cm long, laterally compressed, testa smooth, shining; scar adaxial, 7–8 mm wide.

Field characters: Tree to 30 m high and 50 cm diam., larger specimens with plank buttresses. Bark whitish-brown, finely fissured, slash pale brown, mealy, with white latex. The leaf undersurface is persistently reddish-brown. Flowers greenish-white, fruit glaucous-green. In central Amazonia flowering December to January, and fruit maturing in April.

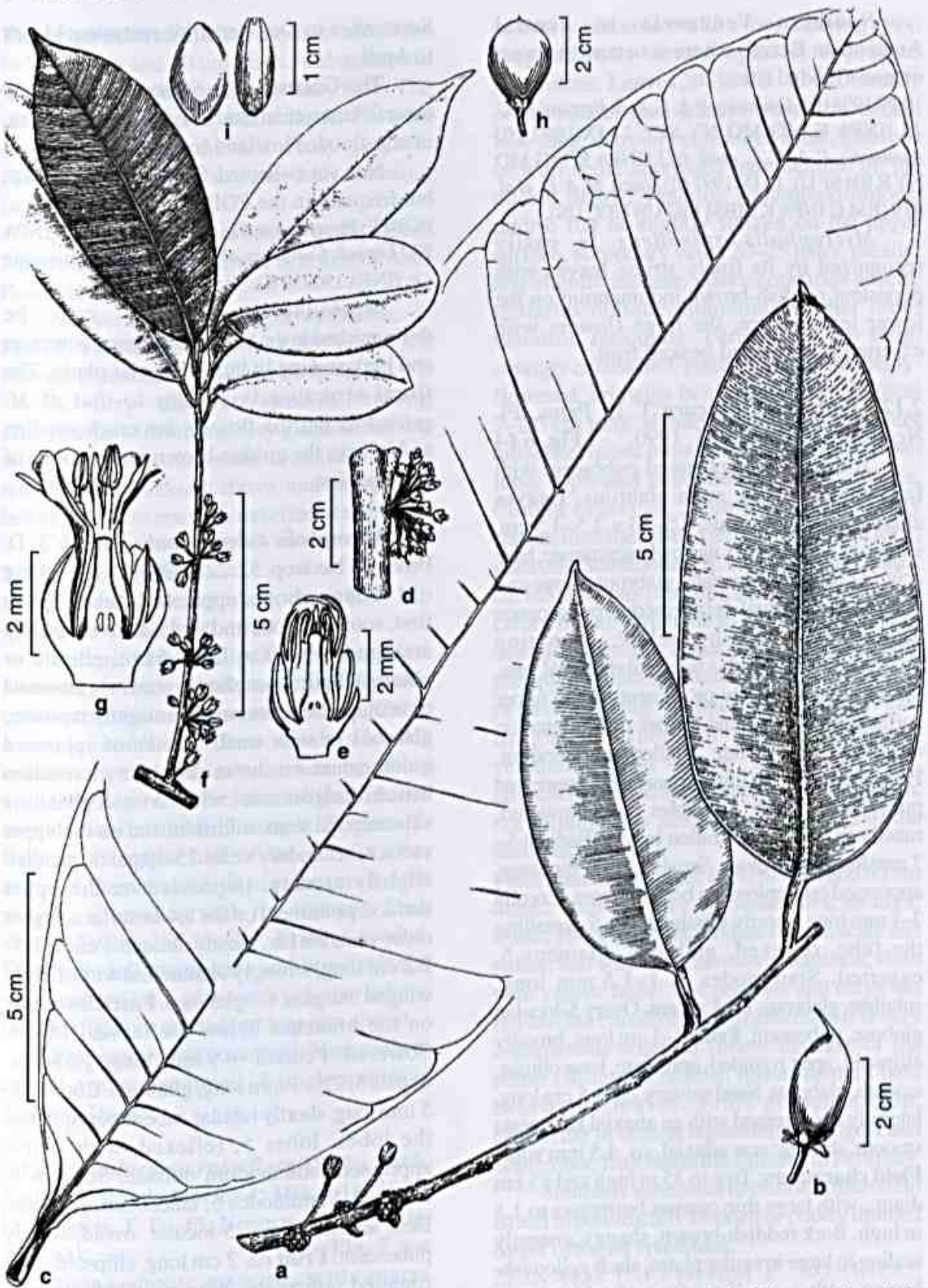

Figura 6 - a-b. *Micropholis splendens* - a. abit (*Marcano-Berti & Salcedo 70-979*); b. fruit (*Clark 7095*). c-e. *Micropholis submarginalis* - c. leave; d. inflorescence; e. young flower (*Coêlho & Osmarino 29806*). f-i. *Micropholis obscura* - f. habit (*Maguire et al. 56042*); g. 1/2 flower (*FDBG 7176*); h. fruit; i. seed (*SF 7417*).

Southern Venezuela to central Amazonian Brazil, where it occurs in forest on non-flooded sites.

19.IV.1994 (fr) *Assunção, P. A. C. L. & Pereira, E. C. 13* (INPA K MG MO NY SP); 21.IX.1997 (fl) *Assunção, P. A. C. L. et al. 671* (INPA K MG MO NY R RB SP U); 19.IX.1997 (fl) *Souza, M. A. D. et al. 419* (BM G INPA K MBM MG UB UEC US).

Micropholis splendens is easily recognized by its finely striate leaves with persistent reddish-brown indumentum on the lower leaf surface, the large flowers with exserted stamens and beaked fruit.

2.12 *Micropholis obscura* T. D. Penn., Fl. Neotrop. 52: 227, fig. 41. 1990. **Fig. 6 f-i**

Young shoots appressed pubescent with ferrugineous hairs, soon glabrous. **Leaves** alternate and distichous, 8.5–13 × 2.5–4.5 cm, elliptic or oblong, apex narrowly acuminate, base acute or narrowly cuneate, glabrous above and with some residual ferrugineous pubescence along the midrib below, venation brochidodromous with a weak submarginal vein, midrib flat or slightly prominent on the upper surface, secondary and higher order venation obscure, finely striate, shallowly ascending. Petiole 0.7–1.2 cm long, channelled, appressed pubescent at first. **Fascicles** 5–15-flowered, mostly in the axils of fallen leaves. Pedicel 5–7 mm long, puberulous. Sepals 5, 2.5-3 mm long, appressed puberulous on both surfaces. Corolla 3-4 mm long, shortly tubular, lobes 5, equalling the tube, reflexed, glabrous. Stamens 5, exserted. Staminodes 5, 1–1.5 mm long, subulate, glabrous. Disk absent. Ovary 5-locular, globose, pubescent. **Fruit** 2–3 cm long, broadly ellipsoid, apex rounded, apiculate, base obtuse, smooth, glabrous. **Seed** solitary, *ca.* 1.8 cm long, laterally compressed with an abaxial keel, testa smooth, shining; scar adaxial, *ca.* 4.5 mm wide. **Field characters**: Tree to 35 m high and 85 cm diam., with large thin convex buttresses to 1.5 m high. Bark reddish-brown, shaggy, coarsely scaling in large irregular plates, slash yellowish-brown with a small amount of white latex. Flowers pale green, scented. Fruit maturing yellowish. Flowering in central Amazonia September to October, fruit maturing March to April.

The Guianas and southern Venezuela to central Amazonian Brazil and Amazonian Peru, in non-flooded lowland forest.

Not yet collected from Reserva Ducke, but frequent in the PDBFF plots.

PDBFF: Reserva km 41, *Oliveira et al. 109* (INPA K), *Lepsch Cunha et al. 3* (INPA K); *Spironello s.n.* (INPA 190939 K).

Micropholis obscura can be distinguished in the field by its convex buttresses and bark scaling in large irregular plates. The floral structure is similar to that of *M. splendens* but the flowers are much smaller, and it lacks the golden-brown indumentum of that species.

2.13 *Micropholis submarginalis* Pires & T. D. Penn., Fl. Neotrop. 52: 228. 1990. **Fig. 6 c-e**

Young shoots appressed pubescent at first, soon glabrous and scaly. **Leaves** spirally arranged, 19–30 × 7.5–9.5 cm, elliptic or oblong-elliptic, apex shortly narrowly attenuate or acute, base acute, margin slightly revolute, glabrous or with small amount of appressed indumentum on the midrib below; venation brochidodromous with a conspicuous submarginal vein, midrib raised on the upper surface, secondary veins 25-30 pai rs, parallel, slightly arcuate, impressed on the upper surface, prominent on the lower surface, higher order venation lax, mostly oblique. Petiole 1.5–2.2 cm long, strongly channelled with slightly winged margins, subglabrous. **Fascicles** mostly on the branches below the leaves, 15–30-flowered. Pedicel 6–9 mm long, glabrous. Sepals 5, 2.5–3 mm long, glabrous. Corolla 4–5 mm long, shortly tubular, tube about equalling the lobes, lobes 5, reflexed, with sparse appressed indumentum outside. Stamens 5, exserted. Staminodes 5, lanceolate, glabrous. Disk absent. Ovary 5-locular, ovoid, shortly pubescent. **Fruit** *ca.* 2 cm long, ellipsoid, apex rounded, apiculate, base rounded, smooth, glabrous. **Seed** *ca.* 1.2 cm long, laterally compressed, scar adaxial, 4–5 mm wide.

Field characters: Small or medium-sized tree to 20 m high and 20 cm diam., unbuttressed, with dark brown hard, slightly flaky bark. The slash contains scarce white latex. Flowers creamish-white, mature fruit yellow. Flowering from May to June, fruit maturing in November.

From the Guianas to central and southern Amazonian Brazil, where it is a tree of non-flooded lowland forest.

Not yet collected in Reserva Ducke.
PDBFF: Fazenda Esteio, *Nee 42885* (INPA K); Fazenda Dimona, *Pacheco et al. 80* (INPA K).

A very distinct species among *Micropholis* with large glossy glabrous leaves, widely spaced, numerous secondary veins which are impressed above and prominent below, and flowers with exserted stamens.

3. *Chromolucuma*

Chromolucuma Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 160, t. 18. 1925.

Unarmed **trees**. Stipules present, large. **Leaves** clustered, spirally arranged. Venation eucamptodromous. **Flowers** unisexual. Calyx a single whorl of 5 free sepals. Corolla cyathiform or broadly tubular, tube equalling or slightly larger than the lobes (slightly shorter in male flowers) lobes 5, simple. Stamens 5, fixed in the upper half of the corolla tube, included. Staminodes 5, fixed in the corolla lobe sinuses, alternating with the stamens. Disk absent. Ovary 2–5-locular. **Fruit** 1-seeded. **Seed** with dull rough testa and broad adaxial scar; embryo with plano-convex cotyledons, radicle slightly exserted; endosperm absent.

Two species from southern Venezuela to central Amazonian Brazil. A single species in Reserva Ducke.

3.1 *Chromolucuma rubriflora* Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 160, t. 18. 1925; Pennington, T. D., Fl. Neotrop. 52: 229, fig. 44. 1990. **Fig. 7 a-e**

Young shoots massive, with sparse appressed pubescence, very rough with prominent scars of fallen leaves and inflorescences. Stipules 1.5–2.5 cm long, narrowly lanceolate with a long tapering apex, longitudinally striate, sparsely appressed puberulous. **Leaves** 20–30 × 8–10 cm, broadly oblanceolate, apex acute, obtuse or rounded, base long, narrowly cuneate or acute, glabrous or with some appressed indumentum on the midrib below; venation eucamptodromous, midrib flat or slightly sunken on the upper surface, secondary veins 20–25 pairs, parallel and slightly arcuate; intersecondaries absent; tertiaries oblique, numerous; higher order venation reticulate. Petiole 3–4 cm long, strongly channelled, glabrous. **Fascicles** many-flowered, on twigs below the leaves. Pedicel 2–2.5 cm long, slender, puberulous. **Flowers** unisexual (plant monoecious). Sepals 4–5 mm long, appressed puberulous on both surfaces. Corolla (male) *ca.* 5 mm long, tube slightly shorter than the lobes; (female) *ca.* 4 mm long, glabrous. Staminodes *ca.* 1.25 mm long (male), *ca.* 0.5 mm long (female), lanceolate, glabrous. Ovary broadly truncate to ovoid, 2–3-locular, densely pubescent. **Fruit** 4–8 cm long, broadly ellipsoid, rounded at base and apex, smooth or rugose (drying to become strongly and irregularly ribbed or furrowed, shortly velutinous. **Seed** solitary, 2.5–5.5 cm, long, ellipsoid, rounded at base and apex; testa rough, not shining; scar adaxial, covering 2/3 of the seed surface.

Field characters: Tree to 30 m high and 60 cm diam., with concave buttresses to 2 m high; trunk cylindrical; bark reddish-brown, scaly and striate, and with vertical rows of lenticels, slash with yellow latex. The pedicels and calyx are red and the corolla cream to greenish; it is very conspicuous when in flower because of the dense clusters of reddish inflorescences held below the leaves. Fruit golden brown. Flowering in central Amazonia in August and September, fruit maturing January to February.

Southern Venezuela to central Amazonian Brazil in periodically flooded or poorly drained forest often on riversides.
25.IX.1957 (fl) *Ferreira, E. 105* (INPA); 31.VIII.1995 (fl) *Ribeiro, J. E. L. S. et al. 1677* (INPA K MG MO RB SP U); 13.IX.1995 (fl) *Ribeiro, J. E. L. S. & Pereira, E. C. 1700* (INPA

K NY); 7.XII.1994 (fr) *Vicentini, A. & Pereira, E. C. 778* (INPA K MG MO NY R RB SP U); 26.VIII.1997 (fl) *Vicentini, A. et al. 1229* (IAN INPA K MO NY RB SP U).

Easily recognized in the field by the yellowish latex, massive scaly twigs with large stipules and the red flowers.

4. *Sarcaulus*

Sarcaulus Radlkofer, Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München 12: 310. 1882.

Unarmed **trees**. Stipules absent. **Leaves** spaced, alternate and distichous or occasionally weakly spirally arranged. Venation brochidodromous. **Inflorescence** axillary, flowers unisexual. Calyx a single whorl of 5 sepals. Corolla globose or broadly cyathiform, lobes 5, simple. Stamens 5, fixed at the top of the corolla tube, exserted, with short swollen filaments. Staminodes 5, thick, carnose. Disk absent. Ovary 2–5-locular. **Fruit** 1-several-seeded. **Seed** laterally compressed, scar adaxial, embryo with plano-convex cotyledons, endosperm absent.

Five species in tropical South America.

4.1 *Sarcaulus brasiliensis* (A.DC.) Eyma, Recueil Trav. Bot. Néerl. 33: 192. 1936; Pennington, T.D., Fl. Neotrop. 52: 233, fig. 46. 1990. **Fig. 7 f-h**

Chrysophyllum brasiliense A. DC., *in* A. P. de Candolle, Prodr. 8: 156. 1844.

Young shoots minutely appressed puberulous. **Leaves** alternate and distichous or weakly spirally arranged, 7–13 × 2.5–4.4 cm, elliptic or oblong-elliptic, apex narrowly acuminate, base acute to rounded, glabrous; venation brochidodromous, midrib slightly raised on the upper surface, secondary veins 9–12, more or less parallel, arcuate; intersecondaries moderately long; tertiaries forming a lax reticulum. Petiole 0.7–1 cm long, flat, often expanded into a narrow wing at the apex, glabrous. **Fascicles** 1–8-flowered, axillary and below the leaves. Pedicel 6–10 mm long, often recurved or coiled in bud, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepal 2–3 mm long, appressed puberulous on both surfaces. Corolla 3–4 mm long, tube about equalling the lobes, weakly to strongly carnose, appressed puberulous on both surfaces. Stamens absent in female flowers. Staminodes 0.5–1.25 mm long, triangular or ovate, appressed puberulous. Ovary ovoid, puberulous. **Fruit** 1.8–3 cm long, ellipsoid to subglobose, apex acute to rounded, base rounded or tapered, smooth, glabrous. **Seeds** 1–2, 1.2–1.7 cm long, laterally compressed, testa smooth, shining; scar adaxial, 2–4 mm wide.

Field characters: Unbuttressed tree to 20 m high and 35 cm diam. with a cylindrical bole, bark pale greyish, slightly scaling or dippled, and lenticellate; slash reddish with plentiful white latex. Flowers whitish, without scent, fruit maturing yellow, with a sticky whitish pulp surrounding the seed. Flowering in central Amazonia in October, fruit maturing January to February.

Southern Central America to the Guianas, Amazonian Brazil, Peru and Bolivia, in lowland and montane forest on periodically flooded and non-flooded land.

27.II.1998 (fr) *Assunção, P. A. C. L. et al. 804* (IAN INPA K MO NY RB SP U UB); 19.IX.1997 (fl) *Martins, L. H. P. et al. 48* (G INPA K MBM MG U UB UEC US); 3.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7543* (INPA); 31.X.1995 (fl) *Vicentini, A. & Assunção, P. A. C. L. 1106* (INPA K MG MO NY RB SP).

Sarcaulus brasiliensis contains two subspecies, but only the typical subspecies is known from central Amazonia. The genus *Sarcaulus* is close to *Pouteria*, but may be distinguished by its leaf arrangement and the carnose corolla.

5. *Elaeoluma*

Elaeoluma Baill., Hist. Pl. 11: 293. 1891.

Unarmed **trees** or **shrubs**. Stipules absent. **Leaves** spirally arranged, minutely punctate on the lower surface. Venation eucamptodromous or brochidodromous, higher order venation often obscure, forming a lax reticulum. **Inflorescence** axillary. **Flowers** unisexual. Calyx a single whorl of 5 sepals.

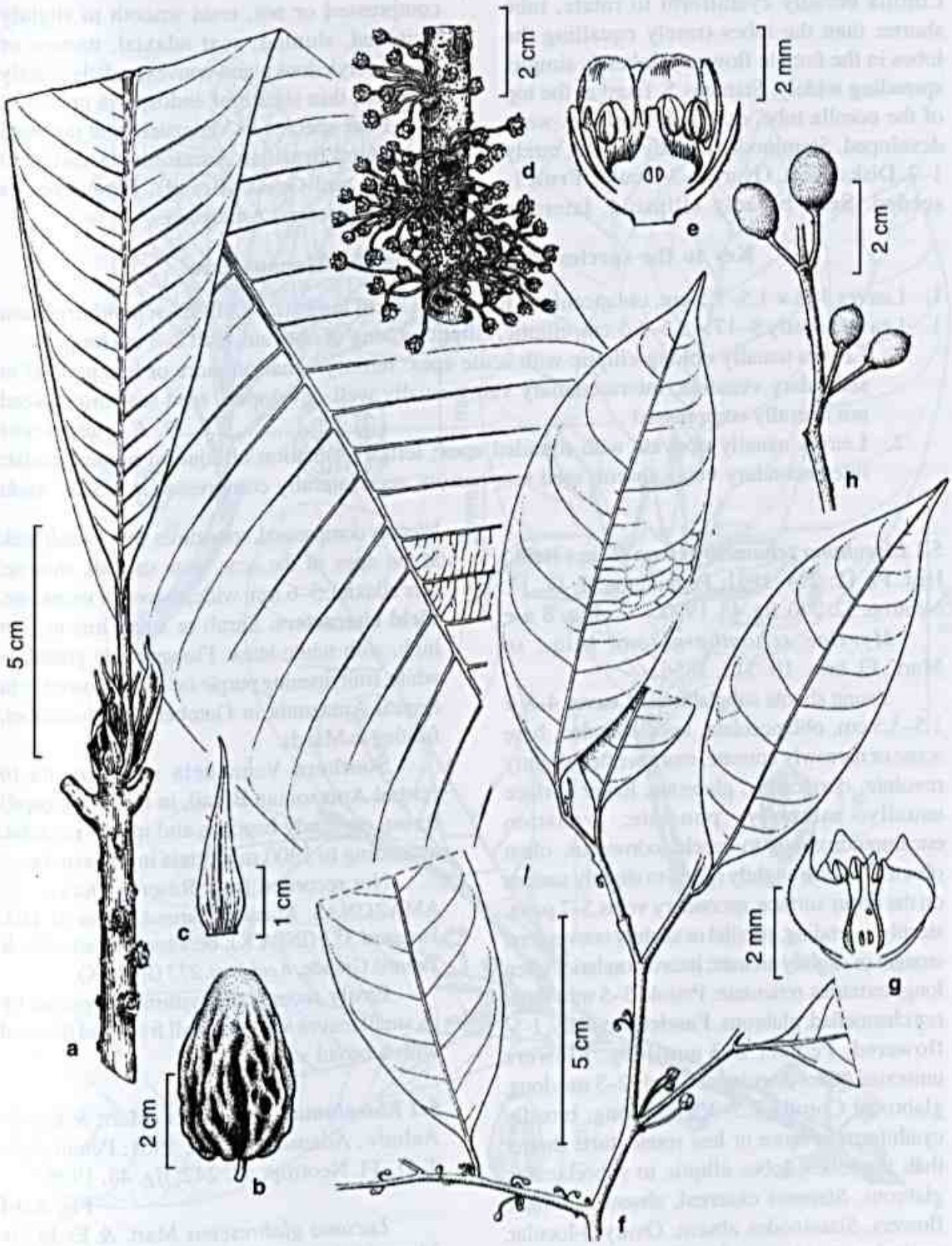

Figura 7 - a-e. *Chromolucuma rubriflora* - a. habit; b. fruit (*Maguire et al. 37399*); c. stipule (*Alencar 475*); d. inflorescence; e. 1/2 flower (*Ducke 289*). f-h. *Sarcaulus brasiliensis* subsp. *brasiliensis* - f. habit (*Granville 3641*); g. 1/2 flower (*Klug 2333*); h. fruits (*Lescure 358*).

Corolla broadly cyathiform to rotate, tube shorter than the lobes (rarely equalling the lobes in the female flowers); lobes 5, simple, spreading widely. Stamens 5, fixed at the top of the corolla tube, exserted; filaments well-developed. Staminodes usually absent, rarely 1–2. Disk absent. Ovary 2–3-locular. **Fruit** 1-seeded. **Seed** broadly ellipsoid, laterally compressed or not, testa smooth to slightly wrinkled, shining; scar adaxial, narrow or broad; cotyledons plano-convex, radicle slightly exserted, thin sheath of endosperm present.

Four species in Venezuela and northern and central Brazilian Amazonia, extending to Panama and Goiás (Brazil). Three species present in central Amazonia.

Key to the species of *Elaeoluma* of the Manaus area

1. Leaves 4–8 × 1.5–3.5 cm, oblanceolate, fruit 1.2–1.4 cm long ..... 1. *E. schomburgkiana*
1. Leaves mostly 9–17 × 3.5–6.5 cm, elliptic, elliptic-oblong or obovate, fruit 2–3 cm long.
   2. Leaves usually oblong-elliptic with acute apex: tertiary venation more or less parallel to secondary venation, intersecondary veins usually well-developed, seed scar broad, seed not laterally compressed ..... 2. *E. glabrescens*
   2. Leaves usually obovate with rounded apex; tertiary venation oblique to perpendicular; intersecondary veins absent; seed scar narrow, seed laterally compressed ..... 3. *E. nuda*

5.1 *Elaeoluma schomburgkiana* (Miq.) Baill., Hist. Pl. 11: 294. 1891; Pennington, T. D., Fl. Neotrop. 52: 240, fig. 48. 1990. **Fig. 8 a-c**

Myrsine schomburgkiana Miq., *in* Mart., Fl. bras. 10: 315. 1856.

Young shoots subglabrous. **Leaves** 4–8 × 1.5–3.5 cm, oblanceolate, apex rounded, base acute or narrowly cuneate, margin often slightly revolute, coriaceous, glabrous, lower surface usually minutely punctate; venation eucamptodromous to brochidodromous, often obscure, midrib slightly raised to slightly sunken on the upper surface, secondary veins 5–7 pairs, steeply ascending, parallel or slightly convergent, straight or slightly arcuate; intersecondaries often long; tertiaries reticulate. Petiole 3–5 mm long, not channelled, glabrous. **Fascicles** axillary, 1-5-flowered. Pedicel 2–3 mm long. **Flowers** unisexual (plant dioecious). Sepals 2–3 mm long, glabrous. Corolla 2.5–3.5 mm long, broadly cyathiform to more or less rotate, tube shorter than the lobes; lobes elliptic to suborbicular, glabrous. Stamens exserted, absent in female flowers. Staminodes absent. Ovary 3-locular, conical or ovoid, sparsely pubescent. **Fruit** 1.2–1.4 cm long, broadly ellipsoid, apex and base rounded, soft-skinned, smooth, glabrous. **Seed** solitary, 0.8–1 cm long, broadly ellipsoid, not laterally compressed, sometimes with a small beak at the apex of the scar, testa smooth, shining; scar adaxial, 5–6 mm wide, rugose or verrucose. **Field characters**: Shrub or small tree to 5 m high, with white latex. Flowers pale greenish-white, fruit ripening purple or black. Flowering in central Amazonia in October and November, fruiting in March.

Southern Venezuela and Guyana to central Amazonian Brazil, in flooded (*igapó*) forest, on sandy beaches and in wet savanna, ascending to 1300 m altitude in Venezuela.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus, Tarumã, Praia da Lua, *Vicentini 352* (INPA K); between Tarumãzinho & Tarumã Grande, *Keel et al. 215* (INPA K).

Easily recognized within *Elaeoluma* by its small leaves and the small fruit, and the seed with a broad scar.

5.2 *Elaeoluma glabrescens* (Mart. & Eichl.) Aubrév., Adansonia 1: 26. 1961; Pennington, T. D., Fl. Neotrop. 52: 242, fig. 48. 1990.

Fig. 8 d-f

Lucuma glabrescens Mart. & Eichl., *in* Mart., Fl. bras. 7: 72. 1863.

Young shoots sparsely appressed puberulous to glabrous. **Leaves** 12–20 × 3.5–7 cm, oblong-elliptic or elliptic, apex usually acute, base narrowly attenuate or cuneate,

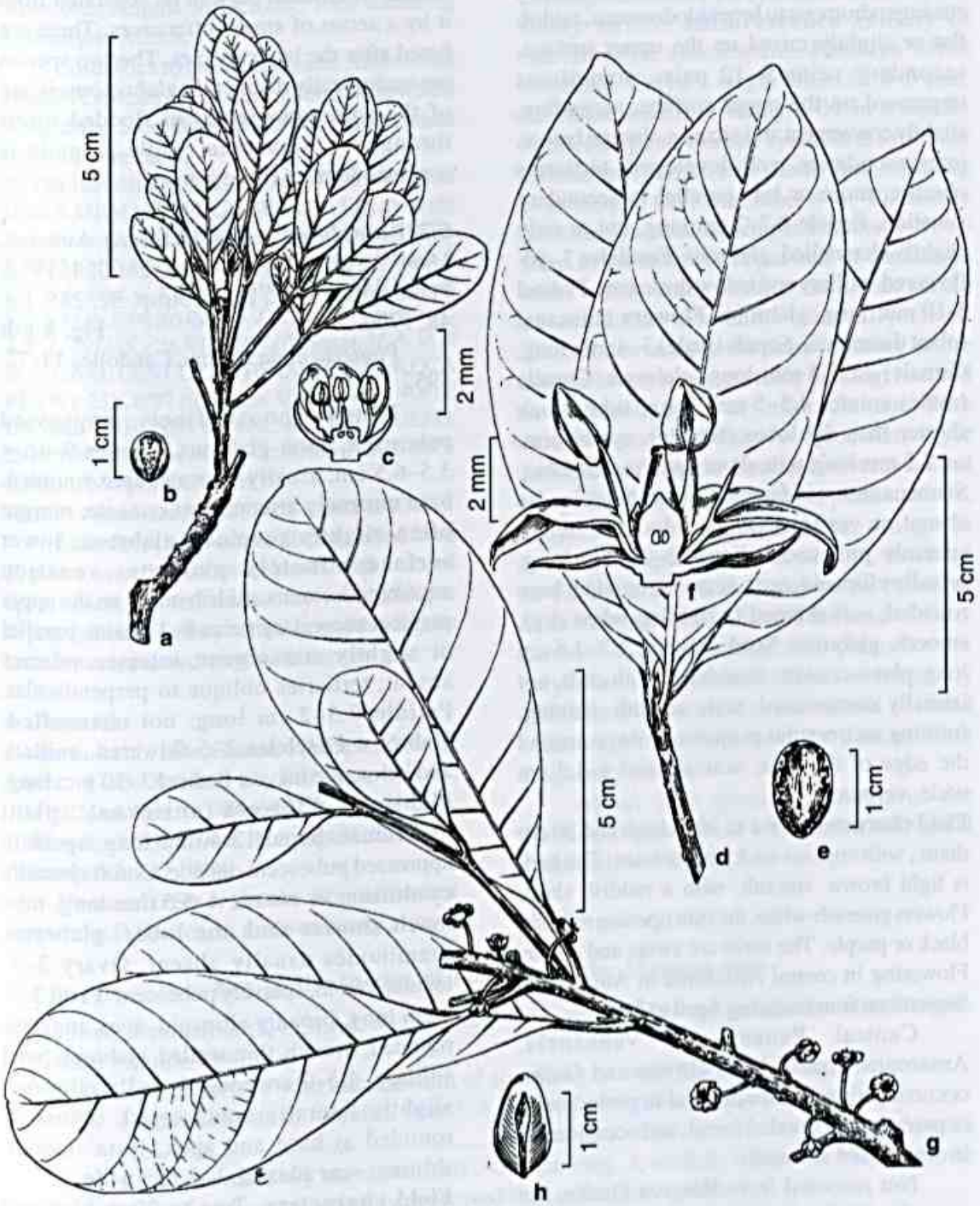

Figura 8 - a-c. *Elaeoluma schomburgkiana* - a. habit; b. seed (*Prance et al. 4661*); c. 1/2 flower (*Maguire & Fanshawe 32176*). d-f. *Elaeoluma glabrescens* - d. habit; e. seed (*Revilla 177*); f. 1/2 flower (*Amaral et al. 397*). g-h. *Elaeoluma nuda* - g. habit (*Silva & Brazão 60650*); h. seed (*Amaral 1545*).

margin often slightly revolute, glabrous, lower surface minutely punctate; venation eucamptodromous to brochidodromous, midrib flat or slightly raised on the upper surface, secondary veins 9–12 pairs, sometimes impressed on the upper surface, ascending, slightly convergent and arcuate, obscure below; intersecondaries well-developed; tertiaries obscure, more or less parallel to secondary venation. Petiole 0.7–2 cm long, not or only slightly channelled, glabrous. **Fascicles** 3–10-flowered, axillary and below the leaves. Pedicel 5-10 mm long, glabrous. **Flowers** unisexual (plant dioecious). Sepals (male) 3–4 mm long, (female) *ca.* 2.5 mm long, glabrous. Corolla (male) rotate, 4.5–5 mm long, tube much shorter than the lobes (female), cyathiform, *ca.* 2.5 mm long, tube about equalling the lobes. Stamens absent in female flowers. Staminodes absent or vestigial.Ovary 3-locular, ovoid, sparsely pubescent. **Fruit** 2–2.5 cm long, broadly ellipsoid, apex acute to rounded, base rounded, soft skinned (wrinkling when dry), smooth, glabrous. **Seed** solitary, 1.3–1.6 cm long, plano-convex, rounded at both ends, not laterally compressed, testa smooth, shining, forming an irregular projecting fringe around the edge of the scar; scar adaxial 1–1.1 cm wide, verrucose.

Field characters: Tree to 30 m high and 30 cm diam., with copious sticky white latex. The bark is light brown, smooth, with a reddish slash. Flowers greenish-white, the fruit ripening reddish-black or purple. The fruits are sweet and edible. Flowering in central Amazonia in August and September, fruit maturing April to June.

Central Panama to Venezuela, Amazonian Brazil, Mato Grosso and Goiás, occurring along riversides and in periodically or permanently flooded forest, and occasionally in white sand savanna.

Not recorded from Reserva Ducke, but occurring in flooded areas near Manaus.

AMAZONAS: Manaus, Tarumã-mirim, *Ferreira 234* (INPA K); Rio Negro, Ilha Baependi, *Mori et al. 21308* (K); Rio Negro, Rio Cuieiras, *Mori & Gracie 22456* (K).

Elaeoluma glabrescens is superficially similar *to E. nuda* but can be separated from it by a series of small differences. These are listed after the latter species. The two species are ecologically distinct, *E. glabrescens* is one of the common species of flooded forest throughout Amazonia, while *E. nuda* is confined to terra firme forest.

5.3 *Elaeoluma nuda* (Baehni) Aubrév., *Mem.* New York Bot. Gard. 23: 224. 1972; Pennington, T. D., Fl. Neotrop. 52: 245, fig. 48. 1990. **Fig. 8 g-h**

Pouteria nuda Baehni, Candollea 14: 72. 1952.

Young shoots finely appressed pubescent, soon glabrous. **Leaves** 9–16 × 3.5–6.5 cm, usually obovate, apex rounded, base narrowly attenuate or cuneate, margin often slightly revolute, glabrous, lower surface minutely punctate; venation eucamptodromous, midrib raised on the upper surface, secondary veins 8–12 pairs, parallel or slightly convergent; intersecondaries absent; tertiaries oblique to perpendicular. Petiole 0.5–2 cm long, not channelled, glabrous. **Fascicles** 2–5-flowered, axillary and below the leaves. Pedicel 3–10 mm long, glabrous. **Flowers** unisexual (plant dioecious). Sepals 2-4 mm long, sparsely appressed pubescent outside. Corolla broadly cyathiform or rotate, 4–5.5 mm long, tube much shorter than the lobes, glabrous. Staminodes usually absent. Ovary 2–3-locular, ovoid, sparsely pubescent. **Fruit** 2.5–3 cm long, broadly ellipsoid, apex and base rounded, smooth, thin-walled, glabrous. **Seed** solitary, 1.5–2 cm long, broadly ellipsoid, slightly laterally compressed, obtuse or rounded at base and apex, testa smooth, shining; scar adaxial, 1–3 mm wide.

Field characters: Tree to 30 m high and 75 cm diam., with small concave buttresses, or base of trunk fluted, upper trunk cylindrical. Bark dark reddish-brown, scaling in rectangular pieces, slash pinkish, with white latex. Flowers pink to greenish-white, fruit

ripening purplish to black. Flowering in central Amazonia August to October, fruit maturing February to March.

Costa Rica to the Guianas and Amazonian Brazil. A species of terra firme forest in lowland Amazonia, ascending to 2000 m in montane forest in Venezuela.

20.VIII.1997 (fl) *Costa, M. A. S. et al. 748* (BM COL G INPA K MBM MG SPF UB UEC U); 15.IX.1994 (fl) *Nascimento, J. R. & Assunção, P. A. C. L. 597* (INPA K MG MO NY R RB SP U); 15.XII.1994 (fl) *Ribeiro, J. E. L. S. & Silva, C. F. 1532* (INPA K MG MO NY R RB SP U); 13.IV.1998 (fr) *Ribeiro, J. E. L. S. & Assunção, P. A. C. L. 1973* (K); 26.VIII.1997 (fl) *Souza, M. A. D. et al. 391* (AAU CEN CUZ GB HB IAN IC INPA K QCA RFA W); 2.IX.1997 (fl) *Souza, M. A. D. et al. 409* (E HAMAB HRB INPA K MAC MG MICH ULM); 25.XI.1997 (fl) *Souza, M. A. D. et al. 466* (ACRE INPA K MEXU MG PUEL S UPCB W).

PDBFF: *Pereira s.n. PDBFF3402.3400.2* (INPA K).

Elaeoluma nuda can be distinguished from *E. glabrescens* by its obovate leaves with rounded apex, absence of intersecondary veins, oblique to perpendicular tertiary venation, and the slightly laterally compressed seed with narrow scar.

6. *Pouteria*

Pouteria Aubl., Hist. Guiane 1: 85, pl. 33 (excl. fruct.). 1775; Baehni, C., Boissiera 5: 144. 1941; Candollea 9: 149. 1942; Cronquist, A. J., Lloydia 9: 257. 1946; Pennington, T. D., Fl. Neotrop. 52: 247. 1990.

Unarmed **trees** or **shrubs**. Stipules absent (present in *P. flavilatex*). **Leaves** nearly always spirally arranged, rarely opposite. Venation eucamptodromous or brochidodromous, not finely striate. **Inflorescence** axillary or ramiflorous, fasciculate. **Flowers** often unisexual. Calyx a single whorl of 4–6 free, imbricate sepals, or rarely 6–11 in a closely imbricate spiral. Corolla cyathiform to shortly tubular, rarely rotate, tube shorter than, equalling or exceeding the lobes, lobes 4–6(–9), usually erect, rarely spreading, simple. Stamens 4–6 (–9) fixed in the lower or upper half of the corolla tube, rarely free, usually included, rarely exserted, the filaments generally short. Staminodes usually the same number as the corolla lobes, rarely partially lacking, inserted in the corolla sinus or inside the tube. Disk rarely present. Ovary 1–6-locular, style included or exserted. **Fruit** a 1-several-seeded berry. **Seed** broadly ellipsoid; plano-convex, shaped like the segment of an orange or laterally compressed, testa smooth, wrinkled or pitted; scar adaxial, narrow or broad or sometimes covering most of the seed surface. Embryo vertical, usually with plano-convex cotyledons and included radicle, less frequently with thin foliaceous cotyledons and exserted radicle; endosperm usually absent, less frequently present.

About 200 species throughout the Neotropics, and about 150 species in tropical Asia and the Pacific.

Key to the species of *Pouteria* of the Manaus area

1. Flowers tetramerous (K4,C4,A4, staminodes 4, G4), corolla lobes and staminodes often fringed-ciliate (section *Pouteria*).
   2. Lower leaf surface with indumentum of spreading or erect hairs.
      3. Leaf base acute to rounded, fruit 3–4 cm long, several-seeded, velutinous ..... 53. *P. hispida*
      3. Leaf base narrowly attenuate, fruit 2–2.5 cm long, 1-seeded, villose .... 51. *P. caimito*
   2. Lower leaf surface with closely appressed indumentum or glabrous.
      4. Venation brochidodromous with a submarginal vein, secondary veins 20–35 pairs ..... 48. *P. gomphiifolia*
      4. Venation eucamptodromous, or if brochidodromous then without a submarginal vein, secondary veins usually fewer.
         5. Venation brochidodromous.

6. Higher order venation laxly reticulate, petiole margins strongly infolded, corolla *ca.* 3 mm long, fruit soft-skinned and squashy ..... 46. *P. plicata*
6. Higher order venation finely reticulchln etate, petiole margin infolded or not, corolla often longer, fruit hard-skinned, not shrinking on drying.
   7. Leaf apex rounded, corolla 3–5 mm long, seed scar 2–3.5 mm wide .... 53. *P. hispida*
   7. Leaf apex usually acute or narrowly attenuate, corolla 4–7 mm long, seed scar usually broader.
      8. Leaf 7–14 × 2.8–5 cm, base often narrowly attenuate, petiole 0.8–1.4 cm long, slightly channelled or flat, pedicel 0.5–1 mm long ..... 51. *P. caimito*
      8. Leaf 11–20 × 5–7 cm, base acute, petiole 1.3–2.5 cm long, margins strongly infolded, pedicel 5–6 mm long ..... 50. *P. guianensis*
5. Venation eucamptodromous.
   9. Lower leaf surface with closely appressed, sometimes sericeous indumentum.
      10. Petiole margins strongly infolded for the whole of their length ..... 50. *P. guianensis*
      10. Petiole margins not infolded, flat or only slightly channelled near the apex.
         11. Leaf midrib slightly raised on the upper surface, leaves without finely areolate reticulum on upper surface, corolla 3–3.5 mm long, lobes ciliate ..... 43. *P. filipes*
         11. Leaf midrib sunken on the upper surface, leaves with fine areolate reticulum (visible with lens) on upper surface, corolla *ca.* 6 mm long, lobes not ciliate ..... 55. *P. freitasii*
   9. Lower leaf surface glabrous, or with close minute appressed hairs forming a pellicle.
      12. Higher order venation finely reticulate.
         13. Bark scaling profusely in large thin papery sheets, leaf apex narrowly acuminate to caudate, lower leaf surface with sparse whitish closely appressed hairs, flowers sessile ..... 54. *P. decorticans*
         13. Bark not scaling in papery sheets, leaf apex narrowly attenuate to rounded, lower leaf surface more or less glabrous, flowers usually pedicellate.
            14. Leaf apex obtuse or rounded.
               15. Petiole not channelled, seed often slightly laterally compressed ..... 51. *P. caimito*
               15. Petiole channelled, seed not laterally compressed ..... 53. *P. hispida*
            14. Leaf apex acute to narrowly attenuate.
               16. Leaves 25–35 × 9–13 cm, secondary veins 19–25 pairs, higher order vein reticulum fine, sharp and conspicuous (lower surface) ..... 52. *P. torta*
               16. Leaves not exceeding 20 × 7 cm, secondary veins 9–16 pairs, higher order venation coarser and less conspicuous.
                  17. Secondary veins 9–12 pairs, leaves 7–14 cm long, petiole not channelled, pedicel 0.5–1 mm long ..... 51. *P. caimito*
                  17. Secondary veins 12–16 pairs, leaves 11–20 cm long, petiole margins strongly infolded, pedicel 5–6 mm long ..... 50. *P. guianensis*
      12. Higher order venation oblique or perpendicular, or if reticulate, then rather lax and often obscure, not finely reticulate.
         18. Leaves with sparse closely appressed whitish hairs below, petiole 3–4.5 cm long, corolla 8–9 mm long ..... 44. *P. petiolata*
         18. Leaves glabrous or with fine appressed hairs forming a pellicle, petiole usually shorter, corolla 2–5 mm long.
            19. Secondary veins 14–20 pairs, tertiary veins reticulate, lax; petiole margins strongly infolded ..... 46. *P. plicata*

19. Secondary veins 7–15 pairs, tertiary venation oblique and/or perpendicular, petiole margins not strongly infolded.
    20. Leaf base acute to rounded, lower leaf surface often with minute appressed hairs forming a pellicle, secondary veins 10–15 pairs ..... 42. *P. glomerata*
    20. Leaf base narrowly attenuate, leaves more or less glabrous, secondary veins 7–9 pairs.
        21. Leaves 11–17.5 × 4.3–8 cm, apex acuminate, petiole 2–3.5 cm long ..... 45. *P. fimbriata*
        21. Leaves 5.5–11 × 2.5–5 cm, apex obtuse or rounded, petiole 5–10 mm long ..... 47. *P. resinosa*

1. Flowers not tetramerous (if with 4 sepals then ovary 1-2-locular, or corolla lobes 6 or more).
    22. Sepals 4, corolla 1.1–1.3 cm long, corolla lobes, stamens and staminodes 6, ovary 7–8-locular ..... 41. *P. venosa*
    22. Sepals 4–5, or more, corolla not exceeding 1 cm long, usually much less, corolla lobes, stamens & staminodes 4–5 (up to 6 in *P. opposita* with opposite leaves), ovary 1–5-locular
        23. Corolla rotate, stamens exserted ..... 57. *P. eugeniifolia*
        23. Corolla cyathiform or tubular, stamens included.
            24. Flowers strictly pentamerous with K5, C5, A5, staminodes 5, G5 (except *P. engleri* and *P. stylifera* which lack several or all staminodes).
                25. Flowers lacking staminodes, or if present then reduced in number and vestigial style long-exserted, somewhat accrescent.
                    26. Leaves 10–12 × 3.5–7 cm, apex shortly attenuate, acute or rounded, secondary veins 6-8 pairs, corolla 3.5–4 mm long. ..... 27. *P. engleri*
                    26. Leaves 3.7–7 × 1.6–3 cm, apex shortly mostly narrowly attenuate, secondary veins 9–10 pairs, corolla *ca.* 3 mm long ..... 28. *P. stylifera*
                25. Flowers with full complement of staminodes, style usually included.
                    27. Seed with copious endosperm, embryo with thin foliaceous cotyledons.
                        28. Stamens free, fruit 6-9 cm long, globose or obovoid ..... 36. *P. laevigata*
                        28. Stamens fixed about halfway up the corolla tube or in the upper half, fruit 2.5–3.5 cm long.
                            29. Leaf apex acute or obtuse, tertiary venation obscure, sepals glabrous ..... 34. *P. tarumanensis*
                            29. Leaf apex usually rounded, tertiary venation oblique, sepals sericeous inside ..... 35. *P. oblanceolata*
                    27. Seed without endosperm (thin layer present in *P. maxima*), embryo with plano-convex cotyledons.
                        30. Lower leaf surface pubescent to tomentose with branched ferrugineous or reddish-brown hairs.
                            31. Leaves alternate and distichous, 13–21 × 8–11.5 cm, broadly elliptic or ovate, base truncate, lower surface (at least midrib and veins) crisped pubescent with ferrugineous hairs, fruit *ca.* 4 cm long, ellipsoid, glabrous ..... 37. *P. maxima*
                            31. Leaves spirally arranged, 10–15 × 4.5–6.5 cm, elliptic or oblanceolate, base narrowly attenuate, lower surface tomentose to pubescent with reddish-brown hairs, fruit 7.5–10 cm long, globose, velutinous ..... 40. *P. manaosensis*
                        30. Lower leaf surface glabrous or with some minute appressed hairs.
                            32. Lower leaf surface glaucous, with minute appressed hairs ..... 39. *P. macrophylla*

32. Lower leaf surface not glaucous, glabrous.
    33. Stamens fixed near the base of the corolla tube, secondary veins 16–20 pairs, fruit 9–10 cm long ..... 49. *P. pariry*
    33. Stamens fixed at the top of the corolla tube, secondary veins 9–15 pairs, fruit 3.5–4 cm long.
        34. Leaves 5–8.5 cm wide, tertiary veins oblique, petiole 2–4.6 cm long, corolla cyathiform, tube shorter than the lobes ..... 21. *P. pentamera*
        34. Leaves 2–4.5 cm wide, tertiary veins forming a loose reticulum, petiole 0.5–1.2 cm long, corolla tubular, tube longer than the lobes ..... 56. *P. procera*
24. Flowers not strictly pentamerous (K4–6, C4–5(–9), A4–5, staminodes 0–5, G. 1–2(–3)).
    35. Staminodes usually absent (flowers may have 1–3(–5) vestiges present). Leaves usually glaucous with higher level venation obscure.
        36. Leaves opposite, corolla lobes and stamens 7–9 ..... 32. *P. opposita*
        36. Leaves spirally arranged, corolla lobes and stamens 5.
            37. Leaves 5–7 cm wide, secondary veins 11–13 pairs, petiole 2–3 cm long, corolla 5.5–6.5 mm long ..... 33. *P. ambelaniifolia*
            37. Leaves 2.5–6 cm wide, secondary veins 15–22 pairs, petiole 0.5–2 cm long, corolla 2.5–3.5 mm long.
                38. Midrib sunken on the upper surface, stamens fixed in the lower half of the corolla tube with well-developed filaments, fruit slender with acute to narrowly attenuate apex ..... 30. *P. elegans*
                38. Midrib slightly raised on the upper surface, stamens fixed near the top of the corolla tube, with very short filaments, fruit broader with rounded apex ..... 31. *P. cuspidata*
    35. Staminodes well-developed, equal in number to the corolla lobes; leaves not usually glaucous (exceptions *P. egregia*, *P. aff. gardneri*), venation obvious.
        39. Higher order venation (tertiary or quaternary) finely reticulate, ovary 1-locular.
            40. Leaves bullate, persistently pubescent on the lower surface, indumentum not appressed ..... 15. *P. platyphylla*
            40. Leaves not bullate, lower leaf surface with appressed indumentum or glabrous.
                41. Lower leaf surface densely appressed puberulous with reddish or golden-brown indumentum.
                    42. Leaves 6.5–13.5 × 3–5, elliptic, apex narrowly attenuate or acuminate, corolla *ca.* 4.5 mm long, lobes ciliate, stamens fixed about halfway up the corolla tube ..... 10. *P. erythrochrysa*
                    42. Leaves 14–20 × 14–10 cm, obovate, apex usually rounded or truncate, corolla *ca.* 3 mm long, lobes not ciliate, stamens fixed in the upper half of the corolla tube ..... 17. *P. fulva*
                41. Indumentum of lower leaf surface not as above, or leaves glabrous.
                    43. Corolla *ca.* 1 cm long, corolla lobes, stamens and staminodes 4, corolla tube 4-5 times as long as the lobes ..... 13. *P. ericoides*
                    43. Corolla not exceeding 5 mm long, corolla lobes, stamens and staminodes 5, corolla tube shorter than, equalling or only slightly longer than the lobes.
                        44. Stamens fixed in the upper half or at the top of the corolla tube, ovary hairy.
                            45. Leaves strongly coriaceous, 1.8–4.5 cm wide, often oblong, with acute, obtuse or rounded apex, pedicel *ca.* 1 mm long ..... 9. *P. pachyphylla*

45. Leaves thinner, usually broader, elliptic or oblanceolate with attenuate apex, pedicel longer than 1 mm.
    46. Leaves with fine appressed indumentum on lower surface.
        47. Leaves 4.5–9 cm wide, corolla 4.5–5 mm long, anthers 1.5–2 mm long, fruit 1.5–2 cm long, seed scar 1.5–2 mm wide ..... 11. *P. campanulata*
        47. Leaves 5–6 cm wide, corolla 2–3 mm long, anthers *ca.* 0.5 mm long, fruit 3–3.5 cm long, seed scar *ca.* 4 mm wide ..... 7. *P. gongrijpii*
    46. Leaves glabrous.
        48. Corolla 4.5–5 mm long, anthers 1.5–2 mm long ..... 11. *P. campanulata*
        48. Corolla 1.5–3.5 mm long, anthers 0.5–0.6 mm long.
            49. Petiole 0.5–1 cm long, corolla 1.5–3 mm long, tube about equalling the lobes, lobes ciliate, anthers often hairy ..... 8. *P. reticulata*
            49. Petiole 2–3 cm long, corolla *ca.* 3.5 mm long, tube much shorter than the lobes, lobes not ciliate, anthers glabrous ..... 12. *P. retinervis*
44. Stamens fixed in the lower half or about halfway up the corolla tube, ovary glabrous.
    50. Leaves 5–13 cm long, often lanceolate, base rounded to acute, upper surface usually smooth and glossy, whole plant more or less glabrous ..... 16. *P. vernicosa*
    50. Leaves 10–23 cm long, elliptic, base narrowly attenuate, upper surface not smooth and glossy, young shoots and inflorescence with some fine appressed indumentum ..... 14. *P. rostrata*

39. Higher order venation not finely reticulate, or if so then ovary 2(–3)-locular.
    51. Stamens free or fixed near the base of the corolla tube.
        52. Venation brochidodromous, secondary veins 14–20 pairs, parallel and usually straight, tertiary veins parallel to the secondaries and descending from the margin, leaves glaucous below ..... 6. *P. egregia*
        52. Venation eucamptodromous, secondary veins 8–10 pairs, strongly arcuate, convergent, tertiary veins reticulate, not parallel to the secondaries and not descending from the margin, leaves not glaucous ..... 5. *P. coriacea*
    51. Stamens in the upper half of the corolla tube (in the lower half in *P. williamii* and *P. anomala* which have 5 corolla lobes).
        53. Ovary unilocular, glabrous ..... 18. *P. peruviensis*
        53. Ovary 2-locular (rarely 3–5-locular in *P. anomala*), pubescent.
            54. Stamens fixed in the lower half of the corolla tube.
                55. Venation brochidodromous with a strong submarginal vein, secondary veins 15–20 pairs, staminodes absent, ovary 3–5-locular, style exserted ..... 29. *P. anomala*
                55. Venation eucamptodromous to brochidodromous, submarginal vein absent, secondary veins 8–10 pairs, staminodes present, ovary 2-locular, style included ..... 25. *P. williamii*
            54. Stamens fixed in the upper half of the corolla tube.
                56. Lower leaf surface with persistent indumentum (lens may be necessary).
                    57. Stipules present, lower leaf surface finely golden-brown sericeous, leaves 9–15 × 4–6.8 cm, apex obtuse or round. ..... 26. *P. flavilatex*
                    57. Stipules absent, lower leaf surface with minute stiff whitish appressed indumentum (lens), leaves 15–27 × 7–10.5 cm, apex usually narrowly attenuate ..... 23. *P. pallens*
                56. Leaves glabrous (residual indumentum sometimes present on lower midrib).
                    58. Stipules present, leaves 3.5–6.5 × 1.5–2.7 cm, secondary veins 5–6 pairs ..... 2. *P. stipulifera*

58. Stipules absent, leaves larger, secondary veins more than 6 pairs.
    59. Corolla 1–2 mm long, corolla lobes 4 (*P. cladantha* has a mixture of 4 and 5 lobes).
        60. Venation brochidodromous, fascicles often clustered on leafless axillary shoots to several cm long, seed with smooth testa ..... 19. *P. cladantha*
        60. Venation eucamptodromous, fascicles axillary, not clustered on leafless shoots, seed with wrinkled testa.
            61. Leaves elliptic, apex narrowly attenuate, secondary venation strongly arcuate and convergent, intersecondary veins moderate to long, ovary glabrous ..... 3. *P. bilocularis*
            61. Leaves broadly oblanceolate to obovate, apex obtuse to rounded, secondary venation slightly arcuate, parallel, intersecondaries absent, ovary puberulous ... 4. *P. minima*
    59. Corolla 3–5 mm long, corolla lobes 5.
        62. Lower leaf surface glaucous ..... 1. *P. aff. gardneri*
        62. Lower leaf surface not glaucous.
            63. Leaves with fine areolate higher order vein reticulum conspicuous on both surfaces (lens) ..... 12. *P. retinervis*
            63. Higher order venation not finely reticulate.
                64. Leaf apex rounded or truncate, secondary veins 6–8 pairs, fruit 4–5 cm long ..... 24. *P. virescens*
                64. Leaf apex acute to narrowly attenuate, secondary veins 9–12 pairs, fruit 2–3 cm long.
                    65. Venation brochidodromous, higher order venation impressed on both surfaces (lens), corolla 2.5–4 mm long, ciliate, fruit velutinous ..... 22. *P. jariensis*
                    65. Venation eucamptodromous (sometimes brochido-dromous in upper half), higher order venation not impressed, corolla 4–5 mm long, not ciliate, fruit glabrous ..... 20. *P. durlandii*

Section 1. *Franchetella* (Pierre) Eyma

6.1 *Pouteria* aff. *gardneri* (Mart. & Miq.) Baehni, Candollea 9: 233. 1942; Pennington, T. D., Fl. Neotrop. 52: 271, fig. 56. 1990.

Chrysophyllum gardneri Mart. & Miq., *in* Mart., Fl. bras. 7: 102. 1863.

Young shoots with spreading pale pubescence, soon glabrous. **Leaves** spirally arranged, 7.5–16 × 3–6.5 cm, elliptic to oblanceolate, apex narrowly attenuate, base acute, upper surface glabrous, lower surface with residual loose indumentum on the midrib, slightly glaucous below; venation eucamptodromous, midrib flat or slightly prominent on the upper surface, secondary veins 8–14 pairs parallel or slightly convergent, slightly arcuate, intersecondaries absent, tertiaries oblique, widely spaced, higher order reticulum conspicuous on the upper surface. Petiole 1.3–2 cm long, slightly channelled, with loose spreading pubescence at first, becoming glabrous. **Fascicles** on twigs below the leaves, 2–5-flowered. **Flowers** probably unisexual. Pedicel 4–5 mm long, sparsely appressed puberulous. Sepals 5, 2–2.5 mm long, appressed puberulous outside, glabrous inside. Corolla *ca.* 4 mm long, cyathiform, lobes 5, much longer than the tube, glabrous. Stamens 5, fixed at the top of the corolla tube, included, glabrous. Staminodes 5, in the corolla lobe sinuses, ovate, glabrous. Ovary ? 2-locular, pubescent. **Fruit** 1.5–2 cm long, ellipsoid, apex and base rounded, smooth, glabrous apart from some residual indumentum at base and apex, pericarp soft and fleshy. **Seed** solitary, 1–1.5 cm long, ellipsoid, laterally compressed, testa smooth, shining; scar adaxial, full length, 4–5 mm wide. Seed without endosperm.

Field characters: Tree to 25 m high and 25 cm diam., with branched buttresses to 1.5m high. Bark yellowish, scaling in irregular

plates. Flowers greenish, fruit maturing reddish-black. Flowering in January, fruiting from February to April.

East and southeast Brazil, Paraguay and Bolivia. If the central Amazonian plant is the same species, this is a range extension from Goiás and Maranhão. *Pouteria gardneri* is a plant of cerrado, gallery forest and grassy campo. The central Amazonian plant is confined to non-flooded high forest.

One tree known in Reserva Ducke, tagged tree number *4596*.

PDBFF: Reserva km 41, *Oliveira et al. 300* (INPA K); *Oliveira et al. 398* (INPA K).

This plant differs from the southeast Brazilian *P. gardneri* only in the longer petioles, and the slightly thicker textured leaves. Only one flowering specimen has been seen, and this is apparently a male flower, with the ovary reduced and only 1 minute locule without ovules.

6.2 *Pouteria stipulifera* T. D. Penn. *sp. nov.* (section *Franchetella*). **Type**: Brazil, Amazonas, Manaus, Reserva Ducke, 2°53'S, 59°58'W, 20.VII.1994, fl, *P. A. C. L. Assunção 33* (holotype INPA, isotypes G K MG MO NY R RB SP). **Fig. 9 a-g**

P. gardneri *affinis sed stipulis parvis, foliis parvis nervis secundariis paucis differt.*

Arbor; stipulae 3–5 mm longae, anguste lanceolatae; folia 3.5–6.5 × 1.5–2.7 cm, elliptica vel oblanceolata; nervi secundarii 5–6-jugi, convergentes et valde arcuati; fasciculi axillares; pedicellus 3–5 mm longus; sepala 5, ca. 2 mm longa; corolla cyathiformis, ca. 3.5 mm longa, lobis 5; staminodia 5; ovarium 2-loculare; fructus 3.5–4.5 cm longus, obovoideus vel ellipsoideus.

Tree. Young shoots sparsely appressed puberulous, soon glabrous and scaling. Stipules 3–5 mm long, narrowly lanceolate, glabrous, caducous. **Leaves** spirally arranged, 3.5–6.5 × 1.5–2.7 cm, elliptic or oblanceolate, apex acute to obtuse, base narrowly cuneate or attenuate, glabrous; venation eucamptodromous in the lower half, brochidodromous in the upper half, midrib flat or slightly raised on the upper surface, secondary veins 5–6 pairs, convergent and strongly arcuate, intersecondaries short or absent, tertiaries forming an open reticulum. Petiole 5–7 mm long, channelled, subglabrous. **Fascicles** axillary, 1–2-flowered. Pedicel 3–5 mm long, sparsely appressed puberulous. Sepals 5, *ca.* 2 mm long, ovate, apex acute, appressed puberulous outside, glabrous within, margin ciliate. Corolla cyathiform, *ca.* 3.5 mm long, tube *ca.* 1.5m long, lobes 5, *ca.* 2 mm long, broadly ovate or elliptic, apex obtuse; glabrous. Stamens 5, fixed in the upper half of the corolla tube, filaments *ca.* 0.5 mm long, glabrous, anthers 1–1.25 mm long, broad, glabrous. Staminodes 5, *ca.* 1 mm long, lanceolate-subulate, carnose, glabrous. Disk absent. Ovary pulvinate, 2-locular, densely short pubescent, style *ca.* 1 mm long, glabrous, included, style-head simple. **Fruit** 3.5–4.5 cm long, obovoid or ellipsoid, apex obtuse or rounded, base obtuse or tapered, soft-skinned and fleshy, smooth (wrinkling in drying) shortly velutinous. **Seed** solitary, *ca.* 2 cm long, ellipsoid, apex and base obtuse or rounded, not laterally compressed, testa smooth, shining; scar adaxial, *ca.* 1.7 × 0.8 cm, verrucose. Seed without endosperm.

Field characters: Tree to 15 m high and 30 cm diam., with small buttresses. Bark reddish, dippled; slash yellowish, with white or yellowish latex. Flowers with green sepals and pink corolla. Fruit maturing orange. Flowering in July and fruit maturing in January.

Known only from three collections in the vicinity of Manaus, Amazonas, Brazil.

Paratype: 19.XI.1997 (fr) *Ribeiro, J. E. L. S. & Pereira, E. C. 1956* (INPA K).

Other collections from outside Reserva Ducke: Brazil, Amazonas, Manaus, Igarapé do Bindó, *D. Coêlho s.n. INPA3321* (INPA).

A very distinct plant whose floral structure and size are close to *P. simulans*, *P. gardneri* and *P. benai*. It differs from all these by the presence of stipules, and by the very small leaves with few secondary veins. The relatively large velutinous fleshy fruit is also

distinctive. *Pouteria benai* has leaves of similar size, but the venation is quite different, as are the long-pedicellate flowers.

6.3 *Pouteria bilocularis* (Winkler) Baehni, Candollea 9: 229. 1942; Pennington, T. D., Fl. Neotrop. 52: 283, fig. 52. 1990. **Fig. 9 h-j**

Labatia bilocularis Winkler, Repert. Spec. Nov. Regni Veg. 7: 112. 1909.

Young shoots glabrous. **Leaves** spirally arranged, 7–12.5 × 3–5.5 cm, elliptic, apex and base narrowly attenuate, glabrous, lower surface minutely punctate, venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 7–11 pairs, arcuate, convergent, intersecondaries moderate to long, tertiaries reticulate and some parallel to the secondaries. Petiole 1.2–1.4 cm long, slightly channelled, glabrous. **Fascicles** 5–20-flowered, axillary and below the leaves. Pedicel 4–5 mm long, glabrous. **Flowers** unisexual. Sepals 4, 1–1.5 mm long, subglabrous. Corolla 1.75–2 mm long, cyathiform, tube equalling or slightly longer than the lobes, glabrous. Stamens 4, fixed at the top of the corolla tube, glabrous, absent in female flowers. Staminodes 4, ovate to subulate, glabrous, vestigial in female flower. Ovary flattened (male flowers) or ovoid (female flowers), 2-locular, glabrous, style included. **Fruit** 2–3 cm long, ellipsoid, apex rounded or obtuse, base acute, hard-skinned, smooth, glabrous. **Seed** solitary, 1.8–2.5 cm long, ellipsoid, laterally compressed, rounded at both ends, testa wrinkled or verrucose, shining; scar adaxial, full-length, 2–3 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 45 cm diam., larger specimens buttressed, bole cylindrical, bark reddish to dark brown, longitudinally fissured and peeling in rectangular plates, slash reddish-brown, with sweet smell, with scarce white latex. Flowers scented, greenish, the fruit ripening orange-yellow. Flowering in central Amazonia in April.

The Guianas and Venezuela across Amazonia to the Andean countries, where it is a species of lowland rainforest, mostly on non-flooded land. It ascends to 1200 m altitude in Bolivia.

15.IV.1994 (fl) *Nascimento, J. R. et al. 508* (G INPA K MBM MG MO NY R RB SP U UEC US).

PDBFF: Reserva km 41, *Pennington et al. 12986* (INPA K); *Freitas et al. F-376* (INPA K).

This species is characterized by the rather coriaceous leaves with conspicuous arcuate venation, the tertiary veins usually more or less parallel to the secondaries, and the seed with a wrinkled testa.

6.4 *Pouteria minima* T. D. Penn., Fl. Neotrop. 52: 285, fig. 59. 1990. **Fig. 10 g-i**

Young shoots glabrous, soon scaling and cracked. Leaves spirally arranged, 6–14 × 3.5–8.3 cm, broadly oblanceolate to obovate, apex obtuse to rounded, base acute to shortly attenuate, coriaceous, glabrous; venation eucamptodromous, midrib slightly prominent on the upper surface, secondary veins 8–9 pairs, slightly arcuate, parallel, intersecondaries absent, tertiaries oblique and reticulate. Petiole 0.9–1.2 cm long, not channelled, glabrous. **Fascicles** 10-20-flowered, axillary and below the leaves. Pedicel 2–3 mm long, sparsely and minutely appressed puberulous. **Flowers** unisexual (plant monoecious). Sepals 4, 1–1.5 mm long, sparsely appressed puberulous. Corolla cyathiform, 1.5–2 mm long, tube about equalling the lobes, lobes 4, glabrous. Stamens 4, fixed in the upper half of the corolla tube, glabrous; absent in female flowers. Staminodes 4, fixed in the corolla lobe sinuses, 0.3–0.4 mm long, glabrous. Ovary ovoid, 2-locular, puberulous. **Fruit** 2.3–2.65 cm long, ellipsoid to obovoid, apex rounded, base acute, hard-skinned, smooth, glabrous. **Seeds** 1–2, *ca.* 1.7 cm long, ellipsoid, laterally compressed, testa wrinkled, shining; scar adaxial, full-length, *ca.* 1.5 mm wide. Seed without endosperm.

Field characters: Tree to 35 m high with cylindrical bole, often fluted at the base and with superficial roots. Bark dark brown, fissured, inner bark reddish, with translucent whitish sap. Flowers slightly perfumed, cream-coloured, fruit maturing yellowish-orange. Flowering in central Amazonia in March, fruiting July to December.

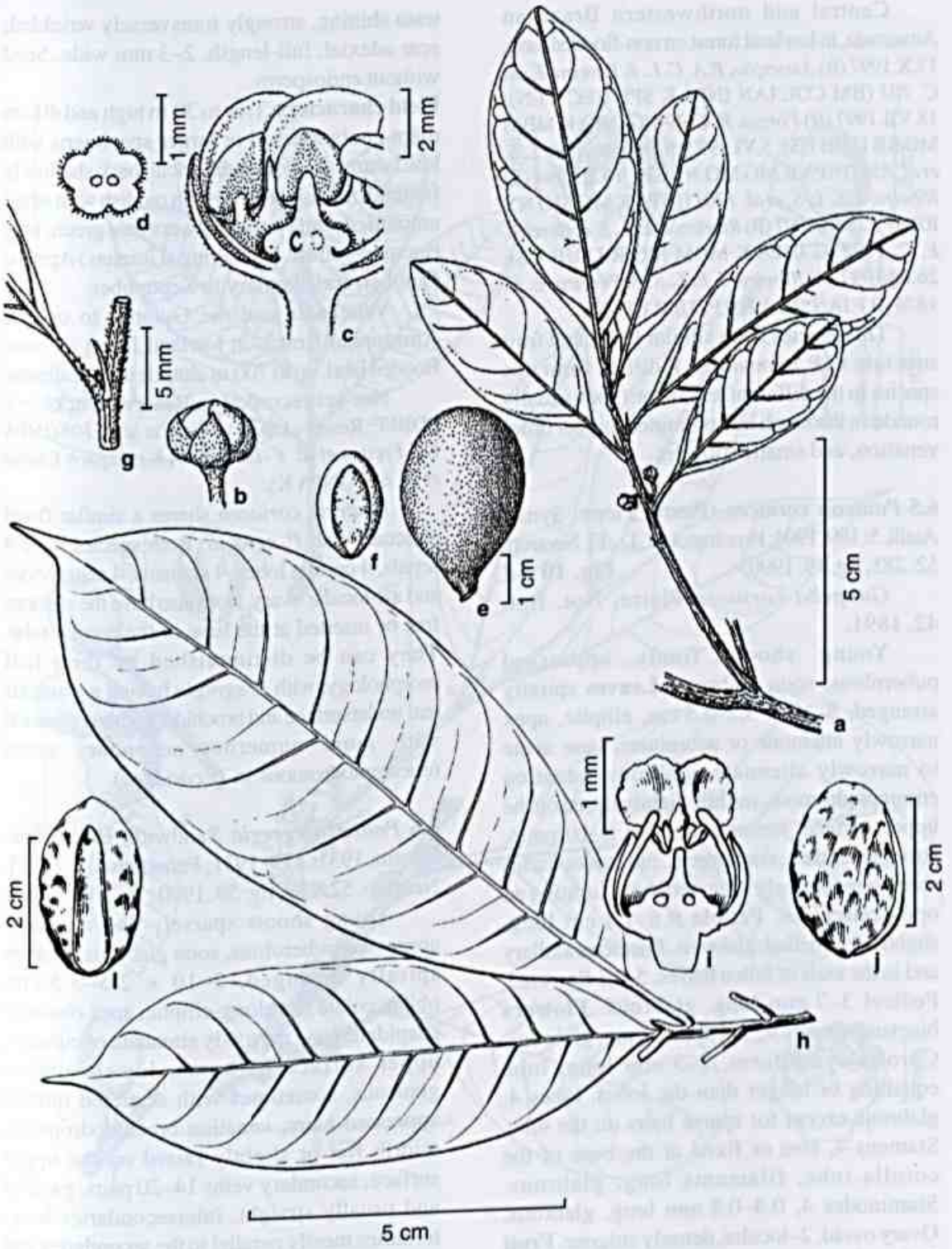

Figura 9 - a-g. *Pouteria stipulifera* - a. habit; b. flower; c. 1/2 flower; d. ovary; e. fruit; f. seed (*Assunção 33*); g. stipules (*Ribeiro 1197*); h-l. *Pouteria bilocularis* - h. habit (*Woytkowski 6216*); i. 1/2 flower (*Krukoff 10560*); j e l. seeds (*Davidse & Huber 15370*).

Central and northwestern Brazilian Amazonia, in lowland forest on non-flooded land. 17.X.1997 (fr) *Assunção, P. A. C. L. & Pereira, E. da C. 703* (BM COL IAN INPA K SPF UEC VEN); 18.VII.1997 (fr) *Forzza, R. C. 294* (G INPA K MBM MG RB U UB US); 5.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 854* (INPA K MG MO NY SP); 10.II.1994 (fl) *Ribeiro, J. E. L. S. et al. 1201* (INPA K MG MO NY RB SP); 25.III.1997 (fl) *Ribeiro, J. E. L. S. & Pereira, E. C. 1872* (G INPA K MBM MG R U UB US); 26.III.1997 (fl) *Ribeiro, J. E. L. S. & Pereira, E. C. 1876* (B F IAN INPA K P PEUFR UFMT).

This species has a similar floral and fruit structure to *P. bilocularis*. It differs from this species in the different leaf shape (apex usually rounded), the much less prominent higher order venation, and smaller flowers.

6.5 *Pouteria coriacea* (Pierre) Pierre, Symb. Antill. 5: 109. 1904; Pennington, T. D., Fl. Neotrop. 52: 285, fig. 49. 1990. **Fig. 10 d-f**

Guapeba coriacea Pierre, Not. Bot. 42. 1891.

Young shoots finely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 8–15 × 3.2–5.5 cm, elliptic, apex narrowly attenuate or acuminate, base acute to narrowly attenuate, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 8–10 pairs, strongly arcuate, convergent, intersecondaries short to moderately long, tertiaries forming an open reticulum. Petiole 0.6–1.1 cm long, slightly channelled, glabrous. **Fascicles** axillary and in the axils of fallen leaves, 5–10-flowered. Pedicel 3–7 mm long, glabrous. **Flowers** bisexual. Sepals 4, 1–1.5 mm long, glabrous. Corolla cyathiform, 2–3 mm long, tube equalling or longer than the lobes, lobes 4, glabrous except for sparse hairs on the tube. Stamens 4, free or fixed at the base of the corolla tube, filaments long, glabrous. Staminodes 4, 0.4–0.8 mm long, glabrous. Ovary ovoid, 2–locular, densely strigose. **Fruit** 2–4 cm long, ovoid or ellipsoid, apex acute to attenuate, base acute to rounded, hard-skinned, smooth, glabrous. **Seed** solitary, 1.4–2.4 cm long, ellipsoid, slightly laterally compressed, testa shining, strongly transversely wrinkled; scar adaxial, full-length, 2–3 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 40 cm diam., unbuttressed or larger specimens with low buttresses, bole cylindrical, bark shallowly fissured, reddish brown, slash reddish with small amount of white latex. Flowers pale green, fruit ripening yellow. Flowering (Guianas) April to October, fruit January to September.

Venezuela and the Guianas to central Amazonian Brazil, in lowland forest on non-flooded land, up to 700 m altitude in the Guianas.

Not yet recorded in Reserva Ducke.

PDBFF: Reserva km 41, *Freitas et al. F-108* (INPA K); *Freitas et al. F-162* (INPA K); *Lepsch Cunha et al. 633* (INPA K).

Pouteria coriacea shares a similar floral structure with *P. egregia*. Both species have 4 sepals, 4 corolla lobes, 4 stamens, 4 staminodes and a 2-locular ovary. Both also have the stamens free or inserted at the base of the corolla tube. They can be distinguished by their leaf morphology, with *P. egregia* having a glaucous leaf undersurface and brochidodromous venation with more numerous secondary veins (eucamptodromous in *P. coriacea*).

6.6 *Pouteria egregia* Sandwith, Bull. Misc. Inform. 1931: 479. 1931; Pennington, T. D., Fl. Neotrop. 52: 289, fig. 59. 1990. **Fig. 10 a-c**

Young shoots sparsely and minutely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 5–10 × 2.5–3.5 cm, oblanceolate to oblong-elliptic, apex obtusely cuspidate, base narrowly attenuate or cuneate, upper surface glabrous, lower surface glaucous, sometimes with scattered minute appressed hairs; venation brochidodromous, midrib flat or slightly raised on the upper surface, secondary veins 14–20 pairs, parallel and usually straight, intersecondaries long, tertiaries mostly parallel to the secondaries and descending from the margin. Petiole 3–9 mm long, slightly channelled, glabrous. **Fascicles** 5–15-flowered, axillary and below the leaves. Pedicel 1–v8 mm long, with sparse minute

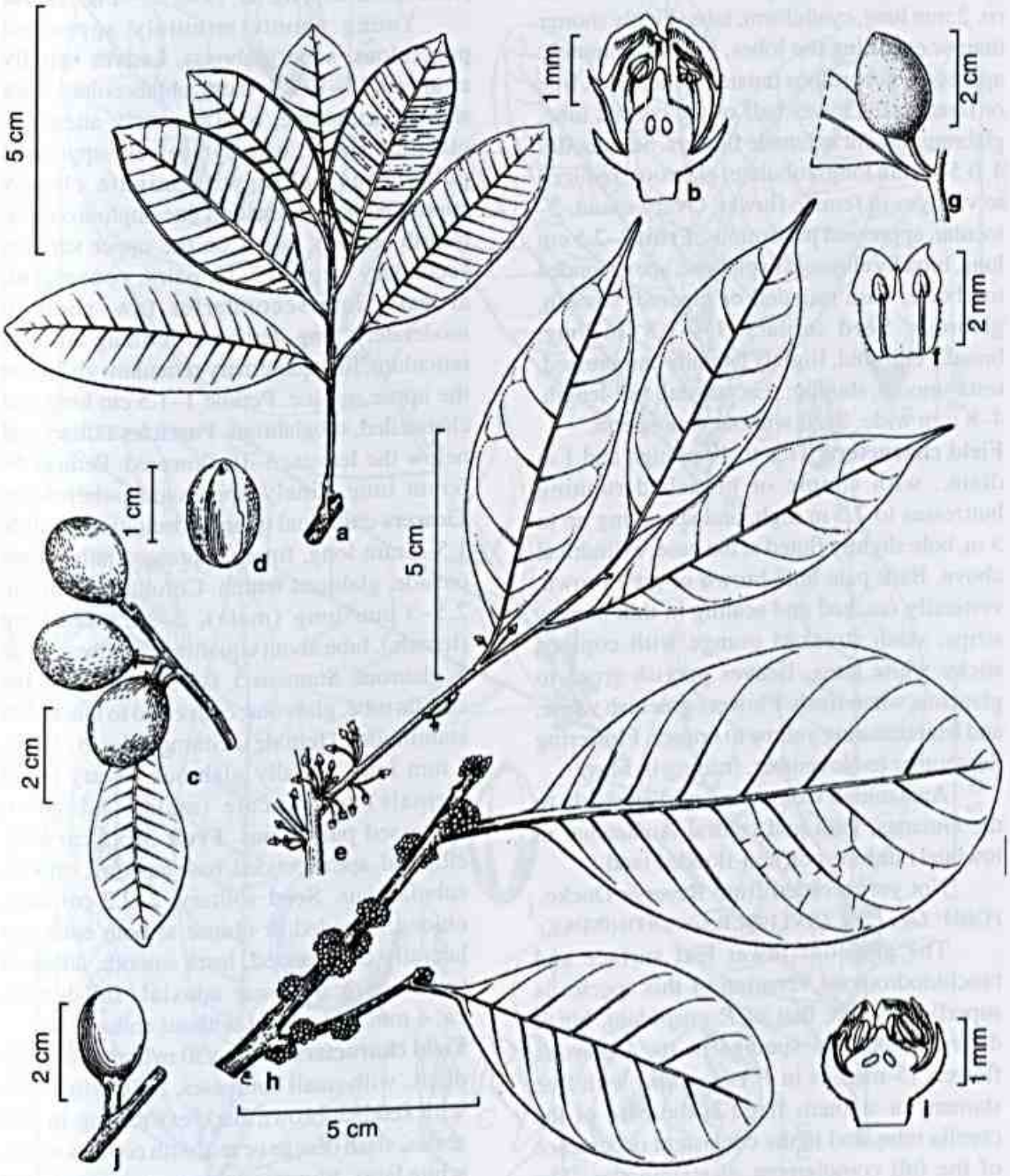

Figura 10 - a-c. *Pouteria egregia* - a. habit (*Wurdack & Monachino 39693*); b. 1/2 flower (*Blanco 268*); c. fruits (*Blanco 582*); d. seed (*Marcano-Berti 184*). e-f. *Pouteria coriacea* - e. habit; f. 1/3 flower (*LBB 12627*); g. fruit (*Davidse et al. 13753*). h-j. *Pouteria minima* - h. habit (*Schultes & Pires 9070*); i. 1/2 flower; j. young fruit (*Schultes & Pires 9094*).

appressed indumentum. **Flowers** unisexual (plant dioecious). Sepals 4, 0.5–1 mm long, sparsely appressed puberulous. Corolla *ca.* 2 mm long, cyathiform, tube slightly shorter than or equalling the lobes, lobes 4, minutely appressed puberulous outside. Stamens 4, free or fixed in the lower half of the corolla tube, glabrous, absent in female flowers. Staminodes 4, 0.5–1 mm long, subulate, glabrous, reduced to vestiges in female flower. Ovary ovoid, 2-locular, appressed puberulous. **Fruit** 2–2.5 cm long, broadly ellipsoid to globose, apex rounded to obtuse, base rounded or tapered, smooth, glabrous. **Seed** solitary, 1.4–1.8 cm long, broadly ellipsoid, slightly laterally compressed, testa smooth, shining; scar adaxial, full-length, 4–8 mm wide. Seed without endosperm.

Field characters: Tree to 40 m high and 1 m diam., with simple or branched running buttresses to 2.5 m high, and spreading up to 3 m, bole slightly fluted at the base, cylindrical above. Bark pale buff-brown or grey-brown, vertically cracked and scaling in thin narrow strips, slash streaked orange with copious sticky white latex. Leaves greyish-green to glaucous when fresh. Flowers greenish white, and fruit maturing yellow to orange. Flowering September to November, fruiting in May.

Amazonian Colombia and Venezuela to the Guianas, Pará and central Amazonia, in lowland rainforest on non-flooded land.

Not yet recorded from Reserva Ducke.

PDBFF: *Lars, L. s.n.*, 15.VI.1984, Reserva 3004 (INPA K).

The glaucous lower leaf surface and brochidodromous venation of this species is superficially like that of *P. cuspidata*, but it differs from this species in its 4-merous flowers (5-merous in *P. cuspidata*) with free stamens or stamens fixed at the base of the corolla tube, and in the consistent occurrence of the full complement of staminodes. The floral structure of *P. egregia* is similar to that of *P. coriacea*, but the latter has eucamptodromous venation with few secondary veins and the lower leaf surface is not glaucous.

6.7 *Pouteria gongrijpii* Eyma, Recueil Trav. Bot. Néerl. 33: 185. 1936; Pennington, T. D., Fl. Neotrop. 52: 293, fig. 61. 1990. **Fig. 11 a-d**

Young shoots minutely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 15–19 × 5–6 cm, oblanceolate, apex shortly acuminate, base narrowly attenuate, glabrous above, usually sparsely appressed puberulous below with minute closely appressed hairs; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 12–15 pairs, convergent, arcuate, intersecondaries few, short to moderately long, tertiaries forming an open reticulum, fine quaternary reticulum visible on the upper surface. Petiole 1–1.5 cm long, not channelled, subglabrous. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 5–6 mm long, finely appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 5, 1.5–2 mm long, finely appressed puberulous outside, glabrous within. Corolla cyathiform, 2.5–3 mm long (male), 2–2.25 mm long (female), tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous, converted to lanceolate staminodes (female). Staminodes 5, 0.75–1 mm long, usually glabrous. Ovary ovoid (female) to truncate (male), 1-locular, appressed puberulous. **Fruit** 3–3.5 cm long, ellipsoid, apex rounded, base tapering, smooth, subglabrous. **Seed** solitary, 2–2.2 cm long, oblong, rounded or obtuse at both ends, not laterally compressed, testa smooth, adherent to the pericarp; scar adaxial, full-length, *ca.* 4 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 40 cm diam., with small buttresses. Bole cylindrical, with reddish-brown bark exfoliating in thin scales, slash orange or red, with copious sticky, white latex. Flowers pale green, scented, fruit maturing orange. Flowering in central Amazonia in September.

Venezuela and the Guianas to eastern and central Amazonian Brazil, in mixed lowland forest on non-flooded land.

17.IX.1987 (bd) *Pruski, J. F. et al. 3267* (INPA K MG RB SP).

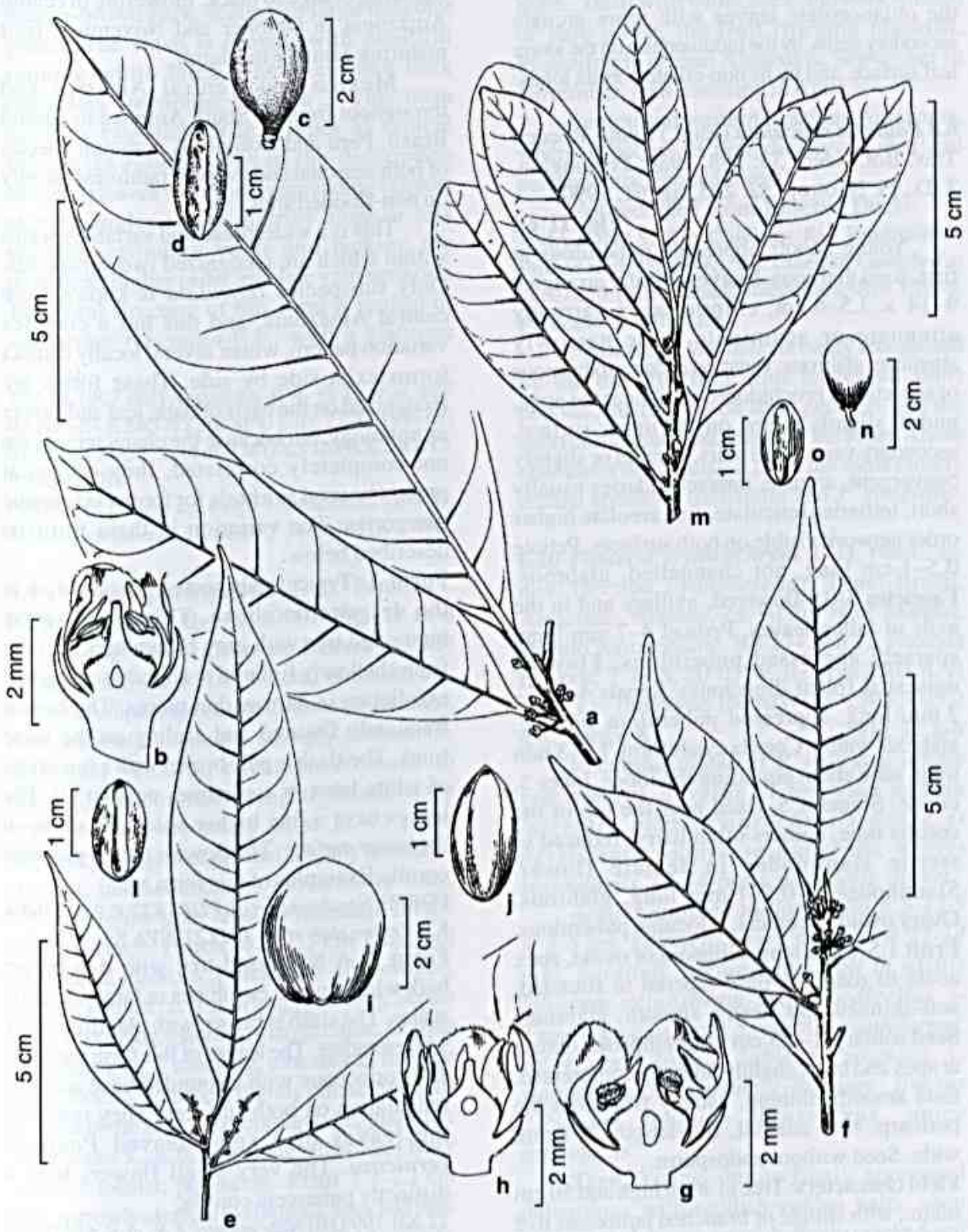

Figura 11 - a-d. *Pouteria gongrijpii* - a. habit; b. flower (*Mori et al. 8743*); c. fruit; d. seed (*Oldeman 3298*). e-l. *Pouteria reticulata* subsp. *reticulata* - e. habit (*Krukoff 6704*); f. habit (*Gentle 1208*); g. male flower (*Croat 49844*); h. 1/3 female flower; i. fruit; j. seed (*Pennington et al. 11489*); l. seed (*Pennington et al. 11364*). m-o. *Pouteria pachyphylla* - m. habit (*Teixeira et al. 1228*); n. fruit; o. seed (*Prance et al. 4763*).

This species is closely related to *P. reticulata*, but may be distinguished from it by the oblanceolate leaves with more arcuate secondary veins, by the indumentum on the lower leaf surface, and by its non-ciliate corolla lobes.

6.8 *Pouteria reticulata* (Engl.) Eyma, Recueil Trav. Bot. Néerl. 33: 183. 1936; Pennington, T. D., Fl. Neotrop. 52: 295, fig. 61. 1990.

Fig. 11 e-l

Young shoots appressed puberulous at first, soon glabrous. **Leaves** spirally arranged, 9–14 × 3.5–6 cm, elliptic, apex narrowly attenuate or acuminate, base narrowly attenuate, glabrous; venation eucamptodromous or sometimes brochidodromous near the apex, midrib slightly raised on the upper surface, secondary veins 9–13 pairs, parallel or slightly convergent, arcuate, intersecondaries usually short, tertiaries reticulate, fine areolate higher order network visible on both surfaces. Petiole 0.5–1 cm long, not channelled, glabrous. **Fascicles** 5–15-flowered, axillary and in the axils of fallen leaves. Pedicel 4–7 mm long, sparsely appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 4–5, 1–2 mm long, appressed puberulous outside, glabrous within. Corolla cyathiform, 1.5–3 mm long, tube about equalling the lobes, lobes 5, ciliate. Stamens 5, fixed near the top of the corolla tube, anthers often hairy; reduced to sterile staminodes in female flower. Staminodes 5, 0.5–1 mm long, glabrous. Ovary ovoid or conical, 1-locular, puberulous. **Fruit** 1.5–3 cm long, ellipsoid or ovoid, apex acute to rounded, base tapered to rounded, soft-skinned and fleshy, smooth, glabrous. **Seed** solitary, 1–2.5 cm long, ellipsoid, obtuse at apex and base, slightly laterally compressed, testa smooth, shining, usually free from the pericarp; scar adaxial, full-length, 2–8 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 50 cm diam., with simple or branched buttresses to 2 m high, lower bole frequently fluted, bark brown to pale greyish, scaling in long irregular plates, slash variable, from pale straw-coloured to reddish, with copious white latex. Flowers greenish-white, usually scented, the fruit maturing orange to black. Flowering in central Amazonia in October and November, fruit maturing January to March.

Mexico and Central America and throughout tropical South America to coastal Brazil, Peru and Bolivia. A common species of both seasonal and everwet rainforest, mostly on non-flooded sites.

This is a widespread and variable species within which are recognized two subspecies. Only subspecies *reticulata* is known from central Amazonia, and this has a complex variation pattern, where several locally distinct forms exist side by side. These forms are recognized on the basis of bark, leaf and flower morphology, but because the character sets are not completely correlated, they cannot at present be used as a basis for formal taxonomic categories. The variation in these forms is described below.

Form 1. Typical subspecies *reticulata* as in the description above. This is a slightly buttressed tree with grey brown bark varying from shallowly fissured to slightly scaling and exfoliating in narrow thin pieces. The bark is frequently fissured and scaling on the same trunk. The slash is pale brown with a few drops of white latex or sometimes none at all. The leaves have a fine higher order reticulum on the lower surface. The flowers have a glabrous corolla.Examples of this form are:

PDBFF: *Nascimento et al. PDBFF2206.2471* (INPA K); *Pennington et al. 13212* (INPA K).

Form 2. A buttressed tree with rich brown bark which which exfoliates in large irregular scales. The slash is brown with plentiful sticky white exudate. The leaves of this form are small and coriaceous with a rounded base and fine reticulation on both surfaces. They resemble the leaves of a small-leaved *Pouteria vernicosa*. The very small flowers have a distinctly pubescent corolla.

22.XII.1994 (fl) *Nascimento, J. R. et al. 695* (INPA K MG MO NY R RB SP U); 7.III.1995 (fr) *Nascimento, J. R. et al. 775* (INPA K MG MO NY R RB SP U).

PDBFF: *Boom et al. 8639* (INPA K); *Mori et al. 20531* (INPA); *Palheta s.n. PDBFF 2303.3454.2*; *A. P. Silva s.n. PDBFF 1301.3497.2*.

Form 3. A buttressed tree with brown to orange-brown bark, scaling in large irregular plates. The slash is brown, with plentiful running white latex. The trunk and bark characters are similar to form 2. This form contains two distinct leaf types a) typical subspecies *reticulata* as in the description above; b) leaves with widely spreading (almost at right angles to the midrib) more or less straight secondary veins and lacking the prominent higher order areolate vein network. The floral structure of this form is typical of subspecies *reticulata* (i.e., with a glabrous corolla).

22.VIII.1997 (bd) *Assunção, P. A. C. L. et al. 624* (IAN INPA K MO NY RB SP U UB); 27.XI.1997 (fr) *Assunção, P. A. C. L. et al. 728* (IAN INPA K MO NY RB SP U UB).

PDBFF: *C. F. Silva s.n. PDBFF 3402.683.2* (INPA); *M. J. R. Pereira et al. s.s. PDBFF 3402.780* (K INPA).

6.9 *Pouteria pachyphylla* T. D. Penn., Fl. Neotrop. 52: 303, fig. 61. 1990. **Fig. 11 m-o**

Young shoots glabrous. **Leaves** spirally arranged, 5.5–12 × 1.8–4.5 cm, oblanceolate, oblong or elliptic, apex acute to obtuse or rounded, base narrowly attenuate, strongly coriaceous, glabrous; venation eucamptodromous to brochidodromous, midrib slightly raised on the upper surface, secondary veins 12–15 pairs, slightly convergent or parallel, slightly arcuate or straight, intersecondaries moderate to long, tertiaries forming an areolate reticulum on the lower surface. Petiole 0.5–1.5 cm long, not channelled, glabrous. **Fascicles** 5–10-flowered, axillary. Pedicel *ca.* 1 mm long, glabrous. Sepals 5, *ca.* 1 mm long, glabrous, margin ciliate. Corolla cyathiform, *ca.* 2 mm long, tube shorter than the lobes, lobes 5, glabrous, slightly ciliate. Stamens 5, fixed at the top of the corolla tube, glabrous. Staminodes 5, *ca.* 0.5 mm long, glabrous. Ovary ovoid, 1-locular, pubescent. **Fruit** 1.7–2.1 cm long, narrowly obovoid to ellipsoid, apex and base acute to obtuse, smooth, glabrous. **Seed** solitary, 1.4–1.8 cm long, narrowly ellipsoid, not laterally compressed, testa smooth, shining; scar adaxial, full-length, 2.5–4 mm wide. Seed without endosperm.

Field characters: Tree to 20 m high and 20 cm diam., slash with white latex. Flowers whitish or pale green, the fruit ripening blackish. Flowering in central Amazonia, September to November, fruit maturing in April.

Central and western Brazilian Amazonia, where it occurs in periodically flooded and permanently flooded forest.

Not recorded from Reserva Ducke.

AMAZONAS, Rio Cuieiras, Rio Branquinho, *Prance et al. 17864* (K); Rio Cuieiras, *Campbell et al. 21850* (K); Manaus-Itacoatiara, Rio Urubú, *Prance et al. 4763* (K).

Pouteria pachyphylla is easily recognized by the thickly coriaceous leaves on short petioles, the flowers on short pedicels, and the short corolla tube exceeded by the lobes. These characters distinguish it from the most closely related species *P. reticulata* and *P. gongrijpii*.

6.10 *Pouteria erythrochrysa* T. D. Penn., *sp. nov.* (section *Franchetella*). **Type**: Brazil, Amazonas, Manaus, *ca.* 90 km N of Manaus, Distrito Agropecuário, BR 174, km 72, Fazenda Dimona, 2°19'S, 60°05'W. Reserva 2303 *A. P. Silva s.n.* (holotype INPA/WWF 2303.3025.2 *n.v.*, isotype K). **Fig. 12 a-h**

P. campanulatae *et* P. rostratae *affinis sed ramulis novellis et foliorum pagina inferiore pilis erythrochrysis dense et persistenter adpresse puberula, nervis secundariis 12-14-jugis parallelis differt.*

Arbor; stipulae nullae; folia 6.5-13.5 × 3-5 cm, elliptica; nervi secundarii 12-14 jugi, paralleli, arcuati; fasciculi in axillis foliorum delapsorum enati; pedicellus 5-7 mm longus; sepala 5; corolla cyathiformis, ca. 4.5 mm longa, lobis 5; stamina 5; staminodia 5; ovarium 1-loculare; fructus 2.2–3 cm longus, ellipsoideus, apice rotundatus.

Tree. Young shoots finely appressed puberulous with reddish-golden hairs, soon becoming glabrous, greyish, finely cracked and fissured. Stipules absent. **Leaves** spirally arranged, 6.5–13.5 × 3–5 cm, elliptic, apex narrowly attenuate to acuminate, base narrowly cuneate or attenuate, glabrous above, finely but

densely appressed puberulous below with reddish-golden hairs; venation eucamptodromous, midrib flat on the upper surface, secondary veins 12–14 pairs, parallel, arcuate, intersecondaries mostly short or absent, tertiaries oblique to perpendicular, fine areolate network sometimes visible on upper surface. Petiole 1.5–2.2 cm long, not or only slightly channelled, sparsely appressed puberulous. **Fascicles** 5–10-flowered, mostly clustered in the axils of fallen leaves. Pedicel 5–7 mm long, finely appressed puberulous. Sepals 5, 1.75–2 mm long, broadly ovate to orbicular, finely appressed puberulous outside, subglabrous inside. Corolla *ca.* 4.5 mm long, cyathiform, tube *ca.* 2 mm long, lobes 5, *ca.* 2.5 mm long, orbicular, margin ciliate, glabrous. Stamens 5, fixed about halfway up the corolla tube, filaments *ca.* 0.3 mm long, glabrous, anthers *ca.* 1 mm long, ovoid, glabrous. Staminodes 5, 1–1.5 mm long, lanceolate-subulate, glabrous. Disk absent. Ovary ovoid, 1.75–2 mm long, 1-locular, glabrous except for long hairs at the base; ovary gradually tapering into a short style, *ca.* 0.5 mm long, included; style-head minutely lobed. **Fruit** 2.2–3 cm long, ellipsoid, apex and base obtuse to rounded, fleshy, soft-skinned, smooth, glabrous. **Seed** solitary, 2-2.2 cm long, ellipsoid, laterally compressed, apex acute, base rounded, testa smooth, shining; scar adaxial, full length, *ca.* 2.5 mm wide; embryo with plano-convex, free cotyledons, extending to the surface. Seed without endosperm.

Field characters: Buttressed tree to 30 m high and 60 cm diam., with cylindrical bole; bark reddish-brown, scaling irregularly in small thin pieces, slash reddish, with whitish latex. Fruit ripening black, with sweet pulp. Flowering in October, fruiting in January.

A common component of non-flooded rainforest in central Amazonia. Thirty individuals (10 cm diam. or greater) were collected from the 25 hectare Sapotaceae plot in the PDBFF reserve at km 41.

Paratypes: 11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F. 642* (INPA K MG MO NY RB SP U UB); 30.I.1996 (fr) *Ribeiro, J. E. L. S. et al. 1785* (INPA K MG MO NY RB SP U); 15.XII.1997 (fl) *Sothers, C. A. & Pereira, E. C. 1073* (INPA K).

This species clearly belongs within section *Franchetella* to the group of species containing *P. campanulata*, *P. sagotiana*, *P. rostrata* and *P. platyphylla*. All have a very similar floral structure with 5 sepals, 5-lobed corolla with the lobes longer than the tube, 5 included stamens, 5 staminodes, and a unilocular ovary. They also share the relatively small fruit, with a single seed bearing a narrow adaxial scar. It differs from all these species in the presence of the fine persistent reddish-golden indumentum on the young parts and lower leaf surface, and in the details of leaf size, shape and venation.

6.11 *Pouteria campanulata* Baehni, Candollea 9: 275. 1942; Pennington, T. D., Fl. Neotrop. 52: 306, fig. 64. 1990. **Fig. 12 i-l**

Young shoots finely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 18–27 × 4.5–9 cm, oblanceolate, apex narrowly attenuate to obtuse, base narrowly attenuate or cuneate, coriaceous, upper surface glabrous, lower surface finely appressed puberulous with whitish hairs; venation eucamptodromous, midrib not raised on the upper surface, secondary veins 16–22 pairs, parallel or slightly convergent, slightly arcuate, intersecondaries absent, tertiaries oblique, fine areolate reticulum visible on lower, or sometimes both surfaces. Petiole 2–3 cm long, not channelled, subglabrous. **Fascicles** mostly on twigs below the leaves, 2–10-flowered. Pedicel 7–9 mm long, sparsely appressed puberulous. Sepals 5, 2.5–3 mm long, appressed puberulous outside. Corolla 4.5–5 mm long, tube shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed in the upper half of the corolla tube, glabrous. Staminodes 5, *ca.* 2 mm long, glabrous. Ovary broadly conical, 1-locular, puberulous. **Fruit** 1.5–2 cm long, ellipsoid, apex and base obtuse to rounded, thin-walled, smooth, glabrous. **Seed** solitary, 1.4–1.8 cm long, ellipsoid, laterally compressed, base and apex obtuse to rounded, testa smooth, shining; scar adaxial, full length, 1.5–2 mm wide. Seed without endosperm.

Field characters: Small or medium sized tree to 30 cm diam., sometimes with small

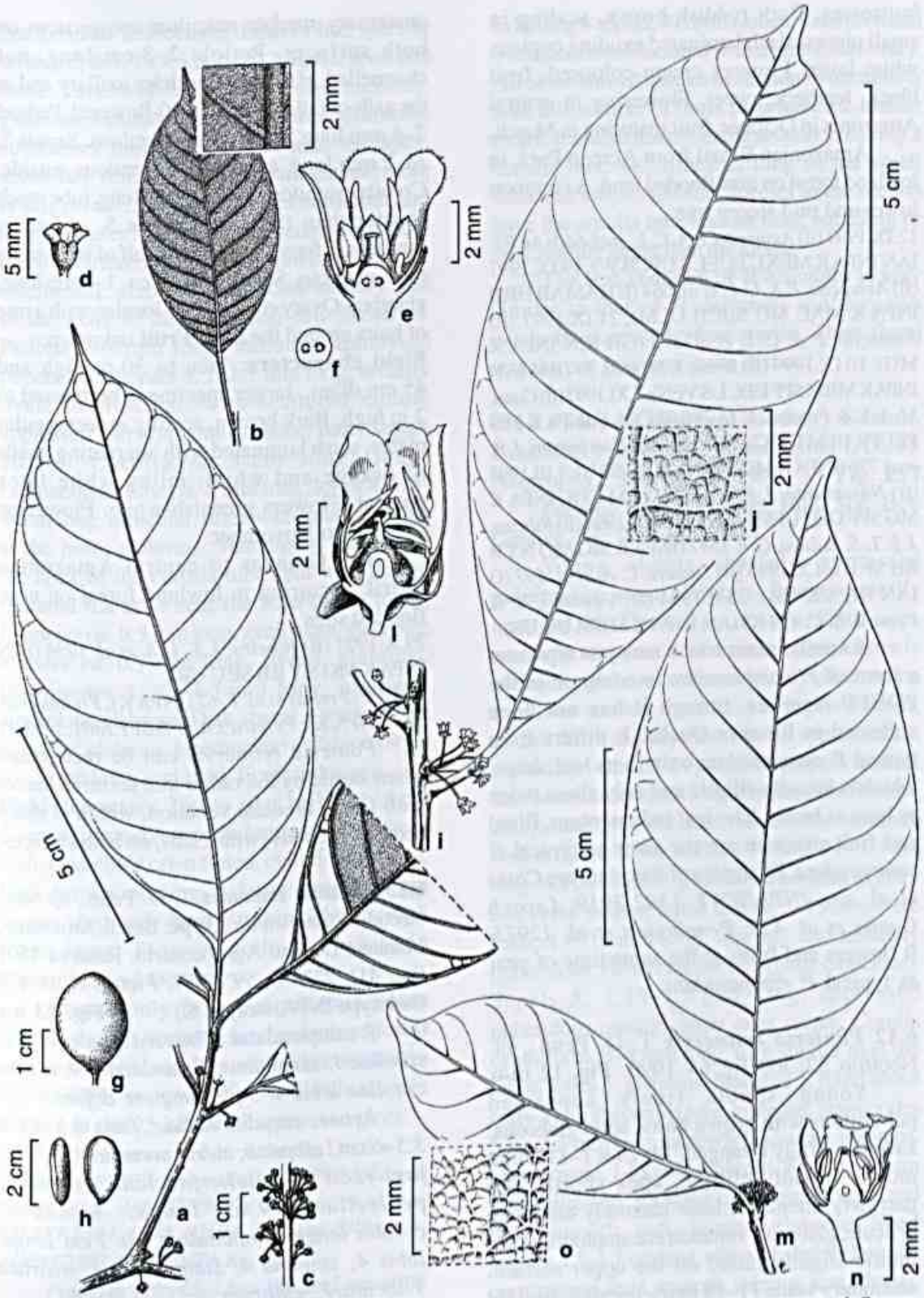

Figura 12 - a-h. *Pouteria erythrochrysa* - a. habit; b. leaf undersurface (*Sothers 1075*); c. inflorescence; d. flower; e. 1/2 flower; f. ovary (*Assunção 742*); g. fruit; h. seed (*Ribeiro 1785*). i-l. *Pouteria campanulata* - i. habit; j. detail of leaf; l. flower (*Pires 552*). m-o. *Pouteria retinervis* - m. habit; n. 1/2 flower; o. detail of leaf (*Mori & Boom 15239*).

buttresses. Bark reddish-brown, scaling in small pieces, slash laminated exuding copious white latex. Flowers cream-coloured, fruit black, leathery, sweet. Flowering in central Amazonia in October, fruit maturing in March.

Amazonian Brazil from Acre to Pará, in lowland forest on non-flooded land. A common lower and mid storey tree.

12.IX.1997 (fl) *Assunção, P. A. C. L. et al. 660* (ACRE IAN INPA K MEXU PUEL S UPCB W); 19.IX.1997 (fl) *Assunção, P. A. C. L. et al. 664* (E HAMAB HRB INPA K MAC MG MICH ULM); 21.IX.1997 (fl) *Assunção, P. A. C. L. et al. 673* (GH ICN INPA K MG); 10.IX.1997 (fl) *Brito, J. M. et al. 34* (BM IAN INPA K MBM SPF UEC US VEN); 7.XI.1997 (fl) *Costa, M. A. S. & Pereira, E. C. 788* (B COL F INPA K MG PEUFR UFMT VIC); 7.III.1995 (fr) *Nascimento, J. R. et al. 776* (INPA K MG MO NY R RB SP U); 7.III.1995 (fr) *Nascimento, J. R. et al. 781* (BM COL INPA K MG SPF UEC UFMT VEN); 16.XII.1994 (fl) *Ribeiro, J. E. L. S. & Silva, C. F. 1547* (INPA K MG MO NY R RB SP U); 4.X.1995 (fl) *Sothers, C. A. et al. 597* (G IAN INPA K UB); 28.II.1994 (fr) *Vicentini, A. & Pereira, E. C. 414* (G IAN INPA K MBM UB US).

A similar plant which may just represent a form of *P. campanulata* is common in the PDBFF reserves, though it has not been collected in Reserva Ducke. It differs from typical *P. campanulata* only in its leaf shape, which is broadly elliptic and only about twice as long as broad. The leaf indumentum, floral and fruit structure are the same as typical *P. campanulata*. Examples of this plant are *Costa et al. s.n. INPA/WWF 1202.2919*; *Lepsch Cunha et al. 459*; *Pennington et al. 12975*. It flowers and fruits at the same time of year as typical *P. campanulata*.

6.12 *Pouteria retinervis* T. D. Penn., Fl. Neotrop. 52: 308, fig. 64. 1990. **Fig. 12 m-o**

Young shoots finely appressed puberulous with brown hairs, soon glabrous. **Leaves** spirally arranged, 14–24 × 7–11.5 cm, mostly broadly elliptic, apex shortly and narrowly attenuate, base narrowly attenuate or acute, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 11–18 pairs, parallel, straight or slightly arcuate, intersecondaries absent, tertiaries widely spaced, oblique, fine quaternary areolate reticulum conspicuous on both surfaces. Petiole 2–3 cm long, not channelled, glabrous. **Fascicles** axillary and in the axils of fallen leaves, 2–10-flowered. Pedicel 2–4 mm long, appressed puberulous. Sepals 5, *ca.* 2 mm long, appressed puberulous outside. Corolla cyathiform, *ca.* 3.5 mm long, tube much shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed in the upper half of the corolla tube, glabrous. Staminodes 5, *ca.* 1.4 mm long, glabrous. Ovary conical, 1–2-locular, with a ring of hairs around the base. **Fruit** unknown.

Field characters: Tree to 30 m high and 45 cm diam., larger specimens buttressed to 2 m high. Bark brown, scaling in rectangular plates, slash laminated with alternating bands of orange and white; milky white latex present. Flowers greenish-white. Flowering October to November.

The Guianas to central Amazonian Brazil, occurring in lowland forest on non-flooded sites.

29.X.1997 (fl) *Ribeiro, J. E. L. S. et al. 1936* (IAN INPA K MO NY RB SP U UB).

PDBFF: *Freitas et al. F-62* (INPA K); *Freitas et al. 633* (INPA K); *Pereira s.n. (PDBFF1301.3407.2)*.

Pouteria retinervis can be recognized when sterile by the rather thin textured leaves with finely areolate venation, which is sharp and conspicuous (with a lens) on both surfaces.

6.13 *Pouteria ericoides* T. D. Penn., *sp. nov.* (section *Franchetella*). **Type**: Brazil, Amazonas, Manaus, Distrito Agropecuário, Reserva 1501 (km 41), 2°24'S, 59°43'W, *Freitas et al. 478* (holotype INPA, isotype K). **Fig. 13 a-e**

P. campanulatae *affinis sed sepalis 4, lobis corollae 4, staminibus 4, staminodiis 4, et tubo corollae lobis 4–5-plo longiore differt.*

Arbor; stipulae nullae; folia 8.5–13 × 3.5–6 cm, elliptica; nervi secundarii 13–15-jugi recti paralleli; fasciculi axillares; pedicellus 7–9 mm longus; sepala 4; corolla longe campanulata, ca. 1 cm longa, lobis 4; stamina 4; staminodia 4; ovarium 1-loculare, glabrum.

Tree. Stipules absent. Young shoots subglabrous, becoming dark blackish-brown,

cracked and lenticellate. **Leaves** lax, spirally arranged, 8.5–13 × 3.5–6 cm, elliptic, apex and base narrowly attenuate, chartaceous, glabrous; venation mostly eucamptodromous, sometimes brochidodromous near the apex, secondary veins 13–15 pairs, straight and more or less parallel, intersecondaries numerous and long, tertiaries forming a conspicuous reticulum on both surfaces. Petiole 7–9 mm long, slightly channelled, glabrous. **Fascicles** axillary and in the axils of fallen leaves, few-flowered. Pedicel 7–9 mm long, minutely appressed puberulous. Sepals 4, 2–2.5 mm long, broadly ovate to orbicular, with scattered minute appressed hairs on both surfaces, inner sepals ciliate. Corolla *ca.* 1 cm long, long-campanulate, tube *ca.* 8 mm long, lobes 4, 1.5–2 mm long, orbicular, often with small auricles at the base; glabrous. Stamens 4, fixed near the apex of the corolla tube (but with strong filament traces to near the base of the tube), filaments *ca.* 0.5 mm long, geniculate, glabrous; anthers *ca.* 0.7 mm long, ovoid, glabrous. Staminodes 4, *ca.* 1.5 mm long, narrowly lanceolate, glabrous. Disk absent. Ovary ovoid, 1-locular, glabrous, tapering into a glabrous style *ca.* 3 mm long, included. **Fruit** unknown.

Field characters: Tree to 30 m high and 35 cm diam. with steep concave buttresses to 75 cm high, lower bole often fluted, cylindrical above. Bark brown, scaling in large irregular thin sheets, slash pale brown to pinkish-red, with white latex. Flowers yellowish-white in September and October.

Known only from central Amazonian Brazil, where it occurs in lowland mixed forest on non-flooded land. It is relatively common in the PDBFF reserves (0.5 individuals per hectare in the 25 hectare Sapotaceae plot).

Not yet recorded in Reserva Ducke.

Paratypes: PDBFF *Spironello s.n.* (INPA K); *Lepsch Cunha et al. 386* (INPA K); *Pereira et al. s.n. PDBFF1301.4294* (INPA K). *Da Silva s.n. PDBFF2303.485.2* (INPA K).

Pouteria ericoides has the leaf venation common to a large group of species within section *Franchetella*, and including *P. reticulata*, *P. campanulata*, and *P. gongrijpii*, but is unusual in having 4 sepals, 4 corolla lobes, 4 stamens and 4 staminodes associated with a unilocular ovary. All other known species of section *Franchetella* with this number of floral parts have a 2-locular ovary. It is also unique in the section in having a corolla tube 4–5 times as long as the small orbicular lobes. All other species in the section have the corolla tube shorter than, equalling or only slightly larger than the lobes.

The leaf venation of *P. ericoides* is very similar to that of *P. durlandii* and they can easily be confused when sterile. Their floral structure is however quite distinct.

6.14 *Pouteria rostrata* (Huber) Baehni, Candollea 9: 270. 1942; Pennington, T. D., Fl. Neotrop. 52: 310, fig. 66. 1990. **Fig. 13 f**

Lucuma rostrata Huber, Bull. Soc. Bot. Genéve, Sér. 2, 6: 195. 1914.

Young shoots sparsely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 10–23 × 4–9 cm, mostly elliptic, apex narrowly attenuate or acuminate, base narrowly attenuate, glabrous, often minutely punctate on the lower surface; venation eucamptodromous, midrib flat or slightly raised on the upper surface, secondary veins 10–14 pairs, convergent, arcuate, intersecondaries short to moderate, tertiaries few, oblique and open reticulate, fine areolate reticulum visible on the lower surface. Petiole 0.8–1.7 cm long, not channelled, glabrous. **Fascicles** axillary and in the axils of fallen leaves, 5–10-flowered. Pedicel 8–10 mm long, sparsely and minutely puberulous. Flowers unisexual (plant dioecious). Sepals 5, 1.25–1.5 mm long, appressed puberulous outside, inner ones ciliate. Corolla cyathiform, 3–4 mm long, tube shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed about halfway up the corolla tube, glabrous. Staminodes 5, *ca.* 1.5 mm long, narrowly lanceolate, glabrous. Ovary ovoid, 1-locular, glabrous. **Fruit** 1.7–2 cm long, ellipsoid, rounded or obtuse at apex and base, smooth, soft-skinned, glabrous. **Seed** solitary, 1.5–1.7 cm long, ellipsoid, slightly laterally compressed, testa, smooth, shining; scar adaxial, full-length, 1.5–2 mm wide. Seed without endosperm.

Field characters: Tree to 25 m high and 60 cm diam., with small buttresses. Bole often fluted. Bark dark brown or reddish-brown with scaling bark, slash pinkish with sticky white latex. Flowers whitish and fruit maturing pale orange. Flowering in central Amazonia in January.

Central and western Amazonian Brazil, Colombia, Ecuador and Peru, in both non-flooded and periodically flooded forest.

11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C.F. da 648* (INPA); 12.IX.1997 (fl) *Assunção, P. A. C. L. et al. 658* (B GH ICN INPA K MG S UPCB VIC); 12.IX.1997 (fl) *Assunção, P. A. C. L. et al. 659* (COL F IAN INPA K PEUFR SPF UFMT VEN); 17.IX.1997 (fl) *Costa, M. A. S. et al. 777* (BM G IAN INPA K MBM UB UEC US); 24.XI.1994 (fl) *Nascimento, J. R. et al. 664* (INPA K MG MO NY R RB SP U).

Pouteria rostrata is close to *P. campanulata*, but may be distinguished by the glabrous leaves with fewer, more arcuate secondary veins, shorter petiole, smaller flowers and glabrous ovary. It is also closely related to the Peruvian *P. aubrevillei*.

6.15 *Pouteria platyphylla* (A.C. Smith) Baehni, Candollea 9: 274. 1942, Pennington, T. D., Fl. Neotrop. 52: 311, fig. 66. 1990. **Fig. 13 g-h**

Lucuma platyphylla A.C. Smith, Bull. Torrey Bot. Club 60: 388. 1933.

Young shoots densely golden-brown tomentose, indumentum persistent. **Leaves** spirally arranged, 15–30 × 6.5–16 cm, mostly broadly oblanceolate or obovate, apex shortly and narrowly acuminate or cuspidate, base acute or narrowly attenuate, strongly bullate, glabrous above, uniformly pubescent below with stalked 2-branched hairs, denser on midrib and veins; venation brochidodromous or eucamptodromous, midrib raised but recessed on upper surface, secondary veins 10–15 pairs, parallel or slightly convergent, arcuate, sunken on the upper surface, strongly raised on the lower surface, intersecondaries short or absent, tertiaries oblique, widely spaced, fine areolate network visible on both surfaces. Petiole 2–3 cm long, not channelled, tomentose. **Fascicles** on twigs below the leaves, 5–10-flowered. Pedicel 1–3 cm long, pubescent. **Flowers** unisexual (plant dioecious). Sepals 5, 2–3 mm long, pubescent outside, subglabrous inside. Corolla cyathiform, *ca.* 4 mm long (female), 5–8 mm long (male), tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed in the upper half of the corolla tube, glabrous, reduced to sterile staminodes in female flowers. Staminodes 5, 1.5–3 mm long, lanceolate, glabrous. Ovary truncate in male, ovoid in female, 1-locular, densely pubescent. **Fruit** 2.7–3 cm long, ovoid to globose, apex and base rounded or truncate, smooth, glabrous. **Seed** solitary, 2–2.5 cm long, ellipsoid, not laterally compressed, testa smooth; scar adaxial, full-length, *ca.* 2 mm wide. Seed without endosperm.

Field characters: Tree to 20 m high and 25 cm diam., bole fluted at the base. Bark dark brown or reddish, scaling in regular plates. Slash fibrous, yellowish, with a sweet smell, and scarce white latex. Flowers greenish-white and fruit maturing black. Flowering in central Amazonia in October, fruiting in March.

Central Amazonian Brazil to Amazonian Peru, in mixed lowland rainforest on non-flooded land.

15.V.1995 (fr) *Cordeiro, I. et al. 1555* (IAN INPA K U UB); 21.VI.1980 (fr) *Nelson, B. W. & Nelson, S. P. 429* (INPA); 24.III.1994 (fr) *Ribeiro, J. E. L. S. et al. 1247* (INPA K MG MO NY RB SP); 24.III.1994 (fr) *Ribeiro, J. E. L. S. et al. 1248* (G IAN INPA K MBM UEC US); 8.IV.1964 (fr) *Rodrigues, W. & Loureiro, A. 5736* (INPA). PDBFF: *Spironello s.n.* (INPA190940 K). *Pennington et al. 13173* (INPA K).

The strongly bullate leaves and brown tomentum on young parts and the lower leaf surface of this species are very characteristic. The floral structure confirms that it belongs to the group of closely related species containing *P. campanulata*, *P. rostrata*, *P. vernicosa* and *P. erythrochrysa*.

6.16 *Pouteria vernicosa* T. D. Penn., Fl. Neotrop. 52: 311, fig. 63. 1990. **Fig. 14 a-b**

Young shoots subglabrous. **Leaves** spaced, spirally arranged, 5–13 × 3–7 cm, broadly lanceolate, elliptic or oblong-elliptic, apex narrowly attenuate to acuminate, base rounded to acute, coriaceous, upper surface usually smooth and glossy, glabrous; venation

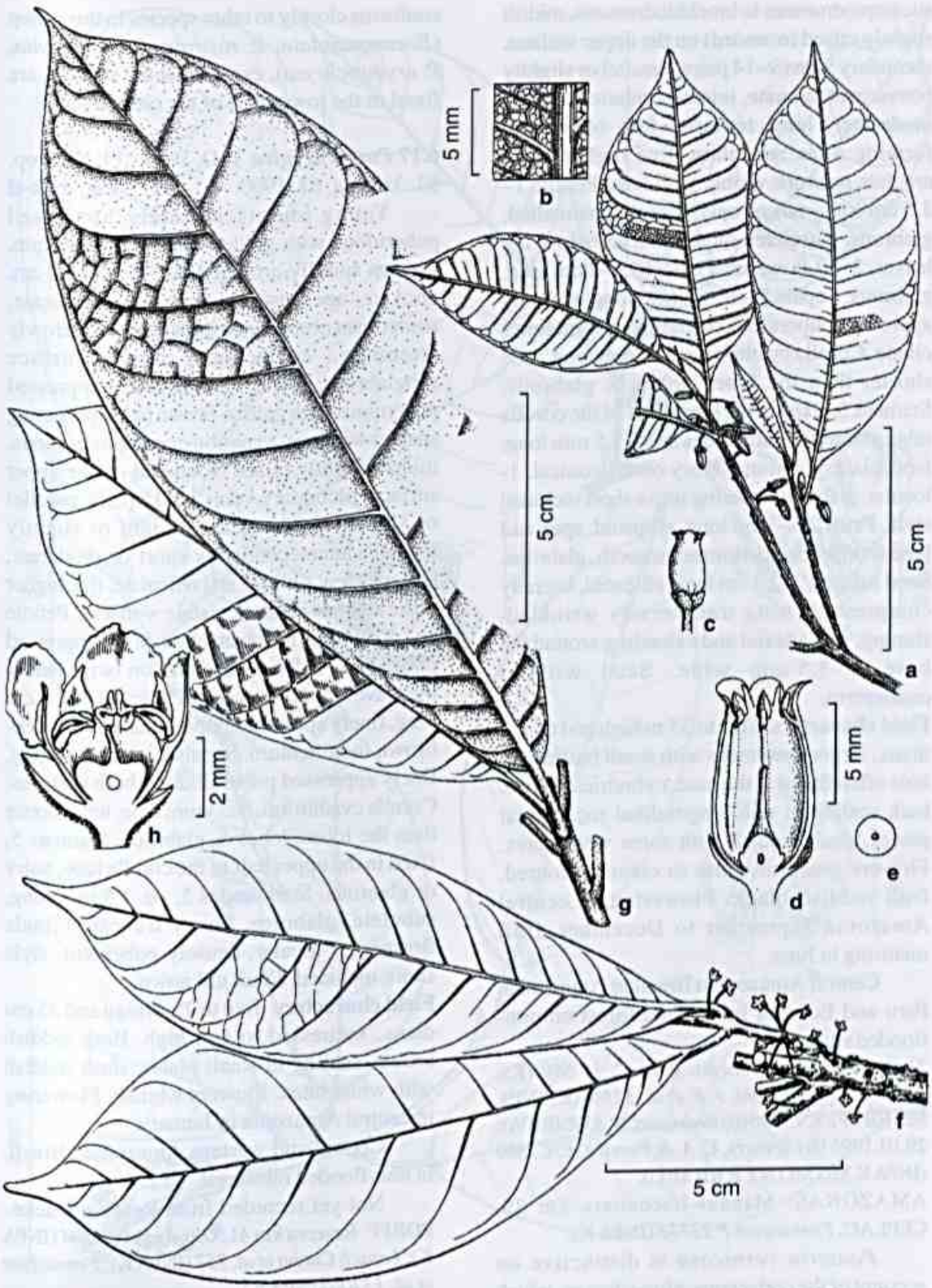

Figura 13 - a-e. *Pouteria ericoides* - a. habit; b. venation on leaf undersurface (*da Silva s.n. PDBFF2303.485.2*); c. flower; d. 1/2 flower; e. ovary (*Lepsch Cunha 386*). f. *Pouteria rostrata* - f. habit (*Krukoff 5701*). g-h. *Pouteria platyphylla* - g. habit (*Nelson &Nelson 429*); h. 1/2 flower (*Ducke RB37452*).

eucamptodromous to brochidodromous, midrib slightly raised (rounded) on the upper surface, secondary veins 9–14 pairs, parallel or slightly convergent, arcuate, intersecondaries short to moderately long, tertiaries few, oblique or forming a lax reticulum, fine higher order areolate network visible with lens. Petiole 1–1.5 cm long, not or only slightly channelled, glabrous. **Fascicles** mostly borne below the leaves, 2–10-flowered. Pedicel 0.5–2 cm long, glabrous. Sepals 5, *ca.* 1.5 mm long, sparsely appressed puberulous or glabrous, sometimes ciliate. Corolla cyathiform, 3–4 mm long, tube shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous. Staminodes 5, *ca.* 1.5 mm long, lanceolate, glabrous. Ovary ovoid-conical, 1-locular, glabrous; tapering into a short included style. **Fruit** 2.5–3 cm long, ellipsoid, apex and base rounded, hard-skinned, smooth, glabrous. **Seed** solitary, 2–2.3 cm long, ellipsoid, laterally compressed, testa transversely wrinkled, shining; scar adaxial and extending around the base, 3–3.5 mm wide. Seed without endosperm.

Field characters: Tree to 35 m high and 65 cm diam., larger specimens with small buttresses, bole often fluted at the base, cylindrical above, bark scaling in thin longitudinal rectangular pieces, slash reddish with some white latex. Flowers greenish-white to cream coloured, fruit reddish-black. Flowering in central Amazonia September to December, fruit maturing in June.

Central Amazonian Brazil to Amazonian Peru and Ecuador in lowland forest on non-flooded sites.

21.IX.1997 (fr) *Assunção, P. A. C. L. 669* (K); 14.IX.1987 (fl) *Pruski, J. F. et al. 3238* ((K) INPA MG RB SP); 8.V.1996 (fr) *Rodrigues, W. 8596* (INPA); 29.III.1995 (fr) *Sothers, C. A. & Pereira, E. C. 380* (INPA K MG MO NY R RB SP U).

AMAZONAS: Manaus-Itacoatiara km 29, CEPLAC, *Pennington P 22773* (INPA K).

Pouteria vernicosa is distinctive on account of the coriaceous, glossy leaves, which are usually lanceolate with a rounded base. The whole plant is subglabrous. The floral structure conforms closely to other species in this group (*P. campanulata*, *P. rostrata*, *P. platyphylla*, *P. erythrochrysa*), except that the stamens are fixed in the lower part of the corolla tube.

6.17 ***Pouteria fulva*** T. D. Penn., Fl. Neotrop. 52: 313, fig. 67. 1990. **Fig. 14 c-d**

Young shoots minutely appressed puberulous with golden-brown indumentum. **Leaves** spirally arranged, 14–20 × 6–10 cm, obovate, apex usually rounded or truncate, sometimes obtusely cuspidate, base narrowly attenuate, coriaceous, upper surface subglabrous, lower surface finely appressed puberulous with golden-brown hairs, becoming sparser with age; venation eucamptodromous, midrib slightly raised (rounded) on the upper surface, secondary veins 11–15 pairs, parallel or slightly convergent, straight or slightly arcuate, intersecondaries short or moderate, tertiaries few, oblique and reticulate, fine higher order areolate network visible with lens. Petiole 1–1.5 cm long, not channelled, finely appressed puberulous at first. **Fascicles** on twigs below the leaves, 5–10-flowered. Pedicel 0.5–1.5 cm long, finely appressed puberulous with golden-brown indumentum. Sepals 5, *ca.* 2 mm long, finely appressed puberulous on both surfaces. Corolla cyathiform, *ca.* 3 mm long, tube shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed in the upper half of the corolla tube, hairy or glabrous. Staminodes 5, *ca.* 1.5 mm long, subulate, glabrous. Ovary truncate (?male flowers), 1-locular, densely pubescent, style short, included. **Fruit** unknown.

Field characters: Tree to 25 m high and 35 cm diam., buttressed to 1 m high. Bark reddish brown, scaling in small plates, slash reddish with white latex. Flowers whitish. Flowering in central Amazonia in January.

Central and western Amazonian Brazil, in non-flooded rainforest

Not yet recorded from Reserva Ducke.

PDBFF: Reserva km 41, *Oliveira et al. 304* (INPA K); *Lepsch Cunha et al. 757* (INPA K); *Pennington et al. 13206* (INPA K).

This species is distinctive on account of the obovate leaves with rounded apex and

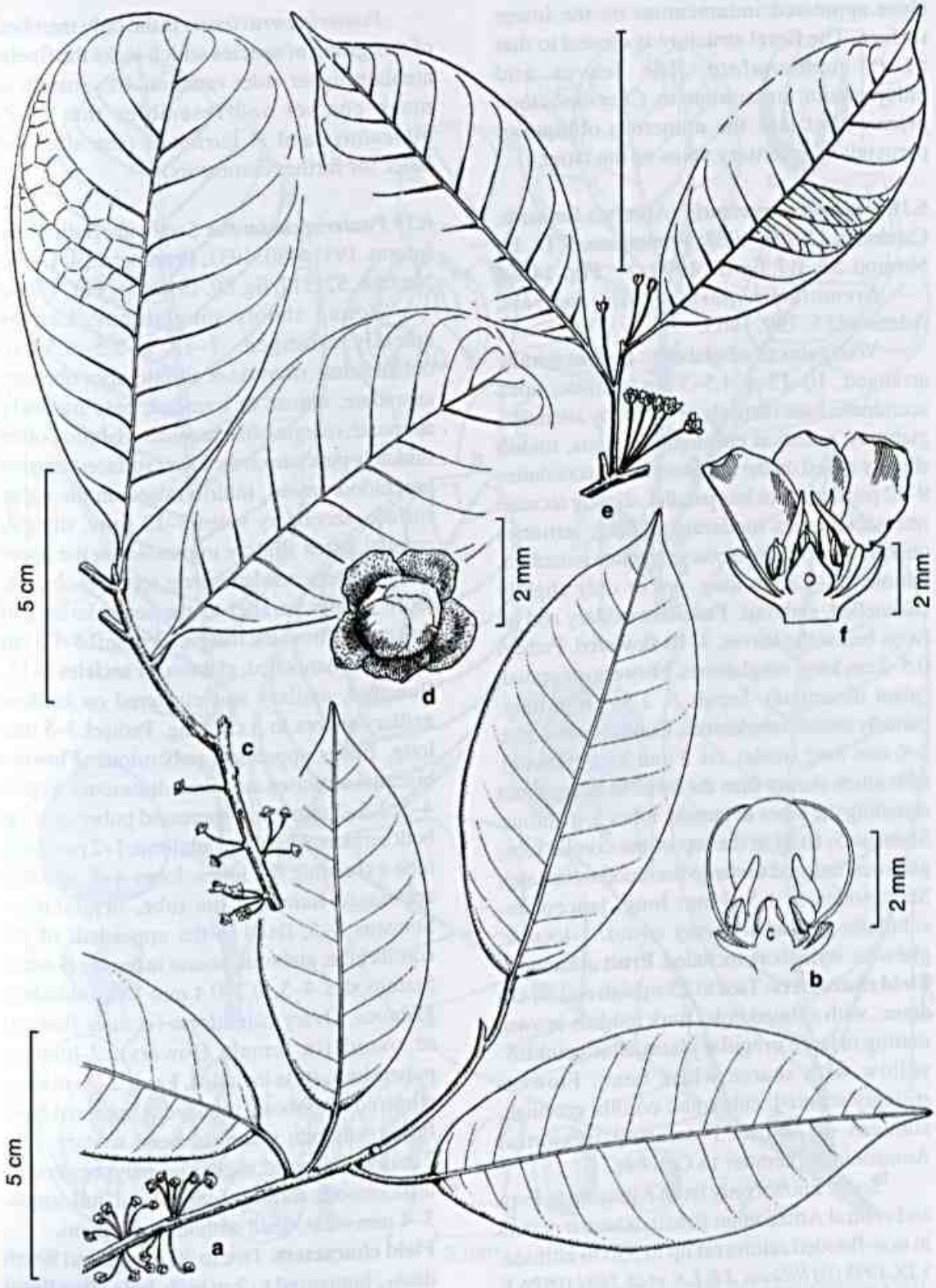

Figura 14 - a-b. *Pouteria vernicosa* - a. habit (*Krukoff 8192*); b. 1/2 flower (*Rodrigues 3364*). c-d. *Pouteria fulva* - c. habit; d. flower bud (*Krukoff 8882*). e-f. *Pouteria peruviensis* - e. habit; f. flower (*Wurdack 2363*).

close appressed indumentum on the lower surface. The floral structure is closest to that of *P. campanulata*. The leaves and indumentum are similar to *Chrysophyllum prieurii*, but lack the numerous oblique or perpendicular tertiary veins of the latter.

6.18 *Pouteria peruviensis* (Aubrév.) Bernardi, Candollea 22: 231. 1967; Pennington, T. D., Fl. Neotrop. 52: 317, fig. 67. 1990. **Fig. 14 e-f**

Eremoluma peruviensis Aubrév., Adansonia 5: 199. 1965.

Young shoots subglabrous. **Leaves** spirally arranged, 10–12 × 4.5–5 cm, elliptic, apex acuminate, base obtusely or narrowly attenuate, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface, secondaries 9–12 pairs, more or less parallel, slightly arcuate, intersecondaries moderate to long, tertiaries oblique and forming a coarse areolate reticulum. Petiole 0.8–1.2 cm long, not or only slightly channelled, glabrous. **Fascicles** axillary and on twigs below the leaves, 3–10-flowered. Pedicel 0.5–2 cm long, subglabrous. **Flowers** unisexual, (plant dioecious). Sepals 5, 1.5–2 mm long, partially united, subglabrous. Corolla cyathiform, 5–6 mm long (male), *ca.* 3 mm long (female), tube much shorter than the lobes in male, about equalling the lobes in female, lobes 5, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous, reduced to sterile staminodes (female). Staminodes 5, 1.5–3 mm long, lanceolate-subulate, glabrous. Ovary ovoid, 1-locular, glabrous, style short, included. **Fruit** unknown.
Field characters: Tree to 25 m high and 30 cm diam., with a fluted bole. Bark reddish-brown, scaling in large irregular plates. Slash pinkish-yellow with scarce white latex. Flowers strongly scented, calyx and corolla greenish, stamens off-white. Flowering in central Amazonia September to October.

So far known only from Amazonian Peru and central Amazonian Brazil, where it occurs in non-flooded rainforest up to 550 m altitude. 1.IX.1995 (fl) *Ribeiro, J.E.L.S. et al. 1691* (INPA K MG MO NY R RB SP U); 11.X.1995 (fl) *Sothers, C.A. & Pereira, E. da C. 621* (BM G INPA K MBM MG UB UEC US).

Pouteria peruviensis is the only member of this group of species which lacks the finely areolate higher order venation. Its venation is much coarser and resembles that of *P. bilocularis* and *P. durlandii* (see after the latter for further comments).

6.19 *Pouteria cladantha* Sandwith, Bull. Misc. Inform. 1931: 480. 1931; Pennington, T. D., Fl. Neotrop. 52: 317, fig. 69. 1990. **Fig. 15 a-c**

Young shoots subglabrous. **Leaves** spirally arranged, 7–13 × 2.5–6.5 cm, oblanceolate, obovate or elliptic, apex obtusely cuspidate, obtuse or rounded, base narrowly attenuate, margin often revolute, glabrous, often minutely punctate on the lower surface; venation brochidodromous, midrib raised on the upper surface, secondary veins 8–13 pairs, straight, parallel, often slightly impressed on the upper surface, intersecondaries long, tertiaries obscure, more or less parallel to the secondaries and descending from the margin. Petiole 0.5–1.5 cm long, not channelled, glabrous. **Fascicles** 5–15-flowered, axillary and clustered on leafless axillary shoots to 8 cm long. Pedicel 3–5 mm long, finely appressed puberulous. **Flowers** bisexual or unisexual (plant dioecious). Sepals 4–5, 1.5–2 mm long, appressed puberulous on both surfaces. Corolla cyathiform, 1–2 mm long, tube exceeding the lobes, lobes 4–5, sparsely appressed hairy on the tube, or glabrous. Stamens 4–5, fixed in the upper half of the corolla tube, glabrous, absent in female flowers. Staminodes 4–5, 0.2–0.4 mm long, subulate, glabrous. Ovary patelliform (in male flowers) or ovoid (in female flowers), 2-locular, puberulous, style included. **Fruit** 2–3 cm long, ellipsoid to globose, rounded at apex and base, fleshy, smooth, glabrous. **Seed** solitary, 1.5–2 cm long, ellipsoid, slightly laterally compressed, testa smooth, shining; scar adaxial, full-length, 3–4 mm wide. Seed without endosperm.
Field characters: Tree to 30 m high and 80 cm diam., buttressed to 2 m high, bole often fluted at the base. Bark dark brown, scaling in thin longitudinal strips, inner bark pinkish or reddish with small amount of watery white latex.

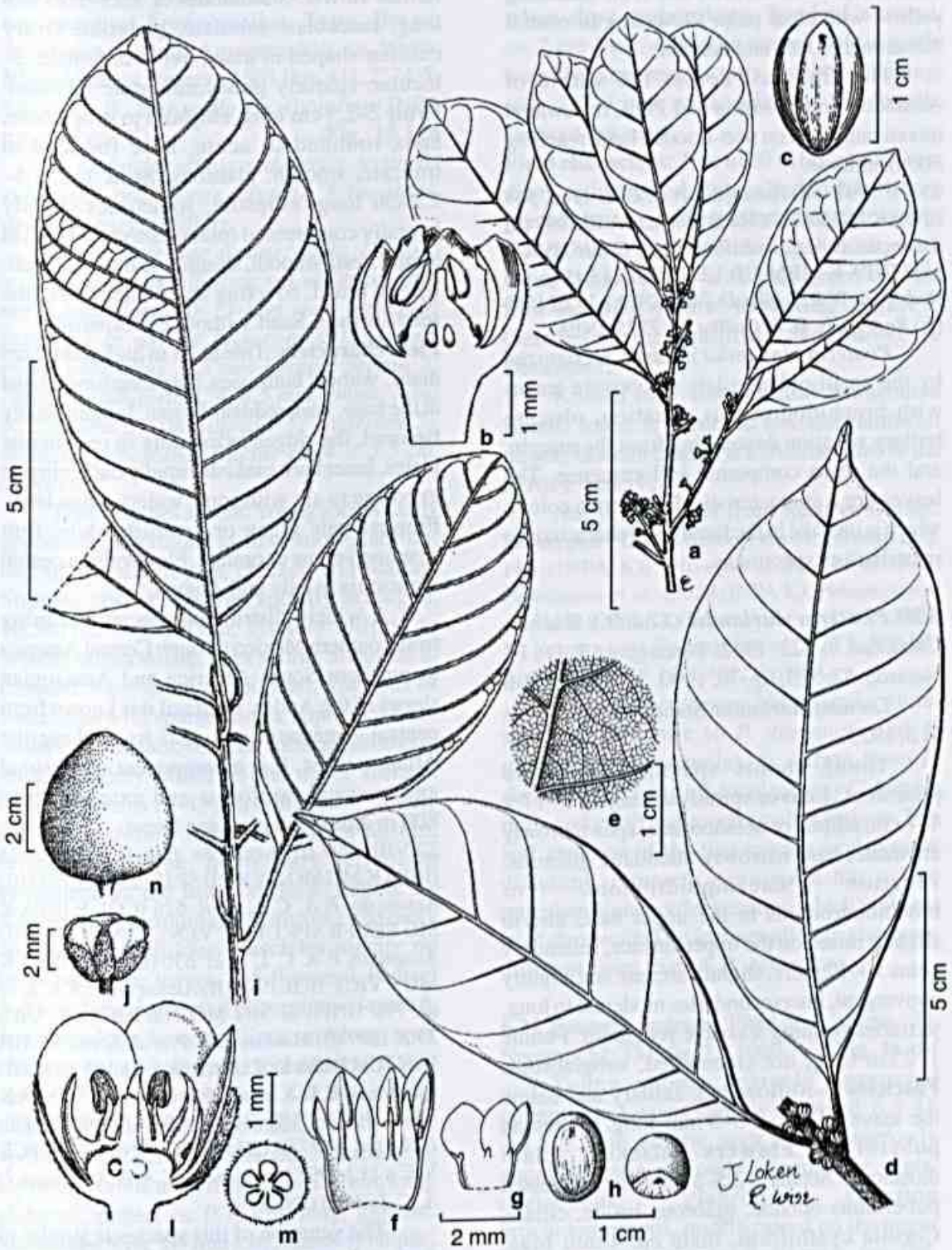

Figura 15 - a-c. *Pouteria cladantha* - a. habit (*Mori et al. 8219*); b. 1/2 flower (*Tessmann 5451*); c. seed (*Oliveira 4503*). d-h. *Pouteria durlandii* - d. habit; e. detail of venation (*Steyermark 39228*); f. part female flower (*Lundell & Contreras*); g. part male flower (*Lundell & Cuatrecasas 19138*); h. seed (*Lundell 12262*). i-m. *Pouteria pentamera* - i. habit (*Spironello s.n.*); j. flower; l. 1/2 flower; m. section of ovary; n. fruit (*Oliveira 186*).

Flowers greenish-white, the fruit maturing yellow, with clear pulp. Flowering in central Amazonia in July and August.

The Guianas, across the whole of Amazonia to Colombia and Peru, in lowland mixed rainforest on non-flooded land, reaching 800 m altitude.

25.VII.1997 (bd) *Assunção, P. A. C. L. et al. 568* (INPA K MG MO NY R RB SP U); 14.VIII.1997 (fl) *Assunção, P. A. C. L. & Pereira, E. C. 616* (BM G IAN INPA K MBM UB UEC US); 24.I.1966 (fr) *Rodrigues, W. & Coêlho, D. 7401* (INPA); 15.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7575* (INPA).

Pouteria cladantha is easily recognized by the small oblanceolate or obovate leaves with brochidodromous venation, obscure tertiary venation descending from the margin, and the often compound inflorescence. The leaves dry a characteristic dark brown colour, which is unusual in the family and characteristic in herbarium specimens.

6.20 *Pouteria durlandii* (Standl.) Baehni, Candollea 9: 422. 1942; Pennington, T. D., Fl. Neotrop. 52: 323, fig. 70. 1990. **Fig. 15 d-h**

Lucuma durlandii Standl. Trop. Woods 4: 5. 1925.

Young shoots sparsely appressed pubescent. **Leaves** spirally arranged, 9–17 × 4–7 cm, elliptic or oblanceolate, apex narrowly attenuate, base narrowly attenuate, glabrous; venation eucamptodromous or brochidodromous in the upper half, midrib slightly raised on the upper surface, secondary veins 10–12 pairs, slightly arcuate and slightly convergent, intersecondaries moderate to long, tertiaries forming a coarse reticulum. Petiole 1–2 cm long, not channelled, subglabrous. **Fascicles** 3–10-flowered, axillary and below the leaves. Pedicel 3–5 mm long, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 5, 2.5–3 mm long, appressed puberulous outside, glabrous inside, ciliate. Corolla cyathiform, male *ca.* 4 mm long, female 2.5–3.5 mm long, tube shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous, absent in female flower. Staminodes 5, 1.25–1.75 mm long, lanceolate-subulate, glabrous. Ovary cushion-shaped in male, ovoid in female, 2-locular, sparsely pubescent, style included. **Fruit** 2–2.5 cm long, ellipsoid to subglobose, apex rounded to acute, base rounded to truncate, smooth, glabrous. **Seed** 1–2, 1.5–2.2 cm long, ellipsoid, sometimes slightly laterally compressed (plano-convex when 2 in a fruit), testa smooth, shining; scar adaxial, full-length, broad, covering about one third of the seed surface. Seed without endosperm.

Field characters: Tree to 25 m high and 60 cm diam., without buttresses, bole sometimes fluted at the base, bark reddish-brown, longitudinally fissured, the ridges exfoliating in rectangular plates, inner bark pinkish, rapidly darkening on exposure to air, with some watery white latex. Flowers pale green or greenish-white, fruit ripening yellow or orange. Flowering in central Amazonia in July and August.

A widely distributed species occurring from southern Mexico through Central America to northern South America and Amazonian slopes of the Andes. In Brazil it is known from central Amazonia and also from along the Atlantic coast. It is a component of seasonal and everwet rainforest and extends up to 800 m altitude in montane forest.

22.VIII.1997 (fl) *Assunção, P. A. C. L. et al. 623* (INPA K MG MO NY R RB SP U); 22.VIII.1997 (fl) *Assunção, P. A. C. L. et al. 626* (COL F INPA K MG PEUFR SPF UFMT VEN); 22.VIII.1997 (fl) *Assunção, P. A. C. L. et al. 630* (GH ICN INPA K MG P VIC); 16.II.1998 (fr) *Assunção, P. A. C. L. et al. 790* (INPA K MG MO NY RB SP U UB); 23.X.1997 (fl) *Martins, L. H. P. et al. 52* (ACRE GH IAN ICN INPA K S UPCB W); 21.VII.1997 (fl) *Ribeiro, J. E. L. S. et al. 1904* (BM G IAN INPA K MBM UB UEC US); 21.VIII.1997 (fl) *Ribeiro, J. E. L. S. et al. 1907* (B GH IAN ICN INPA K P UPCB VIC); 11.I.1998 (fr) *Sothers, C. A. & Assunção, P. A. C. L. 1085* (INPA).

The venation of this species is similar to that of *P. peruviensis*, but they differ in the details of their floral structure, such as the pubescence of the sepals, proportions of corolla tube and lobes, length of staminal filaments.

6.21 *Pouteria pentamera* T. D. Penn., *sp. nov.* (section *Franchetella*). **Type**: Brazil, Amazonas, Distrito Agropecuário, *ca.* 90 km NE of Manaus, Reserva 1501 (km 41), 2°24'S, 59°43'W, *W. Spironello s.n.* (holotype INPA *n.v.*, isotype K). **Fig. 15 i-m**

P. durlandii *affinis sed nervis tertiariis subtiliter reticulatis, ovario 5-loculari, antheris parvis differt.*

Arbor; stipulae nullae; folia 10–17.5 × 5–8.5 cm, late elliptica vel oblanceolata; nervi secundarii 10–13-jugi recti paralleli; fasciculi in axillis foliorum delapsorum enati; pedicellus 3–5 mm longus; sepala 5; corolla cyathiformis, 4–4.5 mm longa, lobis 5; stamina 5; staminodia 5; ovarium 5-loculare, pubescens; fructus ca. 4 × 3.5 cm, ovoideus.

Tree. Stipules absent. Young shoots finely appressed puberulous at first, soon glabrous, becoming pale greyish, cracked and scaling. Stipules absent. **Leaves** spirally arranged, 10.5–17.5 × 5–8.5 cm, broadly elliptic to broadly oblanceolate, apex shortly attenuate to rounded, base acute to rounded, glabrous or sometimes with sparse minute appressed hairs on the lower surface; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 10–13 pairs, straight or slightly arcuate, parallel, intersecondaries absent, tertiaries oblique, quaternary reticulum prominent on the lower surface. Petiole 2–4.6 cm long, channelled above, sparsely appressed puberulous. **Fascicles** mostly on twigs below the leaves, 2–5-flowered. Pedicel 3–5 mm long, appressed puberulous. Sepals 5, 3–3.5 mm long, broadly elliptic to oblong, apex obtuse to rounded, appressed puberulous on both surfaces. Corolla cyathiform, 4–4.5 mm long, tube slightly shorter than the lobes, lobes 5, ovate, apex rounded; glabrous. Stamens 5, fixed at the top of the corolla tube, filaments *ca.* 1 mm long, glabrous, anthers *ca.* 0.75 mm long, globose. Staminodes 5, *ca.* 1.5 mm long, narrowly elliptic, acute, fleshy, glabrous. Disk absent. Ovary 5-locular, pulvinate, flat-topped, pubescent; style 1.5–2 mm long, glabrous, included, style head minutely 5-lobed. **Fruit** *ca.* 4 × 3.5 cm ovoid, apex obtuse, base truncate, smooth (wrinkled when dry), puberulous. **Seeds** 1-several, *ca.* 2 cm long, ellipsoid, not or only slightly laterally compressed, testa smooth, ?shining; scar ? 2–3 mm wide, adaxial, full-length. Embryo not seen.

Field characters: Tree to 30 m high and 50 cm diam., unbuttressed. Bole cylindrical, bark dark greyish-brown, scaling in small thick irregular pieces, slash laminated orange-cream, with white latex. Flower with pale green corolla, fruit maturing yellow. Flowering August to October, fruit maturing November to December.

Known only from central Amazonian Brazil, where it occurs in lowland rainforest on non-flooded land. It is a common tree in the PDBFF reserve.

Not yet recorded from Reserva Ducke.

Paratypes: PDBFF: Reserva km 41, *Oliveira et al. 186* (INPA K); *Oliveira et al. 185* (INPA); *Pennington et al. 13019* (INPA K); *Pennington et al. 13170* (INPA K); *Pennington et al. 12973* (INPA K); Reserva 1301 (Fazenda Esteio), 2°23'S, 59°51W, *da Silva PDBFF 1301.4942.2* (INPA).

Pouteria pentamera has a similar floral size and structure to *P. durlandii* and *P. anteridata* (Venezuela). It differs from *P. durlandii* in having a 5-locular ovary (2-locular in *P. durlandii*) and much smaller anthers. The leaf venation of the two species is also quite different. *Pouteria pentamera* has a fine reticulate higher order venation which is absent in *P. durlandii*. The leaf venation is also quite different from that of *P. anteridata*.

6.22 *Pouteria jariensis* Pires & T. . Penn., Fl. Neotrop. 52: 331, fig. 72. 1990. **Fig. 16 d-f**

Young shoots sparsely appressed puberulous. Leaves spirally arranged, 6.5–18 × 3.5–7.5 cm, elliptic, apex acute to narrowly attenuate, base narrowly attenuate or acute, coriaceous, glabrous; venation brochidodromous, midrib raised on the upper surface, secondary veins 9–10 pairs, parallel, arcuate, intersecondaries short or absent, tertiaries few, reticulate and oblique, slightly impressed on both surfaces. Petiole 0.5–2 cm

long, not channelled, glabrous. **Fascicles** axillary and below the leaves, few-flowered. Pedicel 2–3 mm long, appressed puberulous. Sepals 5, 2.5–3 mm long, appressed puberulous outside, glabrous inside, ciliate. Corolla cyathiform, 4–5 mm long, tube about equalling the lobes, lobes 5, ciliate, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous. Staminodes 5, 1–2 mm long, lanceolate, glabrous. Ovary ovoid, 2-locular, pubescent, style included. **Fruit** 2.5–3 cm long, ellipsoid, apex and base obtuse to rounded, smooth, velutinous. **Seeds** 1–2, 1.5–2 cm long, ellipsoid (plano-convex when 2 seeds in a fruit), not laterally compressed, testa smooth, adherent to the pericarp; scar adaxial, full-length, elliptic, 4.5–7 mm wide. Seed without endosperm.

Field characters: Tree to 25 m high and 40 cm diam., with simple buttresses to 1.5 m high, bole often fluted near the base, bark brown, scaling in thin irregular pieces, slash yellowish, with a little watery white latex. Flowers pale greenish-white, fruit ripening yellow or orange. Flowering in central Amazonia in November, fruit maturing March to April.

Not yet recorded from Reserva Ducke. PDBFF: Reserva km 41, *Oliveira et al. 215* (INPA K); *Alexandro 336* (INPA K); *Freitas et al. F-439* (INPA K).

Pouteria jariensis has a closely similar floral structure to *P. durlandii*, but can be easily distinguished from it by the details of its leaf venation, which is uniformly brochidodromous, with the higher order venation impressed on both surfaces.

6.23 *Pouteria pallens* T. D. Penn., Fl. Neotrop. 52: 335, fig. 72. 1990. **Fig. 16 a-c**

Young shoots finely appressed puberulous, soon becoming glabrous. **Leaves** spirally arranged, 15–27 × 7–10.5 cm, broadly elliptic, apex narrowly attenuate to obtuse, base acute to obtuse, glabrous above, sparsely and minutely hairy below, indumentum of stiff closely appressed whitish hairs (visible only with a lens); venation eucampto-dromous or brochidodromous, midrib raised on the upper surface, secondary veins 10–15 pairs, parallel or slightly convergent, slightly arcuate, slightly raised on the upper surface, intersecondaries absent, tertiaries mostly oblique. Petiole 2–4 cm long, not channelled, sparsely appressed puberulous. **Fascicles** 3–10-flowered, axillary and clustered on twigs below the leaves. Pedicel 3–5 mm long, appressed puberulous. Sepals 5, *ca.* 4 mm long, ovate, appressed puberulous outside, glabrous inside. Corolla cyathiform, 5.5–6 mm long, tube *ca.* 2 mm long, lobes 5, *ca.* 2.5 mm long, ovate, margin truncate; glabrous. Stamens 5, fixed at the top of the corolla tube, anthers 1.75–2 mm long, glabrous. Staminodes 5, *ca.* 2.25 mm long, lanceolate-subulate, glabrous. Ovary ovoid, 2-locular, appressed puberulous, style *ca.* 2.25 mm long, glabrous, exserted in bud, equalling the corolla in open flowers. **Fruit** 2.3–3 cm long, ellipsoid, apex and base rounded, smooth, finely puberulous. **Seeds** 1–2, *ca.* 2 cm long, apex and base obtuse, not laterally compressed, testa smooth, shining; scar adaxial, full-length, *ca.* 4 mm wide. Seed without endosperm.

Field characters: Tree to 20 m high and 30 cm diam., with the trunk fluted at the base. Bark reddish-brown, scaling in small pieces, slash pink to orange with white latex. Flowers with pale green corolla, fruit maturing greenish. Flowering in central Amazonia from July to October, fruit maturing December to February.

Known only from central and western Brazilian Amazonia where it is a mid-storey component of lowland rainforest on non-flooded sites.

17.XII.1993 (fr) *Assunção, P. A. C. L. 5* (INPA K MG NY); 22.VIII.1997 (fl) *Assunção, P. A. C. L. et al. 633* (INPA K MG MO NY R RB SP U); 21.VII.1997 (fl) *Ribeiro, J. E. L. S. et al. 1905* (INPA K MBM MG MO NY R RB SP U U).

Pouteria pallens is related to *P. durlandii* and *P. jariensis*, but differs from both in the fine whitish appressed indumentum on the lower leaf surface. It also differs in the detail of the higher order venation.

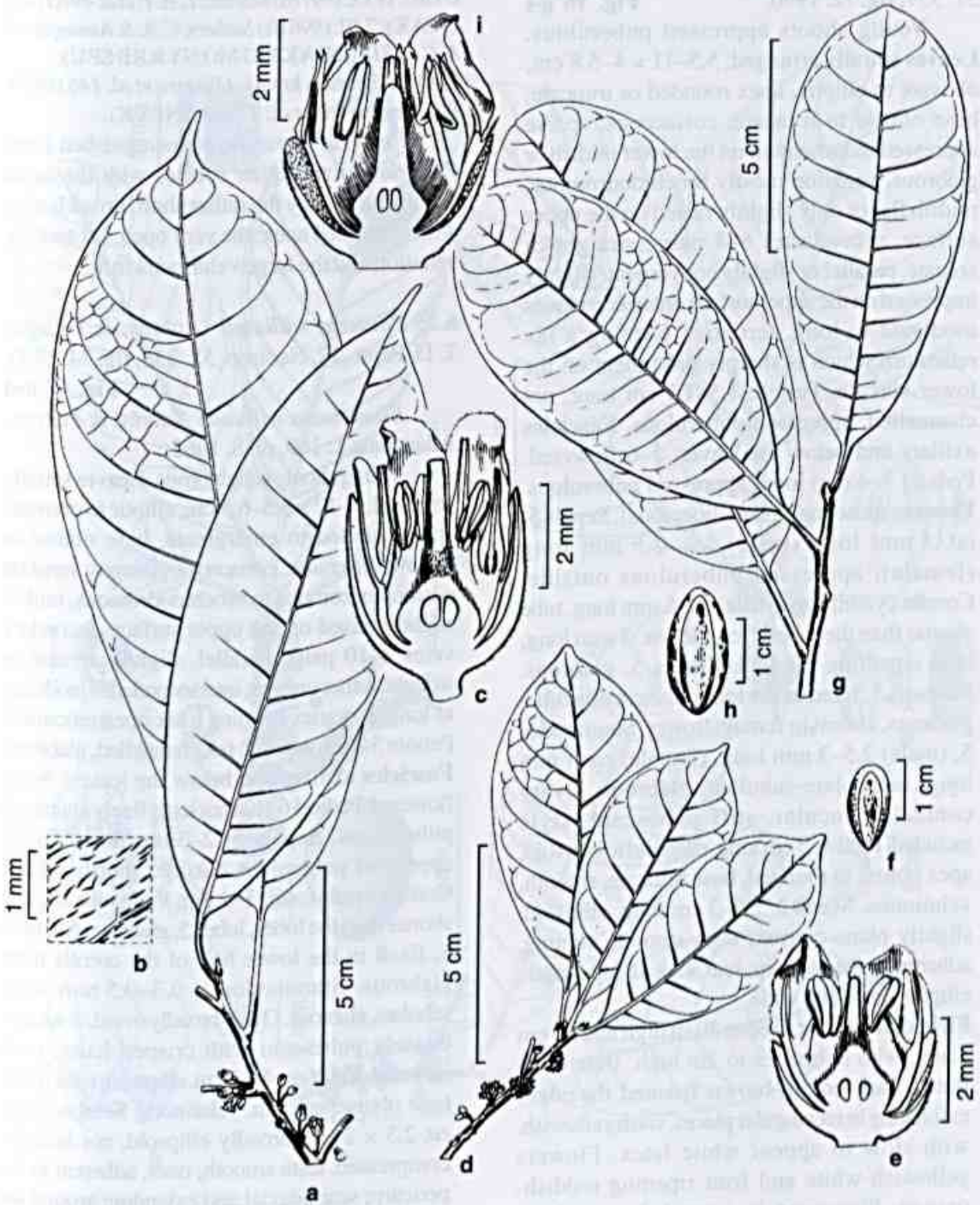

Figura 16 - a-c. *Pouteria pallens* - a. habit; b. detail of leaf indumentum; c. 1/2 flower (*Maguire et al. 56671*). d-f. *Pouteria jariensis* - d. habit (*N. T. Silva 2895*); e. 1/2 flower (*Daly et al. 1514*); f. seed (*A. Silva 122*). g-i. *Pouteria virescens* - g. habit; h. seed (*FDBG* 5547); i. 1/2 flower (*FDBG 4248*).

6.24 *Pouteria virescens* Baehni, Candollea 14: 66. 1952; Pennington, T. D., Fl. Neotrop. 52: 337, fig. 72. 1990. **Fig. 16 g-i**

Young shoots appressed puberulous. **Leaves** spirally arranged, 5.5–11 × 4–5.8 cm, obovate to elliptic, apex rounded or truncate, base obtuse to truncate, coriaceous, sparse appressed indumentum on the lower midrib or glabrous, venation mostly brochidodromous, midrib flat or only slightly raised on the upper surface, secondaries 6–8 pairs, straight or arcuate, parallel or slightly convergent, slightly impressed on the upper surface, intersecondaries moderate to long, tertiaries forming a lax reticulum which is sharply prominent on the lower surface. Petiole 1.5–1.7 cm long, not channelled, appressed puberulous. **Fascicles** axillary and below the leaves, 3–6-flowered. Pedicel 3–4 mm long, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 5, *ca.* 4 mm long (male), *ca.* 2.5 mm long (female), appressed puberulous outside. Corolla cyathiform, (male) *ca.* 5 mm long, tube shorter than the lobes, (female) *ca.* 3 mm long, tube equalling the lobes, lobes 5, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous, absent in female flower. Staminodes 5, (male) 2.5–3 mm long, (female) *ca.* 1 mm long, lanceolate-subulate, glabrous. Ovary conical, 2-locular, stiff-pubescent, style included. Fruit 4–5 cm long, ellipsoid to obovoid, apex obtuse to rounded, base truncate, smooth, velutinous. **Seeds** 2, 2.5–3 cm long, ellipsoid, slightly plano-convex, testa smooth, shining, adherent to the pericarp; scar adaxial, full-length, elliptic, *ca.* 8 mm wide.

Field characters: Tree to 30 m high and 50 cm diam., with buttresses to 2m high. Bole often fluted. Bark reddish-brown, fissured, the ridges exfoliating in rectangular pieces, slash yellowish, with slow to appear white latex. Flowers yellowish-white and fruit ripening reddish-orange. Flowering in central Amazonia in September and October, the fruit maturing in March. Seed without endosperm.

From the Guianas to central Amazonian Brazil, in mixed rainforest on non-flooded land. 1.X.1957 (st) *Ferreira, E. 126* (INPA); 19.IX.1997 (fl) *Martins, L. H. P. et al. 43* (IAN INPA K MO NY RB SP U UB); 19.IX.1997 (fl) *Martins, L. H. P. et al. 49* (G IAN INPA K); 7.III.1996 (fr) *Sothers, C. A. & Assunção, P. A. C. L. 818* (INPA K MG MO NY R RB SP U).

PDBFF: Reserva km 41, *Oliveira et al. 146* (INPA K); *Pennington et al. 13093* (INPA K).

Pouteria virescens is distinguished from *P. durlandii* and other species with the same floral structure by the rather short, broad leaves with a rounded apex, the very open, lax tertiary venation and the large velutinous fruit.

6.25 *Pouteria williamii* (Aubrév. & Pellegr.) T. D. Penn., Fl. Neotrop. 52: 338, fig. 74. 1990. **Fig. 17 a-d**

Eremoluma williamii Aubrév. & Pellegr., Adansonia 1: 169, pl. 8. 1962.

Young shoots subglabrous. **Leaves** spirally arranged, 7–12 × 3.5–6.5 cm, elliptic to obovate, apex rounded to emarginate, base obtuse to narrowly attenuate, coriaceous, glabrous; venation eucamptodromous to brochidodromous, midrib slightly raised on the upper surface, secondary veins 8–10 pairs, parallel, slightly arcuate or straight, rather uneven, intersecondaries moderate to long, tertiaries forming a lax open reticulum. Petiole 5–12 mm long, not channelled, glabrous. **Fascicles** axillary and below the leaves, 3–10-flowered. Pedicel 6–12 mm long, finely appressed puberulous. Sepals 5, 2–3 mm long, finely appressed puberulous outside, shortly ciliate. Corolla cyathiform, 3–4 mm long, tube slightly shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous. Staminodes 5, 0.3–0.5 mm long, subulate, glabrous. Ovary broadly ovoid, 2-locular, densely pubescent with crisped hairs, style included. **Fruit** *ca.* 4 × 3 cm, ellipsoid, apex acute, base obtuse, smooth, velutinous. **Seed** solitary, *ca.* 2.3 × 2 cm, broadly ellipsoid, not laterally compressed, testa smooth, matt, adherent to the pericarp; scar adaxial and extending around the base of the seed, very broad, covering more than half the seed surface. Seed without endosperm.

Field characters: Tree to 20 m high and 40 cm diam., with small concave buttresses, bole fluted, bark dark brown, thinly scaling and with

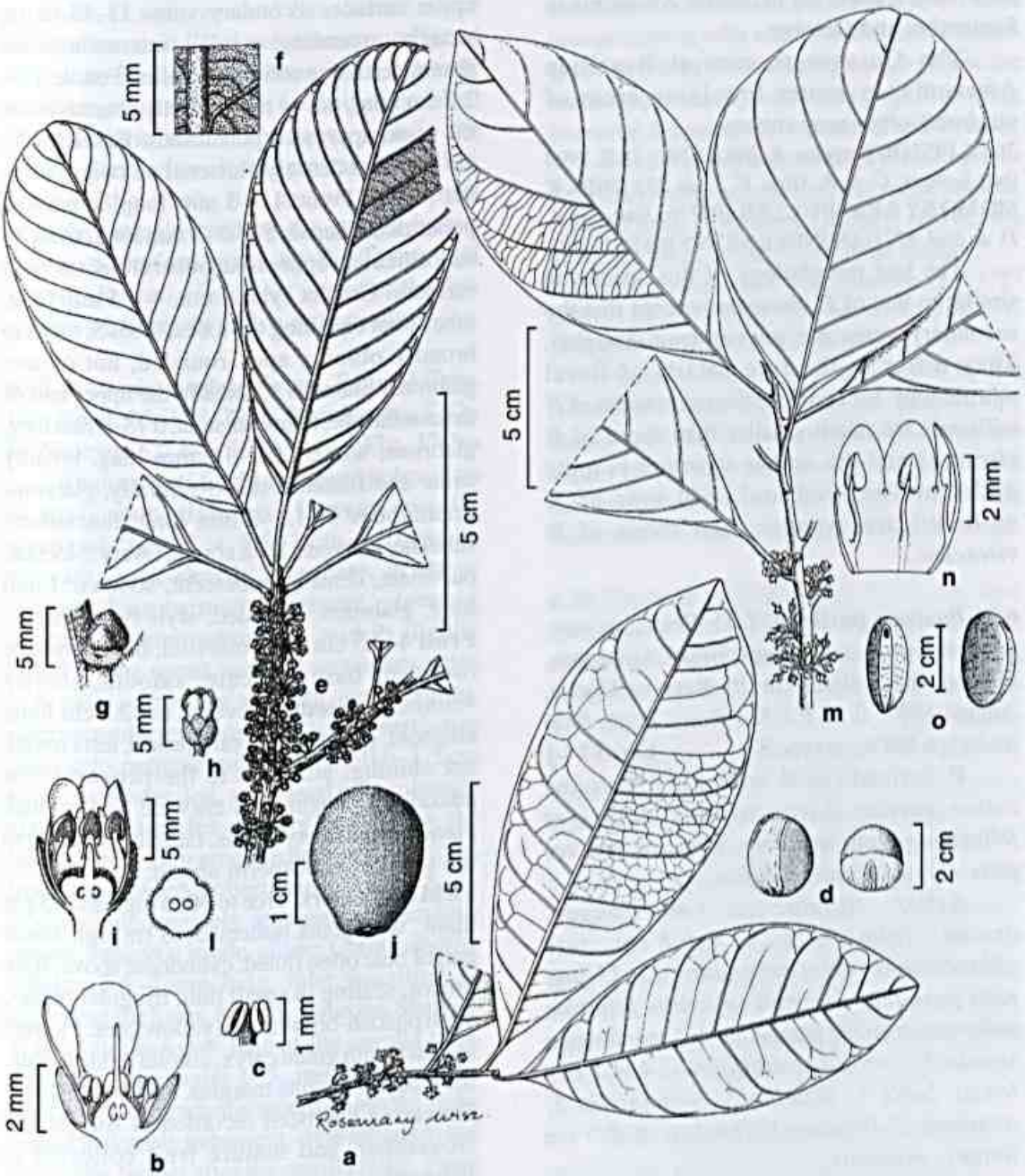

Figura 17 - a-d. *Pouteria williamii* - a. habit; b. flower; c. anther (abaxial view) (*Oldeman 1628*); d. seed (*Grenand 780*). e-j. *Pouteria flavilatex* - e. habit; f. indumentum on leaf undersurface; g. stipule; h. flower; i. 1/2 flower (*Ribeiro 780*). e-j. *Pouteria flavilatex* - e. habit; f. indumentum on leaf undersurface; g. stipule; h. flower; i. 1/2 flower (*Ribeiro 780*); j. fruit; l. section of ovary (*Ribeiro 1197*). m-o. *Pouteria engleri* - m. habit; n. part corolla (*Schultz 7326*); o. seed (*FDBG 2362*).

prominent lenticels in horizontal rows, slash yellowish with sparse translucent yellowish latex. Flowers with pinkish-yellow corolla and fruit covered with golden-brown velvety tomentum. Flowering in central Amazonia in September and October.

The Guianas to central Brazilian Amazonia, in wetter low lying areas of rainforest often near streams.

26.IX.1957 (fl) *Ferreira, E. 108* (INPA); 28.X.1994 (bd) *Sothers, C. A. & Silva, C. F. da 253* (INPA K MG MO NY R RB SP U); 2.XII.1997 (fr) *Souza, M. A. D. de et al. 477* (IAN INPA K MO NY RB SP U UB).

The leaf morphology of this species is similar to that of *P. virescens*, except that the secondary veins are uneven (not straight). They differ in the fine details of floral morphology, for example the staminodes of *P. williamii* are much smaller than those of *P. virescens* and the anther structure is quite different.The seed and seed scar of *P. williamii* are broader than those of *P. virescens*.

6.26 *Pouteria flavilatex* T. D. Penn., *sp. nov.* (section *Franchetella*). **Type**: Brazil, Amazonas, Manaus- Itacoatiara, km 26, Reserva Ducke, August 1997, fl., *J.E.L.S. Ribeiro et al. 1906* (holotype INPA, isotype K). **Fig. 17 i-j**

P. durlandii *et* P. williamii *affinis sed latice cortici flavo, stipulis parvis et foliorum pagina inferiore adpresse sericea, pilis chrysobrunneis differt.*

Arbor; stipulae ca. 3 mm longae, ovatae; folia 9–15 × 4–6.8 cm, late oblanceolata; nervi secundarii 13–15-jugi recti paralleli; fasciculi in axillis foliorum delapsorum enati; pedicellus 3–5 mm longus; sepala 5; corolla cyathiformis, 4–4.5 mm longa, lobis 5; stamina 5; staminodia 5; ovarium 2-loculare; fructus 4–4.5 cm longus, ovoideus.

Tree. Young shoots appressed puberulous with golden-brown indumentum, soon glabrous, pale grey. Stipules *ca.* 3 mm long, ovate, appressed puberulous, caducous. **Leaves** spirally arranged, 9–15 × 4–6.8 cm, broadly oblanceolate, apex obtuse or rounded, base acute, upper surface glabrous, lower surface finely golden-brown-sericeous; venation eucamptodromous, midrib slightly sunken on the upper surface, secondary veins 13–15 pairs, straight, ascending, parallel, intersecondaries absent, tertiaries oblique, parallel. Petiole 1.5–2.2 cm long, not or only slightly channelled at the apex, appressed puberulous. **Fascicles** 5–10-flowered densely clustered on twigs below the leaves. Pedicel 3–5 mm long, appressed puberulous. Sepals 5, 2.5–3 mm long, ovate to suborbicular, appressed puberulous on both surfaces. Corolla cyathiform, 4–4.5 mm long, tube about equalling the lobes, lobes 5, ovate to broadly oblong, apex rounded, not ciliate, glabrous. Stamens 5, fixed in the upper half of the corolla tube, filaments stout, 0.75–1 mm long, glabrous, anthers 0.7–1.2 mm long, broadly ovate and flattened dorso-ventrally, glabrous. Staminodes 5, 1.2–2 mm long, lanceolate-subulate, glabrous. Disk absent. Ovary 2-locular, pulvinate, densely pubescent, style *ca.* 1 mm long, glabrous, included, style-head simple. **Fruit** 4–4.5 cm long, obovoid, base obtuse or rounded, base truncate, smooth, shortly velutinous. **Seeds** 1-several, *ca.* 2.3 cm long, ellipsoid, not laterally compressed, testa rough, not shining, adherent to the pericarp; scar adaxial, full-length, *ca.* 1 cm wide. Embryo with plano-convex cotyledons, radicle extending to the surface; endosperm absent.

Field characters: Tree to 30 m high and 65 cm diam., with plank buttresses to 1m high, lower part of bole often fluted, cylindrical above. Bark brown, scaling in small thin, irregular pieces, slash pinkish-brown, with yellow latex. Flowers scented, with green calyx, corolla reddish-pink, the lobes with white margins. Fruit brown (dry). Flowering has been recorded in August and November, and mature fruit collected in February.

So far known only from Pará and central Amazonia, Brazil, where it is a canopy tree of non-flooded lowland rainforest.

Paratypes: 22.VIII.1997 (bd) *Assunção, P. A. C. L. et al. 627* (K); 9.II.1994 (fr) *Ribeiro, J. E. L. S. et al. 1197* (INPA K MG MO NY RB SP); 21.VIII.1997 (fl)

Ribeiro, J. E. L. S. et al. 1906 (K); 21.VIII.1997 (bd) *Ribeiro, J. E. L. S. et al. 1909* (K).

Pouteria flavilatex is placed in the group of species containing *P. durlandii*, *P. jariensis*, *P. virescens* and *P. williamii*, all of which share a similar floral structure and broad seed scar. *Pouteria flavilatex* is closest to *P. williamii* in floral size. It is easily distinguished from all these species, however, both in the field and herbarium, by the presence of yellow latex in the slash, the presence of small caducous stipules and by the golden brown appressed indumentum on the lower leaf surface. *Pouteria flavilatex* is one of the few species of *Pouteria* with a red corolla.

6.27 *Pouteria engleri* Eyma, Recueil Trav. Bot. Néerl. 33: 178. 1936; Pennington, T. D., Fl. Neotrop. 52: 343. 1990. **Fig. 17 l-n**

Young shoots finely appressed puberulous at first, soon glabrous. **Leaves** spirally arranged, 10–12 × 3.5–7 cm, elliptic to obovate, apex shortly attenuate, acute or rounded, base narrowly attenuate, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 6–8 pairs, strongly arcuate, convergent, intersecondaries mostly absent; tertiaries oblique to perpendicular. Petiole 0.6–1.5 cm long, not channelled, appressed puberulous to glabrous. **Fascicles** axillary and below the leaves, 10-20-flowered. Pedicel 3–8 mm long, finely appressed puberulous. Sepals 5, 2–2.5 mm long, sparsely appressed puberulous outside, sericeous inside, ciliate. Corolla shortly tubular, 3.5–4 mm long, tube equalling or exceeding the lobes, lobes 5, glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous. Staminodes 0–5, minute, glabrous. Ovary conical, gradually tapering into the style, 5-locular, densely pubescent, style exserted (and elongating further after the corolla falls). **Fruit** 2–2.5 cm long, ellipsoid, apex and base rounded, fleshy (shrinking on drying), smooth, glabrous. **Seed** solitary, 1.8–2 cm long, ellipsoid, slightly laterally compressed, testa shining, slightly wrinkled; scar adaxial, full-length, *ca.* 2 mm wide. Seed without endosperm.

Field characters: Tree to 40 m high and 1 m diam., with simple or branched buttresses to 2 m high, bole cylindrical, bark reddish-brown to greyish-brown, shallowly fissured or scaling, sometimes with lenticels in vertical rows, slash orange-brown, with scarce white latex. Flowers greenish-white, fruit maturing orange-yellow, the seeds surrounded by soft sweet pulp. Flowering in central Amazonia in September and October.

From the Guianas to central and eastern Brazilian Amazonia, in lowland forest on non-flooded land. In Reserva Ducke it also occurs in wetter areas in the 'floresta de baixio'. 6.III.1964 (fr) *Rodrigues, W. & Monteiro, O. P. 5727* (INPA); 18.X.1995 (fl) *Vicentini, A. & Silva, C. F. 1086* (INPA K MG MO NY RB SP).

Pouteria engleri is characterized by the relatively broad leaves which usually dry blackish, with few secondary veins, and by the sepals which are sericeous on the inner face and the exserted style. The flowers often lack staminodes, a feature it shares with *P. anomala*.

6.28 *Pouteria stylifera* T. D. Penn., *sp. nov.* (section *Franchetella*). **Type**: Brazil, Amazonas, road Manaus to Caracaraí, km 57, September 1977, fl., *C. Damião & A. Mota 675* (holotype INPA). **Fig. 18 a-e**

P. engleri *affinis sed foliis parvis, anguste ellipticis vel oblanceolatis, apice attenuato, et floribus diminutis differt.*

Arbor; stipulae nullae; folia 3.7–7 × 1.6–3 cm, elliptica vel oblanceolata; nervi secundarii 9–10-jugi, arcuati, convergentes; fasciculi axillares et in axillis foliorum delapsorum enati; pedicellus 2-3 mm longus; sepala 5; corolla tubularis, ca. 3 mm longa, lobis 5; stamina 5; staminodia nulla; ovarium 5-loculare; fructus (leviter immaturus) ca. 1.5 cm longus.

Tree. Stipules absent. Young shoots finely appressed puberulous with golden hairs, becoming glabrous, greyish, smooth and lenticellate. Stipules absent. **Leaves** spirally arranged, 3.7–7 × 1.6–3 cm, elliptic or oblanceolate, apex narrowly attenuate, less frequently acute, base narrowly attenuate,

glabrous; venation eucamptodromous, midrib raised on the upper surface (rounded in section), secondary veins 9–10 pairs, arcuate, convergent, intersecondaries few, moderately long, or absent, tertiaries reticulate, obscure. Petiole 3–4 mm long, not channelled, glabrous. **Fascicles** 5–20-flowered, axillary and densely clustered below the leaves. Pedicel 2–3 mm long, sparsely appressed puberulous. Sepals 5, 1–1.5 mm long, ovate to suborbicular, apex obtuse to rounded, sparsely puberulous outside, sericeous inside. Corolla *ca.* 3 mm long, tubular, tube slightly exceeding the lobes, lobes 5, margin rounded or truncate, glabrous. Stamens 5, fixed about halfway up the corolla tube, filaments 1–1.5 mm long, glabrous, anthers *ca.* 0.5 mm long, ovate, glabrous. Staminodes absent. Disk absent. Ovary 5-locular, globose, *ca.* 1 mm diam., densely pubescent, style tapering from base to apex, *ca.* 3 mm long, exserted in bud and long exserted in open flower, glabrous, style-head minutely lobed. **Fruit** *ca.* 3 cm long, ellipsoid, apex obtuse with persistent style base, base obtuse, smooth, leathery-fleshy, glabrous, shining. **Seed** solitary, *ca.* 2.2 cm long, laterally compressed, apex and base acute, testa rough and slightly verrucose; scar adaxial, full length, *ca.* 4 mm wide. Embryo not seen.

Field characters: Tree to 30 m high and 70 cm diam. with small concave buttresses, bole fluted at the base, cylindrical above. Bark slightly dippled near the base, otherwise smooth, dark brown, slash with some white latex. Flowers yellowish-green, young fruit green, with copious sticky white latex. Flowering June to September, immature fruit in November.

So far known only from collections in central Amazonian Brazil in the region of Manaus. It is frequent in the forests of the PDBFF Reserves north of Manaus. The species is recorded only from non-flooded forest.

Not recorded from Reserva Ducke.

Paratypes: PDBFF: Fazenda Dimona, *Kukle 67* (K); *Pereira et al. s.n. PDBFF2303.2966* (INPA); *da Silva s.n. PDBFF2303.1381.2* (INPA); Reserva km 41, *Freitas F-459* (INPA K).

Pouteria stylifera is close to *P. engleri* and shares with it the lack of floral staminodes. The new species is well characterized by the very small narrowly elliptic or oblanceolate leaves with an attenuate apex. The leaves have more secondary veins that *P. engleri*, and the flowers are much smaller, with the distinctive tapered style about 3 times the length of the ovary. It also differs from *P. engleri* in its rough, verrucose seed.

6.29 *Pouteria anomala* (Pires) T. D. Penn., Fl. Neotrop. 52: 344. 1990. **Fig. 18 f-h**

Chrysophyllum anomalum Pires, Bol. Técn. Inst. Agron. N. 38: 34. 1960.

Young shoots finely and sparsely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 7–10 × 2–4 cm, narrowly elliptic, less frequently oblong, apex narrowly attenuate to acuminate, base narrowly attenuate, glabrous; venation brochidodromous with a strong submarginal vein, midrib slightly raised on the upper surface, secondary veins 15–20 pairs, parallel, slightly arcuate, intersecondaries numerous, long, often extending to near the margin, tertiaries reticulate and tending to perpendicular. Petiole 5–7 mm, not or only slightly channelled, subglabrous. **Fascicles** axillary and below the leaves, 3–10-flowered. Pedicel 4–6 mm long, sparsely appressed puberulous. Sepals 5, *ca.* 2 mm long, subglabrous outside, sericeous inside, inner ones ciliate. Corolla shortly tubular, 3–3.5 mm long, tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous. Staminodes absent. Ovary gradually tapering into the style, 3–5-locular, appressed puberulous, style exserted. **Fruit** 2–3- cm long, globose or ellipsoid, rounded at base and apex, smooth, glabrous. **Seed** solitary, 1.8–2 cm long, broadly ellipsoid, testa smooth, shining; scar adaxial, full-length, 5–9 mm wide. Seed without endosperm.

Field characters: Tree to 35 m high and 70 cm diam., with branched, slightly convex buttresses to 2 m high, bole cylindrical, bark greyish-brown, finely vertically cracked, slash orange to reddish-brown, granular, with sticky

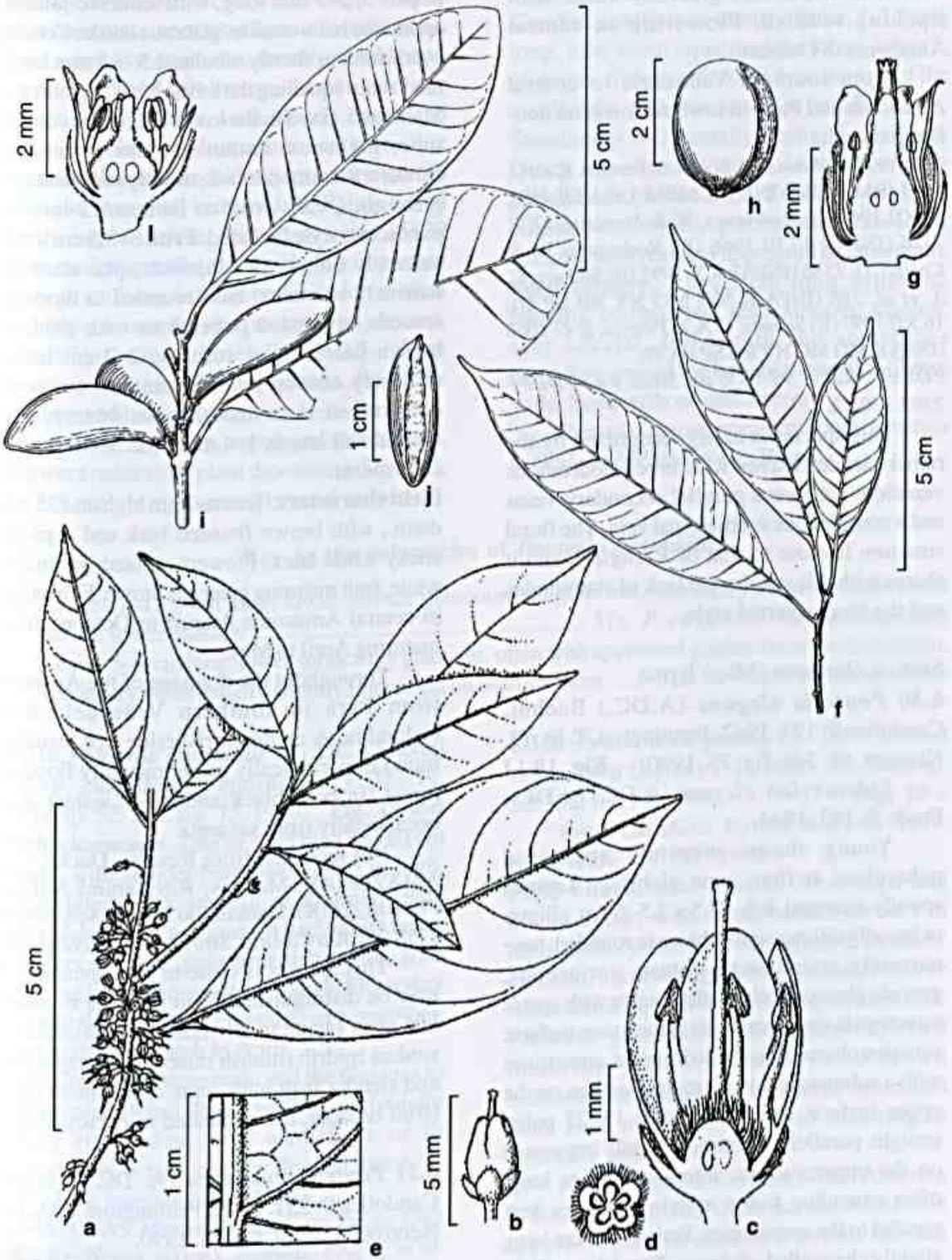

Figura 18 - a-e. *Pouteria stylifera* - a. habit; b. flower; c. 1/2 flower; d. ovary; e. leaf undersurface (*da Silva s.n. tree number 2305.1381.2*). f-h. *Pouteria anomala* - f. habit (*Rodrigues & Coêlho 7586*); g. 1/2 flower (*Lissott 75/77*); h. seed (*Moore 58*). i-l. *Pouteria elegans* - i. habit; j. seed (*Maguire & Wurdack 34994*); l. 1/2 flower (*Fróes 263*).

white latex. Flowers greenish-white, fruit ripening reddish. Flowering in central Amazonia in October.

From southern Venezuela to central Amazonia and Pará, in lowland forest on non-flooded land.

31.X.1997 (fl) *Ribeiro, J. E. L. S. & Pereira, E. da C. 1943* (BM G IAN INPA K MBM UB UEC US); 29.XII.1965 (fr) *Rodrigues, W. & Monteiro, O. P. 7376* (INPA); 17.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7586* (INPA); 4.X.1995 (fl) *Sothers, C. A. et al. 598* (INPA K MG MO NY RB SP U); 16.XII.1997 (fr) *Sothers, C. A. & Pereira, E. C. 1068* (INPA K MG MO NY RB SP U UB).

PDBFF: *Kukle 99* (K); *da Silva s.n. PDBFF 2303.3306.2.*

This species is easily recognized by the rather slender leaves with brochidodromous venation, numerous parallel secondary veins and a conspicuous submarginal vein. The floral structure is close to that of *P. engleri*, and it shares with this species the lack of staminodes and the long exserted style.

Section *Oxythece* (Miq.) Eyma

6.30 *Pouteria elegans* (A.DC.) Baehni, Candollea 9: 197. 1942; Pennington, T. D., Fl. Neotrop. 52: 346, fig. 75. 1990. **Fig. 18 i-l**

Sideroxylon elegans A.DC. *in* DC., Prodr. 8: 183. 1844.

Young shoots minutely appressed puberulous at first, soon glabrous. **Leaves** spirally arranged, 8.5–17.5 × 2.5–6 cm, elliptic or broadly oblong, apex obtuse to rounded, base narrowly attenuate to obtuse, coriaceous, greyish-glaucous below, glabrous or with sparse minute pale appressed hairs in the lower surface; venation obscure, brochidodromous, sometimes with a submarginal vein, midrib sunken on the upper surface, secondary veins 15–22 pairs, straight, parallel, sometimes slightly impressed on the upper surface, intersecondaries long, often extending to the margin, tertiaries few, parallel to the secondaries. Petiole 1–2 cm long, slightly channelled, glabrous. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 7–9 mm long with scattered minute appressed hairs. **Flowers** unisexual (plant dioecious). Sepals 5, 2–3 mm long, with scattered minute appressed hairs outside, glabrous inside. Corolla cyathiform to shortly tubular, 2.5–3.5 mm long, tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous; anthers absent in female flowers. Staminodes 0–2, usually rudimentary, glabrous. Ovary ovoid or flattened, 2-locular pubescent, style included. **Fruit** 3–3.5 cm long, narrowly oblong or ellipsoid, apex acute to narrowly attenuate, base rounded to tapered, smooth, appressed puberulous with golden-brown hairs. **Seed** solitary, 2–3 cm long, narrowly oblong or ellipsoid, not laterally compressed, testa smooth, pale, shining; scar adaxial, full-length, 1–4 mm wide. Seed without endosperm.

Field characters: Tree to 20 m high and 35 cm diam., with brown fissured bark and copious sticky white latex. Flowers scented, greenish-white, fruit maturing greenish-brown. Flowering in central Amazonia August to October, fruit maturing April to May.

Throughout the drainage of the Amazon from Pará to southern Venezuela and Colombia. A common riverside tree, usually found in periodically or permanently flooded forest (in both black and white water) also occasionally from savanna.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus, Rio Tarumã-Mirim, *Ferreira 226* (K); Manaus, Rio Tarumã-Açú, *Nelson 1258* (K); Rio Cuieiras, *Mori & Gracie 19264* (K).

This species is close to *P. cuspidata* but may be distinguished from it by the rounded leaf apex (acute to attenuate in *P. cuspidata*), sunken midrib (midrib raised in *P. cuspidata*) and slender fruit with acute or attenuate apex (fruit broader, apex rounded in *P. cuspidata*).

6.31 *Pouteria cuspidata* (A. DC.) Baehni, Candollea 9: 231. 1942; Pennington, T. D., Fl. Neotrop. 52: 349, fig. 75. 1990.

Sideroxylon cuspidatum A. DC. *in* DC., Prodr. 8: 183. 1844.

Young shoots minutely appressed puberulous at first, soon glabrous. **Leaves**

spirally arranged, 5–13.5 × 2.5–6 cm, elliptic to oblanceolate, apex usually acute to attenuate, base narrowly attenuate, usually coriaceous, upper surface glabrous, lower surface sometimes glaucous, with closely appressed pale or golden indumentum or glabrous; venation obscure, brochidodromous, sometimes with a submarginal vein, midrib slightly raised on the upper surface, secondary veins 15–20 pairs, straight, parallel, usually slightly impressed on both surfaces, intersecondaries long, often extending to near the margin, tertiaries obscure, parallel to the secondaries. Petiole 0.5–1.5 cm long, not channelled, subglabrous. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 5–7 mm long, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 5, 2–2.5 mm long, sparsely and minutely appressed puberulous outside, glabrous inside. Corolla cyathiform or shortly tubular, 3–3.5 mm long, tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed near the top of the corolla tube, glabrous, absent in female flowers. Staminodes 0–3, usually vestigial, glabrous. Ovary truncate or conical, 2-locular, shortly pubescent, style included. **Fruit** 2–3 cm long, ellipsoid or obovoid, apex rounded, base acute, smooth, with residual appressed indumentum. **Seed** solitary, 1.2–2.5 cm long, ellipsoid, laterally compressed, testa smooth, shining; scar adaxial, full-length and sometimes extending around the base of the seed, 1–3 mm wide. Seed without endosperm.

Panama, across northern South America to Goiás and Mato Grosso, Brazil.

Key to the subspecies of *Pouteria cuspidata*

1. Leaves 7–13.5 cm long, lower surface glaucous and glabrous, secondary veins not impressed on the lower surface ..... 31a. *P. cuspidata* subsp. *cuspidata*
1. Leaves 5–8 cm long, lower surface not glaucous, often with appressed golden-brown indumentum, secondary veins usually slightly impressed on both surfaces ..... 31b. *P. cuspidata* subsp. *dura*

6.31a *Pouteria cuspidata* (A. DC.) Baehni subsp. ***cuspidata***; Pennington, T. D., Fl. Neotrop. 52: 350, fig. 75. 1990. **Fig. 19 a-d**

Field characters: Tree to 30 m high and 60 cm diam., with slender buttresses to 1.5 m high, bole fluted, bark smooth or granular, pale greyish brown, slash pinkish with white latex. Flowers scented, pale greenish-white, fruit ripening yellowish-green to orange. Flowering in central Amazonia September to November, fruit maturing March to April.

Colombia, Venezuela and the Guianas to Amazonian Brazil, Peru and Bolivia. Usually along riversides, near waterfalls or in periodically or permanently flooded forest.

Tree number 667 (INPA).

AMAZONAS: Manaus, Ponta Negra, *Ducke 1743* (K); Rio Negro, above Camanaus, *Prance et al. 16023* (K).

6.31b *Pouteria cuspidata* (A. DC.) Baehni subsp. ***dura*** (Eyma) T. D. Penn., Fl. Neotrop. 52: 352, fig. 75. 1990. **Fig. 19 e**

Pouteria dura Eyma, Recueil Trav. Bot. Neérl. 33: 187. 1936.

Field characters: Tree to 30 m high and 50 cm diam., with small buttresses to 1 m high. Bole cylindrical, bark smooth or finely cracked, slash orange-brown, with cream or white latex, sometimes smelling of almonds. Flowers greenish-white, scented, fruit maturing yellowish, with some brown indumentum. Flowering in central Amazonia from June to September, fruit maturing in February and March.

Panama across northern South America to the Guianas, and south across Amazonia to Peru. A plant of rainforest on non-flooded sites, ascending to 1250 m altitude.

1.X.1997 (fl) *Assunção, P. A. C. L. et al. 686* (BM G INPA K MBM MG UB UEC US); 29.IX.1994 (fl)

Hopkins, M. J. G. et al. 1490 (G IAN INPA K MBM MO R RB U); 24.XI.1994 (fr) *Nascimento, J. R. et al. 662* (INPA K MG NY SP); 29.VI.1993 (bd) *Ribeiro, J. E. L. S. et al. 924* (INPA K MG NY SP); 15.IV.1966 (fr) *Rodrigues, W. & Coêlho, D. 7680* (INPA); 5.X.1994 (fl) *Sothers, C. A. et al. 200* (IAN INPA K MO NY RB SP U); 4.II.1995 (fr) *Vicentini, A. et al. 849* (G IAN INPA K MBM R U UB US); 15.III.1995 (fr) *Vicentini, A. & Pereira, E. C. 906* (INPA K MG MO NY RB SP).

Subspecies *dura* varies widely in the amount of indumentum present on the lower leaf surface, some specimens having a uniform pubescence of golden brown appressed hairs, other being quite glabrous.

Note: *Assunção et al. 629* and *Vicentini et al. 445*, both colections of tagged tree number 917, which has leaves measuring *ca.* 5 × 2 cm and small subglabrous flowers may represent a distinct taxon. The fruit and seed are however typical for *P. cuspidata*, and with only a single flowering collection, I hesitate to describe it.

6.32 *Pouteria opposita* (Ducke) T. D. Penn., Fl. Neotrop. 52: 361, fig. 78. 1990.

Fig. 19 f-j

Glycoxylon oppositum Ducke, Arch. Inst. Biol. Veg. Rio de Janeiro 2: 68. 1935.

Young shoots finely appressed puberulous with golden-brown hairs, soon glabrous. **Leaves** opposite, 10–20 × 7–9 cm, obovate to broadly oblong, apex rounded or emarginate, base acute to narrowly attenuate, coriaceous, glabrous above, closely and finely appressed puberulous with golden hairs (lens) below; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 10–13 pairs, parallel, slightly arcuate, intersecondaries usually absent, tertiaries obscure, mostly perpendicular. Petiole 1.5–3 cm long, not channelled, finely appressed puberulous to glabrous. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 3–6 mm long, appressed puberulous. Sepals 5–6, *ca.* 3 mm long, appressed puberulous. Corolla broadly cyathiform, *ca.* 4 mm long, tube about equalling the lobes, lobes 7–9, glabrous. Stamens 7–9, fixed near the top of the corolla tube, glabrous. Staminodes 0–1, *ca.* 1 mm long, glabrous. Ovary ovoid, 2-locular, pubescent, style included. **Fruit** 3–4.5 cm long, broadly ellipsoid, apex rounded, base obtuse to truncate, smooth, with some fine appressed indumentum, becoming glabrous. **Seeds** 1–2, 2–3 cm long, ellipsoid, slightly laterally compressed and with an abaxial keel, testa smooth, shining; scar adaxial, extending for about 3/4 the length of the seed or full length, 4–7 mm wide. Seed without endosperm.

Field characters: Tree to 25 m high and 40 cm diam. with small simple slightly concave buttresses. Bole fluted at the base, usually cylindrical above. Bark dark brown, slightly scaling, slash reddish or brown with copious white latex. Flowers yellowish-green, fruit ripening orange-yellow. The ripe fruit is sweet and edible.

Amazon basin from Pará in Brazil to Peru, a species of non-flooded rainforest up to 800 m altitude in Peru.

Local name: Caramuri.

21.IX.1997 (fl) *Assunção, P. A. C. L. et al. 667* (BM G INPA K MBM MG UB UEC US); 21.IX.1997 (fl) *Assunção, P. A. C. L. et al. 674* (INPA K MG MO NY RB SP U); 27.II.1998 (fr) *Assunção, P. A. C. L. et al. 802* (INPA K MG NY); 23.X.1957 (fl) *Ferreira, E. 159* (INPA); 19.IX.1997 (fl) *Martins, L. H. P. et al. 45* (COL F IAN INPA K PEUFR SPF UFMT VEN); 12.VI.1976 (fr) *Mello, F. & Ramos, J. F. INPA55207* (INPA); 13.II.1976 (fr) *Mello, F. & Ramos, J. F. INPA55215* (INPA); 4.III.1976 (fr) *Mello, F. INPA55339* (INPA); 19.II.1966 (fr) *Rodrigues, W. & Coêlho, D. 7516* (INPA); 4.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7534* (INPA).

The only species of *Pouteria* in central Amazonia with opposite leaves. Most closely related to *P. ambelaniifolia* which has spirally arranged leaves and different venation and fewer puberulous corolla lobes.

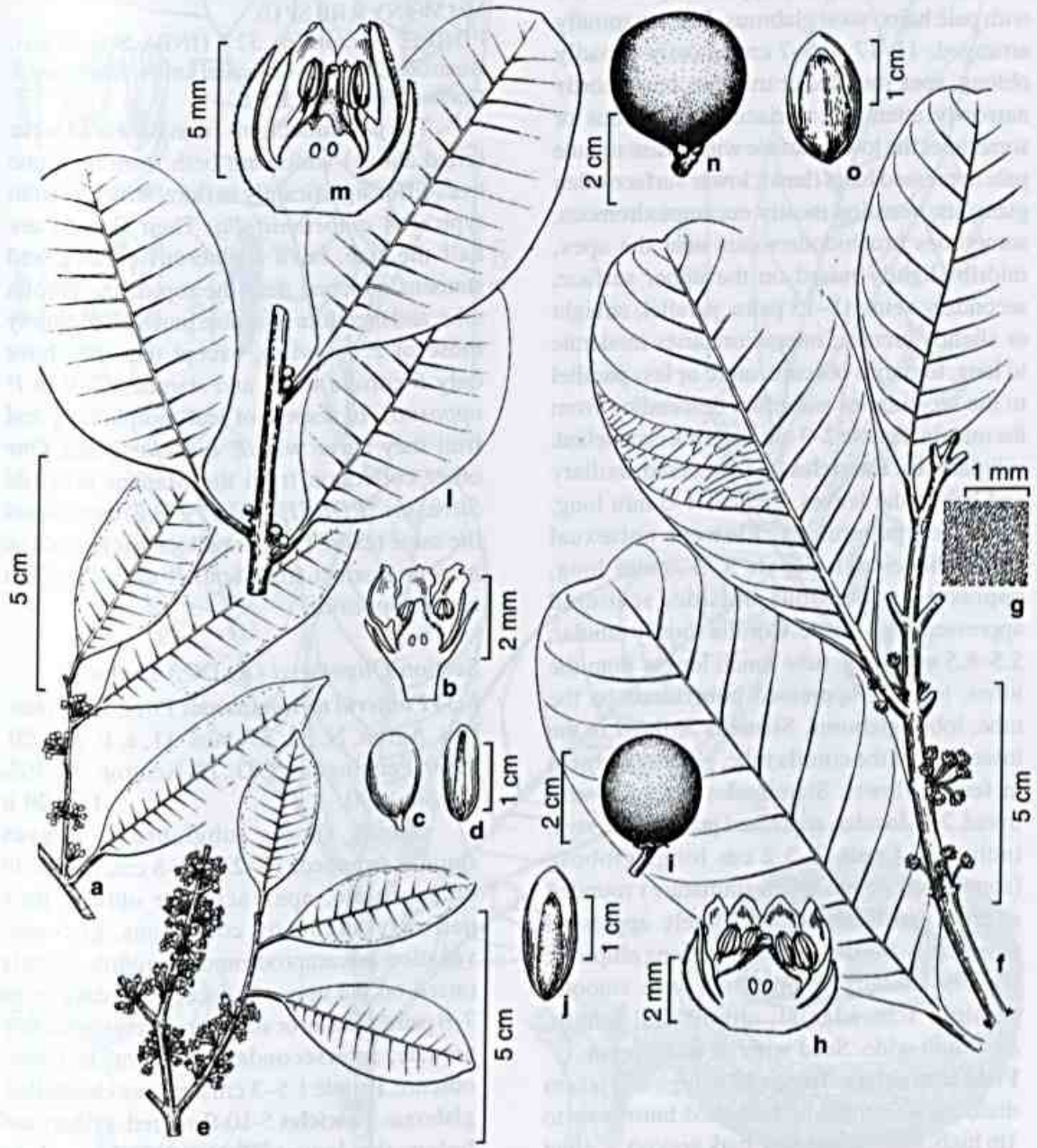

Figura 19 - a-d. *Pouteria cuspidata* subsp. *cuspidata* - a. habit (*Campbell et al. P22356*); b. 1/2 flower (*Sandwith 448*); c. fruit (*Jenman 2359*); d. seed (*Anderson 12093*). e. *Pouteria cuspidata* subsp. *dura* - e. habit (*Schulz 7327*). f-j. *Pouteria opposita* - f. habit; g. detail of indumentum; h. 1/2 flower (*Schunke 10878*); i. fruit; j. seed (*Rodrigues & Coêlho 7516*). l-o. *Pouteria ambelaniifolia* - l. habit (*Mori et al. 8220*); m. 1/2 flower (*Tillett & Tillett 45518*); n. fruit; o. seed (*Marcano-Berti 217*).

6.33 *Pouteria ambelaniifolia* (Sandwith) T. D. Penn., Fl. Neotrop. 52: 362, fig. 78. 1990. **Fig. 19 l-o**

Chrysophyllum ambelaniifolium Sandwith, Bull. Misc. Inform. 1931: 476. 1931.

Young shoots finely appressed puberulous with pale hairs, soon glabrous. **Leaves** spirally arranged, 11–17 × 5–7 cm, mostly broadly oblong, apex rounded or truncate, base shortly narrowly attenuate, coriaceous, glabrous or sometimes the lower surface with sparse minute pale appressed hairs (lens); lower surface often glaucous; venation mostly eucamptodromous, sometimes brochidodromous near the apex, midrib slightly raised on the upper surface, secondary veins 11–13 pairs, parallel, straight or slightly arcuate, intersecondaries moderate to long, tertiaries obscure, more or less parallel to the secondaries and often descending from the margin. Petiole 2–3 cm long, not channelled, subglabrous. **Fascicles** 2–7-flowered, axillary and below the leaves. Pedicel 4–5 mm long, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 5, 5–6 mm long, appressed puberulous outside, scattered appressed hairs inside. Corolla shortly tubular, 5.5–6.5 mm long, tube much longer than the lobes, lobes 5, appressed puberulous on the tube, lobes glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous, absent in female flower. Staminodes absent. Ovary ovoid, 2–4-locular, appressed puberulous, style included. **Fruit** 3–3.2 cm long, globose (sometimes oblate when immature) rounded at apex and base, smooth, finely appressed puberulous. **Seeds** 1–2, *ca.* 2 cm long ellipsoid, slightly laterally compressed, testa smooth, shining; scar adaxial, almost full-length, *ca.* 9 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 60 cm diam., with simple or branched buttresses to 1m high. Bole cylindrical, bark greyish, scaling irregularly, slash pinkish with plentiful white latex. Flowers pale greenish-brown, fruit maturing yellowish. Flowering in central Amazonia in September, fruit maturing February to March.

Venezuela and the Guianas to central Brazilian Amazonia in lowland rainforest on non-flooded sites.

22.VIII.1997 (fr) *Assunção, P. A. C. L. et al. 625* (INPA K MG MO NY R RB SP U); 6.V.1997 (fl) *Ribeiro, J. E. L. S. & Pereira, E. C. 1895* (INPA K MG MO NY R RB SP U).

PDBFF: *Alexandro 327* (INPA K); Brazil, Amazônas, Manaus-Caracaraí km 14, *Rodrigues & Coêlho 2504* (INPA K).

The two collections from Reserva Ducke (cited above) which are both from the same tree, differ significantly in floral structure from typical *P. ambelaniifolia*. Their flowers are half the size, have a glabrous corolla, and stamens attached near the top of the corolla tube, and therefore resemble much more closely those of *P. opposita*, except that they have only 5 corolla lobes and stamens (7–9 in *P. opposita*). In respect of leaf morphology and fruit they agree with *P. ambelaniifolia*. One other collection from the Manaus area (*da Silva s.n. PDBFF2303.17903.2*) represents the same taxon. Further collections may show it to be distinct from both *P. ambelaniifolia* and *P. opposita*.

Section *Oligotheca* (A. DC.) Baehni

6.34 *Pouteria tarumanensis* Pires, Bol. Técn. Inst. Agron. N. 38: 37, tabs. 11, a, b, c, d, 20. 1960; Pennington, T. D., Fl. Neotrop. 52: 368, fig. 80. 1990. **Fig. 20 a**

Young shoots subglabrous. **Leaves** spirally arranged, 15–22 × 5–8 cm, elliptic to oblanceolate, apex acute or obtuse, base narrowly attenuate, coriaceous, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 7–9 pairs, parallel or slightly convergent, slightly arcuate, intersecondaries absent, tertiaries obscure. Petiole 1.5–3 cm long, not channelled, glabrous. **Fascicles** 5-10-flowered, axillary and below the leaves. Pedicel 5–7 mm long (accrescent to 1.5 cm in fruit), glabrous. Sepals 4–4.5 mm long, glabrous. Corolla cyathiform, *ca.* 5.5 mm long, tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed in the upper half of the corolla tube, glabrous. Staminodes

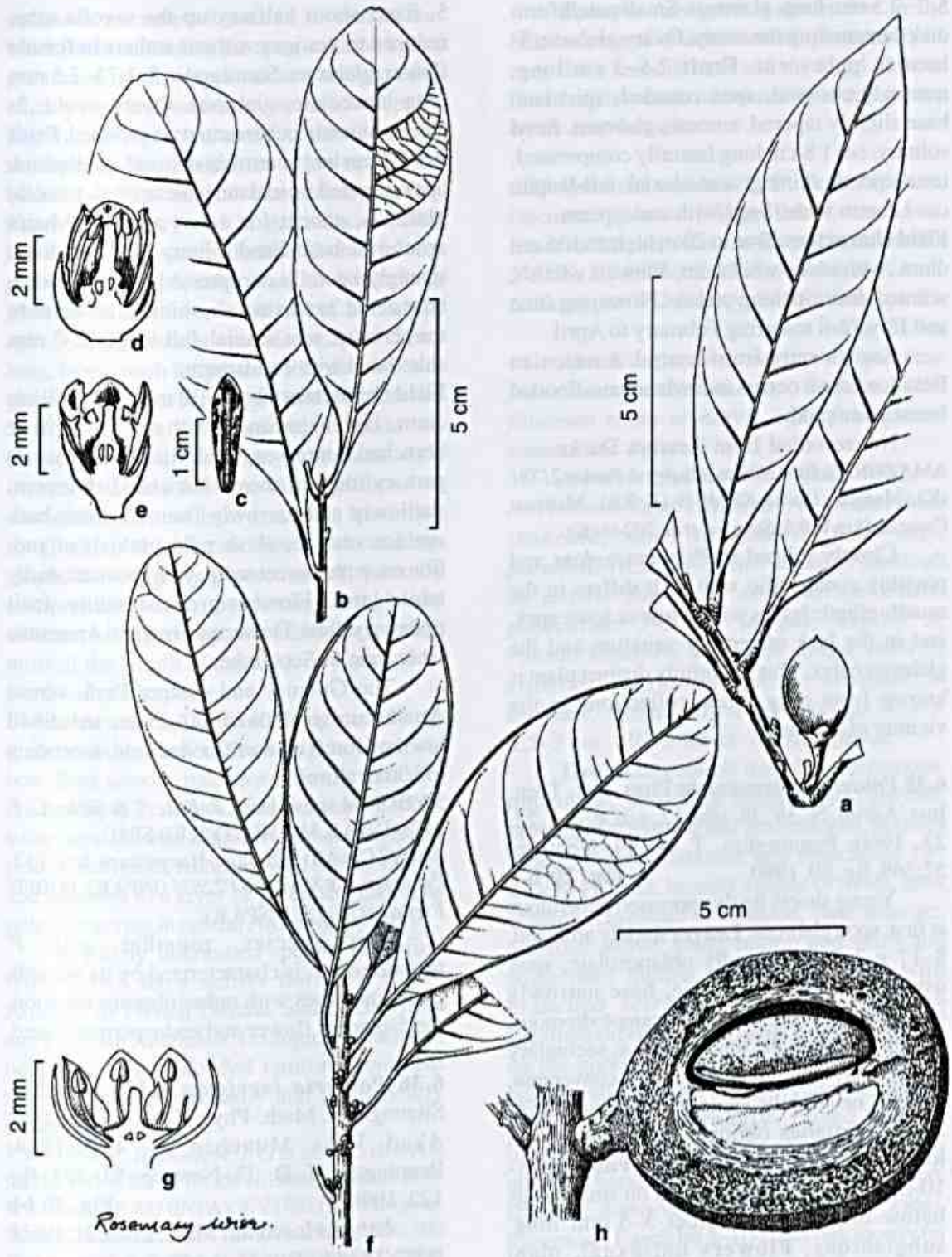

Figura 20 - a. *Pouteria tarumanensis* - a. habit (*Steward et al. P20243*). b-e. *Pouteria oblanceolata* - b. habit; c. seed (*Pires & Silva 4432*); d. 1/2 male flower (*Pennington & Monteiro P22635*); e. 1/2 female flower (*Mori et al. 15002*). f-h. *Pouteria laevigata* - f. habit (*Diaz et al. 441*); g. 1/2 flower (*Schunke 368*); h. fruit (*Croat 19437*).

5, 1–2.5 mm long, glabrous. Small patelliform disk surrounding the ovary. Ovary globose, 5-locular, pubescent. **Fruit** 2.5–3 cm long, narrowly obovoid, apex rounded, apiculate, base slightly tapered, smooth, glabrous. **Seed** solitary, *ca.* 1.8 cm long laterally compressed, testa smooth, shining; scar adaxial, full-length, *ca.* 1.5 mm wide. Seed with endosperm.

Field characters: Tree to 20 m high and 35 cm diam., with sticky white latex. Flowers whitish, scented, fruit ripening yellow. Flowering June and July, fruit maturing February to April

Known only from central Amazonian Brazil, where it occurs in lowland non-flooded forest over sand.

Not recorded from Reserva Ducke.

AMAZONAS: Rio Cuieiras, *Ongley & Ramos 21781* (K); Manaus, *Ducke RB24939* (K RB); Manaus-Caracaraí km 130.5, *Steward et al. 20243* (K).

Closely related to *P. oblanceolata* and possibly conspecific with it. It differs in the usually elliptic leaves with obtuse or acute apex, and in the lack of tertiary venation and the glabrous calyx. This doubtfully distinct plant is known from only a few collections in the vicinity of Manaus.

6.35 *Pouteria oblanceolata* Pires, Bol. Técn. Inst. Agron. N. 38: 38, tabs 12, a, b, c, d, e, 22, 23. 1960; Pennington, T. D., Fl. Neotrop. 52:369, fig. 80. 1990. **Fig. 20 b-e**

Young shoots finely appressed puberulous at first, soon glabrous. **Leaves** spirally arranged, 8–17 × 3–7 cm, broadly oblanceolate, apex usually rounded or obtuse, base narrowly attenuate, glabrous; venation eucamptodromous, midrib raised on the upper surface, secondary veins 9–10 pairs, parallel or slightly convergent, straight or slightly arcuate, intersecondaries absent, tertiaries oblique. Petiole 1–2.5 cm long, not channelled, glabrous. **Fascicles** 3–10-flowered, mostly clustered on small twigs below the leaves. Pedicel 3–5 mm long, subglabrous. **Flowers** unisexual, plant dioecious. Sepals 5, 3–3.5 mm long, glabrous outside, sericeous inside. Corolla cyathiform, or shortly tubular, 4–5 mm long, tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed about halfway up the corolla tube, reduced to vestiges without anthers in female flower, glabrous. Staminodes 5, 1.75–2.5 mm long lanceolate, glabrous. Ovary ovoid, 5-locular, densely pubescent, style included. **Fruit** 2.5–3.5 cm long, narrowly obovoid, or ellipsoid, apex rounded, apiculate, base tapered, smooth, glabrous, except for a few appressed hairs around the base. **Seed** solitary, 1.8–2 cm long, strongly laterally compressed, apex rounded, base acute, testa smooth, shining, adherent to the pericarp; scar adaxial, full-length, 2–3 mm side. Seed with endosperm.

Field characters: Tree to 30 m high and 60 cm diam., larger specimens with small, simple or branched buttresses, trunk fluted in the lower part, cylindrical above. Bark reddish-brown, shallowly and narrowly fissured, inner bark surface orange, slash pale pinkish or red, fibrous, with a sweet smell, with abundant sticky white latex. Flowers greenish-white, fruit ripening yellow. Flowering in central Amazonia from June to September.

The Guianas and eastern Pará, across Amazonia to Amazonian Peru, in mixed lowland forest on non-flooded land, ascending to 600 m altitude.

3.VIII.1994 (fr) *Ribeiro, J. E. L. S. & Silva, C. F. 1373* (INPA K MG MO NY R RB SP U).

AMAZONAS: Manaus-Itacoatiara km 133, *Pennington & Monteiro P22635* (INPA K); PDBFF: *Freitas et al. 780* (INPA K).

This species, together with *P. tarumanensis*, is characterized by its smooth, glabrous leaves with rather obscure venation, the 5-merous flower and endospermous seed.

6.36 *Pouteria laevigata* (Mart.) Radlk., Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München 14: 457. 1884; Pennington, T. D., Fl. Neotrop. 52: 373, fig. 122. 1990. **Fig. 20 f-h**

Labatia laevigata Mart., Flora 21, Beibl. 2: 92. 1838.

Young shoots glabrous, becoming fissured and scaling. **Leaves** spirally arranged, 7–13 × 3–5.5 cm, broadly oblanceolate, apex obtuse or rounded, base narrowly attenuate, glabrous;

venation eucamptodromous or sometimes brochidodromous near the apex, midrib slightly prominent on the upper surface, margin often slightly revolute, secondary veins 10–12 pairs, slightly convergent and arcuate, intersecondaries moderately long, tertiaries a lax reticulum. Petiole 1–1.5 cm long, not channelled, glabrous. **Fascicles** axillary and in the axils of fallen leaves, 2–10-flowered. Pedicel 2–3 mm long, glabrous. Sepals 5, subvalvate, 2–3 mm long, glabrous except for a small tuft of hair at the apex. Corolla broadly cyathiform, 2.5–3.5 mm long, lobes much longer than the tube, lobes 5, glabrous. Stamens 5, free, glabrous. Staminodes 5, 0.75–1.5 mm long, lanceolate, glabrous. Ovary flattened, 5-locular, pubescent, style included. **Fruit** 6–9 cm long, globose or obovoid, apex and base rounded, becoming rough-skinned, glabrous. **Seed** 3–4 cm long, ellipsoid to slightly plano-convex, laterally compressed, testa not shining, rough and adherent to the pericarp; scar adaxial, extending most of the length of the seed, 3–4 mm wide. Seed with endosperm.

Field characters: Tree to 40 m high and 50 cm diam., unbuttressed, with a straight cylindrical bole. Bark smooth, pale brown, finely vertically cracked, up to 2 cm thick, slash beige, with sticky white latex. Flowers whitish, fruit maturing bright yellow, with black lenticels. Seed surrounded by and adherent to a layer of greenish gelatinous pulp. Flowering in central Amazonia in April.

A widely distributed species occurring from Costa Rica across northern South America to French Guiana, and in Brazilian and Peruvian Amazonia. Ecologically variable, occurring in non-flooded rainforest but also frequently on periodically and permanently flooded sites.

8.VII.1994 (fr) *Hopkins, M. J. G et al. 1455* (INPA K MG MO NY R RB SPU); 28.VI.1980 (fr) *Nelson, B. W. & Nelson, S. P. 432* (INPA); 3.V.1961 (fr) *Rodrigues, W. & Coêlho, L. 2457* (INPA); 19.IV.1966 (fr) *Rodrigues, W. & Coêlho, D. 7720* (INPA); 26.IV.1994 (fr) *Vicentini, A. et al. 491* (B F INPA K MG PEUFR); 21.VII.1994 (fr) *Vicentini, A. et al. 639* (G INPA K MBM MG UB US); 1.XI.1994 (fr) *Vicentini, A. et al. 762* (BM COL IAN INPA K SPF UEC UFMT VEN).

Pouteria laevigata is distinctive in the field because of its unbuttressed cylindrical bole, very thick smooth bark and the large globose fruit. It differs from other species in this section by its free stamens.

6.37 *Pouteria maxima* T. D. Penn., *sp. nov.* (section *Oligotheca*). **Type**: Brazil, Amazonas, Reserva Ducke, Manaus-Itacoatiara, km 25, 2°53'S, 59°58'W, fl., *C. A. Sothers & P. A. C. L. Assunção 982* (holotype INPA, isotype K). **Fig. 21 i-n**

Ab aliis speciebus section Oligothecae *foliis latis basi truncata, ramis novellis foliorum costa et nervis infra ferrugineo-tomentosis differt.*

Arbor; stipulae nullae; folia 13–21 × 8–11.5 cm, late elliptica vel ovata, basi truncata; nervi secundarii 10–14-jugi, paralleli, recti vel leviter arcuati; fasciculi in axillis foliorum delapsorum enati; pedicellus 3–5 mm longus; sepala 5; corolla tubularis, ca. 6 mm longa, lobis 5; stamina 5; staminodia 5; ovarium 5-loculare, dense pubescens; fructus 4–5 × 2.5–3 cm, ellipsoideus, laevis, glaber.

Tree. Young shoots densely ferrugineous-tomentose, becoming subglabrous, greyish, prominently fissured and grid-cracked. Stipules absent. **Leaves** alternate and distichous, 13–21 × 8–11.5 cm, broadly elliptic or ovate, apex obtusely cuspidate to rounded, base truncate, glabrous above, lower midrib and veins and sometimes lamina crisped-pubescent with branched ferrugineous hairs; venation eucamptodromous, midrib flat to slightly raised on the upper surface, secondary veins 10–14 pairs, parallel, straight or slightly arcuate, slightly raised above, strongly raised below, intersecondaries short or absent; tertiaries oblique. Petiole 0.8–1.5 cm long, not channelled, flattened dorso-ventrally (up to 5 mm wide), tomentose. **Fascicles** 2–10-flowered, mostly on twigs below the leaves. Pedicel 3-5 mm long, tomentose. Sepals 5, 4–4.5 mm long, broadly elliptic to suborbicular, apex obtuse or rounded, ferrugineous pubescent outside, sparsely

sericeous, glabrous inside. Calyx slightly accrescent in fruit. Corolla *ca.* 6 mm long, tubular, tube *ca.* 4 mm long, lobes 5, *ca.* 2 mm long, ovate with a truncate apex; glabrous. Stamens 5, fixed at the apex of the corolla tube, filaments 0.3–0.5 mm long, glabrous, anthers *ca.* 0.75 mm long, glabrous. Staminodes 5, *ca.* 1.5 mm long, broadly oblong, glabrous. Disk absent. Ovary ovoid, *ca.* 2.5 mm long, 5-locular, densely pubescent, style 3–4 mm long, slightly exserted, style-head simple. **Fruit** 4–5 × 2.5–3 cm, ellipsoid, apex obtuse to shortly apiculate, base obtuse or rounded, hard-skinned, smooth, glabrous. **Seed** solitary, *ca.* 2.5 cm long, narrowly ellipsoid, laterally compressed, apex slender, base obtuse, testa shining, slightly roughened; scar adaxial, full-length, *ca.* 5 mm wide, embryo with thick, flat, free cotyledons, radicle 2–3 mm long, exserted; surrounded by a thin sheath of endosperm.

Field characters: A magnificent forest giant up to 40 m high and 50 cm diam. (above the buttresses), massively buttressed to 8 m high, these mostly simple but some branched near the base, bole fluted, bark greyish-brown, profusely scaling in rectangular or irregular plates, slash pinkish with plentiful sticky white latex. Flowers greenish-white, fruit maturing yellow or orange. Flowering in May, fruit maturing from December to February.

French Guiana and central Amazonian Brazil, where it is a generally rare species of non-flooded lowland rainforest.

Paratypes: 24.II.1997 (fr) *Ribeiro, J. E. L. S. et al. 1868* (K); 13.XII.1995 (fr) *Souza, M. A. D. & Assunção, P. A. C. L. 189* (K); 4.XII.1996 (fr) *Vicentini, A. et al. 1203* (K).

Pouteria maxima is placed in section *Oligotheca* on account of its floral structure. The floral formula is K5, C5, A5 (stamens fixed at the top of the corolla tube), staminodes 5, G5. It also shares with other species of this section, such as *P. oblanceolata*, the tendency towards an accrescent fruiting calyx. The embryo structure is slightly anomalous in having thick flat cotyledons (not foliaceous as in other species of the section) and the endosperm is reduced to a relatively thin layer.

In the field it is distinguished by the huge plank buttresses, reminiscent of some *Sloanea* species, which extend far up the trunk, and by the fluted bole with bark scaling in rectangular or irregular plates. The young growth and leaves have conspicuous ferrugineous indumentum, and the broad leaves with a truncate base are also distinctive. The species was first collected in 1986 in French Guiana, but was impossible to place due to lack of flowers.

6.38 *Pouteria* aff. *latianthera* T. D. Penn., Fl. Neotrop. 52: 371, fig. 80. 1990.

Young shoots sparsely appressed pubescent, soon glabrous, becoming greyish and cracked and fissured. **Leaves** opposite, 4–7 × 2.5–5 cm, obovate, apex rounded, truncate or emarginate, base acute, to narrowly cuneate or alternate, glabrous; venation brochidodromous with a submarginal vein (very close to the margin), midrib raised on the upper surface, secondary veins 8–10 pairs, strongly arcuate, convergent, intersecondaries short or absent, tertiaries numerous, perpendicular, parallel. Petiole 2–3 mm long, not channelled, sparsely pubescent. **Fascicles** mostly on twigs below the leaves, few-flowered. **Flowers** not seen. **Fruit**, *ca.* 1.8 cm long (immature), ellipsoid, apex and base rounded, smooth glabrous.

Field characters: Tree up to 35 cm diam., with small buttresses. Bole fluted. Bark dark brown, scaling in large irregular pieces, slash orange, exuding drops of white latex. Young fruit in September.

At present known only from Reserva Ducke.

2.XII.1997 (fr) *Assunção, P. A. C. L. et al. 732* (INPA K); 13.IX.1994 (fr) *Vicentini, A. et al. 688* (INPA K).

The opposite leaf arrangement, parallel perpendicular tertiary venation and form of the fruit place this species in section *Oligotheca* with the group of species containing *P. oppositifolia*, *P. arcuata* and *P. latianthera*. It differs from all these in its distinctive leaf shape with truncate or emarginate apex, and in the presence of a submarginal vein.

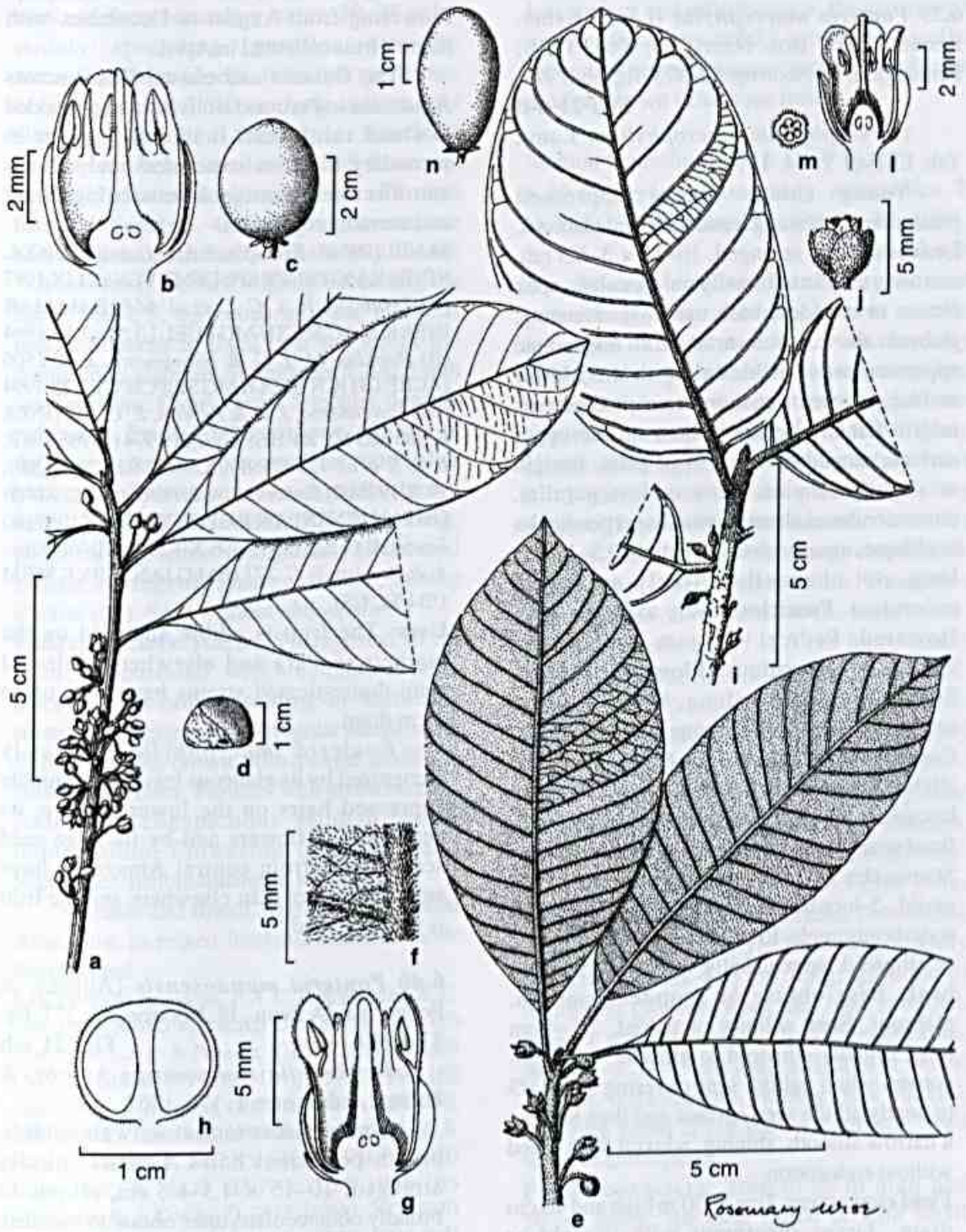

Figura 21 - a-d. *Pouteria macrophylla* - a. habit (*Krukoff 1040*); b. 1/2 flower (*Krukoff 5711*); c. fruit (*Nelson 1214*); d. seed (*Baker 67*). e-h. *Pouteria manaosensis* - e. habit; f. detail of indumentum (*Cid et al. 1002*); g. 1/2 flower (*Ducke 1150*); h. 1/2 fruit (*Daly et al. 1148*). i-n. *Pouteria maxima* - i. habit; j. flower; l. 1/2 flower; m. ovary (*Sothers 982*); n. fruit (*Souza 189*).

Section *Rivicoa* (A. DC.) Baehni

6.39 *Pouteria macrophylla* (Lam.) Eyma, Recueil Trav. Bot. Néerl. 33: 164. 1936; Pennington, Fl. Neotrop. 52: 375, fig. 56. 1990. **Fig. 21 a-d**

Chrysophyllum macrophyllum Lam., Tab. Encycl. 2: 44. 1794.

Young shoots finely appressed puberulous, becoming lenticellate and glabrous. **Leaves** spirally arranged, 10–15 × 3–6.5 cm, narrowly elliptic to broadly oblanceolate, apex obtuse or rounded, base narrowly attenuate, glabrous above, lower surface with fine minute appressed hairs (visible only with lens), lower surface glaucous; venation eucamptodromous, midrib flat or slightly sunken on the upper surface, secondary veins 8–12 pairs, straight or slightly arcuate, more or less parallel, intersecondaries absent, tertiaries perpendicular to oblique, usually obscure. Petiole 0.5–1.7 cm long, not channelled, finely appressed puberulous. **Fascicles** mostly axillary, 3–10-flowered. Pedicel 4–5 mm long, finely appressed puberulous. **Flowers** bisexual. Sepals 5, *ca.* 3 mm long, broadly ovate, sericeous outside, glabrous inside, ciliate. Corolla shortly tubular, *ca.* 4 mm long, tube slightly longer than the lobes, lobes 5, broadly lanceolate, apex obtuse; glabrous. Stamens 5, fixed near the top of the corolla tube, glabrous. Staminodes 5, *ca.* 1.5 mm long, glabrous. Ovary ovoid, 5-locular, pubescent, style exserted, style-head simple. **Fruit** 4–5 × 3–4 cm, globose or ellipsoid, apex usually with a pronounced beak, base obtuse or rounded, smooth, glabrous. **Seed** solitary or paired, 2.5–4 cm long, broadly ellipsoid to globose, or plano-convex when paired, scar covering from 1/3 to nearly all the seed surface and then leaving a narrow smooth, shining, adaxial strip. Seed without endosperm.

Field characters: Tree to 30 m high and 40 cm diam., larger specimens with straight or concave buttresses to 1.5 m high. Bark reddish-brown, finely fissured and scaling in rectangular pieces, slash pink or cream, with white latex. Flowers with green corolla and stamens. Fruit maturing green to yellow with whitish pulp. Flowering from August to December, with mature fruit collected in April.

The Guianas and coastal Brazil across Amazonia to Peru and Bolivia, in non-flooded lowland rainforest. It is also present in secondary forest in some areas and extends into drier forest, transitional between high forest and cerrado vegetation.

24.VIII.1995 (fl) *Assunção, P. A. C. L. et al. 232* (COL F INPA K MG PEUFR SPF UFMT VEN); 21.IX.1997 (fl) *Assunção, P. A. C. L. et al. 668* (E HAMAB INPA K MAC MEXU MG PUEL ULM); 7.XI.1994 (fl) *Hopkins, M. J. G. & Nascimento, J. R. 1506* (ACRE GH ICN INPA K MG S UPCB W); 2.XI.1994 (bd) *Nascimento, J. R. & Pereira, E. C. 615* (INPA K MG MO NY R RB SP U); 7.IV.1994 (fr) *Ribeiro, J. E. L. S. et al. 1254* (INPA K MG MO NY RB SP); 29.X.1996 (fl) *Sothers, C. A. & Pereira, E. C. 924* (B GH IAN ICN INPA K P UPCB VIC); 9.V.1969 (fr) *Souza, A. C. 283* (INPA); 6.XII.1994 (fl) *Vicentini, A. & Pereira, E. C. 771* (BM G IAN INPA K MBM UB UEC US).

Uses: The fruit is edible and sold on the markets in Pará and elsewhere. Selected semi-domesticated strains have fruit up to 6 cm diam.

Pouteria macrophylla is easily recognized by its glaucous leaves with minute appressed hairs on the lower surface, its pentamerous flowers and by its large seed scar. Plants from central Amazonia have smaller flowers than elsewhere and the fruit is often beaked.

6.40 *Pouteria manaosensis* (Aubrév. & Pellegr.) T. D. Penn., Fl. Neotrop. 52: 377, fig. 81. 1990. **Fig. 21 e-h**

Richardella manaosensis Aubrév. & Pellegr., Adansonia 1: 176. 1962.

Young shoots tomentose with reddish-brown persistent hairs. **Leaves** spirally arranged, 10–15 × 4.5–6.5 cm, elliptic to broadly oblanceolate, apex obtuse to rounded, base narrowly attenuate, margin slightly revolute, upper surface sparsely pubescent to glabrous, lower surface tomentose to pubescent with stalked, 2-branched, reddish-brown hairs, indumentum denser on the veins; venation

eucamptodromous, midrib slightly raised on the upper surface, secondary veins, 20–25 pairs, widely spreading, parallel, straight, intersecondaries absent, tertiaries numerous, oblique. Petiole 2.5–3 cm long, not or only slightly channelled, tomentose. **Fascicles** axillary and below the leaves, 2–5-flowered. Pedicel 7–10 mm long, tomentose. **Flowers** bisexual. Sepals 5, 4–6 mm long, tomentose outside, glabrous inside. Corolla shortly tubular, 7–8 mm long, the tube slightly exceeding the lobes, lobes 5, sericeous outside, glabrous inside. Stamens 5, fixed near the top of the corolla tube, glabrous. Staminodes 5, 2–2.5 mm long, subulate. Ovary ovoid, 5-locular, densely pubescent. **Fruit** 7.5–10 cm long, globose or depressed globose, apex and base rounded or truncate, smooth, velutinous with reddish brown hairs. **Seeds** 2 to several, 3.5–4 cm long, plano-convex, scar covering nearly all the seed surface, leaving only a narrow, smooth, shining abaxial strip. Seed without endosperm.

Field characters: Tree to 25 m high and 50 cm diam., unbuttressed, with a cylindrical bole. Bark reddish-brown, scaling or vertically striate, exfoliating in small irregular pieces; slash fibrous, reddish-brown, with a sweet smell and sticky white latex. Flowers with green corolla, fruit with conspicuous reddish-brown indumentum. Flowering in August and September, fruit maturing in March.

Guianas and Brazil, Maranhão to central Amazonia, in mixed lowland forest on non-flooded land.

8.III.1995 (fr) *Assunção, P. A. C. L. & Pereira, E. C. 189* (INPA K MG MO R RB U); 18.VIII.1994 (fl) *Nascimento, J. R. & Pereira, E. C. 571* (BM G IAN INPA K MBM UB UEC US); 25.IX.1994 (fl) *Nascimento, J. R. 607* (COL F IAN INPA K PEUFR SPF UFMT VEN); 3.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 794* (INPA K MG NY SP); 29.VII.1963 (fl) *Rodrigues, W. 5415* (INPA); 10.V.1966 (fr) *Rodrigues, W. & Coêlho, D. 7828* (INPA); 20.X.1970 (fl) *Rodrigues, W. 8976* (INPA); 27.IX.1994 (bd) *Sothers, C. A. et al. 174* (INPA K MG MO NY R RB SP U); 23.VIII.1968 (fl) *Souza, J. A. 108* (INPA).

Pouteria manaosensis is easily recognized by its persistent dense reddish-brown indumentum on the young shoots, lower leaf surface and inflorescence, the leaves with numerous rather widely spreading parallel secondary veins, pentamerous flower and large reddish-brown velutinous fruit.

Section *Antholucuma* (A.DC.) Eyma

6.41 *Pouteria venosa* subsp. ***amazonica*** T. D. Penn., Fl. Neotrop. 52: 399, fig. 88. 1990.

Fig. 22 a-b

Young shoots finely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 7.5–14 × 3.5–5.7 cm, broadly oblanceolate, apex obtuse or obtusely cuspidate to rounded, base narrowly attenuate, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface; secondary veins 8–12 pairs, more or less parallel, slightly arcuate, intersecondaries absent, tertiaries oblique. Petiole 1–1.7 cm long, channelled, finely appressed, puberulous. **Fascicles** mostly borne on twigs below the leaves, 1–3-flowered. Pedicel 0.7–1.3 cm long, finely appressed puberulous. **Flowers** bisexual. Sepals 4, 7–10 mm long, outer pair ovate, inner pair broadly elliptic, sparsely and finely appressed puberulous on both surfaces. Corolla broadly tubular, 1.1–1.3 cm long, tube slightly longer than the lobes, lobes 6, glabrous. Stamens 6, fixed at the top of the corolla tube, glabrous. Staminodes 6, 2–3 mm long, subulate, glabrous. Ovary conical, 7–8-locular, densely pubescent, style becoming slightly exserted. **Fruit** 4–8 cm long, globose or depressed globose, apex and base rounded, smooth, velutinous at first, becoming glabrous. **Seeds** 1–3, 3–4.5 cm long, ellipsoid or plano-convex, testa smooth, shining; scar adaxial, covering about 2/3 of the seed surface. Seed without endosperm.

Field characters: Tree to 30 m high and 50 cm diam., the base fluted or with small buttresses. Bark reddish brown, scaling in small pieces, slash pinkish with sticky white latex. Flowers pale green, with a sweet scent. Fruit maturing orange or yellow, with rather

mealy flesh. Flowering in central Amazonia in July, fruit maturing December to January.

Venezuela and the Guianas to Amazonian Brazil in mixed non-flooded rainforest, usually lowland but ascending to 1200 m in southern Venezuela.

10.VII.1995 (bd) *Lohmann, L. G. et al. 10* (B F INPA K MG PEUFR UFMT); 6.VII.1993 (fl) *Ribeiro, J. E. L. S. et al. 909* (INPA K MG MO NY SP); 23.VII.1964 (fl) *Rodrigues, W. & Monteiro, O. P. 5967* (INPA); 16.VII.1995 (fl) *Sothers, C. A. et al. 510* (BM COL INPA K MG SPF UB UEC VEN); 17.VII.1995 (fl) *Sothers, C. A. et al. 524* (G IAN INPA K MBM R RB U US); 8.VIII.1968 (fl) *Souza, J. A. 82* (INPA); 22.IX.1995 (fr) *Vicentini, A. et al. 718* (INPA K MG MO NY R RB SP U).

The only member of section *Antholucuma* found in Reserva Ducke, and easily identified by its large flowers with 4 sepals, the outer two larger than the inner, and the 6-lobed corolla. The large fruit is also distinctive. The type subspecies of *P. venosa*, which has a much smaller fruit, is confined to coastal Brazil.

Section *Pouteria*

6.42 *Pouteria glomerata* (Miq.) Radlk., Sitzbungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München 12: 333. 1882; Pennington, T. D., Fl. Neotrop. 52: 417, fig. 92. 1990. **Fig. 22 c-f**

Lucuma glomerata Miq. *in* Mart., Fl. bras. 7: 81, tab. 36, fig. 2. 1863.

Young shoots appressed puberulous, soon becoming glabrous and scaling. **Leaves** spirally arranged, 8–5 × 3.5–6 cm, oblanceolate, apex usually obtuse or rounded, base acute, obtuse or rounded, glabrous above, minutely puberulous below with whitish loosely appressed hairs usually forming a pellicle, sometimes becoming subglabrous with age; venation eucamptodromous, midrib flat or slightly sunken on the upper surface, secondary veins 10–15 pairs, convergent or parallel, usually slightly arcuate, intersecondaries usually absent, tertiaries oblique to perpendicular. Petiole 5–10 mm long, not channelled, appressed puberulous. **Fascicles** axillary or on twigs below the leaves, 2–10-flowered. Pedicel 0.5–1 mm long, appressed puberulous. **Flowers** unisexual (plant monoecious or dioecious). Sepals 4, 2–3 mm long, often hooded, the outer 2 appressed puberulous outside, inner 2 more or less glabrous. Corolla broadly cylindrical, 2–3.5 mm long, tube exceeding the lobes, lobes 4, broadly oblong, apex rounded or truncate, glabrous. Stamens 4, fixed in the lower half of the corolla tube, glabrous; absent or reduced to vestiges in female flowers. Staminodes 4, 0.3–1 mm long, lanceolate or oblong, glabrous. Ovary 4-locular, ovoid, densely long-strigose, style included. **Fruit** 3–6 cm long, globose or depressed globose, often broader than long, often irregular and knobbly, surface rough or smooth, more or less glabrous or scurfy. **Seeds** 1-several, 2–3 cm long, broadly ellipsoid (when solitary) or plano-convex, smooth shining area of testa reduced to a small abaxial segment, testa woody, 1–3 mm thick; scar often verrucose. Seed without endosperm.

Field characters: Tree to 20 m high and 30 cm diam., slash with sticky white latex. Flowers greenish-cream, fruit maturing yellowish or pale brown with a hard skin. Flowering in central Amazonia March to May, fruit maturing from May to July.

Mexico and Central America and throughout tropical South America to Paraguay and Argentina. A common tree of riverbanks and periodically or permanently flooded forest.

Not recorded from Reserva Ducke.

AMAZONAS: Município de Manaus, Ilha de Marchantaria, *Ferreira 179* (K), *204* (K); vic. Manaus, Igarapé Ipixuna, *Prance et al. 11260* (K).

Uses: Large fruited varieties are eaten in Mexico, Central America and Pará.

Pouteria glomerata is close to *P. filipes* and they have a similar floral structure. It may be distinguished by the acute to rounded leaf base, shorter petioles, shorter pedicels, non-ciliate corolla lobes and more or less sessile globose fruit.

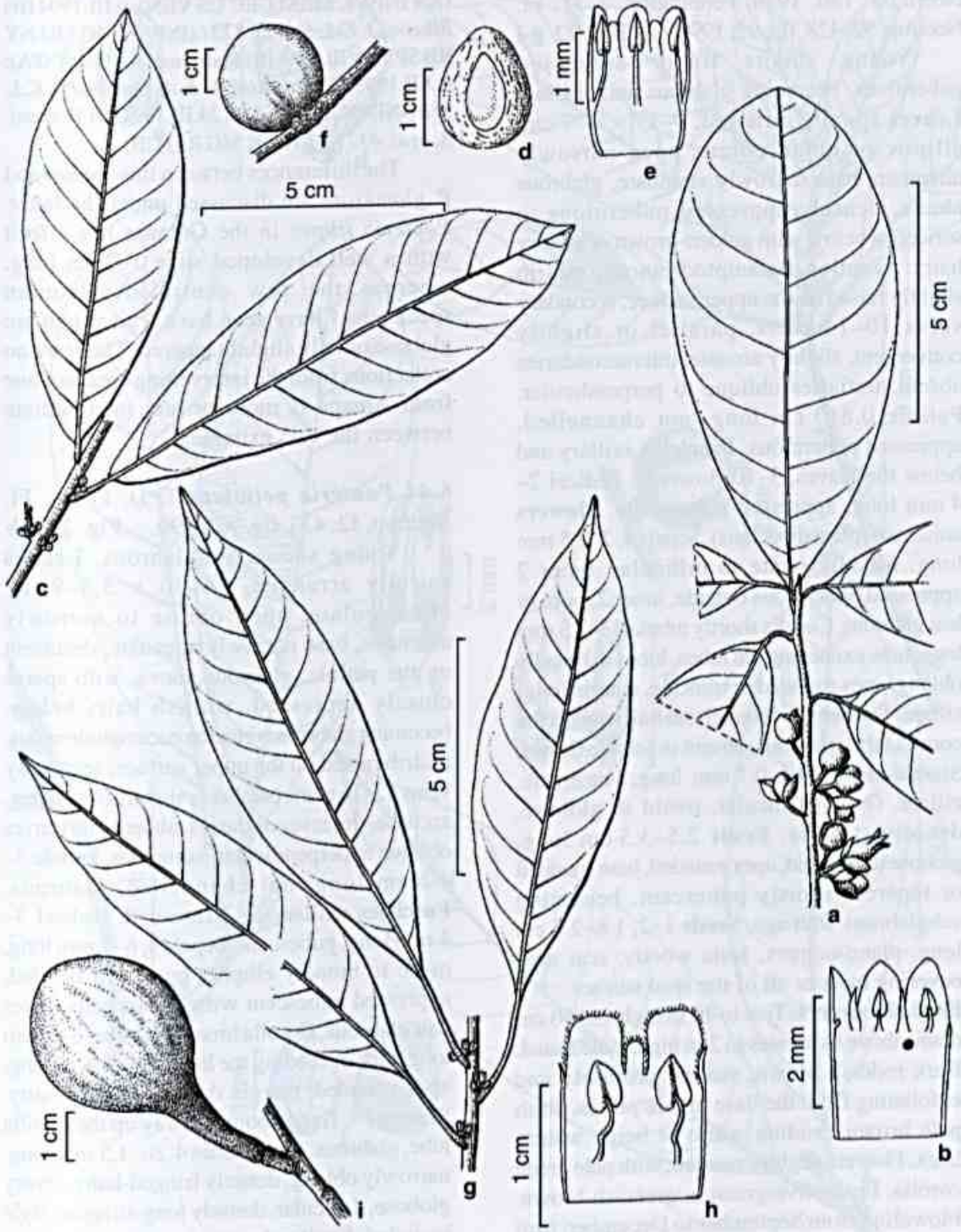

Figura 22 - a-b. *Pouteria venosa* subsp. *amazonica* - a. habit; b. part corolla (*Meijeraan 22*). c-f. *Pouteria glomerata* - c. habit; d. seed (*Cid et al. 1715*); e. 1/2 corolla (*Schinini 6303*); f. fruit (*Black 52-15434*). g-i. *Pouteria filipes* - g. habit (*Steyermark & Rabe 96112*); h. corolla (*Roberts LBB16304*); i. fruit (*Steyermark & Liesner 120748*).

6.43 *Pouteria filipes* Eyma, Recueil Trav. Bot. Néerl. 33: 180. 1936; Pennington, T. D., Fl. Neotrop. 52: 428, fig. 92. 1990. **Fig. 22 g-i**

Young shoots finely appressed puberulous, becoming glabrous and scaling. **Leaves** spirally arranged, 9–17 × 3–7 cm, elliptic or oblanceolate, apex narrowly attenuate, base narrowly attenuate, glabrous above, densely appressed puberulous to sericeous below with golden-brown or silvery hairs; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 10–14 pairs, parallel or slightly convergent, slightly arcuate, intersecondaries absent, tertiaries oblique to perpendicular. Petiole 0.8–3 cm long, not channelled, appressed puberulous. **Fascicles** axillary and below the leaves, 3–10-flowered. Pedicel 2–4 mm long, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 4, 2–2.5 mm long, broadly ovate to orbicular, outer 2 appressed puberulous outside, inner 2 more or less glabrous. Corolla shortly tubular, 3–3.5 mm long, tube exceeding the lobes, lobes 4, broadly oblong, apex rounded or truncate, margin long-ciliate. Stamens 4, fixed about halfway up the corolla tube, glabrous, absent in female flower. Staminodes 4, 0.5–0.7 mm long, lanceolate, ciliate. Ovary 4-locular, ovoid to globose, densely strigose. **Fruit** 2.5–3.5 cm long, globose to obovoid, apex rounded, base rounded or tapered, shortly pubescent, becoming subglabrous with age. **Seeds** 1–2, 1.8–2.5 cm long, plano-convex, testa woody, scar area covering most or all of the seed surface.

Field characters: Tree to 40 m high and 50 cm diam. above buttresses to 2 m high. Bole fluted. Bark reddish brown, scaling profusely and exfoliating from the base in thin pieces, slash pale brown exuding white or beige watery latex. Flowers slightly scented, with pale green corolla. Fruit olive-green to greenish-brown. Flowering from September to December, fruit maturing in March.

Southern Central America, Venezuela and the Guianas to central Amazonian Brazil in mixed lowland rainforest on non-flooded sites. 2.III.1994 (fr) *Ribeiro, J. E. L. S. et al. 1210* (BM IAN INPA K MBM UEC US VEN); 9.III.1994 (fr) *Ribeiro, J. E. L. S. et al. 1221* (INPA K MG MO NY RB SP); 6.VIII.1963 (fr) *Rodrigues, W. 9578* (INPA); 4.XII.1993 (fl) *Vicentini, A. & Assunção, P.A.C.L. 388* (INPA K MG NY SP); 24.III.1994 (fr) *Vicentini, A. et al. 437* (G INPA K MG R U UB).

The differences between this species and *P. glomerata* are discussed under the latter. *Pouteria filipes* in the Guianas has a fruit with a well developed stipe 1–2 cm long, whereas the few central Amazonian specimens I have seen have fruit which are globose or only slightly tapered. There are no collections from the intervening area, but one from Amapá is more or less intermediate between the two extremes.

6.44 *Pouteria petiolata* T. D. Penn., Fl. Neotrop. 52: 433, fig. 96. 1990. **Fig. 23 a-b**

Young shoots subglabrous. **Leaves** spirally arranged, 16–30 × 5.5–9 cm, oblanceolate, apex obtuse to narrowly attenuate, base narrowly attenuate, decurrent on the petiole, glabrous above, with sparse closely appressed, whitish hairs below, becoming glabrous; venation eucamptodromous, midrib raised on the upper surface, secondary veins 12–16 pairs, parallel or slightly convergent, arcuate, intersecondaries absent, tertiaries oblique to perpendicular, numerous. Petiole 3–4.5 cm long, not channelled, glabrous. **Fascicles** axillary, 2–3-flowered. Pedicel 3–4 mm long, pubescent. Sepals 4, 6–7 mm long, ovate to broadly elliptic, outer pair hooded, appressed pubescent with brown hairs, inner pair glabrous. Corolla broadly tubular, 8–9 mm long, tube exceeding the lobes, lobes 4, oblong, apex rounded, margin densely fringed-hairy. Stamens 4, fixed about halfway up the corolla tube, glabrous. Staminodes 4, *ca.* 1.5 mm long, narrowly oblong, densely fringed-hairy. Ovary globose, 4-locular, densely long-strigose, style included. **Fruit** unknown.

Field characters: Tree to 15 m high and 15 cm diam., unbuttressed. Bark brown, shallowly fissured and scaling in thin papery pieces, slash with white or yellowish sticky latex. Flowers

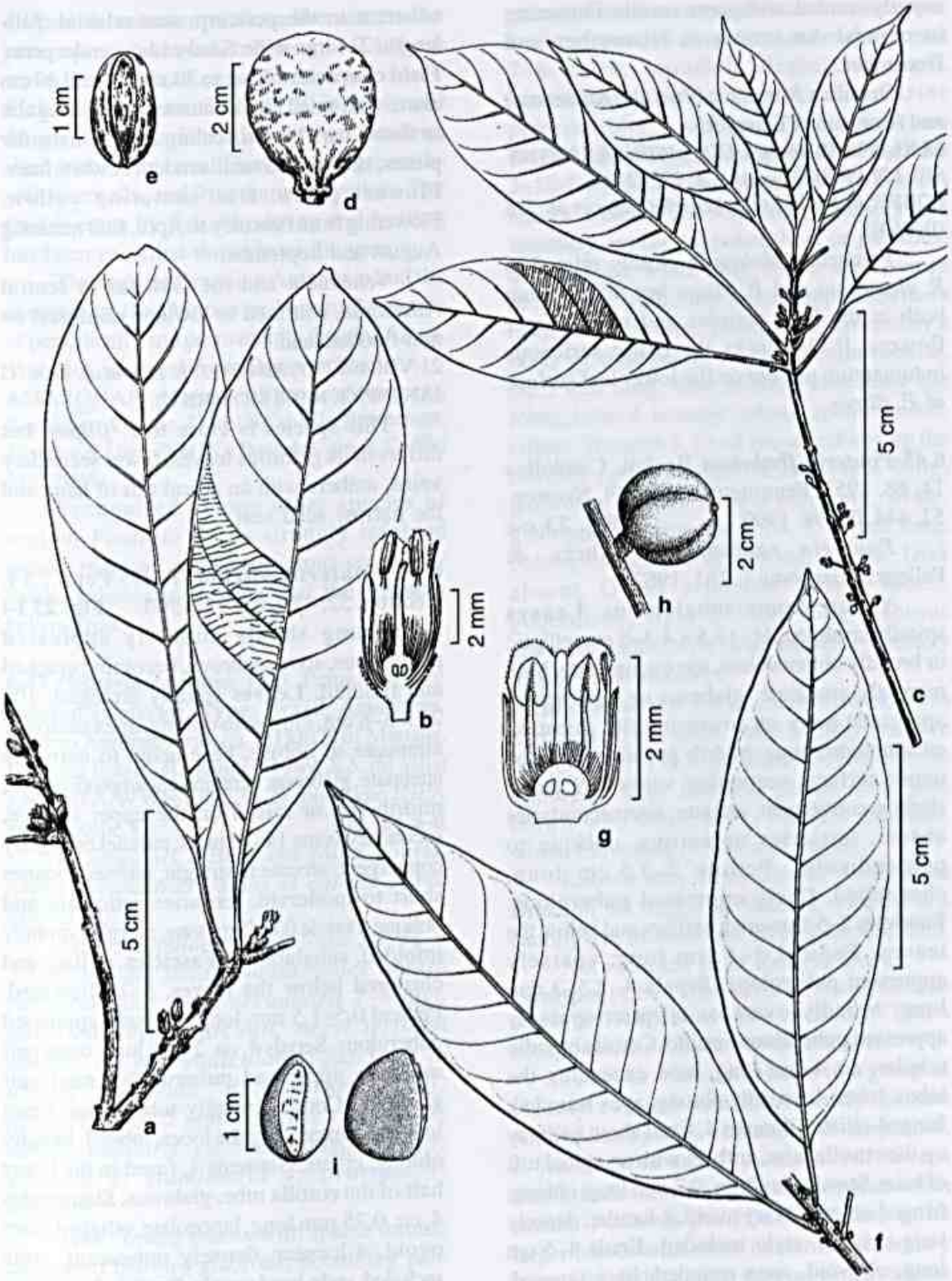

Figura 23 - a-b. *Pouteria petiolata* - a. habit; b. 1/2 flower (*Cid et al. 2363*). c-e. *Pouteria fimbriata* - c. habit (*FDBG 3759*); d. fruit; e. seed (*Coêlho INPA1897*). f-i. *Pouteria plicata* - f. habit (*Krukoff 6632*); g. 1/2 flower (*Davidse & Gonzáles 12134A*); h. fruit (*Revilla 2250*); i. seed (*Rodrigues & Lima* 2270).

sweetly scented, with green corolla. Flowering in central Amazonia in November and December.

Brazilian Amazonia (Pará and Amazonas) and Amazonian Ecuador.

28.XI.1996 (fl) *Sothers, C. A. 946* (INPA K MG NY SP); 1.X.1968 (fl) *Souza, J. A. 197* (INPA).

PDBFF: *Kukle 161* (K); *Lepsch Cunha et al. 776* (INPA K).

Pouteria petiolata is closely related to *P. glomerata* and *P. filipes* but differs from both in the long petioles and much larger flowers. It also lacks the dense sericeous indumentum present on the lower leaf surface of *P. filipes*.

6.45 *Pouteria fimbriata* Baehni, Candollea 14: 68. 1952; Pennington, T. D., Fl. Neotrop. 52: 444, fig. 98. 1990. **Fig. 23 c-e**

Pouteria raulantonia Aubrév. & Pellegr., Adansonia 1: 161. 1962.

Young shoots subglabrous. **Leaves** spirally arranged, 11–17.5 × 4.3–8 cm, elliptic or broadly oblanceolate, apex acuminate, base narrowly attenuate, glabrous or with sparse appressed hairs on lower midrib; venation eucamptodromous, midrib prominent on the upper surface, secondary veins 7–9 pairs, slightly convergent, arcuate, intersecondaries absent, tertiaries numerous, oblique to perpendicular. Petiole 2–3.5 cm long, channelled, finely appressed puberulous. **Fascicles** 2–5-flowered, axillary and below the leaves. Pedicel 3–4 mm long, sparsely appressed puberulous. Sepals 4, 2.5–3 mm long, broadly ovate or elliptic, sparsely appressed puberulous outside. Corolla broadly tubular, *ca.* 4 mm long, tube exceeding the lobes, lobes 4, broadly oblong, apex rounded, fringed-ciliate. Stamens 4, fixed about halfway up the corolla tube, anthers with an apical tuft of hairs. Staminodes 4, *ca.* 0.7 mm long, oblong, fringed-ciliate. Ovary ovoid, 4-locular, densely long-strigose, style included. **Fruit** 4–5 cm long, obovoid, apex rounded, base tapered, smooth, glabrous. **Seeds** several, 2.5–2.8 cm long, oblong-ellipsoid, somewhat laterally compressed, testa hard, woody, smooth, adherent to the pericarp, scar adaxial, full-length, 2–4 mm wide. Seed without endosperm. **Field characters**: Tree to 30 m high and 40 cm diam. with small plank buttresses, bole irregular or fluted, bark brown, scaling in small irregular pieces, slash with a small amount of white latex. Flowers green, fruit maturing yellow. Flowering from February to April, fruit maturing August and September.

Venezuela and the Guianas to central Amazonia, confined to lowland rainforest on non-flooded land.

21.VIII.1997 (fr) *Ribeiro, J. E. L. S. et al. 1908* (G IAN INPA K MBM MO R RB U).

This species is close to *P. filipes*, but differs in its glabrous leaves, fewer secondary veins, anthers with an apical tuft of hairs and the narrow seed scar.

6.46 *Pouteria plicata* T. D. Penn., Fl. Neotrop. 52: 456, fig. 92. 1990. **Fig. 23 f-i**

Young shoots minutely appressed puberulous, soon glabrous, becoming cracked and fissured. **Leaves** spirally arranged, 10–20 × 3–6 cm, elliptic to oblong, apex narrowly attenuate to obtuse, base acute to narrowly attenuate, glabrous; venation eucamptodromous, midrib flat or raised on the upper surface, secondary veins 14–20 pairs, parallel or slightly convergent, arcuate to straight, intersecondaries short to moderate, tertiaries reticulate and oblique. Petiole 0.8–2 cm long, margins strongly infolded, subglabrous. **Fascicles** axillary and clustered below the leaves, 5–10-flowered. Pedicel 0.5–1.5 mm long, sparsely appressed puberulous. Sepals 4, *ca.* 2 mm long, outer pair minutely appressed puberulous, inner pair glabrous. Corolla broadly tubular, *ca.* 3 mm long, tube exceeding the lobes, lobes 4, broadly oblong, ciliate. Stamens 4, fused in the lower half of the corolla tube, glabrous. Staminodes 4, *ca.* 0.75 mm long, lanceolate, ciliate. Ovary ovoid, 4-locular, densely pubescent, style included, style-head simple. **Fruit** 2–4 mm long, globose, apex and base rounded, soft-skinned and fleshy, wrinkling on drying, glabrous. **Seeds** several, 1.8–2 cm long, broadly

ellipsoid, testa smooth, adherent to the pericarp, scar adaxial, full-length, 0.4–1 cm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 40 cm diam. Bark reddish-brown, scaling, slash with white latex. Flowers with greenish-yellow corolla, and fruit maturing yellow. The fruit is eaten by fish. Flowering and fruiting has been recorded throughout the year.

Throughout Brazilian Amazonia and the drainage of the Orinoco in Venezuela. A tree of periodically and permanently flooded forest.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus: Ilha do Marapata, *Rodrigues & Lima 2270* (NY); Vila Betancourt, *Ferreira & Lima 3664* (K); Praia do Cajo, *L. Coêlho 658* (INPA).

Recognized among other species of section *Pouteria* by its strongly infolded petiole margins, rather numerous secondary veins, subsessile flowers and the squashy yellow fruit.

6.47 *Pouteria resinosa* T. D. Penn., *sp. nov.* (section *Pouteria*). **Type**: Brazil, Amazonas. Distrito Agropecuário, *ca.* 90 km N of Manaus, Fazenda Esteio, fl., August 1989, *S.S. da Silva s.n.* (INPA/WWF 1301.36.2) (holotype INPA *n.v.*, isotype K). **Fig. 24 a-d**

P. singulari *affinis sed foliis parvis, nervis secundariis paucis et corolla parva glabra differt.*

Arbor; stipulae nullae; folia 5.5–11 × 2.5–5 cm, late oblanceolata, apice obtusa vel rotundata; nervi secundarii 7–8-jugi, paralleli, leviter arcuati; nervi tertiarii obliqui vel perpendiculares; fasciculi in axillis foliorum delapsorum enati; pedicellus 3–5 mm longus; sepala 4; corolla tubularis, ca. 5 mm longa, lobis 4; stamina 4; staminodia 4; ovarium 4-loculare.

Tree. Young shoots with sparse minute appressed hairs or glabrous, becoming pale greyish and slightly scaling. Stipules absent. **Leaves** spirally arranged, 5.5–11 × 2.5–5 cm, broadly oblanceolate, apex obtuse or rounded, base narrowly attenuate, glabrous; venation eucamptodromous; midrib raised on the upper surface (rounded in section), secondary veins 7–8 pairs, parallel, slightly arcuate, intersecondaries absent, tertiaries perpendicular to oblique. Petiole 5-10 mm long, slightly channelled, glabrous. **Fascicles** 3–10-flowered, mostly on twigs below the leaves. Pedicel 2–3 mm long, sparsely and minutely appressed puberulous or glabrous. Sepals 4, *ca.* 4 mm long, ovate, apex obtuse or rounded, with some minute appressed hairs outside or glabrous; young buds covered by a layer of transparent resin. Corolla tubular, *ca.* 5 mm long, tube slightly exceeding the lobes, lobes 4, broadly oblong, apex rounded, ciliate. Stamens 4, fixed about halfway up the corolla tube, filaments *ca.* 2 mm long, glabrous, anthers *ca.* 1.3 mm long, ovate, glabrous. Staminodes 4, *ca.* 1.75 mm long, oblong-lanceolate or oblong, ciliate. Disk absent. Ovary 4-locular, ovoid, lobed, puberulous, style 2–3 mm long glabrous above, included, style head simple or minutely lobed. **Fruit** unknown.

Field characters: Large canopy tree to 30 m high and 70 cm diam., with slightly concave buttresses to 3 m high. Bark greyish-brown, scaling in large irregular plates, slash pale brown with white latex. Flowers greenish-white. Flowering in July and August.

Known only from central Amazonian Brazil in the region of Manaus, where it is a canopy tree in rainforest on non-flooded land.

Not recorded from Reserva Ducke.

Paratypes: PDBFF: Reserva km 41, *Mori & Cardoso 20666* (INPA K); *Pennington et al. 13057* (INPA K); *Spironello s.n. INPA190948* (INPA K).

Pouteria resinosa belongs in a group of closely related and imperfectly known Amazonian species containing *P. singularis*, *P. franciscana* and *P. juruana*. All have a similar facies and are difficult to separate when sterile. *Pouteria franciscana* differs in its larger leaves with more numerous secondary veins, and slightly larger flowers with a strigose corolla. Both *P. juruana* and *P. singularis* have more slender flower buds than *P. resinosa*, and they also differ in the fine details

of their venation. Species differences in Sapotaceae are usually seen in fruit and seed characters, but unfortunately the fruit of both *P. resinosa* and *P. juruana* remain unknown.

6.48 *Pouteria gomphiifolia* (Mart.) Radlk., Sitzungsber. Math.-Phys. Cl. Konigl. Bayer. Akad. Wiss. München 12: 33. 1882; Pennington, T. D., Fl. Neotrop. 52: 463, fig. 105. 1990. **Fig. 24 e-g**

Lucuma gomphiifolia Mart. *ex* Miq., *in* Mart., Fl. bras. 7: 78, tab. 37, fig. 1. 1863.

Young shoots subglabrous, usually covered with transparent resin, and later scaling in thin papery pieces. **Leaves** spirally arranged, 10–21 × 3–6 cm, oblanceolate, apex acute, obtuse or rounded, base narrowly attenuate, glabrous; venation brochidodromous with a submarginal vein, midrib raised (rounded) on the upper surface, secondary veins 20–35 pairs, parallel, straight, intersecondaries numerous, long, usually extending to near the margin, tertiaries reticulate. Petiole 0.5–1 cm long, not channelled, glabrous. **Fascicles** 3–10-flowered, axillary. Pedicel 3–5 mm long, glabrous. **Flowers** unisexual (plant dioecious). Sepals 4, 2.5–3.5 mm long, ovate, glabrous. Corolla broadly tubular, 4–5 mm long, tube equalling or slightly longer than the lobes, lobes 4, oblong, ciliate. Stamens 4, fixed in the lower half of the corolla tube, glabrous, absent in female flower. Staminodes 4, 1.5–2 mm long, subulate, glabrous. Ovary ovoid, 4-locular, pubescent, style slightly exserted, style-head simple. **Fruit** 4–5 cm long, obovoid or ellipsoid, apex obtuse to rounded, base tapered, smooth, glabrous. **Seeds** 1–2, 2.5–3 cm long, ellipsoid, laterally compressed, apex rounded, base acute, testa smooth and shining; scar adaxial, 4–5 mm wide. Seed without endosperm.

Field characters: Tree to 20 m high and 40 cm diam., larger specimens buttressed to 1m high. Bark scaling, slash with copious white latex. Flowers with greenish corolla and fruit maturing yellow to orange. Flowering in central Amazonia in October and November and the fruit maturing in May.

Throughout Brazilian Amazonia and into Peru, Colombia and Venezuela. It is confined to periodically and permanently flooded forest. AMAZONAS: Município de Manaus, Comunidade Nossa Senhora de Fátima, *Ferreira 251* (K), *255* (K); Rio Cuieiras, *Mori et al. 20334* (K).

Pouteria gomphiifolia is easily recognized in the vegetative state by its distinctive leaves with brochidodromous venation and a submarginal vein, and the numerous straight parallel secondary veins.

6.49 *Pouteria pariry* (Ducke) Baehni, Candollea 9: 354. 1942; Pennington, T. D., Fl. Neotrop. 52: 468, fig. 106. 1990. **Fig. 24 h-j**

Lucuma pariry Ducke, Arch. Jard. Bot. Rio de Janeiro 3: 231, t.15. 1922.

Young shoots shortly brown-pubescent, soon becoming glabrous, scaling and grid-cracked. **Leaves** spirally arranged, 15–22 × 6–9 cm, broadly oblanceolate, apex obtuse to rounded, base tapering but finally abruptly rounded or truncate, glabrous; venation eucamptodromous, midrib sharply raised on the upper surface, but often recessed, secondary veins 16–20 pairs, parallel, straight or slightly arcuate, intersecondaries absent, tertiaries oblique. Petiole 2–4.5 cm long, strongly channelled, subglabrous. **Fascicles** borne on twigs below the leaves, 5–10-flowered. Pedicel *ca.* 4 mm long, puberulous. Sepals 5, 2.5–3 mm long, ovate, puberulous outside, ciliate. Corolla shortly tubular, *ca.* 3.5 mm long, tube equalling the lobes, lobes 5, obovate to broadly oblong, apex truncate, ciliate. Stamens 5, fixed near the base of the corolla tube, glabrous. Staminodes 5, *ca.* 0.5 mm long, subulate, glabrous. Ovary ovoid, 5-locular, densely pubescent, style slightly exserted in bud, style-head simple. **Fruit** 9–10 cm diam., depressed globose, smooth glabrous. **Seeds** 2–3, 3–4.5 cm long, plano-convex or shaped like the segment of an orange, testa smooth, shining, scar adaxial, covering about half the seed surface. Seed without endosperm.

Field characters: Tree to 30 m high and 80 cm diam., with dark greyish scaling bark and white

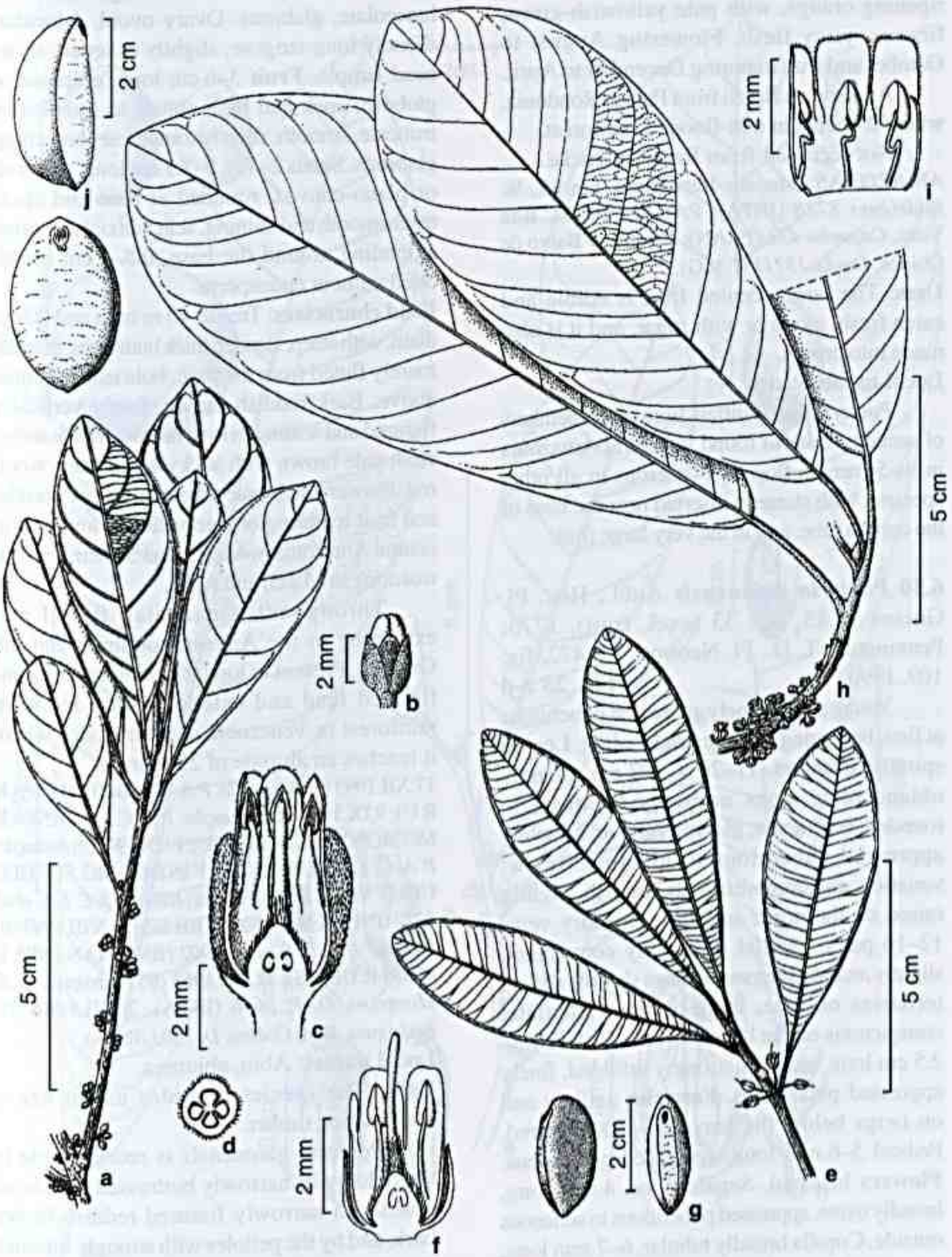

Figura 24 - a-d. *Pouteria resinosa* - a. habit (*Mori & Cardoso 20666*); b. flower; c. 1/2 flower; d. ovary (*Silva s.n.*). e-g. *Pouteria gomphiifolia* - e. habit (*Croat 20416*); f. 1/2 flower (*Fróes 219*); g. seed (*Rimachi 3463*). h-j. *Pouteria pariry* - h. habit; i. 1/2 corolla (*Capucho 431*); j. seed (*Cavalcante 282*).

latex. Flowers with green corolla, fruit scented, ripening orange, with pale yellowish-green, fibrous, juicy flesh. Flowering August to October and fruit maturing December to April.

Amazonian Brazil from Pará to Rondônia, where it occurs in non-flooded rainforest.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus-Itacoatiara, km 68, *W. Rodrigues 8728* (INPA); PARÁ: Tapajós, Boa Vista, *Capucho 431* (F IAN); Paraná de Baixo de Óbidos, *Ducke 15711* (F MG).

Uses: The large scented fruit is edible and eaten fresh, alone or with sugar, and it is also made into drinks.

Local name: Pariri.

Pouteria pariry differs from other members of section *Pouteria* found in central Amazonia in its 5-merous flowers (4-merous in all other species), with stamens inserted near the base of the corolla tube, and in the very large fruit.

6.50 *Pouteria guianensis* Aubl., Hist. Pl. Guiane 1: 85, tab. 33 (excl. fruit). 1775; Pennington, T. D., Fl. Neotrop. 52: 472, fig. 109. 1990. **Fig. 25 a-d**

Young shoots finely appressed puberulous at first, becoming glabrous and scaling. **Leaves** spirally arranged, 11–20 × 5–7 cm, broadly oblanceolate, apex narrowly attenuate to rounded, base acute, glabrous above, minutely appressed puberulous to glabrous below; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 12–16 pairs, parallel or slightly convergent, slightly arcuate, intersecondaries short or absent, tertiaries oblique, quaternaries reticulate, conspicuous on the lower surface. Petiole 1.3–2.5 cm long, margins strongly infolded, finely appressed puberulous. **Fascicles** axillary and on twigs below the leaves, 5–10-flowered. Pedicel 5–6 mm long, appressed puberulous. **Flowers** bisexual. Sepals 4, *ca.* 4 mm long, broadly ovate, appressed puberulous to sericeous outside. Corolla broadly tubular, 6–7 mm long, tube exceeding the lobes, lobes 4, broadly oblong, apex truncate, ciliate. Stamens 4, fixed about halfway up the corolla tube, glabrous. Staminodes 4, *ca.* 1 mm long, narrowly lanceolate, glabrous. Ovary ovoid, 4-locular, densely long-strigose, slightly exserted, style-head simple. **Fruit** 3–6 cm long, ellipsoid or globose, apex and base obtuse to rounded or truncate, smooth, shortly tomentose, becoming glabrous. **Seeds** 2–4, 1.5–3.5 cm long, ellipsoid or plano-convex, rounded at base and apex, testa smooth and shining, scar adaxial and often extending around the base, 0.5–1 cm broad. Seed without endosperm.

Field characters: Tree to 40 m high and 90 cm diam. with steep, slender, thick buttresses, or trunk merely fluted from the base, bole usually fluted above. Bark reddish brown, finely vertically fissured and scaling in long narrow friable strips, slash pale brown with sticky white latex, wood red. Flowers with pale greenish-yellow corolla, and fruit maturing orange-yellow. Flowering in central Amazonia in August and September, fruit maturing in March and April.

Throughout Amazonian Brazil and extending to the Andean countries and the Guianas. Present in lowland rainforest on non-flooded land and extending into montane rainforest in Venezuela and the Andes where it reaches an altitude of 2500 m.

17.XII.1993 (fr) *Assunção, P. A. C. L. 04* (IAN INPA K R U); 9.IX.1994 (fl) *Assunção, P. A. C. L. 51* (INPA K MG MO NY PEUFR RB SP U); 19.IX.1997 (fl) *Assunção, P. A. C. L. et al. 665* (COL F INPA K MG SPF UEC UFMT VEN); 10.III.1994 (fr) *Ribeiro, J. E. L. S. et al. 1222* (INPA K MG MO NY RB SP); 21.VIII.1997 (fl) *Ribeiro, J. E. L. S. et al. 1902* (BM G IAN INPA K MBM R UB US); 31.XII.1963 (fr) *Rodrigues, W. & Monteiro, O. P. 5646* (INPA); 23.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7603* (INPA).

Local names: Abiu, abiurana.

Uses: The species provides useful heavy construction timber.

Pouteria guianensis is recognizable in the field by its narrowly buttressed and fluted bole, with narrowly fissured reddish-brown bark, and by the petioles with strongly infolded margins. The reticulate higher order venation is characteristic in dried specimens. It is closely related to *P. caimito*, *P. hispida* and *P. torta*. See under those species for further comment.

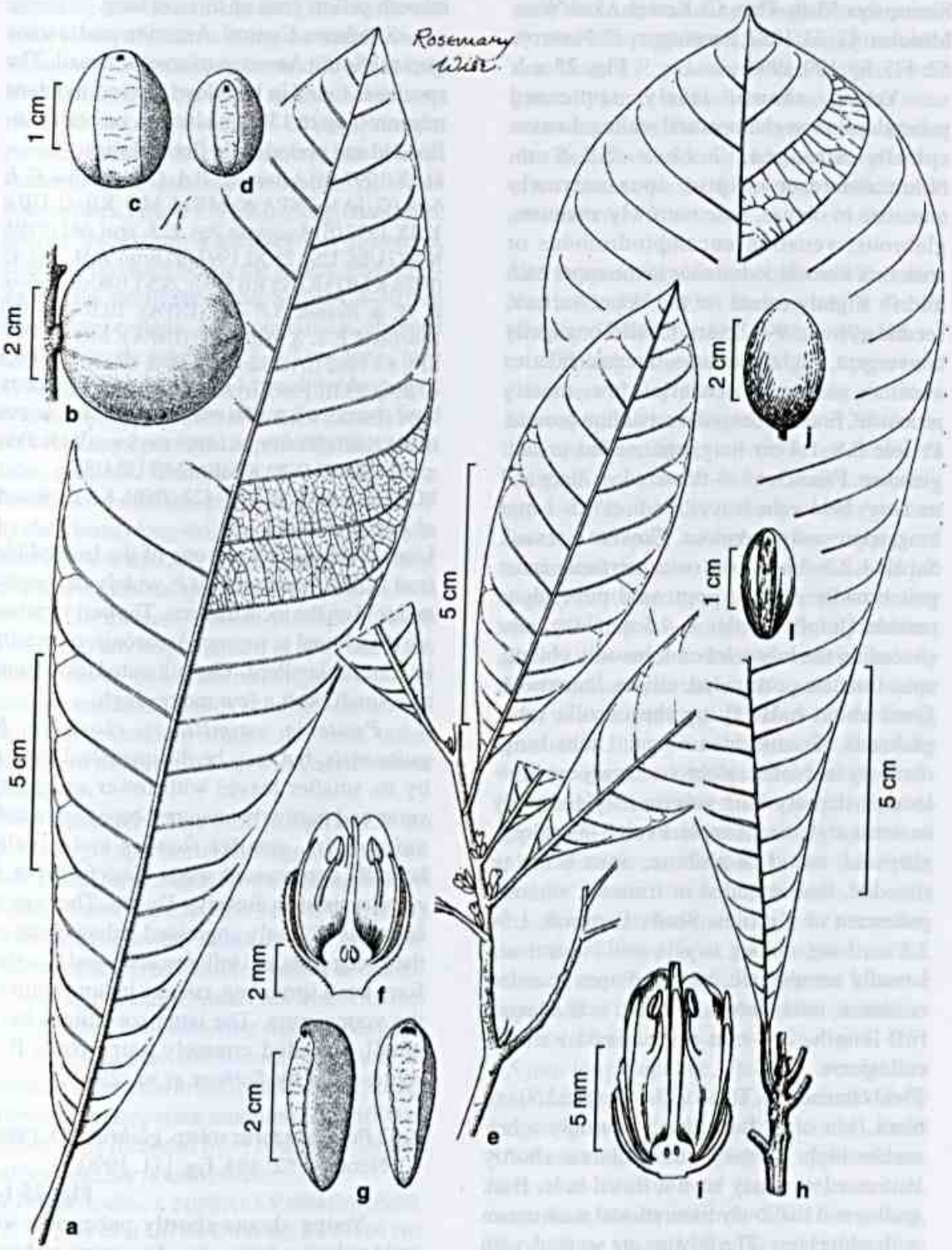

Figura 25 - a-d. *Pouteria guianensis* - a. leaf (*Steyermark 122161*); b. fruit (*Steyermark 60991*); c. seed (*Steyermark & Davidse 116748*); d. seed (*Granville 5256*). e-h. *Pouteria caimito* - e. habit (*Baker 75*); f. 1/2 flower (*Penington & Tenorio 10746*); g. seed (*Pennington 10672*). h-l. *Pouteria torta* subsp. *glabra* - h. habit; i. 1/2 flower (*Pennington & Tenorio 10745*); j. fruit; l. seed (*Gentry et al. 25495*).

6.51 *Pouteria caimito* (Ruiz & Pavón) Radlk., Sitzungsber. Math.-Phys. Cl. Konigl. Akad. Wiss. München 12: 33. 1882; Pennington, Fl. Neotrop. 52: 475, fig. 109. 1990. **Fig. 25 e-h**

Young shoots finely appressed puberulous, soon glabrous and scaling. **Leaves** spirally arranged, 7–14 × 2.8–5 cm, oblanceolate or elliptic, apex narrowly attenuate to obtuse, base narrowly attenuate, glabrous; venation eucamptodromous or sometimes brochidodromous in the upper half, midrib slightly raised on the upper surface, secondary veins 9–12 pairs, parallel or slightly convergent, slightly arcuate, intersecondaries short to moderate, tertiaries few, mostly reticulate, finer higher order reticulum present. Petiole 0.8–1.4 cm long, channelled or not, glabrous. **Fascicles** 3–5-flowered, axillary and on twigs below the leaves. Pedicel 0.5–1 mm long, appressed puberulous. **Flowers** bisexual. Sepals 4, 2.5–3 mm long, outer pair ovate, inner pair broadly elliptic, appressed puberulous outside. Corolla tubular, 4–4.5 mm long, tube exceeding the lobes, lobes 4, broadly oblong, apex truncate or rounded, ciliate. Stamens 4, fixed about halfway up the corolla tube, glabrous. Staminodes 4, *ca.* 1 mm long, narrowly lanceolate, glabrous. Ovary ovoid, 4-locular, densely long-strigose, style slightly exserted, style-head simple. **Fruit** 3–5 cm long, ellipsoid, ovoid or globose, apex acute to rounded, base rounded or truncate, smooth, pubescent or glabrous. **Seeds** 1-several, 1.5–2.5 cm long, oblong to ellipsoid, sometimes laterally compressed, base and apex rounded or obtuse, testa smooth, shining; scar adaxial, full-length, 2–4 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 50 cm diam., but often flowering when only a few metres high. Larger individuals are shortly buttressed and may have a fluted bole. Bark scaling and shallowly fissured, and slash cream with white latex. The flowers are scented, with greenish white corolla. Fruit maturing yellow, with white flesh. Flowering in central Amazonia in November.

The cultivated form of this species has a smooth yellow fruit up to 7 cm long.

Southern Central America and across tropical South America to coastal Brazil. The species is found in both lowland and montane rainforest up to 1500 m altitude, on both non-flooded and periodically flooded sites.

11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F. 649* (G IAN INPA K MBM MO RB U UB); 12.IX.1997 (fl) *Assunção, P. A. C. L. et al. 661* (INPA K MG UEC US); 25.XI.1997 (fr) *Brito, J. M. et al. 45* (INPA K MG MO NY RB SPU); 21.VI.1980 (fr) *Nelson, B. W. & Nelson, S.P. 428* (INPA); 10.II.1994 (fr) *Ribeiro, J. E. L. S. et al. 1205* (INPA K MG MO NY SP); 8.I.1962 (fr) *Rodrigues, W. & Chagas, J. 3263* (INPA); 23.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7601* (INPA); 9.XII.1994 (fl) *Sothers, C. A. et al. 298* (INPA K MG NY SP); 16.I.1998 (fr) *Souza, M. A. D. et al. 520* (BM G INPA K MBM MG UB US).

PDBFF: *Freitas et al. F-427* (INPA K); *Freitas et al. F-420* (INPA K).

Uses: This species has one of the best edible fruit of the family, and it is widely cultivated and sold on the local markets. The best varieties are to be found in western Amazonia, especially in Amazonian Peru. The cultivated form fruits as a small bush a few metres high.

Pouteria caimito is close to *P. guianensis*, but may be distinguished from it by its smaller leaves with fewer secondary veins and narrowly attenuate base (acute in *P. guianensis*), smaller flowers and usually laterally compressed seeds. Two forms of *P. caimito* exist in Reserva Ducke. The typical form has a closely appressed indumentum on the young parts and inflorescence, and the other form has a spreading, coarser indumentum on the young parts. The latter sometimes has a small 1-seeded coarsely hairy fruit. It is represented by *Sothers et al. 298*.

6.52 *Pouteria torta* subsp. ***glabra*** T. D. Penn., Fl. Neotrop. 52: 484, fig. 111. 1990.

Fig. 25 i-m

Young shoots shortly pubescent with golden-brown hairs, soon becoming glabrous. **Leaves** clustered at the shoot tips, spirally arranged, 25–35 × 9–13 cm, broadly oblanceolate with a long tapering base, apex

obtusely cuspidate to shortly and narrowly attenuate, base acute to obtuse; glabrous, or with some short pubescence along the midrib above; venation eucamptodromous, midrib not or only slightly raised on the upper surface, sometimes recessed, secondary veins 19–25 pairs, straight, parallel, intersecondaries absent, tertiaries oblique, numerous, fine quaternary reticulum visible on both surfaces. Petiole 1.5–5.5 cm long, channelled, shortly pubescent. **Fascicles** few-flowered, clustered on twigs below the leaves. Pedicel 0–2 mm long, shortly pubescent. Sepals 4, 4–10 mm long, ovate or elliptic, sericeous outside, glabrous inside. Corolla tubular, 0.7–1.3 cm long, tube exceeding the lobes, lobes 4, broadly oblong, apex rounded to truncate, often ciliate. Stamens 4, fixed about halfway up or in the upper half of the corolla tube, glabrous. Staminodes 4, 1–2 mm long, lanceolate or subulate, glabrous. Ovary ovoid, 4-locular, densely long-strigose, style exserted, style-head simple or minutely lobed. **Fruit** 3–5 cm long, ellipsoid to globose, apex obtuse to rounded, base rounded or truncate, smooth, pubescent. **Seeds** 1–4, 2–3.5 cm long, rounded at apex and base, plano-convex or sometimes slightly laterally compressed, testa smooth, shining; scar adaxial and often extending around the base, rather variable in width, up to 1 cm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 50 cm diam., larger specimens with small buttresses. Bole fluted, bark reddish brown, scaling in small papery pieces. Slash reddish-brown with sticky white latex. Flowers scented, with greenish-yellow corolla. Fruit maturing yellow or orange. Flowering in central Amazonia from October to December, fruit maturing April to May.

The Guianas and across the whole of Brazilian Amazonia to the foothills of the Andes in lowland and montane rainforest up to 1000 m altitude. It is recorded from both non-flooded and periodically flooded sites.

7.V.1958 (fr) *Coêlho, L. 2* (INPA); 5.V.1994 (fr) *Ribeiro, J. E. L. S. et al. 1310* (G INPA K); 5.IV.1966 (fr) *Rodrigues, W. & Monteiro, O. P. 7656* (INPA28.IV.1994 (fr); *Vicentini, A. et al. 517* (INPA K NY).

Pouteria torta is closely related to *P. guianensis* and their flower and fruit are very similar. They differ, however, in the details of their bark and leaf morphology. The petiole of *P. torta* subsp. *glabra* is less strongly infolded than that of *P. guianensis* and the leaves are generally larger with a finer, closed higher order vein reticulum. *Pouteria torta* subsp. *glabra* also lacks the sericeous indumentum which is often present on the lower leaf surface of *P. guianensis*.

6.53 *Pouteria hispida* Eyma, Recueil Trav. Bot. Néerl. 33: 177. 1936; Pennington, T. D., Fl. Neotrop. 52: 488, fig. 122. 1990. **Fig. 26 a-f**

Young shoots closely appressed pubescent to hispid, soon becoming glabrous. **Leaves** spirally arranged, 5–20 × 2.5–6 cm, oblanceolate, apex narrowly attenuate to rounded, base acute to narrowly attenuate, upper surface usually glabrous, lower surface shortly hispid to glabrous; venation eucamptodromous to brochidodromous, midrib slightly raised on the upper surface, secondary veins 10–15 pairs, straight or slightly arcuate, slightly convergent, intersecondaries mostly short or absent, tertiaries oblique, fine higher order reticulum present. Petiole 9–15 mm long, channelled, hispid to subglabrous. **Fascicles** mostly clustered below the leaves, 2–5-flowered. Pedicel 0–1.5 mm long, hispid to appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 4, 2–4 mm long, broadly ovate, sericeous outside. Corolla broadly tubular, 3–5 mm long, tube exceeding the lobes, lobes 4, apex rounded or truncate, often ciliate. Stamens 4, fixed in the lower or upper half of the corolla tube, glabrous, anthers absent in female flower. Staminodes 4, 0.5–1.5 mm long, subulate, glabrous, vestigial in female flower. Ovary ovoid, 4-locular, densely long-strigose, style exserted or included. **Fruit** 3.5–6 cm long, ovoid or globose, apex and base obtuse to rounded or truncate, smooth, velutinous. **Seeds** several, 2.5–3.5 cm long, ellipsoid or shaped like the segment of an orange, testa smooth, shining; scar adaxial, 2–3.5 mm wide, sometimes extending around the base of the seed. Seed without endosperm.

Field characters: Tree to 30 m high and 1 m diam., larger specimens buttressed to several metres high. Bole usually fluted, bark reddish-brown, scaling in longitudinal or irregular pieces, slash pinkish-red to orange, with sticky white latex. Flowers with greenish corolla. Fruit maturing orange to red, with thick hard flesh; there is a thin (2–3 mm) layer of sweet yellowish juicy jelly surrounding the seed. Flowering October to December, fruit maturing March to May.

Southern Central America, Venezuela and the Guianas, Amazonian Brazil, Peru and Bolivia, in lowland rainforest on non-flooded land.

12.V.1995 (fr) *Assunção, P. A. C. L. & Silva, C. F. 197* (G INPA K MBM MG R RB U US); 11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F. 645* (BM G INPA K MBM MG SPF UEC US VEN); 10.III.1998 (fr) *Assunção, P. A. C. L. et al. 813* (G INPA K MBM MG UB US); 12.XII.1969 (fr) *Monteiro, O. P. 20* (INPA); 7.I.1966 (fr) *Rodrigues, W. & Monteiro, O. P. 7381* (INPA); 29.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7635* (INPA); 15.IV.1966 (fr) *Rodrigues, W. & Coêlho, D. 7684* (INPA); 4.V.1966 (fr) *Rodrigues, W. & Coêlho, D. 7814* (INPA); 16.XII.1997 (fl) *Sothers, C. A. & Pereira, E. C. 1070* (IAN INPA K MO NY RB SP U UB VEN); 1.III.1996 (fr) *Souza, M. A. D. et al. 237* (BM IAN INPA K NY UB).

There are two forms of this species in Reserva Ducke. The first has rather small leaves with a rounded apex, and an indumentum of appressed hairs (*Assunção & Silva 197*). The second has larger leaves with an attenuate apex and an indumentum of erect 2-branched hairs (*Souza et al. 237*). They are not recognized as distinct species due to the numerous intermediates found in other areas. *Pouteria hispida* is close to *P. torta*, but may be distinguished from it by the leaf size and/or shape and the indumentum difference, and the smaller flowers.

6.54 *Pouteria decorticans* T. D. Penn., Fl. Neotrop. 52: 489, fig. 112. 1990. **Fig. 26 g-l**

Young shoots finely appressed puberulous with pale hairs, soon glabrous and scaling in thin papery sheets. **Leaves** clustered at the shoot tips, spirally arranged, 14–20 × 5–8 cm, oblanceolate, apex narrowly acuminate to caudate, base narrowly attenuate, glabrous above, fine pale appressed hairs below, mostly confined to the midrib and veins; venation eucamptodromous, midrib slightly raised on the upper surface; secondary veins 14–18 pairs, mostly straight and parallel, intersecondaries absent, tertiaries oblique, quaternary reticulum present. Petiole 1.5–3.5 cm long, channelled, subglabrous. **Fascicles** axillary and clustered below the leaves, 2–4-flowered. **Flowers** sessile. Sepals 4, 6–7 mm long, broadly ovate or elliptic, appressed pubescent on the outer surface. Corolla broadly tubular, 1–1.1 cm long, tube exceeding the lobes, lobes 4, broadly oblong, glabrous. Stamens 4, fixed in the upper half of the corolla tube, glabrous. Staminodes 4, *ca.* 2 mm long, narrowly lanceolate, glabrous. Ovary ovoid, 4-locular, densely stiff-hairy, style exserted from the flower bud, later included. **Fruit** 3–3.5 cm long, broadly ellipsoid, apex and base obtuse, smooth, appressed puberulous with pale hairs. **Seeds** several, 1.8–2 cm long, oblong to ellipsoid, often plano-convex, testa smooth, shining; scar adaxial and extending around the base, *ca.* 2 mm wide. Seed without endosperm.

Field characters: Tree to 25 m high and 35 cm diam., unbuttressed or larger specimens with small buttresses to 50 cm high, bole fluted or irregular in section, bark reddish-brown, exfoliating profusely in large irregular papery pieces, slash *ca.* 2 mm, orange, pink or cream, with sticky white latex. Flowers with greenish-white corolla, and fruit maturing yellow or pale orange. Flowering in central Amazonia in July, fruit maturing in November.

Venezuela and the Guianas, across Brazilian Amazonia to Rondônia, where it occurs in non-flooded rainforest up to 500 m altitude.

Not collected in Reserva Ducke.

PDBFF: *Lepsch Cunha et al. 220a* (INPA K); *Freitas et al. 314* (INPA K); *Ferreira et al. PDBFF 3402.4510* (INPA K).

Although closely related to *P. torta* and other species of this group, *P. decorticans* has a distinctive appearance both in the field and

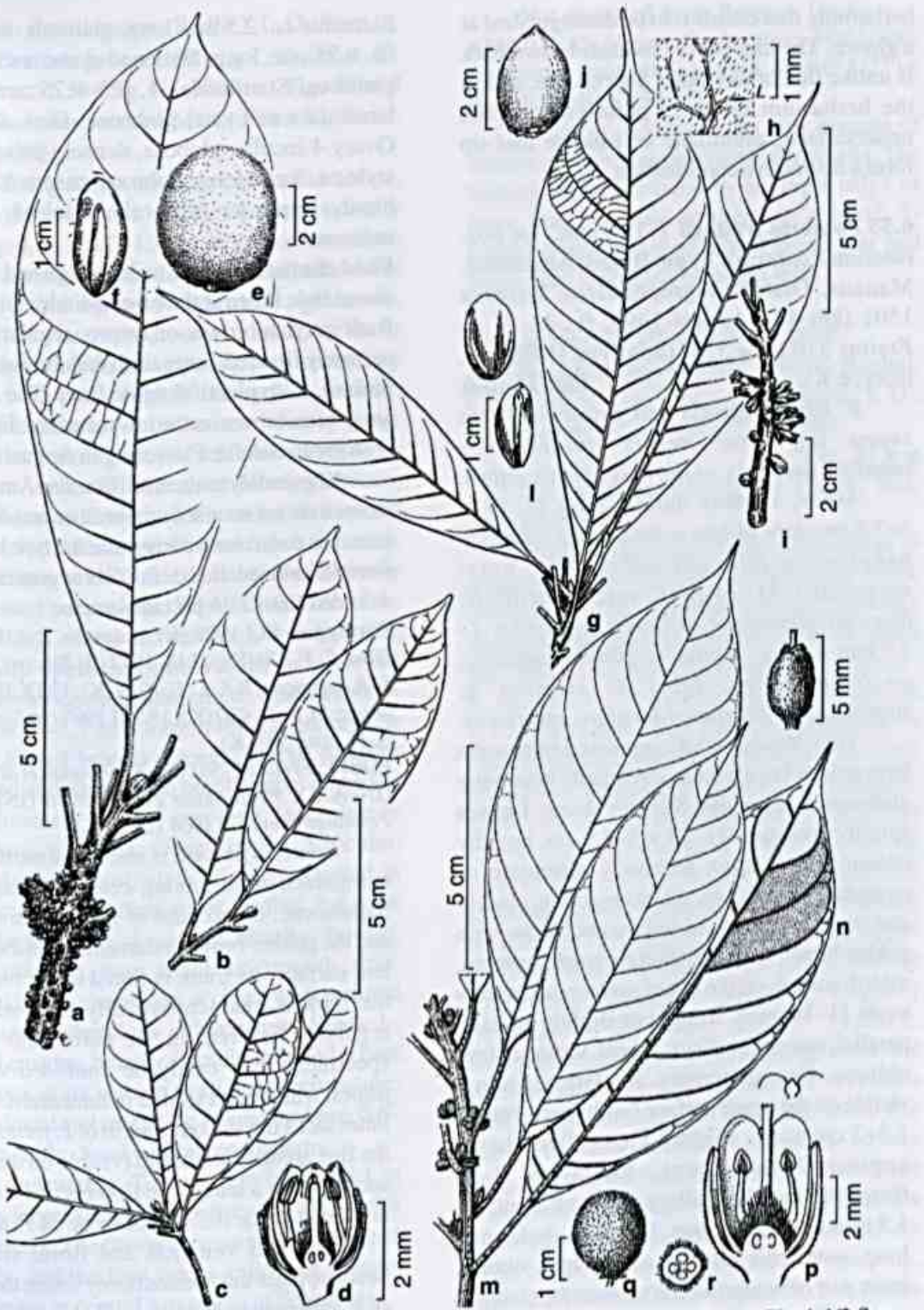

Figura 26 - a-f. *Pouteria hispida* - a. habit (*FDBG 7551*); b. habit (*Blanco 72*); c. habit (*Blanco 78*); d. 1/2 flower (*Marcano-Berti 261*); e. fruit; f. seed (*Diaz et al. 1058*). g-l. *Pouteria decorticans* - g. habit; h. detail of indumentum (*Boom & Mori 1970*); i. inflorescence (*Black et al. 57-19964*); j. fruit; l. seed (*Mori & Pipoly 15409*). m-q. *Pouteria freitasii* - m. habit; n. indumentum on leaf lower surface (*Ribeiro 1919*); o. flower bud; p. 1/2 flower (*Freitas 510*); q. young fruit; r. section of ovary (*Souza 508*).

herbarium, that enable it to be distinguished at a glance. The thin papery reddish-brown bark is unlike that of any other Sapotaceae, and in the herbarium the long petioles and pale undersurface, acuminate or caudate leaf tip form a distinctive combination.

6.55 *Pouteria freitasii* T. D. Penn., *sp. nov.* (section *Pouteria*). **Type**: Brazil, Amazonas, Manaus, Distrito Agropecuário, Reserva 1501 (km 41), August 1990, fl., *M. A. de Freitas 510* (tree 324) (holotype INPA *n.v.*, isotype K). **Fig. 26 m-q**

P. filipes *affinis sed foliorum costa supra impressa, nervis quaternariis subtiliter areolatis, et floribus magnis differt.*

Arbor; stipulae nullae; folia 11–19 × 5–7.5 cm, late oblanceolata, infra adpresse pubescentia pilis chrysobrunneis; nervi secundarii 11–14-jugi, recti, paralleli; fasciculi plerumque axillares; pedicellus 1–1.5 mm longus; sepala 4; corolla tubularis, ca. 6 mm longa, lobis 4; stamina 4; staminodia 4; ovarium 4-loculare, pubescens.

Tree. Young shoots appressed pubescent with golden brown hairs, eventually becoming glabrous, pale greyish. Stipules absent. **Leaves** spirally arranged, 11–19 × 5–7.5 cm, broadly oblanceolate, apex narrowly attenuate or cuspidate, base acute, glabrous above, closely and densely appressed pubescent below with golden-brown hairs; venation eucamptodromous, midrib sunken on the upper surface, secondary veins 11–14 pairs, straight or slightly arcuate, parallel, intersecondaries absent, tertiaries few, oblique, fine quaternary areolate reticulum visible on the upper surface (with lens). Petiole 1.3–3 cm long, slightly channelled above, appressed pubescent. **Fascicles** 3–5-flowered, mostly axillary. Pedicel stout, 1–1.5 mm long, sericeous. Sepals 4, 4–4.5 mm long, outer pair broadly ovate, apex obtuse, inner pair orbicular; sericeous outside, glabrous inside. Corolla tubular, *ca.* 6 mm long, tube exceeding the lobes, lobes 4, *ca.* 1.5 mm long, apex truncate, not ciliate, glabrous. Stamens 4, fixed in the lower half of the corolla tube, filaments *ca.* 2.5 mm long, glabrous, anthers *ca.* 0.75 mm long, flattened dorso-ventrally, glabrous. Staminodes 4, 0.5–0.75 mm long lanceolate to ovate, glabrous. Disk absent. Ovary 4-locular, globose, densely pubescent, style *ca.* 3 mm long, glabrous, exserted, style-head simple or minutely 4-lobed. Fruit unknown.

Field characters: Tree to 30 m high and 70 cm diam., bole fluted at the base, cylindrical above. Bark greyish-brown, or brown, regularly and narrowly fissured, outer slash dark brown, inner pinkish, with plentiful white latex. The leaves are golden-brown on the lower surface. Flowers with green corolla. Flowering in August.

Known only from central Brazilian Amazonia, where it occurs in mixed rainforest on non-flooded sites. It is particularly common at the type locality were 48 individuals (10 cm DBH or greater) were recorded from a 25 hectare sample.

Paratypes: 14.I.1998 (fr) *Assunção, P. A. C. L. & Silva, C. F. 770* (K); 23.IX.1997 (fl) *Ribeiro, J. E. L. S. & Assunção, P. A. C. L. 1919* (K); 19.IX.1997 (fl) *Souza, M. A. D. 420* (K); 18.XII.1997 (fr) *Souza, M. A. D. et al. 508* (K).

PDBFF: *Freitas F-503* (K); *Pennington et al. 12649* (INPA K); *Pennington et al. 12940* (INPA K); *Pennington et al. 13004* (INPA K).

Pouteria freitasii is one of the most easily recognized trees among central Amazonian Sapotaceae, on account of its distinctive bole and the golden-brown indumentum on the lower leaf surface. Its trunk is fluted at the base and the bark is characteristically narrowly and regularly fissured. In the herbarium sterile specimens may easily be confused with *P. filipes*, which has a similar indumentum, but the latter lacks the sunken midrib of *P. freitasii* and the fine areolate reticulum (visible on the upper surface with a lens). The flowers of *P. reitasii* are about twice the size of those of *P. filipes*.

The leaf venation and floral size and structure place this species firmly within the group of *P. guianensis*, *P. hispida*, *P. decorticans*, but it differs from all of these in the characteristic reddish-brown indumentum of the young shoots, leaves and inflorescence, in the sunken midrib of the leaves and in the finely areolate venation.

Section *Aneulucuma* (Radlk.) T. D. Penn.

6.56 *Pouteria procera* (Mart.) T. D. Penn., Fl. Neotrop. 52: 504, fig. 116. 1990. **Fig. 27 a-d**

Lucuma procera Mart., Flora 22, Beibl. 1: 57. 1839.

Young shoots minutely puberulous at first, soon glabrous and scaling. **Leaves** spirally arranged, 6–12 × 2–4.5 cm, elliptic or lanceolate, apex narrowly attenuate or acuminate, base shortly and narrowly attenuate, glabrous; venation eucamptodromous, midrib flat or slightly raised on the upper surface, secondary veins 9–15 pairs, slightly convergent, arcuate, intersecondaries short to moderately long, tertiaries forming a loose reticulum. Petiole 5–12 mm long, slightly channelled, glabrous. **Fascicles** axillary and on twigs below the leaves, 3–12-flowered. Pedicel 0.5–2 mm long, sometimes with 1–2 small bracts, sparsely appressed puberulous. Sepals 5–6, outer 1.5–2 mm long, inner 3–3.5 mm long, broadly ovate, sparsely appressed puberulous or glabrous outside, sericeous inside; ciliate. Corolla shortly tubular, 3–5.5 mm long, tube exceeding the lobes, lobes 5, broadly oblong, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous. Staminodes 5, 0.5–1.5 mm long, lanceolate or subulate, glabrous. Ovary ovoid, 5-locular, densely pubescent, style slightly exserted in flower bud, equalling or exceeding the open corolla. **Fruit** 3.5–4 cm long, broadly obovoid, apex rounded, base attenuate, smooth, thin-walled (often shrinks on drying), with residual appressed puberulous indumentum. **Seeds** 1–2, 2–3 cm long, broadly ellipsoid, rounded at base and apex, testa smooth to slightly verruculose; scar adaxial and extending around the base, 0.6–1.2 cm wide. Seed without endosperm.

Field characters: Tree to 45 m high and 1 m diam., larger specimens buttressed. Slash with white latex. The flowers have a yellowish green corolla, and the fruit ripens yellow or orange. Flowering in central Amazonia in February.

Venezuela, Brazilian Amazonia to Peru and Bolivia, coastal Brazil. It occurs in lowland rainforest, frequently on periodically flooded land (restinga alta).

Not recorded from Reserva Ducke

AMAZONAS: Manaus, Careiro, *Fróes 24061* (NY); Amazonas, mouth of R. Embira, *Krukoff 5177* (A BM F K M MO NY RB US).

Pouteria procera is the only species of section *Aneulucuma* in central Amazonia. The section is characterized by having a calyx of more than 5 sepals arranged in a spiral, 5-locular ovary and seed with a broad scar and frequently verrucose or pitted testa.

Section *Gayella* (Pierre) T. D. Penn.

6.57 *Pouteria eugeniifolia* (Pierre) Baehni, Candollea 9: 218. 1942; Pennington, T. D., Fl. Neotrop. 52: 527, fig. 124. 1990. **Fig. 27 e-g**

Micropholis eugeniifolia Pierre, Not. Bot. 40. 1891.

Young shoots appressed puberulous to sericeous with reddish-ferrugineous hairs, soon glabrous. **Leaves** spaced, usually opposite, but often variable on the same shoot and then some spirally arranged, 4–10 × 2–8 cm (leaves on sterile specimens may be 1.5–2 times this size), lanceolate, elliptic or oblong-elliptic, apex acute to attenuate, base narrowly attenuate, acute or rounded, glabrous or some reddish-ferrugineous appressed indumentum restricted to the midrib and veins below, often slightly glaucous below; venation brochido-dromous, midrib flat or slightly sunken on the upper surface, secondaries 15–18 pairs, widely spreading, straight, parallel, slightly impressed on the upper surface, intersecondaries long, extending from the submarginal loops to the midrib, tertiaries reticulate, tending to descend from the margin towards the midrib. Petiole 5–10 mm long, not channelled, appressed puberulous with reddish-ferrugineous hairs. **Fascicles** 5–10-flowered, axillary and clustered on twigs below the leaves. Pedicel 4–5 mm long, appressed puberulous. Sepals 5, 1–1.5 mm long, ovate or triangular, puberulous outside. Corolla rotate, 2–2.5 mm long, tube shorter than the lobes, lobes 5, lanceolate, apex acute, appressed pubescent outside, glabrous

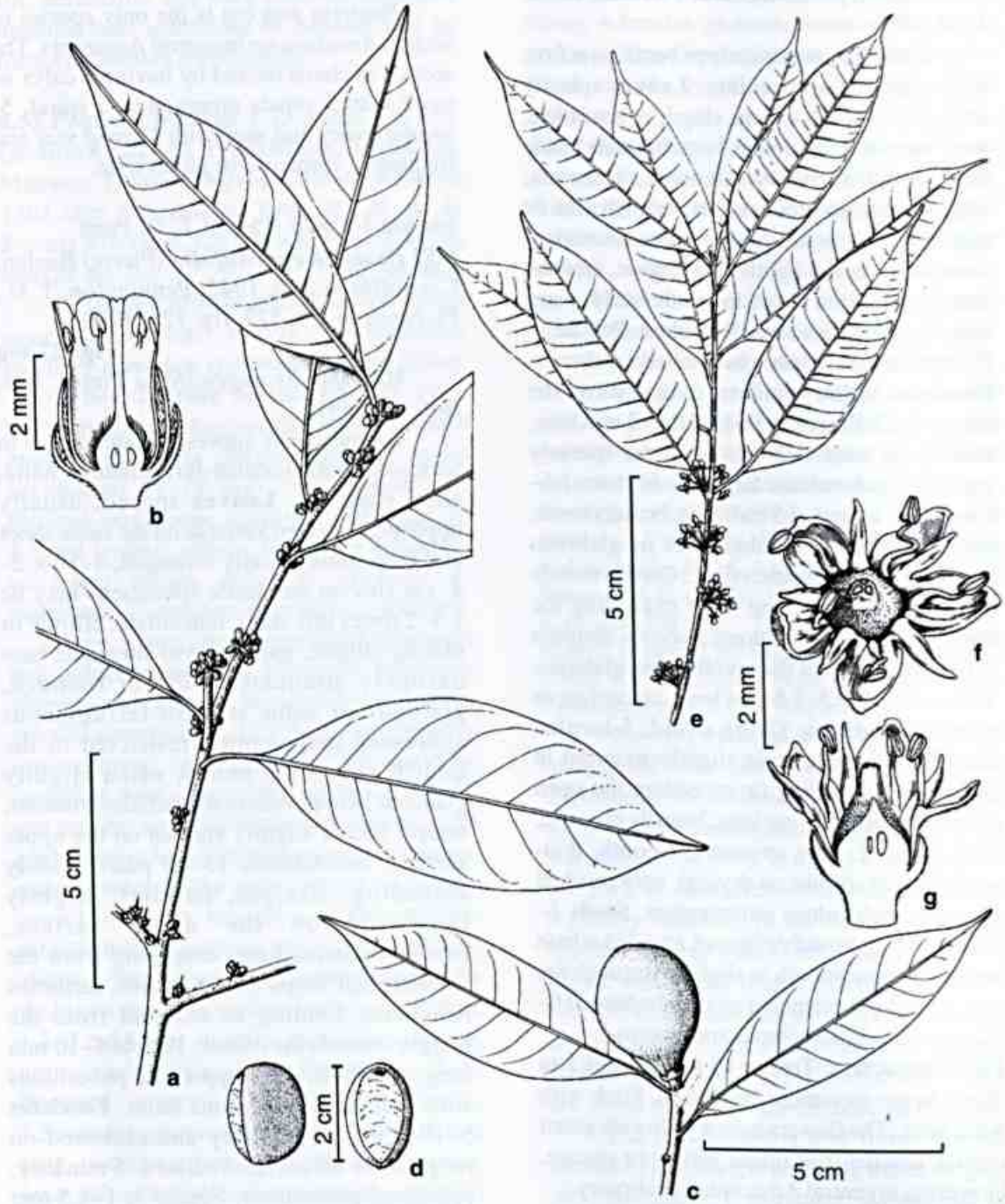

Figura 27 - a-d. *Pouteria procera* - a. habit (*Pinheiro 328*); b. 1/2 flower (*Santos 378*); c. habit with fruit (*Steyermark et al. 101941*); d. seed (*Curran 25*). e-g. *Pouteria eugeniifolia* - e. habit (*Silva & Bahia 3093*); f. flower; g. 1/2 flower (*Maguire & Politi 28742*).

inside. Stamens 5, fixed at the top of the corolla tube, exserted, glabrous. Staminodes 5, 1.5–2 mm long, narrowly lanceolate, or subulate, glabrous. Ovary ovoid, 4–5-locular, appressed puberulous, style glabrous. **Fruit** 1.5–2 cm long, subglobose, apex rounded, base rounded or tapered, smooth, appressed puberulous with ferrugineous hairs. **Seed** solitary, 1–1.3 cm long, broadly ellipsoid, testa smooth; scar adaxial, 3–5 mm broad. Seed without endosperm.

Field characters: Tree to 40 m high and 60 cm diam., larger specimens with simple or branched steep buttresses merging into a fluted bole, upper bole usually cylindrical. The buttresses sometimes run several metres from the trunk. Bark reddish-brown, scaling in large irregular pieces. Slash reddish-brown, with cream or cream-brown sticky latex. Flowers pale green, fruit brown. Flowering in central Amazonia recorded in May and September.

Colombia, Venezuela and the Guianas and Amazonian Brazil. It occurs in non-flooded rainforest up to an altitude of 1000 m. 9.IX.1994 (fl) *Assunção, P. A. C. L. 49* (INPA K MG MO NY R RB SP U); 21.V.1997 (fl) *Sothers, C. A. 990* (BM G IAN INPA K MBM UB UEC US).

Pouteria eugeniifolia is the only species of section *Gayella* in central Amazonia and is characterized by its rotate pentamerous flowers with exserted stamens. In the field it is distinctive because of the opposite (decussate) leaves which are usually glaucous below.

7. Chrysophyllum

Chrysophyllum L., Sp. Pl. 192. 1753; Cronquist, A. J. Bull. Torrey Bot. Club 72: 191. 1945; 73: 286. 1946.

Unarmed **trees**. Stipules absent. **Leaves** alternate and distichous or spirally arranged. Venation brochidodromous or eucamptodromous, tertiary veins parallel to the secondaries and descending from the margin, or oblique and closely parallel or reticulate. **Inflorescence** axillary or ramiflorous. **Flowers** unisexual or bisexual. Calyx a single whorl of 5 sepals, sometimes accrescent in fruit. Corolla globose, campanulate or cylindrical, tube shorter than, equalling or longer than the lobes, lobes 5, simple. Stamens 5, fixed in the lower or upper part of the corolla tube, included; anthers hairy or glabrous. Staminodes absent (minute staminodes present in *C. pomiferum* and *C. durifructum*). Ovary (2–)5-locular, style included. **Fruit** 1–5-seeded. **Seed** laterally compressed and with a narrow adaxial scar, or not laterally compressed and then the scar broader, basi-ventral or adaxial; testa smooth and shining, or rough and then adherent to the pericarp; embryo with thin, foliaceous or thick flat cotyledons and exserted radicle; endosperm abundant.

Forty three species in the Neotropics, *ca.* 15 in Africa, *ca.* 10 in Madagascar and 2–3 in Asia and the Pacific. Eleven species in Reserva Ducke and environs.

Key to the species of *Chrysophyllum* of the Manaus area

1. Leaves alternate and distichous, venation mostly brochidodromous, seed scar broad, basiventral.
   2. Corolla sericeous; stamens fixed at the apex of the corolla tube, anthers glabrous ..... 1. *C. argenteum*
   2. Corolla more or less glabrous; stamens fixed in lower half of the corolla tube, anthers hairy ..... 2. *C. sparsiflorum*
1. Leaves spirally arranged, venation eucamptodromous, seed scar narrow, adaxial, sometimes extending around the base of seed.
   3. Seed coat rough, not shining, adherent to the pericarp.
      4. Leaves broadly oblanceolate or obovate, persistently rufous-brown sericeous below, secondary veins 7–14 pairs ..... 8. *C. prieurii*
      4. Leaves narrower, not rufous-brown sericeous, secondary veins often more than 14 pairs.

5. Indumentum of young parts and lower leaf surface crisped or spreading, not appressed, secondary veins straight ..... 7. *C. manaosense*
5. Indumentum of young shoots and lower leaf surface appressed, secondary veins slightly arcuate.
6. Leaves 16–26 cm long, secondary veins 13–21 pairs, petiole 2–4.5 cm long, fruit 4.5–5 cm long, rough-skinned, without lenticels ..... 6. *C. colombianum*
6. Leaves 9.3–17.5 cm long, secondary veins 10–13 pairs, petiole 1–2.2 cm long, fruit 3–4.5 cm long, smooth, lenticellate ..... 5. *C. amazonicum*

3. Seed coat smooth, shining, free from pericarp.
7. Sepals usually accrescent in fruit; seed scar adaxial and extending around the base.
8. Leaf indumentum closely appressed or leaves glabrous ..... 3. *C. sanguinolentum*
8. Leaf indumentum tomentose with ferugineous spreading hairs ..... 4. *C. ucuquirana-branca*
7. Sepals not accrescent in fruit; seed scar adaxial, not extending around the base.
9. Young shoots, leaves and inflorescence densely golden or ferrugineous-tomentose with spreading hairs ..... 13. *C. eximium*
9. Young shoots, leaves and inflorescence with closely appressed pubescence or glabrous.
10. Corolla tube shorter than the lobes ..... 11. *C. lucentifolium*
10. Corolla tube equalling or exceeding the lobes.
11. Leaves mostly less than 10 cm long, venation mostly brochidodromous, secondary veins 7–10 pairs, petiole 3–7 mm long ..... 9. *C. pomiferum*
11. Leaves 11–28 cm long, venation eucamptodromous, secondary veins 11–16 pairs, petiole 2–4 cm long.
12. Leaves 13–28 × 6–12 cm, secondary veins slightly convergent, tertiary veins reticulate, sepals glabrous, staminodes present ..... 10. *C. durifructum*
12. Leaves 11–15 × 4.5–6 cm, secondary veins parallel, tertiary veins oblique, sepals sericeous inside, staminodes absent ..... 12. *C. wilsonii*

Section *Chrysophyllum*

7.1 *Chrysophyllum argenteum* Jacq., Enum. Syst. Pl. 15. 1760; Pennington, T. D., Fl. Neotrop. 52: 543, fig. 126. 1990. **Fig. 28 a-d**

Young shoots sericeous, with golden-brown hairs, soon glabrous. **Leaves** alternate and distichous, 8–15 × 4–6 cm, broadly oblong or elliptic, apex obtusely cuspidate or narrowly attenuate, base acute to rounded, glabrous above, golden sericeous to subglabrous below; venation mostly brochidodromous, midrib sunken on the upper surface, secondary veins 10–16 pairs, parallel, straight or slightly arcuate, not impressed or raised on the upper surface, intersecondaries often long, tertiaries more or less parallel to the secondaries and descending from the margin, eventually forming a lax reticulum. Petiole 1–1.5 cm long, channelled, sericeous. **Fascicles** axillary, 5–10-flowered. Pedicel 3–5 mm long, sericeous. **Flowers** bisexual. Sepals 1.5–2 mm long, sericeous outside. Corolla 4–5 mm long, tubular, tube much longer than the lobes, sericeous outside. Stamens fixed at the top of the corolla tube, glabrous. Ovary 5-locular, appressed puberulous, style-head conspicuously 5-lobed. **Fruit** 1–2.5 cm long, ellipsoid, apex and base acute to rounded, smooth, glabrous, fleshy. **Seed** solitary, 0.8–2 cm long, ellipsoid, slightly laterally compressed, testa smooth, shining; scar broad, basi-ventral.

Field characters: Tree to 30 m high and 50 cm diam., but often flowering when only a few metres high. Large specimens have small rounded buttresses. Bark fissured, greyish, with pink or reddish slash and copious sticky white latex. Flowers pale greenish-cream and fruit ripening purplish-black. Flowering in central Amazonia mostly July to September, fruit ripening November to April.

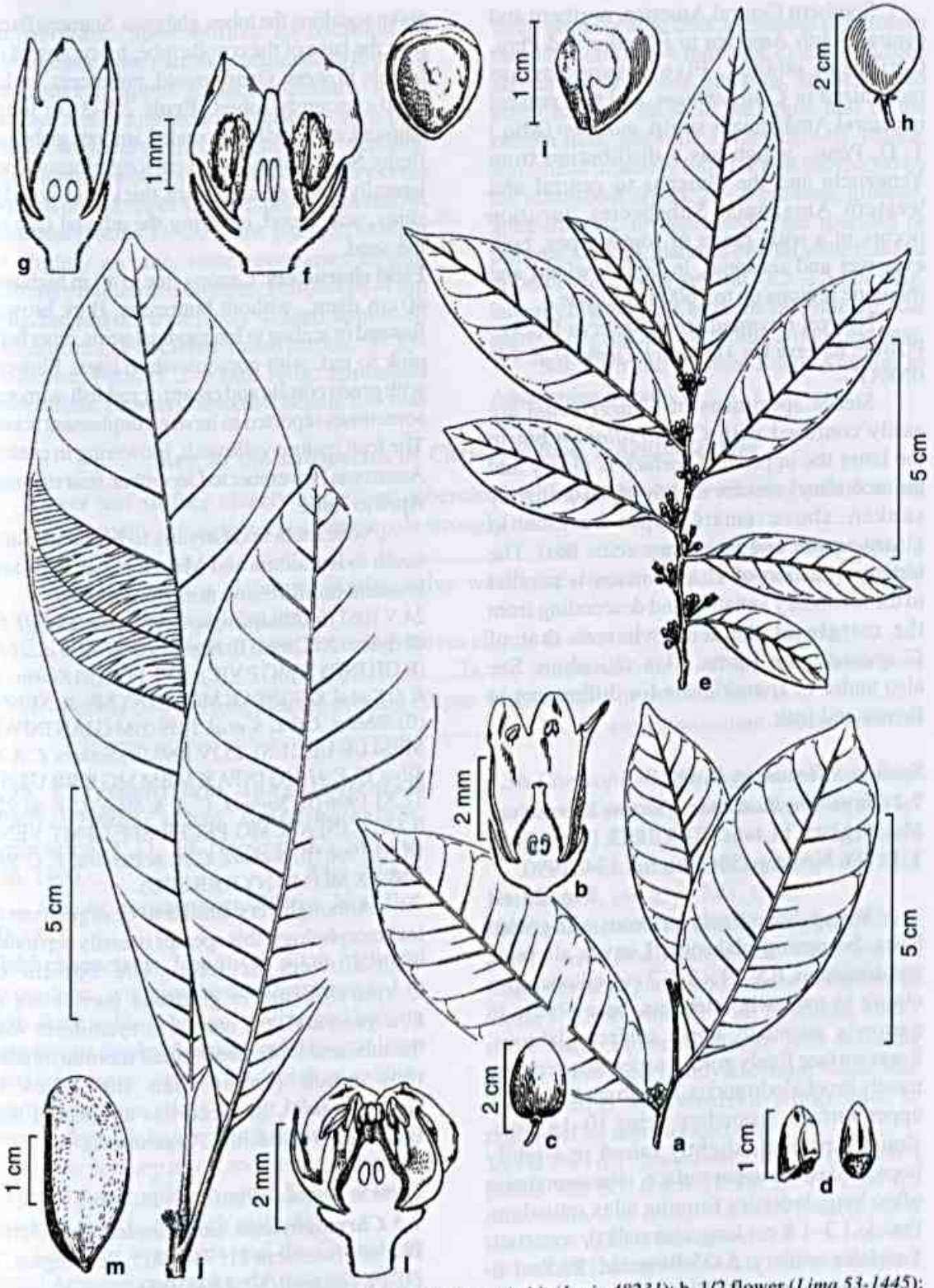

Figura 28 - a-d. *Chrysophyllum argenteum* subsp. *auratum* - a. habit (*Irwin 48231*); b. 1/2 flower (*Lima 53-1445*); c. fruit; d. seed (*Bruijn 1389*). e-i. *Chrysophyllum sparsiflorum* - e. habit; f. 1/2 male flower (*Delascio & Liesner 7075*); g. female flower (*Aristeguieta & Labbiente 7313*); h. fruit; i. seed (*Bahia 50*). j-m. *Chrysophyllum colombianum* - j. habit; l. 1/2 flower (*Castenada 4855*); m. seed (*Pennington & Poveda 11451*).

Southern Central America, northern and central South America to Ecuador and Peru, Caribbean islands. Five subspecies are recognized in *C. argenteum*, and that present in central Amazonia is subsp. *auratum* (Miq.) T. D. Penn., which has a distribution from Venezuela and the Guianas to central and western Amazonia. Subspecies *auratum* occurs in a wide range of forest types, both ever wet and seasonal, in both lowland and montane regions up to 1600 m altitude.

Not yet recorded from Reserva Ducke. PDBFF: Reserva km 41, *Lepsch Cunha et al. 740* (INPA K).

Sterile specimens of *C. argenteum* are easily confused with *C. sparsiflorum* but in the latter the upper leaf surface is glossy and the secondary veins are slightly raised or slightly sunken above (matt upper surface in *C. argenteum* and secondary veins flat). The tertiary venation of *C. argenteum* is parallel to the secondary venation and descending from the margin of the leaf, whereas that of *C. sparsiflorum* forms a lax reticulum. See also under *C. sparsiflorum* for differences in flower and fruit.

Section *Villocuspis* A. DC.

7.2 *Chrysophyllum sparsiflorum* Klotzsch *ex* Miq. *in* Mart., Fl. bras. 7: 90. 1863; Pennington, T. D., Fl. Neotrop. 52: 580, fig. 134. 1990.

Fig. 28 e-i

Young shoots finely sericeous with golden hairs, becoming glabrous. **Leaves** alternate and distichous, 6.5–14 × 2.8–7 cm, elliptic, apex obtuse to narrowly attenuate, base obtuse to narrowly attenuate, upper surface glabrous, lower surface finely golden sericeous; venation mostly brochidodromous, midrib sunken on the upper surface, secondary veins 10–14 pairs, straight, parallel, slightly raised or slightly impressed on the upper surface, intersecondaries often long, tertiaries forming a lax reticulum. Petiole 1.3–1.8 cm long, channelled, sericeous. **Fascicles** axillary, 5–25-flowered. Pedicel 6-10 mm long, sericeous. **Flowers** unisexual (plant dioecious). Sepals 1–1.5 mm long, sericeous outside. Corolla cyathiform, 3.5–4 mm long, tube about equalling the lobes, glabrous. Stamens fixed near the base of the corolla tube, hairy; absent in female flowers. Ovary ovoid, pubescent, style-head obscurely lobed. **Fruit** 2.5–3 cm long, ellipsoid, apex and base rounded, smooth, glabrous, fleshy. **Seed** solitary, 2–2.3 cm long, ellipsoid, not laterally compressed, testa thick and woody, shiny; scar broad, covering the adaxial face of the seed.

Field characters: Canopy tree to 40 m high and 40 cm diam., without buttresses. Bark brown, fissured or scaling in longitudinal strips, inner bark pink to red, with copious white latex. Flowers with green corolla and cream or reddish stamens, sometimes reported to have an unpleasant scent. The fruit mature yellowish. Flowering in central Amazonia November to December, fruit ripening April to June.

Venezuela and Guyana to Maranhão and south to Rondônia and Mato Grosso, in mixed lowland rainforest on non-flooded land.

24.V.1967 (fr) *Albuquerque, B. W. P. de & Elias, J. 61* (INPA); 6.XII.1996 (fl) *Hopkins, M. J. G. et al. 1614* (B GH INPA K MG P VIC); 4.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 829* (INPA K MG MO NY SP); 19.XI.1996 (fl) *Ribeiro, J. E. L. S. et al. 1859* (BM G IAN INPA K MBM UB UEC US); 25.IV.1995 (fr) *Sothers, C. A. & Silva, C. F. 410* (G INPA K MBM MG R RB U US); 12.XI.1996 (fl) *Sothers, C. A. & Silva, C. F. da 927* (COL F INPA K MG PEUFR SPF UFMT VEN); 18.XI.1996 (fl) *Sothers, C. A. & Pereira, E. C. 932* (INPA K MG MO NY R RB SP U).

Although very similar to *C. argenteum* in leaf morphology, this species is easily separated with flowers or fruit. The corolla of *C. sparsiflorum* is glabrous (sericeous in *C. argenteum*), the corolla is cyathiform with the tube and lobes about equal (corolla tubular, tube much longer than the lobes in *C. argenteum*), the seed has an adaxial scar (scar basi-ventral in *C. argenteum*).

Section *Ragala* (Pierre) T. D. Penn.

7.3 *Chrysophyllum sanguinolentum* (Pierre) Baehni, Boissiera 11: 74. 1965; Pennington, T. D., Fl. Neotrop. 52: 583. 1990.

Young shoots finely appressed puberulous, becoming glabrous. **Leaves** spirally arranged, 12.5–30–6 × 15 cm, broadly elliptic, oblong-elliptic

or obovate, apex obtuse to rounded or emarginate, base narrowly attenuate to rounded or truncate, upper surface glabrous, lower surface finely appressed puberulous with pale brown to silvery hairs, or glabrous; venation eucamptodromous, midrib and secondary veins sunken on the upper surface, prominent below, secondary veins 11–20 pairs, parallel, straight or slightly arcuate, intersecondaries absent, tertiaries numerous, oblique. Petiole 0.8–4 cm long, flat and often narrowly winged, appressed puberulous. **Fascicles** ramiflorous, 5–15-flowered. Pedicel 2–6 mm long, appressed puberulous. **Flowers** bisexual. Sepals 2–3 mm long, accrescent in fruit, appressed puberulous outside. Corolla 3–4 mm long, cyathiform, tube shorter than the lobes, glabrous. Stamens fixed about halfway up or in the upper half of the corolla tube, glabrous. Ovary densely villose, style-head minutely lobed. **Fruit** subtended by the accrescent sepals, 2.5–6 cm long, globose, apex truncate or depressed, base rounded or truncate, smooth, glabrous or with some residual pubescence. **Seeds** several, 1.5–2.5 cm long, laterally compressed, testa smooth, shining; scar narrow, adaxial and extending around the base.

Northern and western South America to Amazonian Brazil.

Key to the subspecies of *Chrysophyllum sanguinolentum*

1. Lower leaf surface closely appressed puberulous with pale brown or silvery hairs; fruiting calyx usually strongly accrescent (sepals strongly thickened, *ca.* 1 × 1.5 cm) ..... 3c. *C. sanguinolentum* subsp. *balata*
1. Lower leaf surface glabrous; fruiting calyx weakly accrescent (sepals not or only weakly thickened, less than 1 cm long.
   2. Petiole usually less than 2 cm long, leaves elliptic to obovate, base usually tapered ..... 3a. *C. sanguinolentum* subsp. *sanguinolentum*
   2. Petiole 2–4 cm long, leaves broadly elliptic with rounded or truncate base ..... 3b. *C. sanguinolentum* subsp. *spurium*

7.3a *Chrysophyllum sanguinolentum* (Pierre) Baehni subsp. ***sanguinolentum;*** Pennington, T. D., Fl. Neotrop. 52: 583, fig. 136. 1990. **Fig. 29 a-b**

Ragala sanguinolenta Pierre, Not. Bot. 60. 1891.

Field characters: Tree up to 40 m high and 60 cm diam., with simple, stout buttresses to 1 m high. Bark reddish-brown, scaling and leaving conspicuous dipples, the scales exfoliating to leave a reddish-orange surface. Slash pink or reddish, exuding copious sticky white latex. Flowers greenish, fruit pale brown, rough skinned; the inner layer of the pericarp is soft and fleshy. Flowering in central Amazonia in August. The fruit takes about six months to reach maturity.

Southern Venezuela and the Guianas to central Amazonian Brazil and Amazonian Peru. A frequent tree in non-flooded forest.

1.VII.1993 (fl) *Ribeiro, J. E. L. S. et al. 968* (INPA K MG MO NY RB SP).

PDBFF: *da Silva PDBFF1301.626.2.*

7.3b *Chrysophyllum sanguinolentum* subsp. ***spurium*** (Ducke) T. D. Penn., Fl. Neotrop. 52: 585, fig. 136. 1990. **Fig. 29c-e**

Ecclinusa spuria Ducke, Bull. Mus. Hist. Nat. (Paris), sér. 2, 4: 743. 1932.

Field characters: Tree to 35 m high and 50 cm diam., with small buttresses. Bark brown, scaling in large plates and leaving conspicuous dipples. Slash pinkish with abundant sticky white latex. Flowers whitish, fruit maturing brown. Flowering in July in central Amazonia.

Central and western Amazonia, in rainforest on non-flooded sites.

26.VII.1994 (fl) *Nascimento, J. R. et al. 549* (INPA K MG MO NY R RB SP U); 26.VII.1994 (fl) *Nascimento, J. R. et al. 550* (G IAN INPA K MBM UB US); 5.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 858* (INPA K MG MO NY SP); 4.XII.1993 (fr) *Vicentini, A. & Assunção, P. A. C. L. 385* (K).

7.3c *Chrysophyllum sanguinolentum* subsp. ***balata*** (Ducke) T. D. Penn., Fl. Neotrop. 52: 587, fig. 136. 1990. **Fig. 29 f-h**

Ecclinusa balata Ducke, Rev. Int. Bot. Appl. Agric. Trop. 10: 850. 1930; Trop. Woods 31: 19. 1932.

Field characters: Tree to 40 m high and 60 cm diam., with small buttresses. Bark greyish-brown, scaling and leaving conspicuous dipple marks. Slash reddish with copious sticky white latex. Flowers cream-coloured, fruit maturing pale brown. Flowering April to July, fruit maturing in December.

Central Amazonian Brazil to Amazonian Colombia and Peru and north to Venezuela and Guyana. In Reserva Ducke in non-flooded forest but elsewhere frequently collected on periodically flooded sites.

14.VIII.1993 (fr) *Ribeiro, J. E. L. S. et al. 1151* (INPA K MG MO NY SP); 4.XII.1993 (fr) *Vicentini, A. & Assunção, P. A. C. L. 379* (INPA K MG RB U).

7.4 *Chrysophyllum ucuquirana-branca* (Aubrév. & Pellegr.) T. D. Penn., Fl. Neotrop. 52: 589, fig. 137. 1990. **Fig. 29 i-j**

Ecclinusa ucuquirana-branca Aubrév. & Pellegr., Adansonia 1: 23. 1961.

Young shoots ferrugineous-brown tomentose, becoming glabrous, and with prominent leaf and inflorescence scars. **Leaves** spirally arranged, 13.5–24 × 7.5–11 cm, broadly elliptic, apex shortly attenuate to rounded, base rounded or obtuse, slightly decurrent, upper surface glabrous, lower surface uniformly crisped tomentose with ferrugineous hairs; venation eucamptodromous, midrib and secondary veins sunken on the upper surface, very prominent below, secondaries 13–21 pairs, parallel, slightly arcuate, intersecondaries absent, tertiaries numerous, oblique. Petiole 1.5–2.5 cm long, flat and narrowly winged, puberulous. **Fascicles** ramiflorous, 10–20-flowered. Pedicel 1–2 mm long, tomentose. **Flowers** unisexual (plant dioecious). Sepals 5–6 mm long, accrescent and thickened in fruit to 1.5 × 1.5 cm, ferrugineous tomentose outside. Corolla (male) 5–6 mm long, lobes much longer than the tube, glabrous, (female) *ca.* 4 mm long. Stamens fixed near the top of the corolla tube, glabrous, absent in female flowers. Ovary densely villose, style-head minutely lobed. **Fruit** subtended by the persistent accrescent calyx, 4.5–5 cm long, globose, apex depressed, densely rufous-villose. **Seeds** several, *ca.* 2 cm long, laterally compressed, testa smooth, shiny; scar adaxial and extending around the base of the seed, *ca.* 2 mm broad.

Field characters: Tree to 30 m high and 45 cm diam., larger specimens with small buttresses. Bark dark brown, scaling and leaving dipple marks which are lenticellate. Slash reddish-brown, with abundant sticky milky latex. Flower pale green, fruit matures reddish. Flowering in central Amazonia July to November, fruit maturing in March.

Central and northern Amazonian Brazil to southern Venezuela, in rainforest on non-flooded sites.

13.VII.1994 (bd) *Nascimento, J. R. & Pereira, E. C. 534* (INPA K MG MO NY RB SP); 7.III.1995 (fr) *Nascimento, J. R. et al. 777* (INPA K MG MO NY RB SP); 16.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7570* (INPA); 31.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7651* (INPA); 24.V.1966 (fr) *Rodrigues, W. & Coêlho, D. 7864* (INPA).

This species is similar in form to *C. sanguinolentum* but is easily recognized by the ferrugineous tomentose indumentum on the young parts and lower leaf surface, and by the dense reddish indumentum of the fruit.

Section *Prieurella* (Pierre) T. D. Penn.

7.5 *Chrysophyllum amazonicum* T. D. Penn., Fl. Neotrop. 52: 595, fig. 140. 1990. **Fig. 30 a-e**

Young shoots minutely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 8–15 × 4–6.5 cm, oblanceolate or narrowly ovate, apex obtuse or rounded, base acute to narrowly attenuate, glabrous on both surfaces; venation eucamptodromous, midrib slightly raised on the upper surface, secondaries 10–12 pairs; parallel, straight or slightly arcuate, slightly prominent on both surfaces, intersecondaries absent, tertiaries numerous, oblique. Petiole 0.7–2 cm long, not channelled,

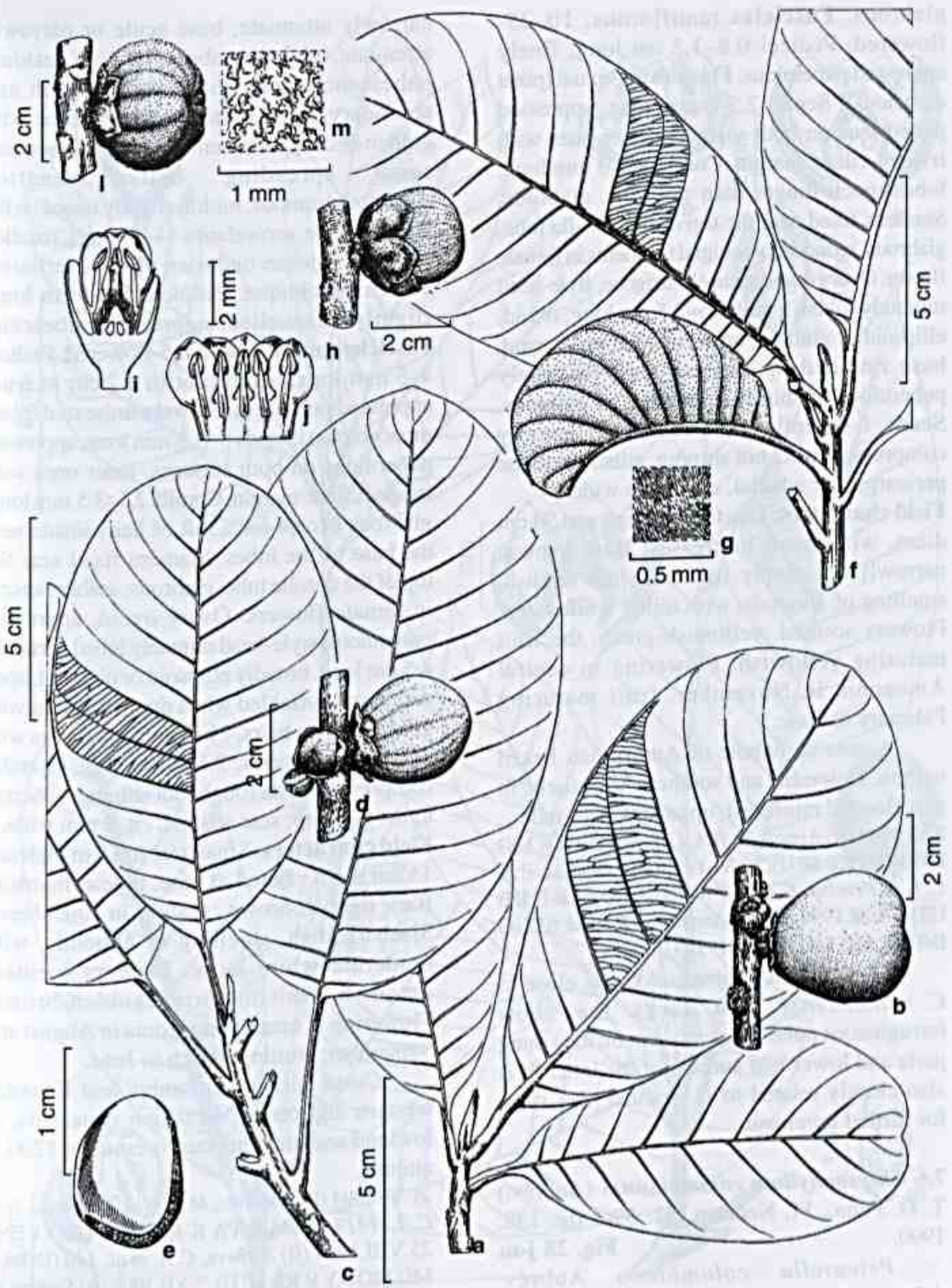

Figura 29 - a-b. *Chrysophyllum sanguinolentum* subsp. *sanguinolentum* - a. habit; b. fruit (*Fróes 25988*). c-e. *Chrysophyllum sanguinolentum* subsp. *spurium* - c. habit (*Schultes & López 9065*); d. young fruit (*Clark & Maquirino 8323*); e. seed (*Rimachi 4434*). f-h. *Chrysophyllum sanguinolentum* subsp. *balata* - f. habit; g. detail of leaf indumentum (*Fróes 554*); h. young fruit (*Fróes 21825a*); i. 1/2 flower; j. corolla & stamens (*Silva & Santos 4749*). l-m. *Chrysophyllum ucuquirana-branca* - l. young fruit; m. detail of leaf indumentum (*Marcano-Berti & Salcedo 85-979*).

glabrous. **Fascicles** ramiflorous, 10–25-flowered. Pedicel 0.8–1.3 cm long, finely appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 2.5–3 mm long, appressed puberulous on both surfaces, inner ones with fringed-ciliate margin. Corolla *ca.* 3 mm long, lobes much longer than the tube, glabrous. Stamens fixed near the top of the corolla tube, glabrous, reduced to vestigial filaments in female flower. Ovary ovoid, densely strigose, style-head minutely lobed. **Fruit** 2.5–3.5 cm long, ovoid, ellipsoid or globose, apex rounded to truncate, base rounded or tapered, smooth, finely puberulous or shortly velutinous or glabrous. **Seeds** 1-several, 2–2.5 cm long, laterally compressed, testa not shining, adherent to the pericarp; scar adaxial, *ca.* 2 mm wide.

Field characters: Tree to 30 m high and 50 cm diam. with small buttresses. Bark brown, narrowly but deeply fissured, slash reddish, smelling of almonds, with milky white latex. Flowers scented, yellowish-green, the fruit maturing yellowish. Flowering in central Amazonia in November, fruit maturing February to June.

Across the whole of Amazonian Brazil to Peru, Colombia and southern Venezuela, in non-flooded rainforest, up to 800 m altitude.

8.XI.1994 (fl) *Assunção, P. A. C. L. 66* (INPA K MG MO NY R RB SP U); 10.VI.1995 (fr) *Assunção, P. A. C. L. & Pereira, E. C. 207* (G INPA K MG R U UB US); 14.XI.1994 (fl) *Nascimento, J. R. et al. 637* (G INPA K MG MO NY R RB SP U).

Chrysophyllum amazonicum is close to *C. manaosense*, but lacks the short ferrugineous pubescence present on the young parts and lower leaf surface of the latter. It is also closely related to *C. prieurii*. See there for further comment.

7.6 *Chrysophyllum colombianum* (Aubrév.) T. D. Penn., Fl. Neotrop. 52: 596, fig. 138. 1990. **Fig. 28 j-m**

Prieurella colombiana Aubrév. Adansonia 7: 143, pl. 1. 1967.

Young shoots pubescent with mostly appressed golden-brown hairs. **Leaves** spirally arranged, 13–25 × 5–8 cm, oblanceolate, apex narrowly attenuate, base acute or narrowly attenuate, glabrous above or with residual pubescence along the midrib, midrib and secondary veins on the lower surface with golden-brown indumentum of appressed and some spreading hairs; venation eucamptodromous, midrib slightly raised on the upper surface, secondaries 14–17 pairs, parallel, straight, intersecondaries absent, tertiaries numerous, oblique. Petiole 1.5–2.5 cm long, slightly channelled, appressed pubescent. **Fascicles** ramiflorous, 5–15-flowered. Pedicel 4–5 mm long, accrescent to 1.2 cm in fruit, appressed pubescent. **Flowers** unisexual (plant monoecious). Sepals 3–3.5 mm long, appressed puberulous on both surfaces, inner ones with fringed ciliate margin. Corolla 2.5–3.5 mm long, glabrous except for a tuft of hairs inside near the base of the lobes. Stamens fixed near the top of the corolla tube, glabrous; anthers absent in female flowers. Ovary ovoid, appressed puberulous, style-head minutely lobed. **Fruit** 3–4.5 cm long, broadly ellipsoid or obovoid, apex depressed, wrinkled when dry, pubescent with golden-brown hairs, ? becoming glabrous with age. **Seeds** several, 2.5–4 cm long, laterally compressed, testa rough, not shining, adherent to the pericarp; scar adaxial, *ca.* 2 mm wide.

Field characters: Small tree to 15 m high and 15 cm diam., fluted at base, bole cylindrical. Bark reddish-brown, scaling in fine sheets. Slash reddish, smelling of almonds, with moderate white latex. Flowers scented, greenish, fruit maturing golden-brown. Flowering in central Amazonia in August and September; fruiting March to June.

Costa Rica to Colombia and Ecuador, western and central Brazilian Amazonia, in lowland and montane rainforest up to 1200 m altitude.

21.VI.1994 (fr) *Hopkins, M. J. G. & Assunção, P. A. C. L. 1419A* (BM INPA K MG SPF UEC VEN); 25.VIII.1994 (fl) *Sothers, C. A. et al. 140* (INPA K MG MO NY R RB SP U); 7.XII.1994 (fr) *Sothers, C. A. & Silva, C. F. 282* (INPA K MG MO NY R RB SP U); 16.III.1995 (fr) *Vicentini, A. & Pereira, E. C. 913* (G IAN INPA K MBM UB US).

Chrysophyllum colombianum is close to *C. amazonicum* but may be distinguished by

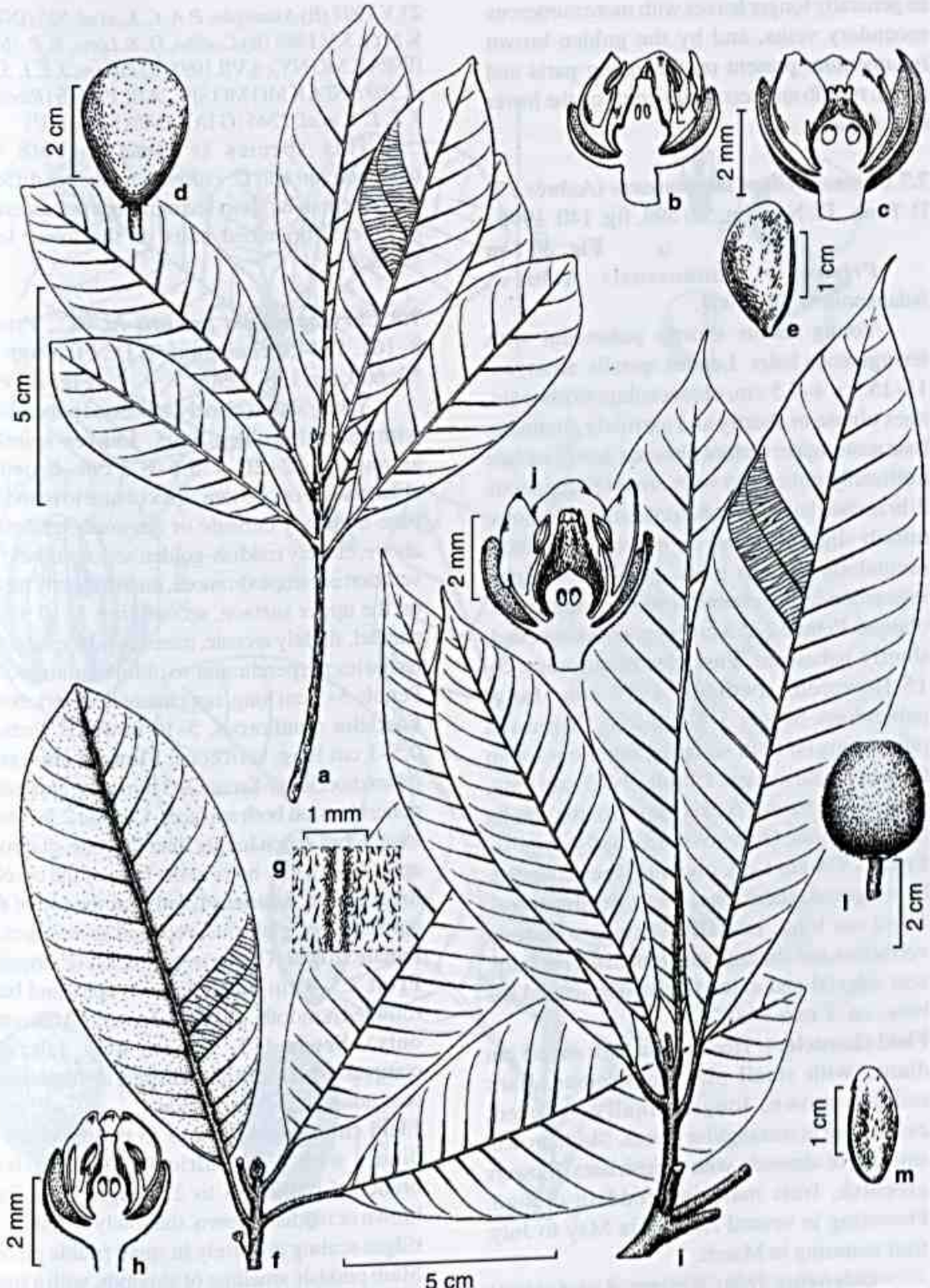

Figura 30 - a-e. *Chrysophyllum amazonicum* - a. habit (*Prance et al. 18330*); b. 1/2 female flower (*Silva & Brazão 60710*); c. 1/2 female flower (*Wurdack 2293*); d. fruit; e. seed (*Schunke 2592*). f-m. *Chrysophyllum manaosense* - f. habit; g. detail of leaf indumentum ×10; h. 1/2 flower (*Silva & Santos 4736*); i. habit (*Rimachi 2785*); j. 1/2 flower (*Foster 4403*); l. fruit; m. seed (*Castro 335*).

its generally longer leaves with more numerous secondary veins, and by the golden-brown indumentum present on the young parts and on the midrib and secondary veins on the lower leaf surface.

7.7 *Chrysophyllum manaosense* (Aubrév.) T. D. Penn., Fl. Neotrop. 52: 598, fig. 140. 1990. **Fig. 30 f-m**

Prieurella manaosensis Aubrév., Adansonia 4: 370. 1964.

Young shoots shortly pubescent with ferrugineous hairs. **Leaves** spirally arranged, 11–15.5 × 4–7.5 cm, oblanceolate to obovate, apex obtuse or shortly and narrowly attenuate, base acute, upper surface glabrous, lower surface uniformly pubescent with erect ferrugineous 2-branched hairs; venation eucamptodromous, midrib slightly raised on the upper surface, secondaries 14–16 pairs, parallel, straight, intersecondaries absent, tertiaries numerous, oblique. Petiole 2–2.3 cm long, not channelled, shortly pubescent. **Fascicles** ramiflorous, 5–15-flowered. Pedicel 4–10 mm long, puberulous. Sepals 3–4 mm long, appressed puberulous on both surfaces, inner ones with fringed ciliate margin. Corolla 3-3.5 mm long, glabrous. Stamens fixed at the top of the corolla tube, glabrous. Ovary ovoid, densely strigose. **Fruit** 3.5–4 cm long, obovoid, apex rounded, base tapered, glabrous, smooth. **Seeds** several, 1.8–2 cm long, laterally compressed, testa verrucose, not shining, adherent to the pericarp; scar adaxial and extending partly around the base, *ca.* 2 mm wide.

Field characters: Tree to 40 m high and 65 cm diam., with small plank buttresses. Bark reddish-brown, longitudinally fissured, exfoliating in rectangular pieces. Slash brown, smelling of almonds, with whitish latex. Flowers greenish, fruit maturing reddish-orange. Flowering in central Amazonia May to July, fruit maturing in March.

Extending from western Amazonia to Surinam, in non-flooded rainforest below 300 m altitude.

27.V.1997 (fl) *Assunção, P. A. C. L. et al. 505* (INPA K NY); 5.V.1988 (fr) *Coêlho, D. & Lima, R. P. 16-D* (INPA K MG NY); 6.VII.1993 (fr) *Ribeiro, J. E. L. S. et al. 903* (INPA K MG MO SP); 24.III.1994 (fr) *Ribeiro, J. E. L. S. et al. 1246* (G IAN INPA K R RB U).

This species is close to both *C. amazonicum* and *C. colombianum*, but differs from them in its short ferrugineous pubescence of erect 2-branched hairs on the lower leaf surface.

7.8 *Chrysophyllum prieurii* A. DC., Prodr. 8: 161. 1844; Pennington, T. D., Fl. Neotrop. 52: 600, fig. 138. 1990. **Fig. 31 e-h**

Young shoots closely appressed puberulous with reddish-golden hairs. **Leaves** spirally arranged, 12–20 × 5.5–8.5 cm, broadly oblanceolate or obovate, apex obtuse to rounded, base narrowly cuneate or attenuate, glabrous above, closely reddish-golden sericeous below; venation eucamptodromous, midrib slightly raised on the upper surface, secondaries 8–10 pairs, parallel, slightly arcuate, intersecondaries absent; tertiaries perpendicular to oblique, numerous. Petiole 3–5 cm long, not channelled, sericeous. **Fascicles** ramiflorous, 5–10-flowered. Pedicel 0.5–1 cm long, sericeous. **Flowers** unisexual (plant dioecious). Sepals 2–3 mm long, appressed puberulous on both surfaces. Corolla 2.5–3 mm long, lobes much longer than the tube, glabrous apart from a few hairs at the base of the corolla lobes inside. Stamens fixed near the top of the corolla tube, glabrous, reduced to vestiges in female flower. Ovary ovoid, densely strigose. **Fruit** 3.5–4 cm long, globose, apex and base rounded, smooth, glabrous (central Amazonia only). **Seeds** 1–5, 2–3 cm long, laterally compressed, testa rough, adherent to the pericarp; scar adaxial, 2–3 mm wide.

Field characters: Tree to 35 m high and 1 m diam., with a cylindrical bole and steep branched buttresses to 2 m high. Bark dark brown or reddish-brown, shallowly fissured, the ridges scaling profusely in small friable pieces. Slash pinkish, smelling of almonds, with a small amount of white latex. Flowers pale green, scented, fruit maturing greenish-brown. Flowering in central Amazonia in September, fruit ripening from March to June.

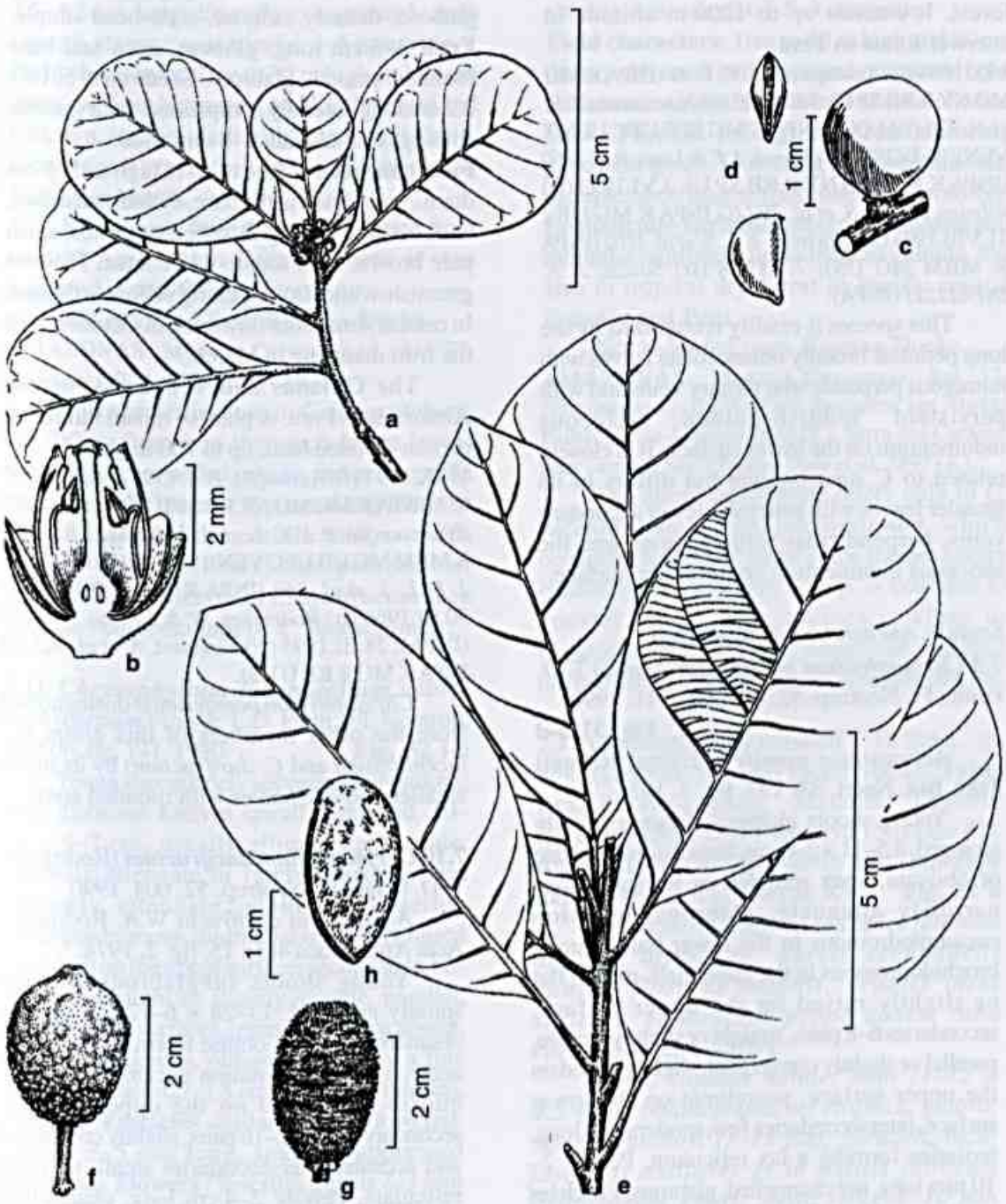

Figura 31 - a-d. *Chrysophyllum pomiferum* - a. habit (*Prance et al. 3082*); b. 1/2 flower (*FDBG 2641*); c. fruit (*Santos 69*); d. seed (*Mori & Bolten 8520*). e-h. *Chrysophyllum prieurii* - e. habit (*Mori & Boom 15284*); f. fruit (*Pires & Silva 4430*); g. fruit (*Steward et al. P. 20306*); h. seed (*Gómez 4161*).

Widely distributed across the whole of northern South America to Panama. It occurs in non-flooded rainforest and in sandy campina forest. It extends up to 1200 m altitude in everwet forest in Peru.

8.IX.1994 (fl) *Assunção, P. A. C. L. 41* (INPA K MG MO NY R RB SP U); 7.III.1995 (fr) *Nascimento, J. R. et al. 778* (BM COL INPA K MG SPF UEC UFMT VEN); 26.IV.1988 (fr) *Ramos, J. F. & Lima, R. P. 1860* (INPA K MG MO NY R RB SP U); 3.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 797* (G INPA K MG UB); 11.VIII.1993 (fr) *Ribeiro, J. E. L. S. et al. 1102* (INPA K MBM MG US); 7.V.1968 (fr) *Souza, J. A. INPA21211* (INPA).

This species is readily recognized by the long petiolate broadly oblanceolate leaves with numerous perpendicular tertiary veins and with persistent reddish-golden sericeous indumentum on the lower surface. It is closely related to *C. amazonicum* but differs in its broader leaves with generally fewer secondary veins, perpendicular tertiary veins and the sericeous indumentum on the lower surface.

Section *Aneuchrysophyllum* Engl.

7.9 *Chrysophyllum pomiferum* (Eyma) T. D. Penn., Fl. Neotrop. 52: 602, fig. 141. 1990.

Fig. 31 a-d

Achrouteria pomifera Eyma, Recueil Trav. Bot. Neérl. 33: 193, fig. 3. 1936.

Young shoots glabrous. **Leaves** spirally arranged, 4.5–11 × 2–6 cm, broadly oblanceolate or obovate, apex rounded or truncate, base narrowly attenuate, glabrous; venation eucamptodromous in the lower half, usually brochidodromous in the upper half, midrib flat or slightly raised on the upper surface, secondaries 6–8 pairs, straight or slightly arcuate, parallel or slightly convergent, slightly raised on the upper surface, prominent on the lower surface, intersecondaries few, moderate to long, tertiaries forming a lax reticulum. Petiole 2–10 mm long, not channelled, glabrous. **Fascicles** axillary and below the leaves, 2–10-flowered. Pedicel 2–3 mm long, with scattered appressed hairs. **Flowers** unisexual (plant dioecious). Sepals 2.5–3 mm long, with scattered appressed hairs outside. Corolla shortly tubular or campanulate, 3-4 mm long, tube much longer than the lobes, glabrous. Stamens fixed in the lower half of the corolla tube, glabrous. Staminodes 0.2–0.7 mm long, glabrous. Ovary globose, densely strigose, style-head simple. **Fruit** 3–5 cm long, globose, apex and base rounded, smooth, glabrous. **Seeds** up to 5, 1.5–2.2 cm long, laterally compressed, testa smooth, shining; scar adaxial, 5–6 mm wide.

Field characters: Tree to 40 m high and 75 cm diam., bole fluted at the base, cylindrical above, bark brown, scaling in suberous plates, slash pale brown, with scarce white latex. Flowers greenish-white, fruit ripening yellow to orange. In central Amazonia flowering in October, with the fruit maturing in March.

The Guianas and Venezuela, across Amazonia to Peru. A plant of mixed rainforest on non-flooded land, up to 700 m altitude.

11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F. 651* (INPA K MG MO NY RB SP U UB); 11.XI.1997 (fr) *Assunção, P. A. C. L. et al. 714* (BM COL INPA K MBM MG UB UEC VEN); 5.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 860* (INPA K MG MO NY SP); 30.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7633* (INPA); 28.III.1995 (fr) *Vicentini, A. et al. 925* (G INPA K MG R RB U US).

Chrysophyllum pomiferum is distinguished from the other members of this group (*C. lucentifolium* and *C. durifructum*) by its much smaller obovate leaves with rounded apex.

7.10 *Chrysophyllum durifructum* (Rodrigues) T. D. Penn., Fl. Neotrop. 52: 604. 1990.

Achrouteria durifructa W.A. Rodrigues, Acta Amazonica 4(3): 15, fig. 2. 1974.

Young shoots subglabrous. **Leaves** spirally arranged, 13–28 × 6–12 cm, broadly oblanceolate, apex obtuse to emarginate, base acute, glabrous; venation eucamptodromous, midrib not raised on the upper surface, secondary veins 12–16 pairs, slightly convergent and arcuate, intersecondaries small, tertiaries reticulate. Petiole 2–4 cm long, channelled, glabrous. **Fascicles** axillary and below the leaves, few-flowered. Pedicel 5–10 mm long, glabrous. Sepals 4–6 mm long, glabrous. Corolla 3–4 mm long, tube about equalling the lobes, glabrous. Stamens fixed in the lower half of the corolla tube, glabrous. Staminodes 0.5–0.7 mm

long, glabrous. Ovary ovoid, densely strigose, style-head simple. **Fruit** 5-6.5 cm long, depressed globose, smooth, glabrous. **Seeds** 5, 2.5–4.3 cm long, laterally compressed, testa smooth, shining; scar adaxial, 3–6 mm wide.
Field characters: Tree to 30 m high and 50 cm diam., without buttresses, trunk cylindrical and bark thin, scaling, slash with scarce white latex. Flowers pale green, fruit green. Flowering and fruiting in March.

Known only from the type collection from central Amazonian Brazil, where it was collected in non-flooded forest.

Not recorded from Reserva Ducke.
AMAZONAS: Manaus-Caracaraí rd., km 27, *Rodrigues, W. A. 8783* (INPA MG).

This species is close to *C. lucentifolium*, but differs from it in the much larger leaves with longer channelled petiole, and in its corolla structure (tube more or less equalling lobes, in *C. lucentifolium* the corolla tube is much shorter than the lobes) and presence of staminodes. The leaves of *C. durifructum* lack the fine vein reticulum of *C. lucentifolium*.

7.11 *Chrysophyllum lucentifolium* subsp. ***pachycarpum*** Pires & T. D. Penn., Fl. Neotrop. 52: 606, fig. 141. 1990. **Fig. 32 l-o**

Young shoots finely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 10–19 × 4–7 cm, usually elliptic, apex acute, narrowly attenuate or rarely rounded, base narrowly attenuate, glabrous; venation eucamptodromous, midrib flat or slightly raised (rounded) on the upper surface, secondaries 12–15 pairs, straight or slightly arcuate, parallel, raised on both surfaces, intersecondaries absent, tertiaries numerous, oblique, joined by a fine reticulum. Petiole 0.7–1.5 cm long, not channelled, glabrous. **Fascicles** axillary, 5–15-flowered. Pedicel 3–5 mm long, sparsely appressed puberulous. **Flowers** ? bisexual. Sepals 2–3 mm long, appressed puberulous outside. Corolla 3–4 mm long, tube shorter than the lobes, glabrous. Stamens fixed near the top of the corolla tube, glabrous. Staminodes usually absent, rarely present as a few small vestiges. Ovary ovoid, densely pubescent. **Fruit** 3.5–5 cm long, ovoid to globose, apex rounded or truncate, thick-walled, smooth, glabrous. **Seeds** up to 5, 2–2.5 cm long, laterally compressed, testa smooth, shining; scar adaxial, 1.5–3 mm wide.
Field characters: Tree to 40 m high and 80 cm diam., with small buttresses and cylindrical bole, slash cream-coloured with small amount of white latex. Flowers pale green, fruit maturing yellowish-green. Flowering in Amazonia June to September, mature fruit collected December.
Ecologically variable: present in lowland and montane rainforest, up to 1400 m altitude, but also in tropical dry forest in Pacific coastal Ecuador and Peru.

Not recorded from Reserva Ducke.
AMAZONAS: Manaus-Caracaraí, km 57, *Nascimento 42* (INPA); Pará, Santarém, km 70 rd to Palhão, *Silva & Souza 2646* (K); Serra dos Carajás, near camp at Serra Norte, *Daly et al. 1895* (K).

The above description refers only to *C. lucentifolium* subsp. *pachycarpum*, which occupies most of the range of the species except coastal Brazil. The type subsp. is confined to coastal Brazil. The species is close to *C. pachycarpum* and to *C. pomiferum*, and their differences are discussed under those species.

7.12 *Chrysophyllum wilsonii* T. D. Penn., *sp. nov.* (section *Aneuchrysophyllum*). **Type**: Brazil, Amazonas, Manaus, Distrito Agropecuário, PDBFF Reserva 1501 (km 41), August 1996, *W. Spironello s.n.* (holotype INPA 190944, *n.v.*, isotype K). **Fig. 32 b**

C. lucentifolio *affinis sed apice foliorum anguste attenuato, nervis secundariis paucis, floribus magnis, sepalis intus sericeis, staminibus prope basem tubo corollae affixis differt.*

Arbor; stipulae nullae; folia 11–15 × 4.5–6 cm, oblanceolata vel elliptica, glabra; nervi secundarii 11–13-jugi, paralleli, recti; fasciculi axillares et in axillis foliorum delapsorum enati; pedicellus 4–10 mm longus; sepala 5; corolla late tubularis, 4–5 mm longa, lobis 5; stamina 5, prope basem tubo corollae affixa; staminodia nulla; ovarium 5-loculare; fructus 4–5 cm diametro, globosus, glaber.

Tree. Stipules absent. Young shoots puberulous with golden indumentum, finally becoming glabrous, greyish-white, grid-cracked. **Leaves** spirally arranged, 11–15 × 4.5–6 cm, oblanceolate or elliptic, apex narrowly attenuate, base narrowly attenuate and decurrent on the petiole, glabrous; venation eucamptodromous, midrib raised on the upper surface (rounded in section), secondary veins 11–13 pairs, raised on the upper surface, rather steeply ascending, parallel, straight or slightly arcuate, intersecondaries short or absent, tertiaries oblique. Petiole 1–2 cm long, not channelled, subglabrous. **Fascicles** 4–10-flowered, axillary and clustered below the leaves. Pedicel 4–10 mm long, sparsely puberulous. Sepals 5, 2.5–4 mm long, broadly ovate to suborbicular, apex rounded, subglabrous outside, sericeous inside, with a broad hyaline margin. Corolla 4–5 mm long, broadly tubular, the tube slightly longer than the lobes, lobes 5(–6), broadly oblong, apex rounded to truncate, glabrous. Stamens 5(–6), fixed near the base of the corolla tube, filaments 2–3 mm long, glabrous, anthers 1-1.25 mm long, broadly lanceolate, apiculate, glabrous. Staminodes absent. Disk absent. Ovary 5(–6)-locular, lobed, densely pubescent, style *ca.* 2.5 mm long, slightly exserted in bud, included in open flower, pubescent in the lower part, style-head simple, unexpanded. **Fruit** 4–5 cm diam., globose, apex and base rounded, thick-walled (9–10 mm thick when dry) and becoming woody on drying, smooth, glabrous. **Seeds** several, 2.2–2.3 cm long, laterally compressed with an abaxial keel, testa mostly smooth, but slightly verrucose on the sides, shining; scar adaxial, *ca.* 1.6 cm long, *ca.* 7 mm wide; embryo with foliaceous cotyledons and exserted radicle, surrounded by copious endosperm.

Field characters: Tree to 40 m high and 85 cm diam., buttressed to 2 m high, bole cylindrical above. Bark dark, scaling in large rectangular plates, slash with white latex. Flowers greenish-yellow and fruit ripening yellowish. Flowering from August to October, fruit maturing in April.

At present known only from the PDBFF Reserve 1501 (km 41) north of Manaus, Amazonas, Brazil, where it occurs in lowland rainforest (50-125 m altitude) on non-flooded land.

Not yet recorded from Reserva Ducke.

PDBFF: Reserva km 41, *Oliveira, A. A. et al. 151* (INPA K); *Oliveira, A. A. et al. 168* (INPA K); *Oliveira, A. A. et al. 379* (INPA); *Oliveira, A. A. et al. 430* (INPA).

Chrysophyllum wilsonii is a superb canopy tree, with close affinities with *C. durifructum* and *C. lucentifolium*. The differences that separate it from *C. lucentifolium* are the narrowly attenuate leaf apex (usually obtuse or rounded in *C. lucentifolium*), fewer secondary veins, much larger calyx and corolla, inner face of calyx sericeous, corolla tube longer than lobes (shorter than lobes in *C. lucentifolium*), stamens fixed at the base of the corolla tube (at top of corolla tube in *C. lucentifolium*), broader, shorter seed scar.

The floral structure is similar to that of *C. durifructum*, but this species has much larger leaves with differing venation, a glabrous calyx and 5 staminodes (these absent in *C. wilsonii*).

7.13 *Chrysophyllum eximium* Ducke, Bull. Mus. Hist. Nat., (Paris), sér. 2, 4:744. 1932; Pennington, T. D., Fl. Neotrop. 52: 618, fig. 145. 1990. **Fig. 32 a-c**

Young shoots densely ferrugineous or golden tomentose. **Leaves** spirally arranged, 11–20 × 3.5–10 cm, oblanceolate to obovate, apex obtuse to rounded, base narrowly attenuate, margin revolute, upper surface glabrous or with residual tomentum along the midrib, lower surface densely golden- or ferrugineous-tomentose; venation eucampto-dromous, midrib slightly raised on the upper surface, secondary veins 7–11 pairs, steeply ascending, slightly convergent or parallel, arcuate, impressed on the upper surface, prominent below, intersecondaries absent, tertiaries oblique to perpendicular, obscure. Petiole 1.2–1.5 cm long, not channelled,

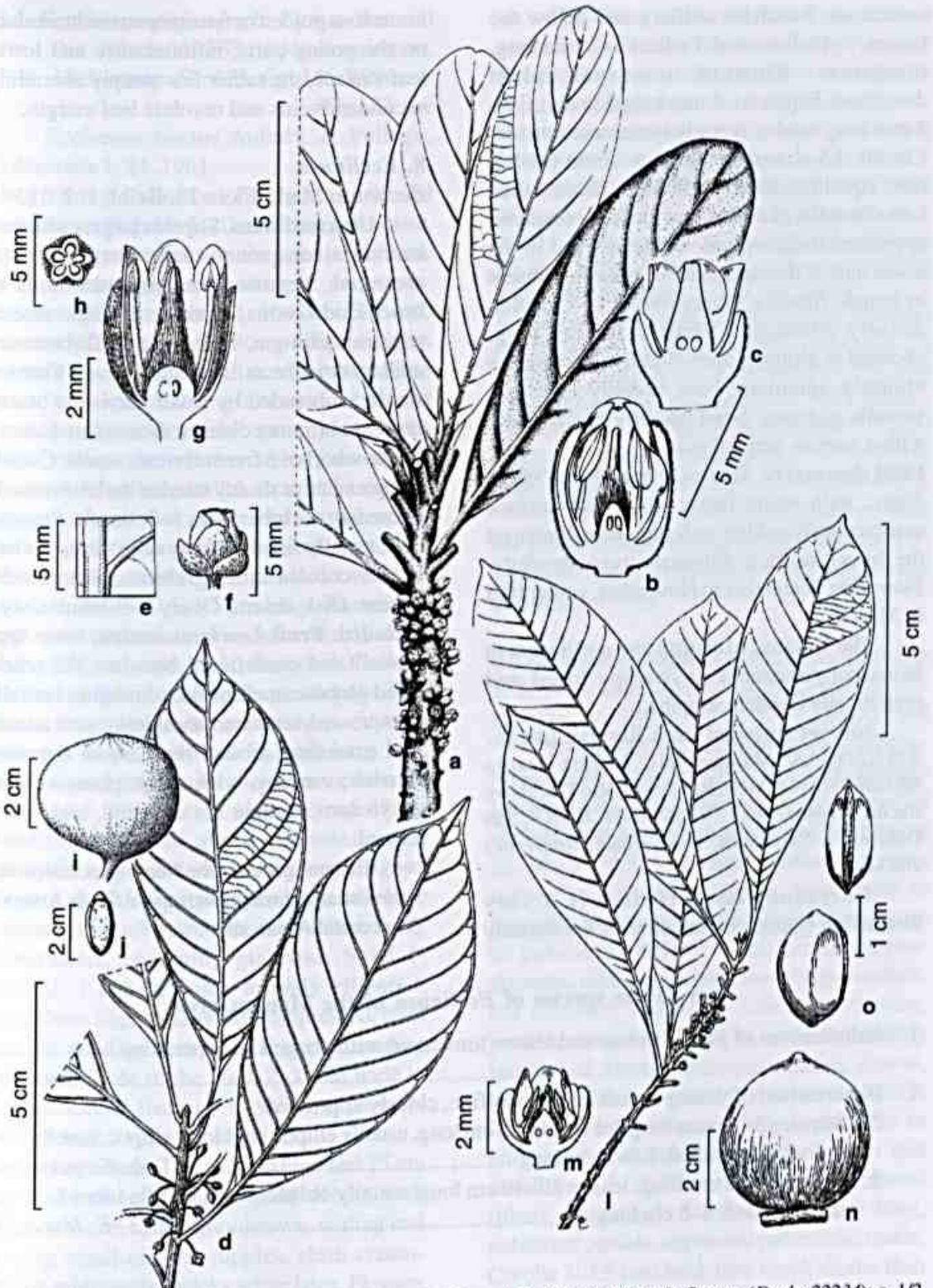

Figura 32 - a-c. *Chrysophyllum eximium* - a. habit (*Kubitzki et al. 79-234*); b. 1/2 male flower (*Ducke 22234*); c. 1/2 female flower (Ducke 2098). d-j. *Chrysophyllum wilsonii* - d. habit; e. leaf undersurface; f. flower; g. 1/2 flower; h. ovary (*Spironello s.n.*); i. fruit; j. seed (*Oliveira 430*). l-o. *Chrysophyllum lucentifolium* subsp. *pachycarpum* - l. habit (*Blanco 951*); m. 1/2 flower (*Bruijn 1723*); n. fruit (*Liesner & González 11125*); o. seed (*Williams 12911*).

tomentose. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 3–7 mm long, tomentose. **Flowers** unisexual (plant dioecious). Sepals *ca.* 3 mm long (female), 3.5–4 mm long (male), densely tomentose outside. Corolla 3.5–4 mm (female), 5–7 mm (male), tube equalling lobes in female, shorter than lobes in male, glabrous or with some scattered appressed indumentum. Stamens fixed in the lower half of the corolla tube, glabrous, absent in female flowers. Ovary ovoid, 2–3-locular, densely pubescent. **Fruit** 4.5–5 cm long, obovoid or globose, apex slightly depressed or obtusely apiculate, base broadly tapering, smooth, glabrous. **Seed** laterally compressed, with a narrow adaxial scar.

Field characters: Tree to 20 m high and 35 cm diam., with white latex, lower leaf surface conspicuously golden- or ferugineous-brown on the lower surface. Flowers greenish-white. Flowering September to November, young fruit in March.

The Guianas to central and northwestern Brazilian Amazonia in swampy forest and periodically flooded campina.

Not yet recorded from Reserva Ducke. AMAZONAS: Manaus, Rio Tarumã, *Ducke RB34980* (IAN K MG); Rio Negro, Rio Teá, above Bacurí, *Kubitzki et al. 79-234* (INPA K MG); São Gabriel da Cachoeira, Rio Cubate, *Rodrigues 10834* (K).

Chrysophyllum eximium is a very distinctive species on account of the densely tomentose golden or ferrugineous indumentum on the young parts, inflorescence and lower leaf surface, the rather few steeply ascending secondary veins and revolute leaf margin.

8. *Ecclinusa*

Ecclinusa Mart., Flora 22, Beibl. 1: 2. 1839.

Unarmed **trees**. Stipules large, caducous, leaving a conspicuous scar. Leaves spirally arranged. Venation eucamptodromous to brochidodromous, intersecondaries absent, tertiaries oblique, numerous. **Inflorescence** axillary or in the axils of fallen leaves. **Flowers** sessile, subtended by small persistent bracts, unisexual (monoecious or dioecious). Calyx a single whorl of 5 free imbricate sepals. Corolla campanulate or shortly tubular, the lobes usually exceeding the tube; lobes 5–7, simple. Stamens 5–7, usually fixed halfway or in the upper half of the corolla tube, glabrous. Staminodes absent. Disk absent. Ovary 5–9-locular, style included. **Fruit** 1-several-seeded, often thin-walled and constricted between the seeds. **Seed** globose or ellipsoid, sometimes laterally compressed, testa smooth, shining; scar adaxial and extending around the base of the seed, narrow; embryo with thick plano-convex cotyledons, radicle not exserted, endosperm absent.

Eleven species in the Neotropics, distributed from Panama throughout tropical South America, 3 in central Amazonia.

Key to the species of *Ecclinusa* of the Manaus area

1. Indumentum of young shoots and leaves tomentose with crisped and spreading hairs. ..... 2. *E. ramiflora*
1. Indumentum of young shoots and leaves fine, closely appressed
   2. Stipules 5–10 mm long, leaves 10–20 cm long, usually elliptic or oblong-elliptic, corolla lobes 5, fruit thin-walled, 1.5–3 cm long ..... 1. *E. guianensis*
   2. Stipules 1–2 cm long, leaves 20–40 cm long, usually oblanceolate, corolla lobes 5–7, fruit thick-walled, 5–6 cm long ..... 3. *E. lanceolata*

8.1 *Ecclinusa guianensis* Eyma, Recueil Trav. Bot. Néerl. 33: 203. 1936; Pennington, T. D., Fl. Neotrop. 52: 623, fig. 146. 1990. **Fig. 33 a-c**

Ecclinusa bacuri Aubrév. & Pellegr., Adansonia 1: 21. 1961.

Young shoots finely appressed puberulous. Stipules 5–10 mm long, lanceolate, appressed puberulous on the adaxial surface, with a broad glabrous margin, caducous. **Leaves** spirally arranged, 10–20 × 3–6 cm, narrowly elliptic or oblong-elliptic, apex narrowly attenuate to acuminate, base narrowly attenuate, glabrous; venation eucamptodromous, midrib prominent on the upper surface (but often recessed), secondary veins 17–25 pairs, parallel, straight or slightly arcuate, sometimes impressed on the upper surface, intersecondaries absent, tertiaries oblique, close, numerous; higher order venation areolate. Petiole 0.5–1.5 cm long, channelled, appressed puberulous. **Fascicles** mostly in the axils of fallen leaves, 5–10-flowered. **Flowers** unisexual (plant monoecious). Sepals 2.5–3 mm long, appressed puberulous outside, glabrous inside. Corolla 2.5–3 mm long, tube much shorter than the lobes, glabrous, lobes 5. Stamens 5, fixed at or near the top of the corolla tube, glabrous, absent in female flowers. Ovary 5-locular, globose, densely long-strigose. **Fruit** 1–3 cm long, globose, apex and base truncate or rounded, smooth, thin-walled, finely puberulous, becoming glabrous. **Seed** 1-several, 1.2–2 cm long, broadly ellipsoid, sometimes slightly laterally compressed, testa smooth, shining scar adaxial and extending around the base of the seed, 2–3 mm wide in several-seeded fruit, up to 9 mm wide in 1-seeded fruit.

Field characters: Tree to 35 m high and 75 cm diam., unbuttressed, with cylindrical bole, bark reddish-brown to dull grey-brown, scaling and leaving small circular dipples, slash cream-brown, with copious sticky white latex. Flowers fragrant, greenish-white, fruit ripening yellow. Flowering in central Amazonia July to August, the fruit maturing in January.

The Guianas and northern Venezuela to central Amazonia, where it occurs in non-flooded forest up to 600 m altitude. The species is present in savanna forest in Surinam.

18.I.1995 (fr) *Assunção, P. A. C. L. 162* (G IAN INPA K MBM R U UB US); 6.V.1997 (fr) *Assunção, P. A. C. L. et al. 503* (G IAN INPA K MBM UB US); 15.VII.1997 (fl) *Assunção, P. A. C. L. et al. 540* (INPA K MG R U); 25.XI.1997 (fr) *Brito, J. M. et al. 47* (BM IAN INPA K); 15.IV.1994 (bd) *Nascimento, J. R. et al. 509* (INPA K MG MO NY RB SP); 12.VIII.1993 (fr) *Ribeiro, J. E. L. S. et al. 1118* (INPA K MG MO NY RB SP); 3.VII.1963 (fr) *Rodrigues, W. 5333* (INPA); 15.IV.1964 (fr) *Rodrigues, W. & Loureiro, A. 5798* (INPA); 27.V.1964 (fr) *Rodrigues, W. & Loureiro, A. 5823* (INPA); 10.II.1965 (fr) *Rodrigues, W. & Monteiro, O. P. 6860* (INPA); 27.VI.1965 (fl) *Rodrigues, W. & Coêlho, D. 6960* (INPA); 20.IX.1968 (fr) *Souza, J. A. 164* (INPA).

Ecclinusa guianensis is distinctive within the genus on account of its small, rather narrow, glabrous leaves and numerous secondary veins and its small fruit.

8.2 *Ecclinusa ramiflora* Mart., Flora 22, Beibl. 1: 2. 1839; Pennington, T. D., Fl. Neotrop. 52: 625, fig. 146. 1990. **Fig. 33 d-f**

Young shoots tomentose with golden-brown hairs. Stipules 0.6–2 cm long, broadly lanceolate or ovate, pubescent on the abaxial surface, with a broad glabrous margin. **Leaves** 21–30 × 8–10.5 cm, mostly oblanceolate, apex narrowly attenuate or acute, base acute or narrowly attenuate, glabrous above, tomentose to pubescent below; venation eucampto-dromous, midrib prominent on the upper surface, but recessed, secondary veins 16–28 pairs, parallel, straight or slightly arcuate, often slightly impressed above, intersecondaries absent, tertiaries oblique, parallel, numerous. Petiole 1.2–2 cm long, channelled, tomentose to pubescent. **Fascicles** below the leaves and ramiflorous, 5–10-flowered. **Flowers** unisexual (plant dioecious). Sepals 5, 2–3 mm long, pubescent outside, appressed puberulous inside. Corolla 3–3.5 mm long, tube much shorter than the lobes, lobes 5, glabrous outside, sparsely hairy inside. Stamens 5, fixed near the top of the corolla tube, glabrous, absent in female flower.

Ovary ovoid, 5-locular, densely long-strigose. **Fruit** 2.5–5 cm long, globose, apex rounded, base rounded or depressed, densely pubescent to velutinous. **Seeds** several, 1.8–2.2 cm long, ellipsoid, laterally compressed or shaped like the segment of an orange, testa smooth, shining; scar adaxial and extending around the base of the seed, 3–6 mm wide.

Field characters: Tree to 30 m high and 1 m diam., unbuttressed, with a cylindrical bole. Bark black-grey to reddish-brown, scaling and leaving conspicuous dipples, slash cream with copious sticky white latex.

Flowers greenish-white, fruit maturing yellow or orange. Flowering in central Amazonia September to December.

Colombia, Venezuela and the Guianas to Amazonian Brazil and Bolivia, in everwet and seasonal lowland rainforest on non-flooded land.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus, Estrada do Aleixo, *Ducke 1073* (K); Manaus, Cachoeira do Mindú, *Ducke RB22249* (K).

This species is similar in leaf size and shape *to E. lanceolata*, but differs in its tomentose spreading indumentum, and in the strictly 5-merous flowers.

8.3 *Ecclinusa lanceolata* (Mart. & Eichl.) Pierre, Not. Bot. 57. 1891; Pennington, T. D., Fl. Neotrop. 52: 635, fig. 150. 1990.

Fig. 33 g-h

Passaveria lanceolata Mart. & Eichl. *in* Mart., Fl. bras. 7: 86, tab. 38. 1863.

Young shoots closely appressed puberulous. Stipules 1–2 cm long, lanceolate, often longitudinally striate, appressed puberulous on the abaxial face with a broad glabrous margin. **Leaves** spirally arranged, 20–40 × 8–15 cm, usually oblanceolate, apex obtuse to shortly and narrowly attenuate, base narrowly attenuate, cuneate or acute, closely whitish-sericeous below, glabrous; venation eucamptodromous, midrib slightly prominent on the upper surface, secondary veins 28–40 pairs, parallel, straight or slightly arcuate, intersecondaries absent, tertiaries oblique, numerous. Petiole 2–4 cm, long, channelled, appressed puberulous. **Fascicles** axillary and in the axils of fallen leaves, 5–10-flowered. **Flowers** unisexual (plant ? monoecious). Sepals 5, 2.5–4 mm long, appressed puberulous outside, glabrous within. Corolla 3–5.5 mm long, tube shorter than or equalling the lobes, lobes 5–7, glabrous. Stamens 5, fixed in the upper half of the corolla tube, glabrous, absent in female flowers. Ovary ovoid, 7–9-locular, densely long-strigose. **Fruit** 5–6 cm long, globose, apex and base rounded or truncate, thick-walled, smooth, minutely puberulous. **Seeds** several, 2–3 cm long, broadly ellipsoid or shaped like the segment of an orange, testa smooth, shiny; scar adaxial and extending around the base of the seed, 5–9 mm wide.

Field characters: Tree to 30 m high and 50 cm diam., trunk unbuttressed, cylindrical. Bark dark brown or black, strongly dippled, slash cream to reddish with copious sticky white latex. Flowers greenish-white, fruit maturing orange, with the inner pericarp white and spongy. Flowering August to November, fruit maturing January to July.

The Guianas to western Brazilian Amazonia, Peru, Colombia and Panama, where it occurs in lowland and montane rainforest up to 1300 m altitude, on non-flooded and periodically flooded land.

Not yet recorded at Reserva Ducke but frequent in the PDBFF reserves.

PDBFF: Reserva km 41, *Lepsch Cunha et al. 737* (INPA K); *Pennington et al. 12626* (INPA K); *Freitas et al. F-224* (INPA K).

This species has a similar indumentum to *E. guianensis* but differs in its much larger leaves, longer petioles and it often has more than 5 corolla lobes and a 7–9-locular ovary.

9. *Pradosia*

Pradosia Liais, Climat. Geol., Faune Brésil 614. 1872.

Unarmed trees. Stipules absent. **Leaves** opposite, verticillate or spirally arranged. Venation usually eucamptodromous, less frequently brochidodromous, midrib usually sunken on the upper surface, secondary veins often impressed on the upper surface, tertiary veins usually oblique to perpendicular. Minute paired stipels sometimes present on petiole. Usually cauliflorous or ramiflorous.

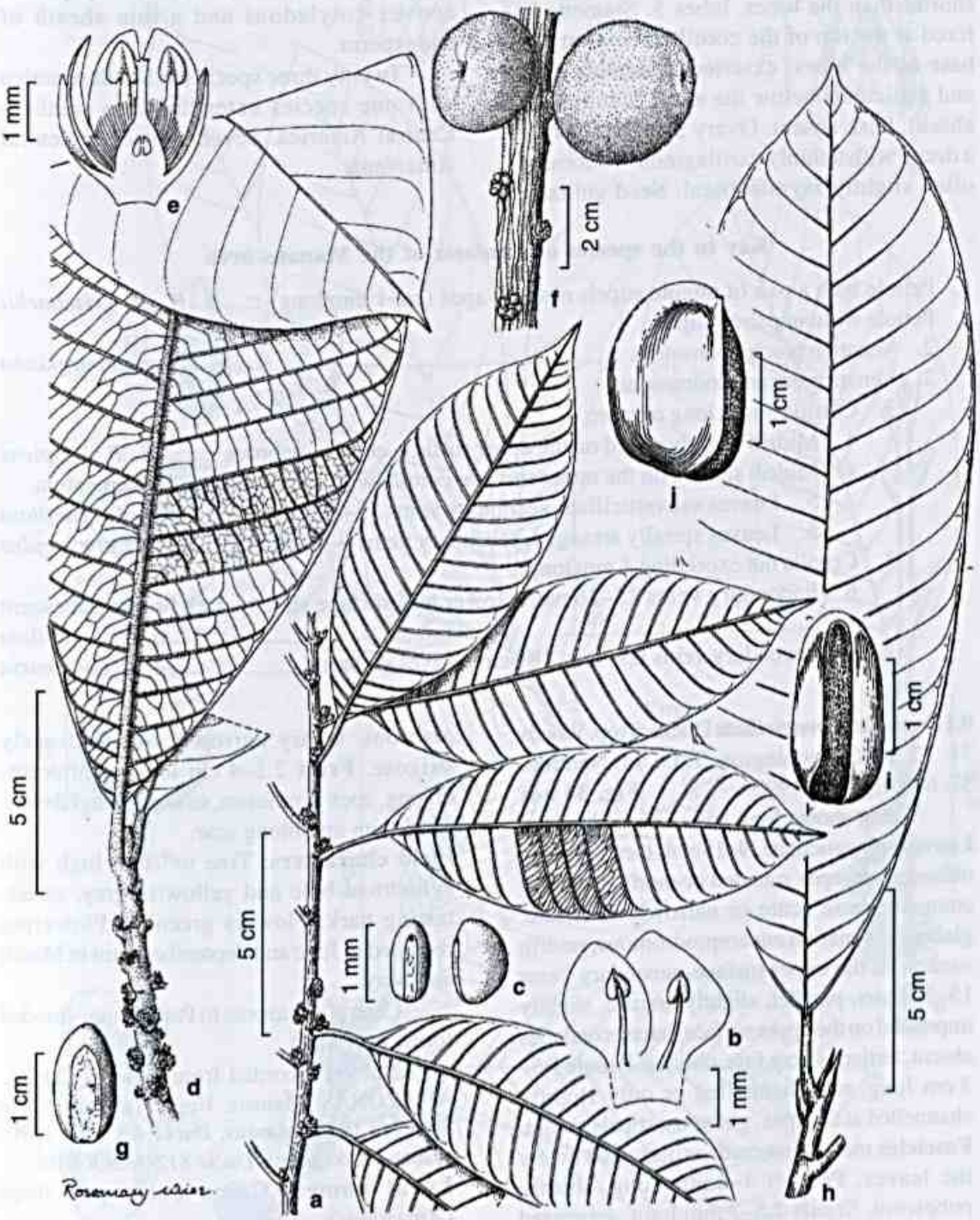

Figura 33 - a-c. *Ecclinusa guianensis* - a. habit (*Marcano-Berti 368*); b. part corolla with stamens (*Marcano-Berti 366*); c. seed (*Blanco 531*). d-f. *Ecclinusa ramiflora* - d. habit (*Maguire et al. 60094*); e. 1/2 flower (*Hoehne 28590*); f. fruit c. seed (*Blanco 531*). d-f. *Ecclinusa ramiflora* - d. habit (*Maguire et al. 60094*); e. 1/2 flower (*Hoehne 28590*); f. fruit c. seed (*Blanco 531*). h-j. *Ecclinusa lanceolata* - h. habit (*Boom & Mori 1884*); i. seed (*Steyermark & Liesner 120700*); g. seed (*Grenand 855*). h-j. *Ecclinusa lanceolata* - h. habit (*Boom & Mori 1884*); i. seed (side view); j. seed (frontal view) (*Mori & Pipoly 15408*).

Flowers bisexual. Calyx a single whorl of 5 sepals. Corolla rotate, tube nearly always shorter than the lobes, lobes 5. Stamens 5, fixed at the top of the corolla tube or at the base of the lobes, exserted, filaments long and geniculate below the apex. Staminodes absent. Disk absent. Ovary 5-locular. **Fruit** a drupe with a thinly cartilaginous endocarp, often slightly asymmetrical. **Seed** solitary, with smooth, shining testa and full-length adaxial scar; embryo with thinly plano-convex cotyledons and a thin sheath of endosperm.

Twenty three species in South America with one species extending into southern Central America. Seven species in central Amazonia.

Key to the species of *Pradosia* of the Manaus area

1. Petiole with a pair of minute stipels near the apex (*ca.* 1 mm long) ..... 7. *P. aff. grisebachii*
1. Petiole without paired stipels.
   2. Venation brochidodromous ..... 5. *P. schomburgkiana*
   2. Venation eucamptodromous.
      3. Corolla 5 mm long or more.
         4. Midrib slightly raised on the upper surface, corolla glabrous ..... 2. *P. decipiens*
         4. Midrib sunken on the upper surface, corolla with some appressed indumentum
            5. Leaves subverticillate, secondary veins 15–20 pairs ..... 1. *P. subverticillata*
            5. Leaves spirally arranged, secondary veins 9–10 pairs ..... 3. *P. ptychandra*
      3. Corolla not exceeding 4 mm long.
         6. Secondary veins 23–26 pairs, lower leaf surface shortly dark brown pubescent ..... 6. *P. verticillata*
         6. Secondary veins less than 18 pairs, leaves glabrous ..... 4. *P. cochlearia*

9.1 *Pradosia subverticillata* Ducke, Trop. Woods 71: 13. 1942; Pennington, T. D., Fl. Neotrop. 52: 646, fig. 151. 1990. **Fig. 34 a-b**

Young shoots long and stiffly pubescent. **Leaves** subverticillate, 9–15 × 4–6 cm, broadly oblanceolate, apex rounded or shortly narrowly attenuate, base acute or narrowly attenuate, glabrous; venation eucamptodromous, midrib sunken on the upper surface, secondary veins 15–20 pairs, parallel, slightly arcuate, slightly impressed on the upper surface, intersecondaries absent, tertiaries very fine, oblique. Petiole 1.5–3 cm long, not channelled or only slightly channelled at the apex, glabrous; stipels absent. **Fascicles** many-flowered, axillary and below the leaves. Pedicel 4–6 mm long, shortly pubescent. Sepals 2.5–3 mm long, appressed pubescent outside, margin ciliate. Corolla *ca.* 6 mm long, tube much shorter than the lobes, sparsely sericeous outside. Stamens fixed at the base of the corolla lobes, exserted, glabrous. Ovary narrowly ovoid, densely strigose. **Fruit** 2.5–4 cm long, subfalcate-oblong, apex acuminate, smooth, subglabrous. **Seed** with an oblong scar.

Field characters: Tree to 20 m high with cylindrical bole and yellowish-grey, sweet-tasting bark. Flowers greenish. Flowering recorded in June and September, fruit in March and May.

Central Amazonia to Pará, in non-flooded forest over sand.

Not yet recorded from Reserva Ducke. AMAZONAS: Manaus, Upper Tarumã, *Ducke RB22145* (RB); Manaus, *Ducke RB35544* (RB); Manaus, Rio Tarumã, *Ducke 812* (IAN K RB).

Local names: Casca doce, pau doce (Amazonas).

This species is characterized by the subverticillate glabrous leaves and the numerous parallel secondary veins with fine oblique tertiaries.

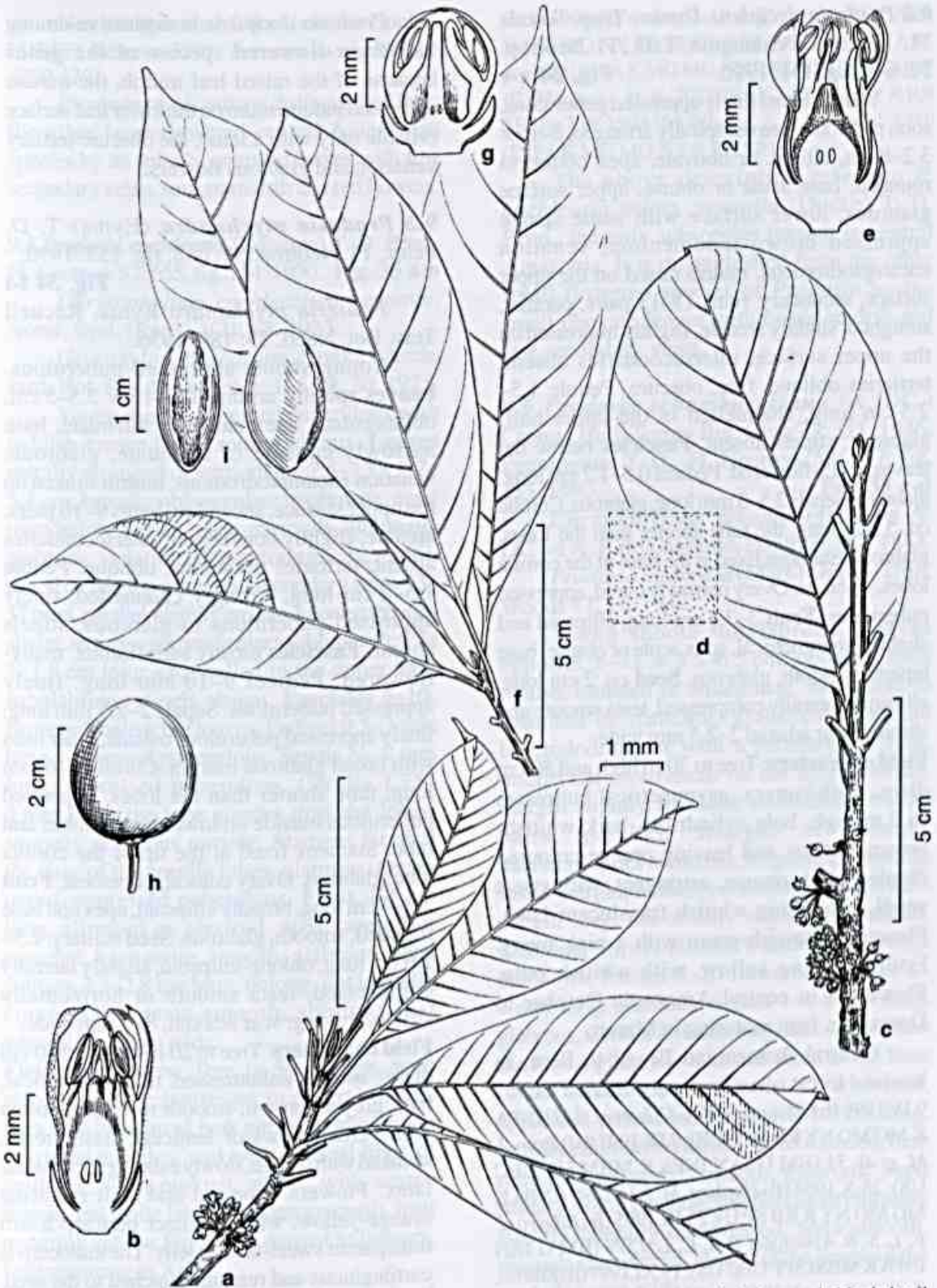

Figura 34 - a-b. *Pradosia subverticillata* - a. habit; b. 1/2 flower (*Ducke 812*). c-e. *Pradosia decipiens* - c. habit; d. detail of leaf indumentum; e. 1/2 flower (*Ducke 24860*). f-i. *Pradosia ptychandra* - f. habit; g. 1/2 flower (*Mori & Veyret 8982*); h. fruit; i. seed (*Pennington & Mori 12103*).

9.2 *Pradosia decipiens* Ducke, Trop. Woods 71: 17. 1942; Pennington, T. D., Fl. Neotrop. 52: 646, fig. 151. 1990. **Fig. 34 c-e**

Young shoots finely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 8–15 × 3.2–8 cm, elliptic or obovate, apex obtuse to rounded, base acute or obtuse, upper surface glabrous, lower surface with some sparse appressed brown indumentum, venation eucamptodromous, midrib raised on the upper surface, secondary veins 11–13 pairs, parallel, straight or slightly arcuate, slightly impressed on the upper surface, intersecondaries absent, tertiaries oblique, fine, obscure. Petiole 1.5–2.5 cm long, channelled in the upper half, glabrous; stipels absent. **Fascicles** below the leaves, 5–15-flowered. Pedicel 0.5–1.2 cm long, glabrous. Sepals 2.5–3 mm long, glabrous. Corolla *ca.* 5 mm long, the tube shorter than the lobes, glabrous. Stamens fixed at the base of the corolla lobes, glabrous. Ovary narrowly ovoid, appressed puberulous. **Fruit** 3–3.5 cm long, ellipsoid and slightly asymmetrical, apex acute or obtuse, base tapered, smooth, glabrous. **Seed** *ca.* 2 cm long, ellipsoid, laterally compressed, testa smooth and shining; scar adaxial 2–2.5 mm wide.

Field characters: Tree to 30 m high and 50 cm diam., with convex, asymmetrical buttresses to 2 m high, bole cylindrical, bark whitish-brown, scaling and leaving orange-coloured dipples, slash orange, astringent, with sweet smell, containing whitish translucent latex. Flowers yellowish-green with a pink ovary. Fruit maturing yellow, with whitish pulp. Flowering in central Amazonia October to December, fruit maturing in March.

Central Amazonian Brazil to Peru, in lowland forest often on poorly drained sites. 9.IV.1998 (fr) *Assunção, P. A. C. L. et al. 833* (INPA K MG MO NY RB SP U UB); 9.IX.1997 (bd) *Brito, J. M. et al. 31* (BM G IAN INPA K MBM UB UEC US); 28.X.1994 (fl) *Hopkins, M. J. G. 1499* (INPA K MG MO NY R RB SP U); 23.III.1995 (fr) *Ribeiro, J. E. L. S. & Assunção, P. A. C. L. 1579* (BM G IAN INPA K MBM SPF UEC US); 19.XI.1997 (fl) *Ribeiro, J. E. L. S. et al. 1950* (B GH IAN ICN INPA K S UPCB VIC); 2.XII.1997 (fl) *Souza, M. A. D. et al. 474* (COL F IAN INPA K PEUFR SPF UFMT VEN).

Pradosia decipiens is distinctive among the larger-flowered species of the genus because of the raised leaf midrib, the minute appressed indumentum on the lower leaf surface (visible only with a lens), the obscure tertiary venation and glabrous flowers.

9.3 *Pradosia ptychandra* (Eyma) T. D. Penn., Fl. Neotrop. 52: 648, fig. 153. 1990. **Fig. 34 f-i**

Pouteria ptychandra Eyma, Recueil Trav. Bot. Néerl. 33: 189. 1936.

Young shoots appressed puberulous. **Leaves** spirally arranged, 9–15 × 3.5–5 cm, oblanceolate, apex narrowly attenuate, base narrowly cuneate or attenuate, glabrous; venation eucamptodromous, midrib sunken on the upper surface, secondary veins 9–10 pairs, arcuate, slightly convergent, intersecondaries absent, tertiaries numerous, oblique. Petiole 1.5–2 cm long, strongly channelled, finely appressed puberulous to glabrous; stipels absent. **Fascicles** mostly ramiflorous, many-flowered. Pedicel 9–10 mm long, finely appressed puberulous. Sepals 2–2.5 mm long, finely appressed puberulous outside, inner ones with broad glabrous margin. Corolla 5–6 mm long, tube shorter than the lobes, appressed puberulous outside on lower part of lobes and tube. Stamens fixed at the tip of the corolla tube, glabrous. Ovary conical, pubescent. **Fruit** 3.3–4 cm long, broadly ellipsoid, apex and base rounded, smooth, glabrous. **Seed** solitary, 2.5–2.6 cm long, oblong-ellipsoid, slightly laterally compressed, testa smooth or horizontally striate, shining; scar adaxial, 8–9 mm wide.

Field characters: Tree to 20 m high and 40 cm diam., usually unbuttressed, trunk cylindrical, bark greyish-brown, smooth to dippled, often with vertical rows of lenticels, slash cream, streaked with orange, slowly exuding sticky white latex. Flowers wine-red and fruit maturing orange-yellow, with the inner pericarp a soft transparent sweet-tasting jelly. The endocarp is cartilaginous and remains attached to the seed. Flowering in central Amazonia January to April.

The Guianas to central Amazonia, in non-flooded lowland rainforest.

Not yet recorded from Reserva Ducke. PDBFF: Reserva 3209, *Ferreira et al. PDBFF 3209.1291*.

Pradosia ptychandra is distinguished from the other large-flowered central Amazonian species by its spirally arranged leaves with few secondary veins, sunken midrib and red flowers.

9.4 *Pradosia cochlearia* (Lecomte) T. D. Penn., Fl. Neotrop. 52: 655, fig. 154. 1990. **Fig. 35 a-b**

Chrysophyllum cochlearium Lecomte, Notul. Syst. (Paris) 4(2): 63. 1923.

Glycoxylon praealtum Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 165, pl. 20. 1925.

Young shoots appressed puberulous with reddish-brown hairs, soon glabrous. **Leaves** spirally arranged or verticillate, 7.5–13 × 2.7–5.4 cm, broadly oblanceolate to obovate, apex rounded or retuse, base narrowly attenuate, glabrous; venation eucamptodromous, midrib raised on the upper surface, secondary veins 13–17 pairs, parallel, slightly arcuate, intersecondaries absent, tertiaries perpendicular to oblique. Petiole 1–1.5 cm long, channelled in the upper half, subglabrous; stipels absent. **Fascicles** 5–10-flowered, below the leaves. Pedicel 0.5–3 mm long, appressed puberulous. Sepals *ca.* 2 mm long, appressed puberulous. Corolla 1.75–3 mm long, the tube shorter than the lobes, sparsely sericeous outside. Stamens fixed at the base of the corolla lobes, glabrous. Ovary ovoid, appressed puberulous. **Fruit** 4–5 cm long, ellipsoid or obovoid, apex tapered or rounded, base acute, smooth, glabrous. **Seed** solitary 2.2–2.8 cm long, oblong, not laterally compressed, testa smooth, shining; scar adaxial, 6–7 mm wide.

Field characters: Tree to 50 m high, with straight, simple buttresses to several metres high, bole cylindrical, bark greyish-white scaling in irregular plates, and with vertical lines of lenticels; slash pinkish, sweet, with scarce translucent white latex. Flowers greenish, fruit maturing yellow. Flowering August to January, fruit maturing in April.

Pará and the Guianas through central and western Amazonia, in lowland rainforest on non-flooded land.

20.II.1998 (fr) *Assunção, P. A. C. L. et al. 797* (INPA K MG MO NY RB SP U); 9.IX.1997 (fl) *Brito, J. M. et al. 29* (INPA K MG MO NY R RB SP U); 1.X.1997 (fl) *Mesquita, M. R. 20* (INPA K MG MO NY R RB SP U); 7.IV.1994 (fr) *Ribeiro, J. E. L. S. et al. 1259* (INPA K MG MO NY R RB SP U).

The above description refers to *P. cochlearia* subsp. *praealta* (Ducke) T. D. Penn., the only subspecies present in central Amazonia. It is distinguished from the other small flowered species of *Pradosia* by the small obovate leaves with raised midrib and few secondary veins.

9.5 *Pradosia schomburgkiana* (A. DC.) Cronq., Bull. Torrey Bot. Club 73: 311. 1946; Pennington, T. D., Fl. Neotrop. 52: 657, fig. 155. 1990. **Fig. 35 c-d**

Chrysophyllum schomburgkianum A. DC. *in* A. P. de Candolle, Prodr. 8: 157. 1844.

Pradosia inophylla (Mart.) Ducke, Trop. Woods 71: 16. 1942.

Young shoots subglabrous. **Leaves** opposite, 6–11 × 3.5–6.5 cm, obovate, apex obtuse, rounded or emarginate, base acute to rounded or truncate, glabrous; venation brochidodromous with a submarginal vein, midrib flat (not raised) on the upper surface, margin slightly revolute, secondaries 14–20 pairs, parallel, straight or arcuate, intersecondaries numerous, long, often extending to the margin, tertiaries reticulate. Petiole 0.5–1.2 cm long, not or only slightly channelled, glabrous; stipels absent. **Fascicles** on twigs below the leaves, 5–20-flowered. Pedicel 4–7 mm long, glabrous. Sepals 1–1.5 mm long, glabrous. Corolla 2–3 mm long, tube shorter than the lobes, glabrous. Stamens fixed at the base of the corolla lobes, glabrous. Ovary ovoid, appressed pubescent. **Fruit** 1.2–1.6 cm long, broadly ellipsoid or obovoid, apex rounded, base rounded or tapered, smooth, glabrous. **Seed** solitary, 1–1.5 cm long, subglobose or ellipsoid, slightly laterally compressed, testa smooth, shining; scar adaxial, about 2/3 the length of the seed, 2–5 mm wide.

Field characters: In campina and campinarana vegetation this is only a shrub or

small tree flowering when a few metres high, but in high rainforest it can be a buttressed tree to 30 m high and 40 cm diam. Bark light brown to reddish-brown, scaling to leave round dipple marks, slash reddish, sweet, with sticky white latex. Flowers greenish-white, fruit maturing yellow. Flowering in central Amazonia November to February, fruit February to March.

Venezuela and the Guianas to central and eastern Amazonia, occurring in a variety of habitats from savanna, campina and campinarana to high rainforest, often on white sand, up to 1400 m altitude.

27.III.1996 (fr) *Brito, J. M. et al. 21* (INPA K MG MO RB); 13.II.1996 (fr) *Campos, M. T. V. A. et al. 484* (INPA K MG NY SP); 23.XI.1993 (fr) *Ribeiro, J. E. L. S. et al. 1166* (INPA K MG NY SP); 4.II.1995 (fl) *Vicentini, A. et al. 844* (INPA K MG MO NY R RB SP U); 9.II.1995 (fr) *Vicentini, A. et al. 862* (G INPA K MBM MG MO R RB U).

Local name: Pau doce.

Easily recognized among other *Pradosia* here by the relatively short but broad leaves with brochidodromous venation and submarginal vein, and by the numerous secondary veins with numerous long intersecondaries.

9.6 *Pradosia verticillata* Ducke, Trop. Woods 71: 12. 1942; Pennington, T. D., Fl. Neotrop. 52: 664, fig. 155. 1990. **Fig. 35 e-f**

Young shoots densely brown-tomentose. **Leaves** verticillate in whorls of 5–7, 11–25 × 4.5–10 cm, broadly oblanceolate, apex shortly and obtusely attenuate to rounded, base acute to narrowly cuneate, upper surface glabrous or with some residual indumentum, lower surface dark brown-pubescent, denser on the midrib and veins; venation eucamptodromous, midrib, secondary and tertiary veins sunken on the upper surface, secondary veins 23–26 pairs, parallel, slightly arcuate, intersecondaries absent, tertiaries numerous, oblique. Petiole 1.5–4 cm long, channelled in the upper part, brown-tomentose; stipels absent. **Fascicles** on twigs below the leaves and on branches, 5–10-flowered. Pedicel, *ca.* 1 mm long, appressed puberulous. Sepals *ca.* 2 mm long, appressed puberulous outside, glabrous inside. Corolla *ca.* 4 mm long, tube shorter than the lobes, densely sericeous outside, except for the glabrous margin. Stamens fixed at the base of the corolla lobes, glabrous. Ovary conical, densely strigose. **Fruit** 3.5–5 cm long, narrowly obovoid, asymmetric, apex rounded, base attenuate, smooth, glabrous. **Seed** solitary, 2.5–3 cm long, laterally compressed, testa smooth, shining; scar adaxial, full-length, *ca.* 4 mm wide.

Field characters: Tree to 35 m high and 35 cm diam., with short, simple, stout buttresses to 0.5 m high, bark pale buff-brown, exfoliating in large irregular thin sheets and leaving dipples, slash orange-brown, with sticky white latex. Crown with massive twigs and dense terminal clusters of leaves. Flowers dark violet-black. Flowering in central Amazonia in October.

The Guianas to central Amazonian Brazil, in mixed lowland rainforest on non-flooded land.

Tagged tree number *724*, *926*, *2348*.

PDBFF: *Pennington et al. s.n.* (INPA K); Amazonas, Manaus, Villa Municipal, *Ducke 811* (IAN K MG RB).

A very distinct species in *Pradosia* with the characteristic dark brown tomentum on its young parts and lower leaf surface, and verticillate leaves with numerous parallel veins.

9.7 *Pradosia* aff. *grisebachii* (Pierre) T. D. Penn., Fl. Neotrop. 52: 655, fig. 154. 1990.

Young shoots finely appressed puberulous with reddish-brown hairs. **Leaves** subverticillate, 10–5 × 3.5–4.5 cm, oblanceolate, apex shortly and narrowly attenuate, base narrowly attenuate, glabrous above, sparsely and minutely appressed puberulous below (lens); venation eucamptodromous, midrib sunken on the upper surface, secondary veins 13–16 pairs, parallel, slightly arcuate, intersecondaries absent, tertiaries numerous, fine, oblique. Petiole 1–2 cm long, strongly channelled in the upper half, subglabrous; stipels present near the apex of the petiole or on the lower midrib at the base of the lamina, *ca.* 1 mm long, paired. **Fascicles** cauliflorous, many-flowered. Pedicel 7–10 mm long, finely

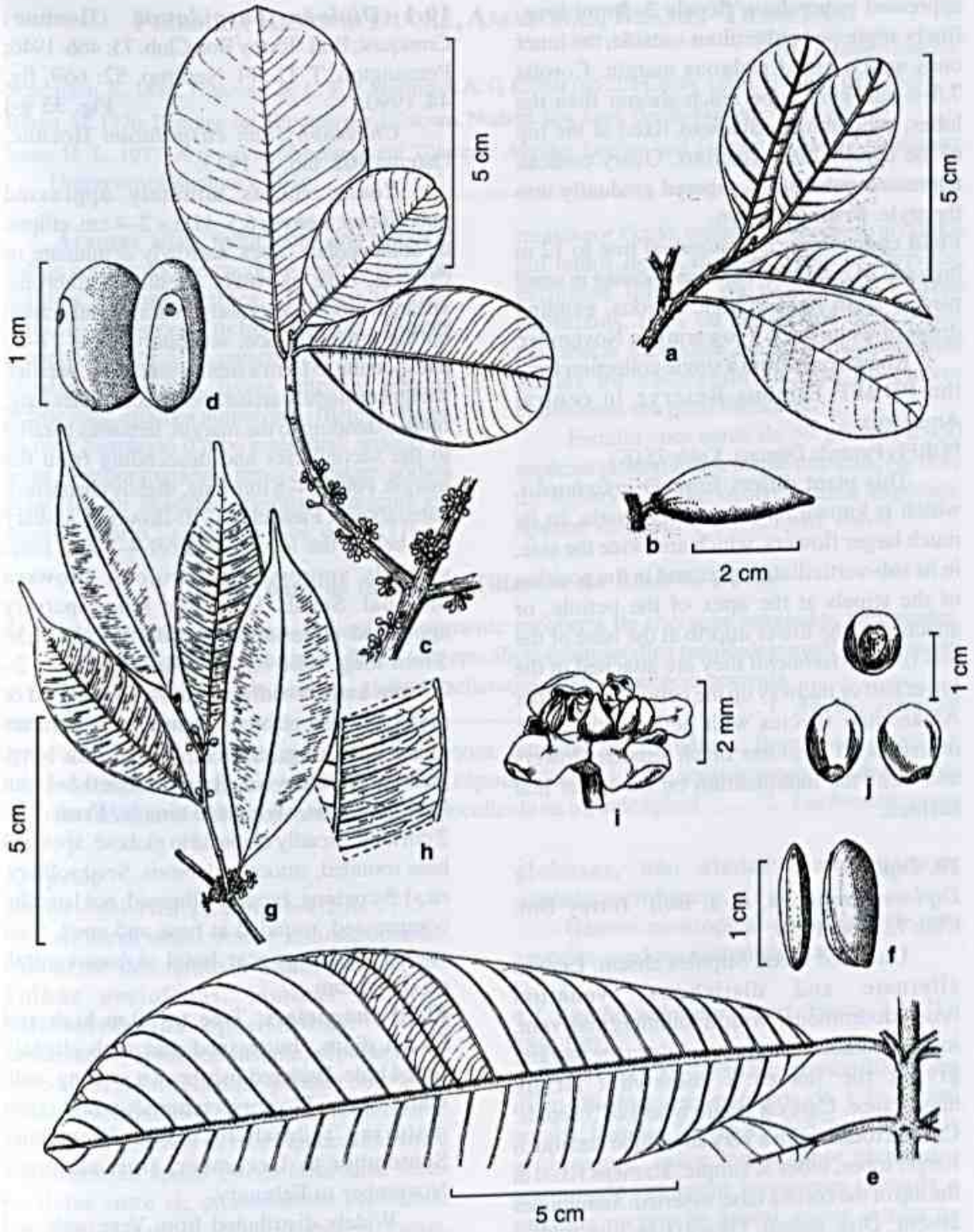

Figura 35 - a-b. *Pradosia cochlearia* subsp. *praealta* - a. habit; b. fruit (*Ducke 1663*). c-d. *Pradosia schomburgkiana* - c. habit (*Clark & Maquirino 7619*); d. seed (*Liesner 3369*). e-f. *Pradosia verticillata* - e. habit; f. seed (*Ducke 881*). g-j. *Diploön cuspidatum* - g. habit; h. detail of venation (*Hatschbach 19595*); i. flower (*Wurdack & Monachino 39595*); j. seed (*Hatschbach 20951*).

appressed puberulous. Sepals 3–5 mm long, finely appressed puberulous outside, the inner ones with a broad glabrous margin. Corolla 7.5–8 mm long, tube much shorter than the lobes, subglabrous. Stamens fixed at the top of the corolla tube, glabrous. Ovary conical, appressed puberulous, tapered gradually into the style. **Fruit** unknown.

Field characters: Unbuttressed tree to 12 m high and 14 cm diam., bark hard, scaling in small pieces, slash light orange, fibrous, exuding drops of white latex. Flowering in November.

Known only from a single collection from the PDBFF Dimona Reserve in central Amazonia.

PDBFF: Fazenda Dimona, *Kukle 75* (K).

This plant differs from *P. grisebachii*, which is known only from Venezuela, in its much larger flowers, which are twice the size, in its sub-verticillate leaves and in the position of the stipels at the apex of the petiole, or attached to the lower midrib at the base of the leaf (in *P. grisebachii* they are attached in the lower half or midway up the petiole). The other Amazonian species with petiole stipels, *P. atroviolacea*, also has much smaller flowers and lacks the indumentum on the lower leaf surface.

10. *Diploön*

Diploön Cronquist, A. J. Bull. Torrey Bot. Club 73: 466. 1946.

Unarmed **trees**. Stipules absent. **Leaves** alternate and distichous. Venation brochidodromous, with a submarginal vein, intersecondaries long, extending to the margin, giving the leaves a somewhat striate appearance. Calyx a single whorl of 5 sepals. Corolla rotate, with a very short tube and much longer lobes, lobes 5, simple. Stamens fixed at the top of the corolla tube, exserted. Staminodes absent. Disk absent. Ovary 1-locular with 2 basal ovules. **Seed** with small basal or basi-ventral scar; embryo with plano-convex cotyledons, endosperm absent.

A single species in South America.

10.1 ***Diploön cuspidatum*** (Hoehne) Cronquist, Bull. Torrey Bot. Club. 73: 466. 1946; Pennington, T. D., Fl. Neotrop. 52: 669, fig. 44. 1990. **Fig. 35 g-j**

Chrysophyllum cuspidatum Hoehne, Ostenia 302, tab. 8. 1933.

Young shoots minutely appressed puberulous. **Leaves** 6.5–11.5 × 2–4 cm, elliptic to oblanceolate, apex narrowly acuminate or caudate, base narrowly attenuate, glabrous; venation brochidodromous, midrib slightly raised on the upper surface, secondary veins 17–20 pairs joining to form a submarginal vein, parallel, straight or slightly arcuate, intersecondaries long, often extending to the margin, tertiaries parallel to the secondaries and descending from the margin. Petiole 4–8 mm long, slightly channelled, subglabrous. **Fascicles** 3–10-flowered, axillary and below the leaves. Pedicel 4–5 mm long, sparsely appressed puberulous. **Flowers** bisexual. Sepals 1–1.5 mm long, sparsely appressed puberulous outside. Corolla 2.5–3 mm long, tube *ca.* 0.5 mm long, lobes 2–2.5 mm long, broadly elliptic, apex rounded or slightly hooded, glabrous. Stamens with filaments 1–1.5 mm long, anthers 1–1.25 mm long, glabrous. Ovary ovoid, glabrous, style 0.5–1 mm long, glabrous, style-head simple. **Fruit** 1.8–2 cm long, broadly ellipsoid to globose, apex and base rounded, smooth, glabrous. Seed solitary, *ca.* 1.5 cm long, broadly ellipsoid, not laterally compressed, rounded at base and apex, testa smooth, shining; scar basal or basi-ventral, *ca.* 7 × 5 mm.

Field characters: Tree to 30 m high and 50 cm diam., buttressed and with slightly fluted bole. Bark reddish-brown, scaling, with white latex. Flowers creamish-white, fruit maturing reddish to black. Flowering September to December, fruit maturing November to February.

Widely distributed from Venezuela and Guyana to southern Amazonian Peru and Bolivia, also in coastal Brazil from Alagoas to Paraná. A tree of lowland rainforest on non-flooded land.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus-Caracaraí km 39, *A. P. Silva s.n. INPA108274* (INPA).

Flora da Reserva Ducke, Amazonas, Brasil: Tiliaceae

Gerleni Lopes Esteves[1]

Schumann, K. 1886. Tiliaceae. *In*: C. F. P. Martius & A. G. Eicher (eds.). Fl. bras. 12(3):117-200, tabs.25-39.

Burret, M. 1926. Beiträge zur Kenntnis der Tiliaceen. Notizbl. Bot. Gart. Berlin-Dahlem, 9:592-880.

Seter, H. L. 1977. A revision of neotropical Tiliaceae: *Apeiba, Luehea* and *Lueopsis*. Tese de Doutorado. University of Kentucky. 207p.

Árvores altas; indumento dos ramos e folhas constituído de tricomas estrelados e/ou simples. **Folhas** simples, alternas; lâminas inteiras. **Inflorescências** cimosas. **Flores** monoclinas; epicálice presente em *Lueheopsis*; sépalas 5, valvares, livres entre si; pétalas imbricadas; estames numerosos; filetes conatos na base formando o tubo estaminal; anteras 2-tecas, 4-esporangiadas, rimosas; estaminódios presentes ou ausentes; ginóforo presente ou ausente; ovário 2-muitos lóculos; óvulos (1–)2-muitos por lóculo; estiletes colunares ou divididos em tantos ramos quantos forem os carpelos; estigmas lobados ou denteados. **Frutos** capsulares, lisos ou recobertos de acúleos, deiscência loculicida ou poricida. **Sementes** aladas ou não; embrião reto ou curvo; cotilédones em geral foliáceos.

Família com cerca de 50 gêneros e 450 espécies predominantemente tropicais. Na flora da Reserva Ducke ocorrem duas espécies: *Apeiba echinata* e *Lueheopsis rosea*.

Chave para os táxons de Tiliaceae da Reserva Ducke

1. Face abaxial das lâminas foliares densamente recoberta de tricomas estrelados minúsculos, alvos e ferrugíneos misturados; flores sem epicálice; estaminódios petalóides; ginóforo presente; cápsulas, recobertas de acúleos, globoso-achatadas, com deiscência poricida ..... 1. *Apeiba echinata*

1'. Face abaxial das lâminas foliares lanuginosa, inteiramente ferrugínea; flores com epicálice; estaminódios fimbriados; ginóforo aussente; cápsulas desprovidas de acúleos, recobertas de tricomas estrelados, oval-oblongas, com deiscência loculicida na metade apical ..... 2. *Lueheopsis rosea*

1. *Apeiba*

Apeiba Aubl. Hist. pl. Guiane. 1:536, 1775.

Árvores altas, tronco sem sapopemas; indumento dos ramos e folhas pubescente. **Folhas** pecioladas, lâminas inteiras. **Inflorescências** opositifólias. **Flores** pediceladas; epicálice ausente; sépalas livres entre si, oval-lanceoladas; pétalas obovadas, ápice arredondado; estames numerosos; filetes concrescidos na base; anteras lineares, com extensão apical estéril bifurcada, tecas paralelas entre si; estaminódios presentes; ginóforo presente; ovário sub-globoso, multilocular, multiovulado por lóculo; estiletes colunares; estigmas curtamente denteados. **Cápsulas** globoso-achatadas, recobertas de acúleos, deiscência poricida. Sementes globosas, não aladas; embrião reto; cotilédones foliáceos.

Gênero neotropical com cerca de sete espécies predominantemente arbóreas.

1.1 *Apeiba echinata* Gaert. Fruct. 2 (121): 189. 1802.

Árvores 15–25 m alt.; tronco 20–30 cm diâm. **Folhas** com pecíolos de 1,3–2,5 cm compr.; lâminas 7,2–16 × 3,7–5,7 cm, elípticas a oblongas, ápice longamente atenuado-acuminado, margem levemente crenada a serreada na porção apical, quase inteira na porção basal, 5-nervadas na base, nervuras laterais 5–7, escuras, face adaxial nigrescente, quase glabra, com tricomas estrelados esparsos sobre as nervuras, face

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abaxial esverdeada, com tricomas estrelados minúsculos alvos e ferrugíneos, entre as nervuras basais e laterais tufos de tricomas estrelados ferrugíneos. **Flores** com pedicelos até 1 cm compr.; sépalas ca. 2 cm compr., carnosas, cuculadas na parte apical, amarelas; pétalas 1,3–1,5 cm compr., largamente obovadas, amarelas; filetes curtos; estaminódios menores que os estames, petalóides; ginóforo curto. **Cápsulas** 6–7 cm diâm., acúleos uncinados, escuros, glabros, delgados.

Venezuela, Guiana, Suriname, Guiana Francesa e Norte do Brasil.

Floresta de baixio.

Nome local: pente de macaco.

3.XI.1994, *Ribeiro et al. 1483* (INPA, SP).

Material adicional examinado: 11.VIII.1966 (fr.) *Rodrigues & Osmarino* 822 (INPA); 15.IV.1966 (fr.) Rodrigues & Coelho 7686 (INPA).

Espécie facilmente reconhecida pela presença de um tufo de tricomas estrelados na axila das nervuras basais e laterais das lâminas foliares.

2. *Lueheopsis*

Lueheopsis Burret, Beiträge zur Kenntnis der Tiliaceen. Notizbl. Bot. Gart. Berlin-Dahlem, 9: 838. 1926.

Árvores; indumento constituído de tricomas estrelados. **Folhas** curtamente pecíoladas; lâminas inteiras. **Inflorescências** axilares e terminais; flores curtamente pediceladas; epicálice gamofilo, lobado; cálice com comprimento maior que o epicálice; sépalas livres entre si, carnosas; pétalas com tricomas estrelados na base; estames numerosos, agrupados em falanges conatas na base formando o tubo estaminal; anteras 2-tecas, lineares, rimosas, tecas divergentes na metade apical; estaminódios 5, fimbriados; ginóforo ausente; ovário 5-locular, multiovulado por lóculo; estiletes colunares, levemente dilatado na porção apical; estigmas 5-lobados. **Cápsulas** sublenhosas, sem acúleos, pubescentes a glabrescentes, tricomas estrelados, deiscência loculicida na metade apical. **Sementes** ovóides; embrião reto, cotilédones foliáceos.

Gênero com cerca de cinco espécies distribuídas na região neotropical.

2.1 *Lueheopsis rosea* (Ducke) Burret. Notizbl. bot. gart. Berlin-Dahlem, 9: 840. 1926.

Árvores 18–20 m alt.; tronco tortuoso; ramos jovens densamente recobertos de tricomas estrelados, glabrescentes. **Folhas** com pecíolos de 0,5–10 mm compr.; lâminas 9,5–29 × 4,3–10 cm, obovadas a largo-elípticas, ápice atenuado-acuminado, base obtusa, margem inteira na porção basal, esparsamente serreada na porção apical, dentes proeminentes, 3-nervadas na base, nervuras laterais ca. 4 (incluindo as basais), discolores, face adaxial glabra, face abaxial lanuginosa, ferrugínea. **Flores** com pedicelos de 3–4 mm compr., pubescentes, ticomas estrelados ferrugíneos; epicálice ca. 3 mm compr., 6-lobado, ferrugíneo, lobos oval-agudos; sépalas 9–12 mm compr., róseas, face dorsal pilosa, face ventral glabras; pétalas 12–14 mm compr., lilás; tubo estaminal glabro, estaminódios maiores que os estames. **Cápsulas** ca. 3 cm compr., oval-oblongas, rostradas; sementes aladas.

Guiana, Suriname, Guiana Francesa e Norte do Brasil (Amazonas, Pará).

Floresta de vertente e de platô.

Nome local: açoita-cavalo.

17.VII.1995, *Sothers et al. 521* (INPA, SP); 15.VII.1995, *Hopkins et al. 1572* (INPA, SP); 11.VIII.1995, *Ribeiro et al. 1100* (INPA); 23.VIII.1995, *Assunção & Pereira 229* (INPA); 11.X.1994, *Vicentini et al. 729* (INPA); 11.VIII.1995, *Costa et al. 341* (INPA, SP); 8.VIII. 1997, *Assunção et al. 603* (INPA, SP).

Lueheopsis rosea assemelha-se a *L. dukeana* por ambas apresentarem a face abaxial das folhas lanuginosas e as sépalas glabras na face ventral, entretanto, pode ser distinta pelos ramos floridos, pedicelos e epicálice recobertos de tricomas estrelados minúsculos e pelas flores comparativamente menores com o epicálice lobado até a metade do seu comprimento total; ao passo que *L. dukeana* apresenta os ramos floridos, pedicelos e epicálice vilosos, as flores comparativamente maiores, com epicálice curtamente lobado.

INSTRUÇÕES AOS AUTORES

Escopo

A Rodriguésia é uma publicação quadrimestral do Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, que publica artigos e notas científicas, em Português, Espanhol ou Inglês em todas as áreas da Biologia Vegetal, bem como em História da Botânica e atividades ligadas a Jardins Botânicos.

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Todos os artigos serão submetidos a 2 consultores *ad hoc*. Aos autores será solicitado, quando necessário, modificações de forma a adequar o trabalho às sugestões dos revisores e editores. Artigos que não estiverem nas normas descritas serão devolvidos.

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Palavras em latim devem estar em itálico, bem como os nomes científicos genéricos e infragenéricos. Utilizar nomes científicos com-pletos (gênero, espécie e autor) na primeira men-ção, abreviando o nome genérico subseqüente-mente, exceto onde referência a outros gêneros cause confusão. Os nomes dos autores de táxons devem ser citados segundo Brummitt & Powell (1992), na obra "Authors of Plant Names".

Primeira página – deve incluir o título, autores, instituições, apoio financeiro, autor e endereço para correspondência e título abreviado. O título deverá ser conciso e objetivo, expressando a idéia geral do conteúdo do trabalho. Deve ser escrito em negrito com letras maiúsculas utilizadas apenas onde as letras e as palavras devam ser publicadas em maiúsculas.

Segunda página – deve conter Resumo (incluindo título em português ou espanhol), Abstract (incluindo título em inglês) e palavras-chave (até 5, em português ou espanhol e inglês). Resumos e abstracts devem conter até 200 palavras cada. O Corpo Editorial pode redigir o Resumo a partir da tradução do Abstract em trabalhos de autores não fluentes em português.

Texto – Iniciar em nova página de acordo com seqüência apresentada a seguir: Introdução, Material e Métodos, Resultados, Discussão, Agradecimentos e Referências Bibliográficas. Estes itens podem ser omitidos em trabalhos sobre a descrição de novos táxons, mudanças nomenclaturais ou similares. O item Resultados pode ser agrupado com Discussão quando mais adequado. Os títulos (Introdução, Material e Métodos etc.) e subtítulos deverão ser em negrito. Enumere as figuras e tabelas em arábico de acordo com a seqüência em que as mesmas aparecem no texto. As citações de referências no texto devem seguir os seguintes exemplos: Miller (1993), Miller & Maier (1994), Baker *et al.* (1996) para três ou mais autores ou (Miller 1993), (Miller & Maier 1994), (Baker *et al.* 1996).

Referência a dados ainda não publicados ou trabalhos submetidos deve ser citada conforme o exemplo: (R.C. Vieira, dados não publicados). Cite resumos de trabalhos apresentados em Congressos, Encontros e Simpósios se estritamente necessário.

O material examinado nos trabalhos taxonômicos deve ser citado obedecendo a seguinte ordem: local e data de coleta, fl., fr., bot. (para as fases fenológicas), nome e número do coletor (utilizando *et al.* quando houver mais de dois) e sigla(s) do(s) herbário(s) entre parêntesis, segundo o *Index Herbariorum*. Quando não houver número de coletor, o número de registro do espécime, juntamente com a sigla do herbário,deverá ser citado. Os nomes dos países e dos estados/províncias deverão ser citados por extenso, em letras maiúsculas e em ordem alfabética, seguidos dos respectivos materiais estudados.
Exemplo:
BRASIL. BAHIA: Ilhéus, Reserva da CEPEC, 15.XII.1996, fl. e fr., *R. C. Vieira et al. 10987* (MBM, RB, SP).

Para números decimais, use vírgula nos artigos em Português e Espanhol (exemplo: 10,5 m) e ponto em artigos em Inglês (exemplo: 10.5 m). Separe as unidades dos valores por um espaço (exceto em porcentagens, graus, minutos e segundos).

Use abreviações para unidades métricas do Systeme Internacional d´Unités (SI) e símbolos químicos amplamente aceitos. Demais abreviações podem ser utilizadas, devendo ser precedidas de seu significado por extenso na primeira menção.

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Tolbert, R. J. & Johnson, M. A. 1966. A survey of the vegetative shoot apices in the family Malvaceae. American Journal of Botany 53(10): 961-970.

Engler, H. G. A. 1878. Araceae. *In*: Martius, C. F. P. von; Eichler, A. W. & Urban, I. Flora brasiliensis. Munchen, Wien, Leipzig, 3(2): 26-223.

_____. 1930. Liliaceae. *In*: Engler, H. G. A. & Plantl, K. A. E. Die Naturlichen Pflanzenfamilien. 2. Aufl. Leipzig (Wilhelm Engelmann). 15: 227-386.

Sass, J. E. 1951. Botanical microtechnique. 2ed. Iowa State College Press, Iowa, 228p.

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"Apenas algumas espécies apresentam indumento (Tabela 1)..."

"Os resultados das análises fitoquímicas são apresentados na Tabela 2..."

Figuras - não devem ser inseridas no arquivo de texto. Submeter originais em preto e branco e três cópias de alta resolução para fotos e ilustrações, que também podem ser enviadas em formato eletrônico, com alta resolução, desde que estejam em formato TIF ou compatível com *CorelDraw*, versão 10 ou superior. Ilustrações de baixa qualidade resultarão na devolução do manuscrito. No caso do envio das cópias impressas a numeração das figuras, bem como textos nelas inseridos, devem ser assinalados com *Letraset* ou similar em papel transparente (tipo manteiga), colado na parte superior da prancha, de maneira a sobrepor o papel transparente à prancha, permitindo que os detalhes apareçam nos locais desejados pelo autor. Os gráficos devem ser em preto e branco, possuir bom contraste e estar gravados em arquivos separados em disquete (formato TIF ou outro compatível com *CorelDraw 10*). As pranchas devem possuir no máximo 15 cm larg. x 22 cm comp. (também serão aceitas figuras que caibam em uma coluna, ou seja, 7,2 cm larg.x 22 cm comp.). As figuras que excederem mais de duas vezes estas medidas serão recusadas. As imagens digitalizadas devem ter pelo menos 600 dpi de resolução.

No texto as figuras devem ser sempre citadas de acordo com os exemplos abaixo:

"Evidencia-se pela análise das Figuras 25 e 26...."

"Lindman (Figura 3) destacou as seguintes características para as espécies..."

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Primera página - debe incluir el título, autores, afiliación profesional, financiamiento, autor y dirección para correspondencia, así como título abreviado. El título deberá ser conciso y objetivo, expresando la idea general del contenido del artículo; además, debe ser escrito en negrita con letras mayúsculas utilizadas apenas donde las letras y las palabras deban ser publicadas en mayúsculas.

Segunda página - debe tener un Resumen (incluyendo título en portugués o español), Abstract (incluyendo título en ingles) y palabras clave (hasta cinco, en portugués o español e inglés). Resúmenes y "abstracts" llevan hasta 200 palabras cada uno. El Consejo Editorial puede traducir el "abstract", para hacer el Resumen en trabajos de autores que no tienen fluencia en portugués.

Texto – iniciar en una nueva página de acuerdo con secuencia presentada a seguir: Introducción, Materiales y Métodos, Resultados, Discusión, Agradecimientos y Referencias Bibliográficas. Estas secciones pueden ser omitidas en trabajos relacionados con la descripción de nuevos taxones, cambios nomenclaturales o similares. La sección Resultados puede ser agrupada con Discusión cuando se considere pertinente. Las secciones (Introducción, Material y Métodos, etc.) y subtítulos deberán ser escritas en negritas. Las figuras y las tablas se deben numerar en arábigo de acuerdo con la secuencia en que las mismas aparezcan en el texto. Las citaciones de referencias en el texto deben seguir los ejemplos: Miller (1993), Miller & Maier (1994), Baker *et al.* (1996) para tres o mas autores o (Miller, 1993), (Miller & Maier, 1994), (Baker *et al.*, 1996).

Las referencias a datos todavía no publicados o trabajos sometidos a publicación deben ser citados conforme al ejemplo: (R.C. Vieira, com. pers. o R.C. Vieira obs. pers.). Cite resúmenes de trabajos presentados en Congresos, Encuentros y Simposios cuando sea estrictamente necesario.

El material examinado en los trabajos taxonómicos debe ser citado obedeciendo el siguiente orden: lugar y fecha de colección, fl., fr., bot. (para las fases fenológicas), nombre y número del colector (utilizando *et al.* cuando existan más de dos) y sigla(s) de lo(s) herbario(s) entre paréntesis, siguiendo el *Index Herbariorum*. Cuando no exista número de colector, el número de registro del espécimen, juntamente con la sigla del herbario, deberá ser citado. Los nombres de los países y de los estados o provincias deberán ser citados por extenso, en letras mayúsculas y en orden alfabética, seguidos de los respectivos materiales estudiados.

Ejemplo:

BRASIL. BAHIA: Ilhéus, Reserva da CEPEC, 15.XII.1996, fl. y fr., *R. C. Vieira et al. 10987* (MBM, RB, SP).

Para números decimales, use coma en los artículos en Portugués y Español (ejemplo: 10,5 m) y punto en artículos en Ingles (ejemplo: 10.5 m). Separe las unidades de los valores por un espacio (excepto en porcentajes, grados, minutos y segundos).

Use abreviaciones para unidades métricas del Systeme Internacional d'Unités (SI) y símbolos químicos ampliamente aceptados. Las otras abreviaciones pueden ser utilizadas, debiendo ser precedidas de su significado por extenso en la primera mención.

Referencias Bibliográficas - Todas las referencias citadas en el texto deben ser listadas en esta sección. Las referencias bibliográficas deben ser ordenadas en orden alfabético por apellido del primer autor, solo la primera letra debe estar en caja alta, seguido de todos los demás autores. Cuando exista repetición del(los) mismo(s) autor(es), el nombre del mismo deberá ser substituido por una raya; cuando el mismo autor tenga varios trabajos en un mismo año, deberán ser colocadas letras alfabéticas después de la fecha. Los títulos de revistas no deben ser abreviados.

Ejemplos:

Tolbert, R. J. & Johnson, M. A. 1966. A survey of the vegetative shoot apices in the family Malvaceae. American Journal of Botany 53(10): 961-970.

Engler, H. G. A. 1878. Araceae. *In*: Martius, C. F. P. von; Eichler, A. W. & Urban, I. Flora brasiliensis. Munchen, Wien, Leipzig, 3(2): 26-223.

_____. 1930. Liliaceae. *In*: Engler, H. G. A. & Plantl, K. A. E. Die Naturlichen Pflanzenfamilien. 2. Aufl. Leipzig (Wilhelm Engelmann). 15: 227-386.

Sass, J. E. 1951. Botanical microtechnique. 2ed. Iowa State College Press, Iowa, 228p.

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Tablas - deben ser presentadas en blanco y negro, en el formato Word para Windows. En el texto las tablas deben estar siempre citadas de acuerdo con los ejemplos abajo:

"Apenas algunas especies presentan indumento (Tabla 1)..."

"Los resultados de los análisis fitoquímicos son presentados en la Tabla 2..."

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Manuscripts must be presented in *Microsoft Word* software (vs 6.0 ou more recent), with Times New Roman font size 12, double spaced. Page format must be size A4, margins 2,5 cm, justified (except in the cases explained below), printed on one side only. All pages, except the title page, must be numbered in the top right corner. Capital letters to be used only for initials, according to the language.

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First page – must include title, authors, addresses, financial support, main author and contact address and abbreviated title. The title must be short and objective, expressing the general idea of the contents of the article. It must appear in bold with capital letters where relevant.

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Tolbert, R. J. & Johnson, M. A. 1966. A survey of the vegetative shoot apices in the family Malvaceae. American Journal of Botany 53(10): 961-970.

Engler, H. G. A. 1878. Araceae. *In*: Martius, C. F. P. von; Eichler, A. W. & Urban, I. Flora brasiliensis. Munchen, Wien, Leipzig, 3(2): 26-223.

_____. 1930. Liliaceae. *In*: Engler, H. G. A. & Plantl, K. A. E. Die Naturlichen Pflanzenfamilien. 2. Aufl. Leipzig (Wilhelm Engelmann). 15: 227-386.

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