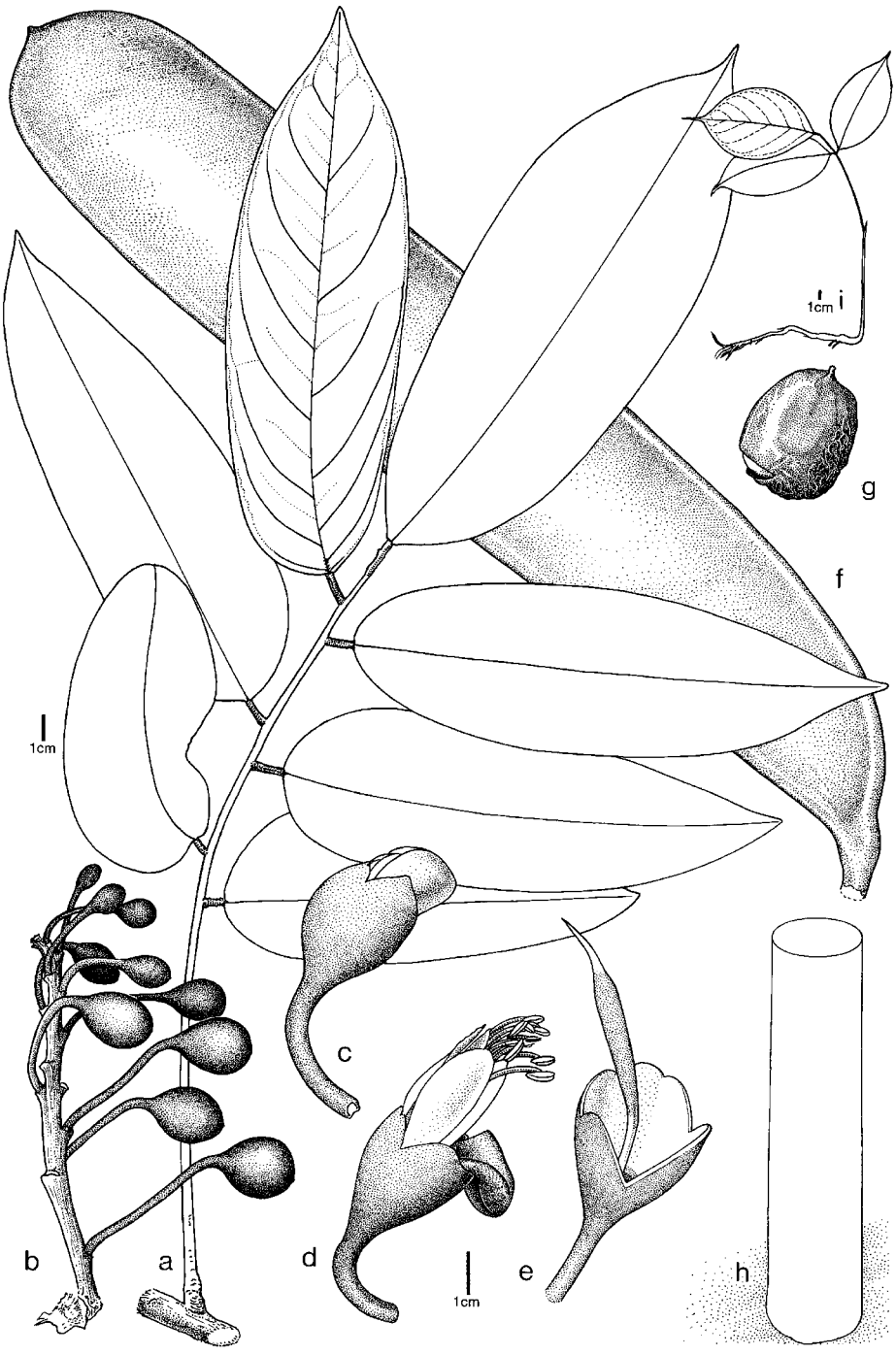


1. *Alexa imperatricis* a. leaf; b. inflorescence with flower buds; c. immature flower; d. mature flower; e. flower with petals and stamens removed, showing calyx and ovary; f. fruit; g. seed; h. trunk base; i. seedling.

1. **Alexa imperatricis** (R.H. Schomb.) Baill. **LEGUMINOSAE-PAPIL. White aromatta**

Vernacular names: White aromatta, Aramatta (Cr), Aromata, Haiariballi[1] (Ar), Kureku (C), Ada karikoro (Wr).

Botanical description: Tree, to 40 m tall; trunk to 60 cm in diam. Outer bark light brown, lenticellate, inner bark bright yellow, with strong, poisonous scent and little colourless exudate, sapwood whitish to light brown, heartwood dark brown. Branches minutely puberulous when young. Leaves alternate, 7-9-foliate, rachis ca. 20 cm long; stipules inconspicuous; petiole ca. 11 cm long; leaflets alternate, petiolules ca. 1 cm long, wrinkled; blades leathery, glabrous, narrowly oblong-elliptic, to 24 x 11 cm, apex shortly acuminate to acute, base obtuse. Inflorescences terminal racemes ca. 18 cm long, rachis deep red, covered with small, brown, appressed hairs; pedicels ca. 6 cm long. Flowers zygomorphic, stout, producing nectar; calyx dark red, leathery, cup-shaped, ca. 2.3 cm long, dark brown velutinous, lobes unequal, persistent; petals 5, somewhat leathery, ca. 4 cm long, 4 petals orange, connivent, 1 petal dark red, recurved; stamens 10, orange-red; ovary superior, 1-locular, tomentose, style 1, persistent. Pod woody, dark brown, flattened, elongate, sickle-shaped, ca. 35 x 5 cm, brown velutinous, longitudinally dehiscent, valves with spongy, white inner layer; seeds 8-10, black, broadly ellipsoid, flattened, ca. 2 x 0.5 cm.

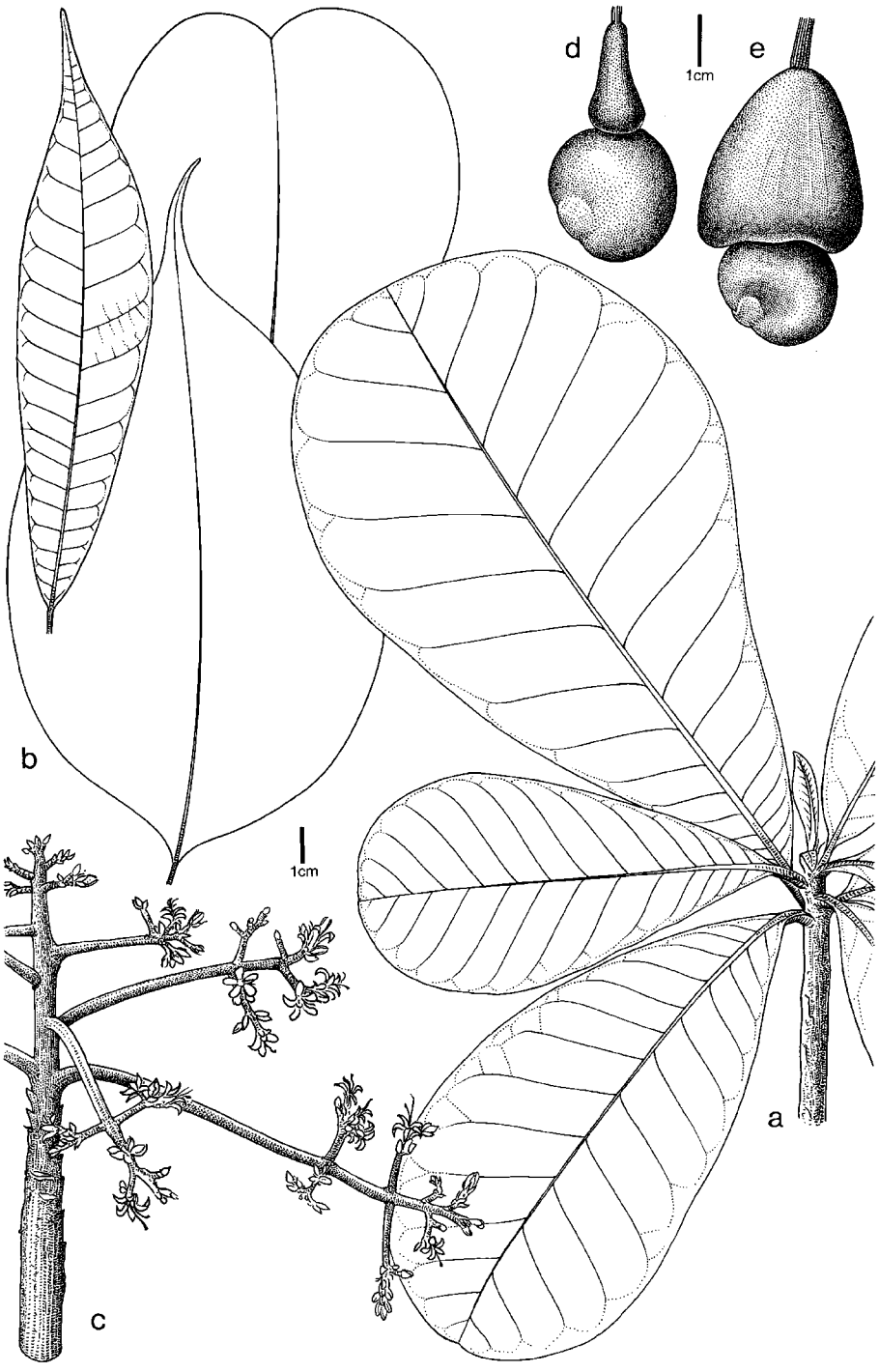
Distribution and ecology: Probably endemic to Guyana, locally dominant on light sands and loamy soils. In northwest Guyana, frequent in Mora, mixed, and secondary forests. Flowering nearly throughout the year; fruiting mainly in April and May (Polak, 1992). In Barama trees were observed fruiting annually from August to December. The flowers are probably pollinated by hummingbirds (Polak, 1992).

Use: The inner bark of this tree is said to be very poisonous. It produces a pungent smell, which provokes an instant headache. Fresh bark scrapings are applied to bites of the munuri ant (*Pariponera clavata*), a large black ant that stings painfully. To ease down the pain, the bark is tied on the bite with a piece of cloth. Bark scrapings are also applied to skin sores and put between the toes to cure 'ground itch', a common fungal infection of the feet (athlete's feet). A small dose of sap squeezed from the fresh bark is given to persons bitten by the labaria snake (*Bothrops asper*). Patients were warned to use this medicine only when bitten by this particular snake, as the labaria poison counteracts the aromatta poison. An incident was mentioned of coastlanders in Kwebanna (Waini), who took aromatta bark for locust bark (*Hymenaea courbaril* var. *courbaril*) and brewed a tea that caused acute poisoning resulting in the death of several persons. Forte (1997) reported on logging companies throwing aromatta logs in creeks, making the water unsafe for drinking for the surrounding villages. Despite its toxicity, very small doses of the bark tea are drunk to treat malaria.

A day after slashing the aromatta bark, the cut is filled with a transparent, jelly-like substance, which is rubbed in the hair to kill lice and cure dandruff. Aromatta seeds are shortly roasted and put on a hook as fish bait. Raw seeds are used to catch morocots (*Myletes* sp.). The poisonous seeds cause a severe headache when eaten by humans. Fresh bark and seeds are stuffed in the hole of an armadillo (*Dasypus* sp.). The poison kills the animal, but its meat is apparently still safe for consumption. Baboons (howler monkey, *Alouatta seniculus*) feed on the pods and seeds of this tree. Amerindians gave this as the main reason for the terrible smell of baboon droppings and the fact that they rarely eat the meat of this animal. Because of its poisonous contents, Amerindians do not use aromatta wood for firewood, unless it is thoroughly rotten. Coastlanders said they used aromatta firewood without problems. Fanshawe (1948) mentioned the use of aromatta wood chips as fish poison, but this practise was unknown in the North-West District.

Economy: The species is commercially harvested for timber and plywood (Polak, 1992). Other aromatta products are used for subsistence only.

Notes: (1) Named after the poisonous haiari liana (*Lonchocarpus* spp.), having a similar scent (Fanshawe, 1949).



2. *Anacardium giganteum* a. leafy branch; b. different leaf shapes; c. inflorescence; d. unripe fruit; e. ripe fruit with enlarged pedicel.

2. **Anacardium giganteum** Hancock ex Engl. **ANACARDIACEAE** **Hubudi**

Vernacular names: Wild cashew, Hubudi (Cr), Ubudi (Ar), Akayu-u (C), Merehi (Wr).

Botanical description: Tree, to 40 m tall; crown broad; trunk to 3 m in diam., cylindrical, unbuttressed. Outer bark very thick, brown, moderately coarse, flaky with vertical fissures, inner bark pinkish brown. Leaves clustered at branch ends; with strong turpentine-like (mango) odour; stipules absent; petiole stout, ca. 1 cm long, puberulous; blades papery to leathery, narrowly to broadly obovate, to 36.5 x 14 cm, shiny, glabrous above, puberulous on veins below, apex rounded, acute or obtuse, base cuneate, obtuse or slightly auriculate; domatia deep, pit-like. Inflorescences terminal or axillary panicles to 26 x 29 cm, densely puberulous; peduncle ca. 1.5 cm long; basal bracts leaflike, obovate, distal bracts sepal-like; pedicels ca. 1.5 mm long. Flowers bisexual or male, with heavy sour-sweet smell; calyx 5-lobed, lobes ovate, ca. 2 mm long, puberulous; petals 5, yellowish, turning dark red after pollination, narrowly elliptic to ovate, ca. 5 mm long, recurved, sparsely puberulous; stamens 7-10, 1 much larger; ovary superior, subglobose, 1-locular, with basal ovule, style excentric, ca. 4 mm long, stigma reduced to a point. Pedicels pear-shaped, becoming thick and fleshy when ripe, ca. 1.5 x 2.5 cm, red, shiny. Fruits (nuts) brown to black, kidney-shaped, ca. 2.5 x 2 cm; seed 1, light brown, kidney-shaped.

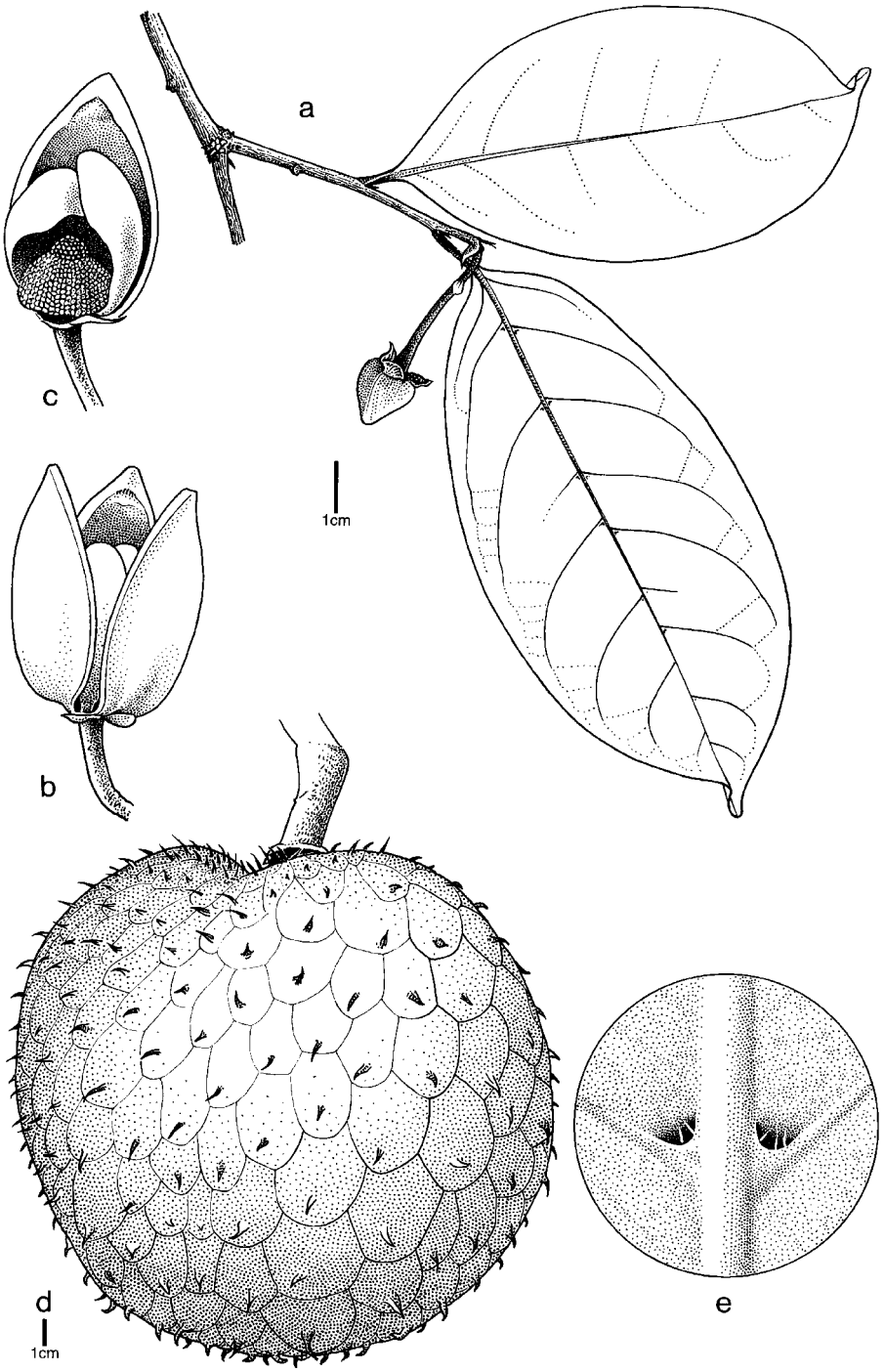
Distribution and ecology: Northern South America, in evergreen, non-inundated, high forest. In northwest Guyana, occasional in mixed forest and Mora forest. In remote areas, the species is truly wild. In villages along the Moruca River, however, large hubudi trees had been planted or spared from cutting more than 100 years ago[1]. Flowering from April to January; fruiting from July to February (Mitchell, 1997). People in the North-West District said that the tree was fruiting only once every four years. In 1995, germinated seedlings of the crop of 1994 were found in Barama. In December 1997, the tree was flowering for the first time again, while ripe fruits were abundant at the end of January 1998.

Use: The hubudi fruit (actually the modified pedicel or hypocarp) is edible and very popular. Shrubs under the trees are frequently weeded to facilitate the gathering of fallen fruits. A notorious strong alcoholic drink, known locally as 'hubudi local' or 'cashew wine' is made from the fermented fruits. When the fruits are in season, drinking sprees are held in which the liquid is consumed in huge quantities. Hubudi fruits and drinks are consumed throughout the Amazonian region (Stahel, 1944; Cavalcante, 1972; Balée, 1994; Sánchez, 1996).

Tapirs or bush cows (*Tapirus terrestris*) are fond of hubudi as well. After eating large numbers of fruits, the animals get drunk and stagger through the forest, producing their typical whistling sound. As the animals are easy to shoot when intoxicated, hunters wait near fruiting hubudi trees at night for the tapirs to approach. The seeds of cultivated cashew (*Anacardium occidentale*) are usually roasted in the shell. The hubudi seed, however, is seldom eaten, since the nut shell contains an irritating oil that blisters the lips and tongue. If the shell is removed carefully, in a way that that the oil does not touch the seeds, the nuts can be roasted and eaten. The bark is used as a treatment for diarrhoea. A piece of ca. 10 x 4 cm of the inner bark is boiled until the liquid becomes dark brown in colour. Small amounts of the astringent ('stainy') tea are drunk. The wood is occasionally used to make boards and canoes, but it is not very durable and rots fast.

Economy: Fermented hubudi drink is sold for US$ 5 per gallon at the Saturday's market in Santa Rosa, where a large variety of home-made fermented drinks are sold among residents. These drinks cannot be stored long, as the fermenting process continues and bottles are likely to explode. Hubudi has only a local economic value.

Notes: (1) See plate 1.



3. *Annona montana* a. flowering branch; b. flower; c. flower, partly opened to show stamens and carpels; d. fruit; e. domatia in nerve angles (r = 2 mm).

3. **Annona montana** Macfad. **ANNONACEAE** **Wild soursop**

Synonym: *Annona marcgravii* Mart., *Annona pisonis* Mart., *Annona sphaerocarpa* Splitg.

Vernacular names: Wild soursop (Cr), Duru (Ar), Arasyisyu (C), Ibakwaha (Wr).

Botanical description: Tree, to 15 m tall; trunk to 10 cm in diam. Outer bark dark, smooth, peeling off easily, with a pungent smell. Branches terete, glabrous. Leaves simple, alternate, in two vertical rows along the branches; stipules absent; petiole ca. 1 cm long, thickened, glabrous; blades obovate to elliptic, ca. 10 x 6 cm, glabrous, shiny above, ash-gray sericeous below when young, soon becoming glabrous, with pocket-shaped, hairy domatia in the nerve angles, apex rounded to bluntly acuminate, base acute. Inflorescence terminal or opposite the leaves, 1-flowered; bracts rounded-triangular, ca. 2.5 mm long; pedicels ca. 1.5 cm long. Flowers actinomorphic, pendent, olive-green, conical in bud; sepals 3, triangular-rounded, ca. 5 mm long, acute, reflexed; outer petals 3, broadly ovate, ca. 2.5 cm long, thick, valvate, inner petals 3, slightly smaller, thick, rounded, broadly stipitate at the base, overlapping; stamens numerous, ca. 5 mm long, spirally disposed on a broad receptacle; ovaries numerous, free, each with 1 ovule, basal, erect, with sessile stigma. Fruit syncarpous, yellow, globose to ovoid, ca. 15 cm in diam., surface areolate, with a straight spine on each areole, fruit pulp white, rather dry; seeds numerous, golden yellow, ca. 18 x 24 mm long.

Distribution and ecology: Northern South America, the West Indies, and the Amazon region (Rainer, pers. comm.). According to collection labels from Suriname and French Guiana (U), the species is common in coastal marsh forests, sand ridges, and riverine forests. It also occurs occasionally in non-flooded primary forest with palms in Central Guyana. In northwest Guyana, the species was only observed in cultivation, although locals were convinced that they had seen the species in the wild. Cultivated individuals probably bear much larger fruits than their wild relatives[1]. In Suriname, the species is flowering from April to July (Fries, 1940). In Barama, flowers were seen in December and fruits from June to January.

Use: The flesh of the large fruits is rather dry and hard, much less juicy than the cultivated soursop (*Annona muricata*). Nevertheless, wild soursop is much esteemed and widely cultivated in northwest Guyana. Children even eat the unripe fruits. Pieces of the white fruit pulp are also put on a hook and used as fish bait.

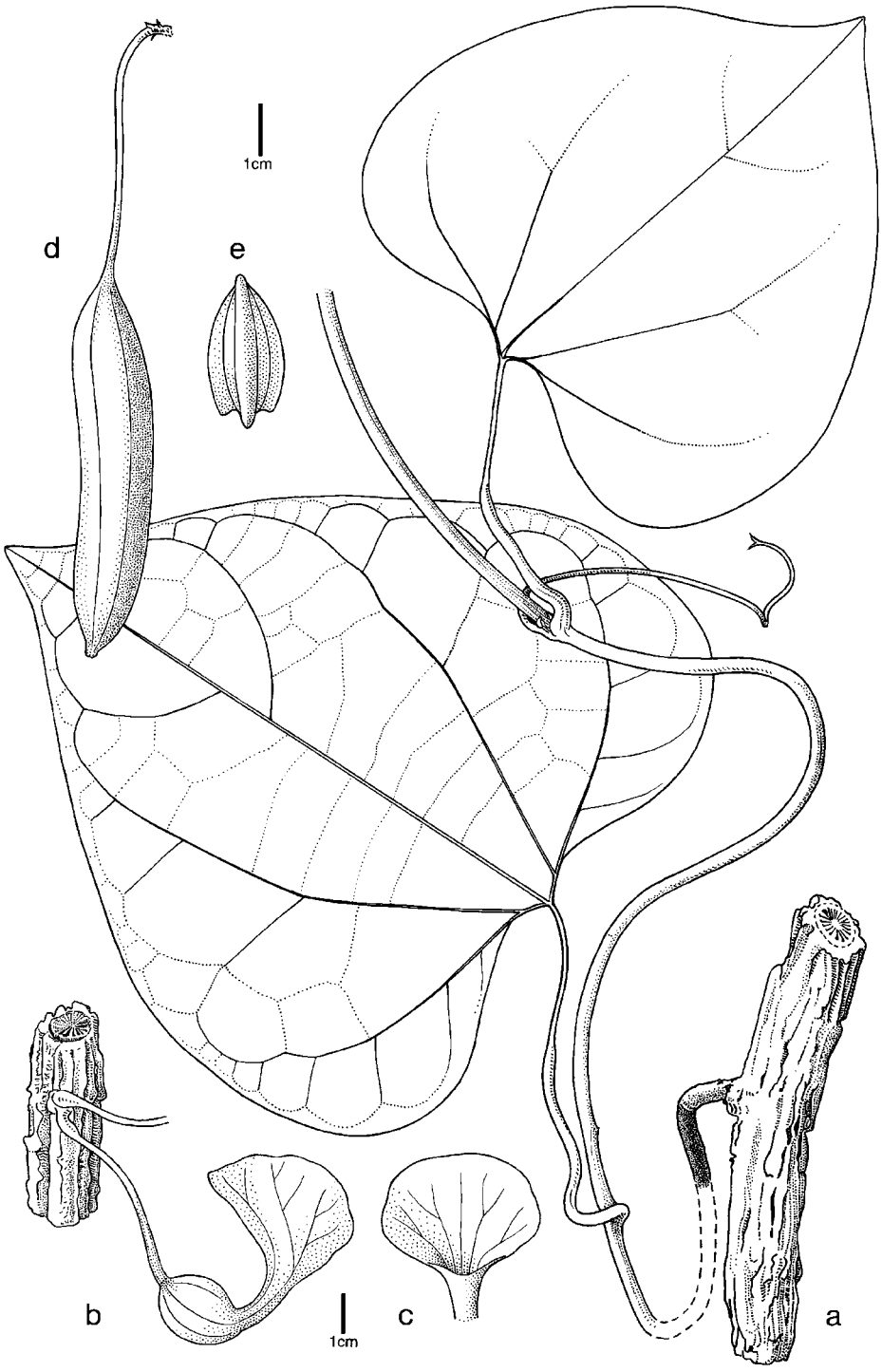
The strong-scented leaves of the wild soursop are used in the same way as those of the cultivated soursop. Leaves are briefly heated over a fire and applied to the forehead to relieve headache and fever. Some oil may be rubbed on the forehead to stick the leaves to the skin. The leaves are said to 'cool the head'.

In French Guiana, the Creoles prepare an evening tea from soursop leaves to calm down their nerves and to be sure of a good night's rest. An infusion of the bark and leaves is drunk as a tranquillizer and as a remedy for irregular heart beating (Grenand et al., 1987). In Suriname, the leaves are used in herbal baths to calm down stress. Three spoons a day of an infusion of the petals should be taken by patients suffering from nervous breakdowns (May, 1982). A brew made from the leaves of wild soursop and seville orange (*Citrus aurantium*) is drunk for asthma, high blood pressure, and nervousness (Heyde, 1990). In Brazil, the same decoction is used as a herbal bath for influenza (Branch and da Silva, 1983).

Numerous alkaloids have been isolated from this species, of which some have tranquillizing properties, while others influence the nervous system (Grenand et al., 1987; Lebœuf et al., 1982).

Economy: In Guyana, the species is used for subsistence only.

Notes: (1) See plate 2.



4. *Aristolochia daemoninoxia* a. habit; b. flower; c. perianth lobe; d. fruit; e. seed.

4. **Aristolochia daemoninoxia** Masters **ARISTOLOCHIACEAE** **Boyari rope**

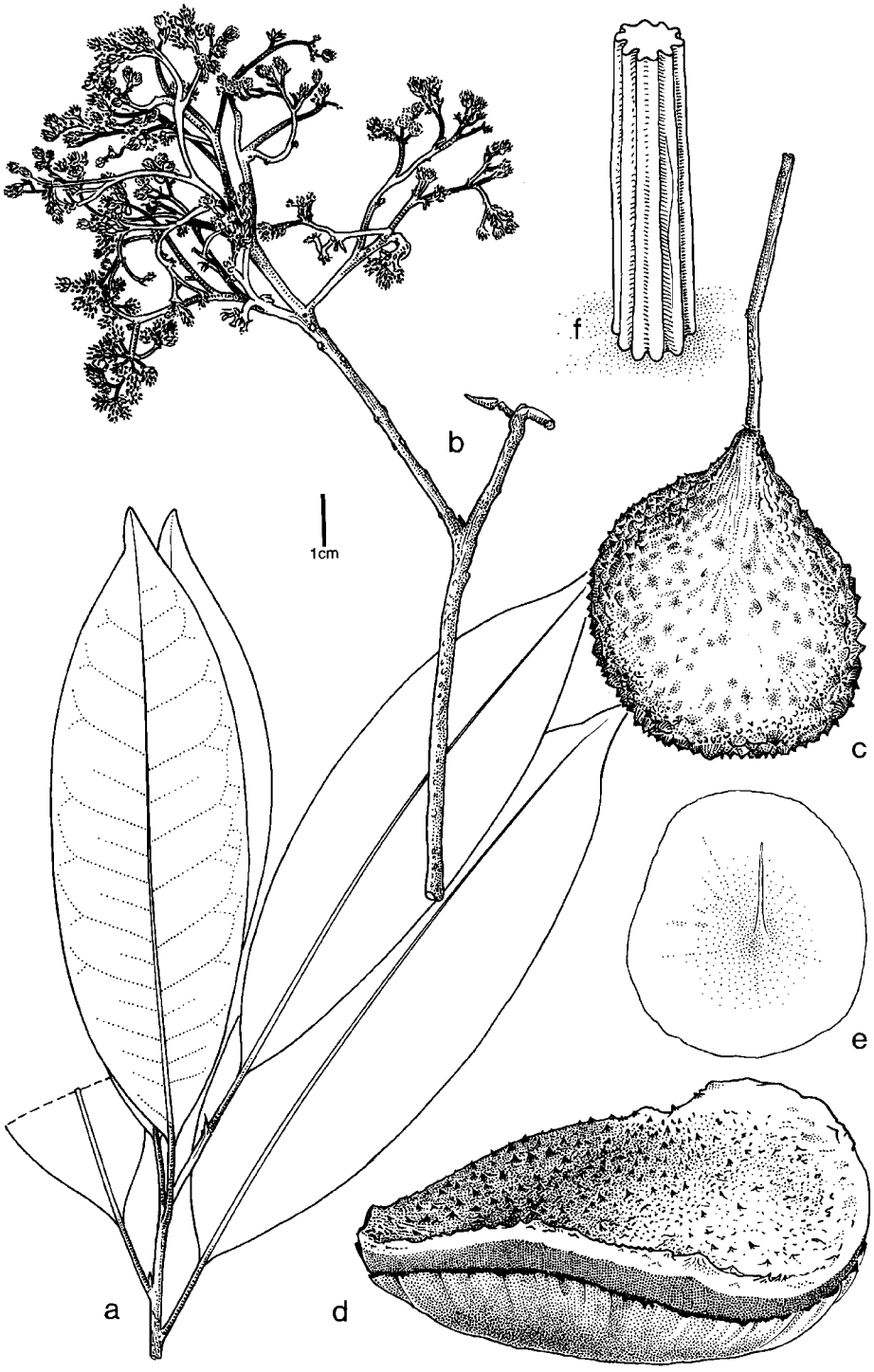
Vernacular names: Boyari rope, Carrion crow rope[1] (Cr), Boyari (Ar), Kurumu simyorï, Watopï (C), Azari (Wr).

Botanical description: Liana, stem woody, flexible, ca. 2 cm in diam. Outer bark light brown, deeply ridged, corky, with characteristic smell of cough tablets. Branchlets glabrous. Leaves alternate, simple, palmately veined; stipules absent; petiole twining, to 7 cm long; blades papery, triangular, ca. 12 x 13 cm, glabrous, shiny above, waxy velvet-tomentose below, apex obtuse or acute, base straight to slightly cordate. Inflorescence produced from the main stem; racemes contracted, bearing few flowers with minute, scaly bracts; pedicels ca. 3 cm long. Flowers zygomorphic, curved, poorly known; tepals 3, tomentose outside when young, pale brownish green with dark veins, connate into a tube with inflated base, tube short, funnel-shaped; superior lobe broadly ovate, ca. 3 x 5.5 cm, apex truncate and mucronate, inside verrucose, utricle ovoid, 2 x 1.3 cm; ovary inferior, ca. 1.3 cm long. Fruit a septicidal capsule, dehiscing like a parachute, ca. 9 cm long, rough, glabrous, midribs of carpels thickened, with a median groove, external wall thick, woody; seeds ovoid, 5 x 3 mm.

Distribution and ecology: The species is known from Guyana only. In the North-West District it occurs occasional in mixed and secondary forest. Phenology unknown.

Use: This corky liana is used for various medicinal purposes and is surrounded by some mystery. Women supposedly use this liana to provoke abortions and as a contraceptive. To prepare this treatment, the woody stem is chopped into pieces and boiled as tea. The brown boyari tea mixed with the leaves of sweet alas (*Euphorbia neriifolia*) is believed to induce permanent sterility. Inhalation of the boyari scent alone is thought to be sufficient to act as contraceptive. For this reason, a piece of vine with a few leaves is placed under the pillow or bed. A syrup boiled from immature pineapple (*Ananas comosus*) and boyari rope can cause abortions as well (Lachman-White et al., 1992). In general, people are reluctant to talk about plant use concerning female sexuality (e.g., menstruation, contraception, abortion). They hesitate before giving detailed recipes for 'ladies problems' and pretend they do not know these treatments very well, 'because they never use them'. The species probably contains chemicals that inhibit fertility, like other *Aristolochia* species (Grenand et al., 1987; Lachman-White et al., 1992). Aristolochic acid, found in this genus, is known to be mutagenic and carcinogenic in animals. The use of this plant on a continuous basis is not recommended (Arvigo and Balick, 1993).
In spite of its strong contents, the tea is used for many illnesses in Guyana, although pregnant women are warned not to use it. The inner stem of the liana is boiled for half an hour, left to cool and drunk against stomach aches. A hot decoction is drunk or used as a steam bath to cure fever. Then the stem is boiled in a large pot, after which the patient bends over the steaming pot, covering himself with a bed sheet. In case of severe illness, the steaming pot is placed under the patient's hammock and a sheet is placed over it like a tent. The same decoction is used to bathe children suffering from fever. Fanshawe (1948) described the species as a reputed antispasmodic, when boiled good for tuberculosis, bronchitis, bad coughs, bad bowels, and indigestion (heart burn). The highly aromatic, dark brown decoction of boyari leaves with the leaves of munuridan (*Siparuna guianensis*), bamboo (*Bambusa vulgaris*), sweet sage (*Lantana camara*), lemongrass (*Cymbopogon citratus*), and lime (*Citrus aurantiifolia*) is used to sweat out fever. In coastal Guyana, a decoction of boyari with haiawa (*Protium* spp., unknown if gum or leaves are used) acts as a vomiting agent for drowsiness, listlessness, and as an antispasmodic. An infusion of the inner bark scrapings in cold water or alcohol is used for indigestion, coughs, asthma, thrush and spasms (Lachman-White et al., 1992). The Warao treat bloody diarrhoea by boiling a ca. 6 cm-long piece of the stem in a pint of water until the liquid gets very dark. Half a cup of the brew must be drunk two or three times a day (Reinders, 1993). It is believed that a person who accidentally steps over this liana will get lost in the forest. Therefore, people prefer to bend down and creep under the liana or cut it before they cross it.

Economy: The species is used for subsistence only.
Notes: (1) This Creole name is a translation of the Carib name, as 'kurumu' is vulture and 'simyo' means liana.



5. *Aspidosperma marcgravianum* a. leafy branch; b. inflorescence; c. fruit; d. dehisced fruit; e. seed; f. trunk base.

5. **Aspidosperma marcgravianum** Woodson **APOCYNACEAE White yarula**

Vernacular names: White yarula (Cr), Yaruru (Ar), Tamuneng apukuitya[1], Apukuitya rone (C), Yaruru (Wr).

Botanical description: Tree, to 30 m tall; trunk deeply fluted. to 75 cm in diam. Outer bark smooth, yellowish brown, inner bark thin, bright yellow, with little white latex, wood light brown. Branches round, lenticellate. Leaves alternate, simple, unpleasantly scented; stipules absent; petiole ca. 1 cm long, grooved; blades elliptic, ca. 8 x 4 cm, dull green above, grey-green below, apex acute, base cuneate. Inflorescence a terminal panicle ca. 5 cm in diam., many-flowered, brown pilose. Flowers actinomorphic, bisexual, sessile, immediately subtended by small bracts; calyx 5-lobed, lobes acute, ca. 3 mm long, white puberulous outside; corolla light green, 5-lobed, tube ca. 5 mm long, white puberulous outside, lobes elliptic-ovoid, contorted, ca. 1.5 mm long; stamens 5; ovary superior, glabrous, style and stigma 1. Fruit a woody follicle, warty, strongly flattened, circular, ca. 5 cm in diam., stipe ca. 1 cm long, wall ca. 5 mm thick; seeds many, flat, winged, ca. 2 cm in diam., wings white, thin, papery, ca. 4 cm in diam.

Distribution and ecology: Venezuela, the Guianas, Brazil, and Bolivia, in evergreen and semideciduous lowland forest. In northwest Guyana, common in mixed forest in the Moruca area, occasionally in secondary and Mora forests. Phenology unknown. Flowers are pollinated by butterflies or bees; seeds are dispersed by the wind (Maas and Westra, 1993).

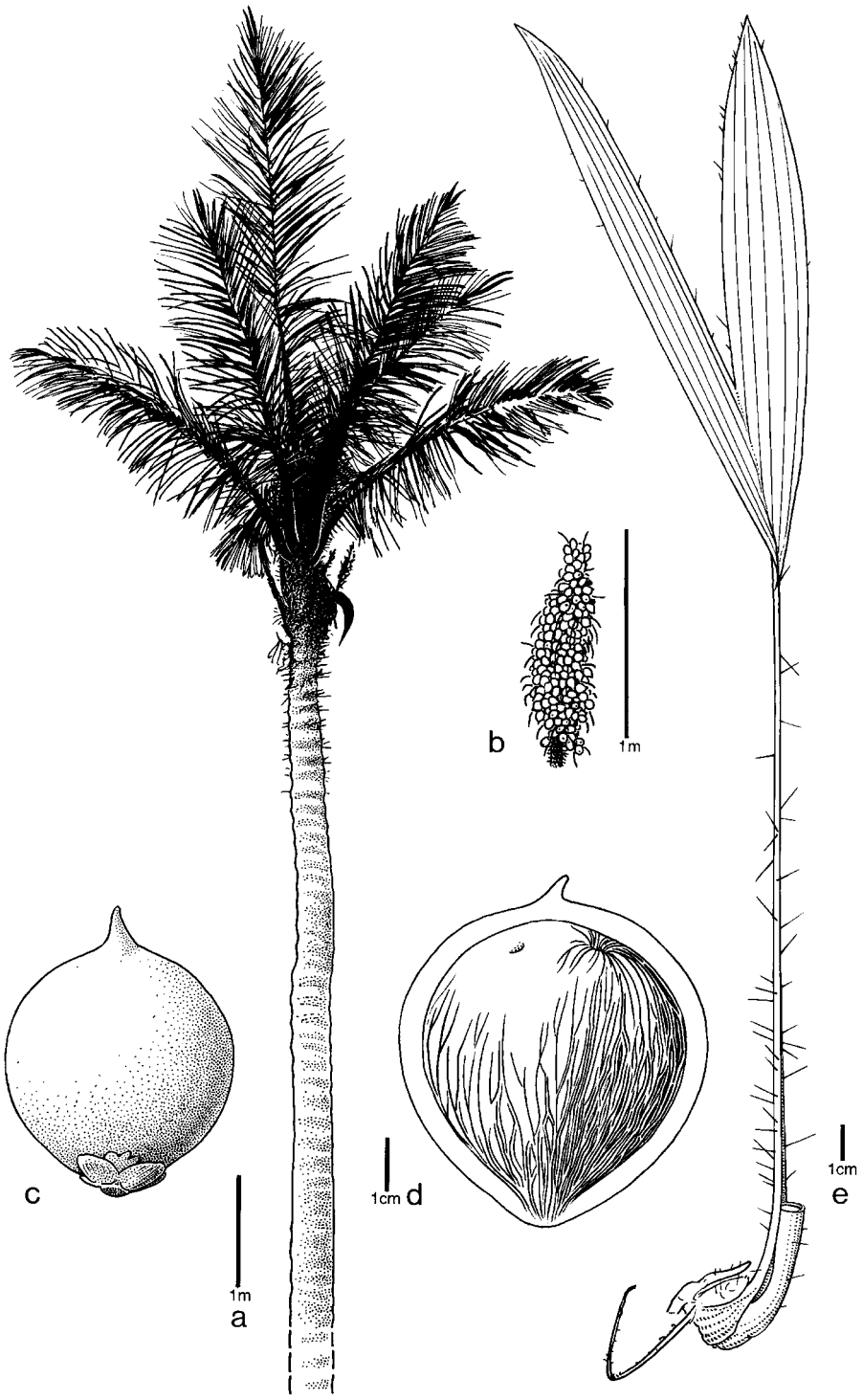
Use: Besides the white yarula, the black (*A. excelsum*) and the red yarula (*A.* cf. *cruentum*) are considered the best wood for paddles throughout the Guianas. To make a paddle, a rectangular piece is split from the fluted trunk with a cutlass. Mature individuals contain many flanges, so this will not seriously affect the tree. Around Amerindian settlements, one often sees *Aspidosperma* trees with some of their flanges missing. Single-blade paddles with a foliate-shaped blade and a crescent-shaped handle are carved from the wood and polished with the leaves of the sandpaper tree (*Pourouma guianensis*). Double-blade paddles, known as 'yalo' along the Barima and Waini Rivers, are sporadically made from the wood as well. Paddles from white yarula are rather heavy and tend to sink, while black yarula paddles float and are easily recaptured when lost on the river. The Arawaks and Warao living in the coastal swamps make their paddles mostly from white cedar (*Tabebuia insignis* var. *monopylla*). This wood of this species also splits easily and is more abundant in the local wetlands than yarula.

The hard and heavy wood is also frequently used for tool handles. In Kariako, wooden slippers were occasionally carved out of the flanges. With a rubber strap attached to the soles, the slippers were said to be very comfortable. Bush Negroes in Suriname use *Aspidosperma* flanges for their decorative wood carvings.

Yarula bark is a well-known remedy for malaria. A piece of ca. 10 cm long is boiled in water. Two mouthfuls of the tea, which is said to be 'bitter like quinine itself', must be drunk for nine mornings. The same amount of bark is added to a pint of water, boiled down to one cup and drunk in small quantities to relieve headache. People repeatedly warned not to use more of the bark or drink too much of the tea, since an overdose of this medicine could be deadly. Yarula bark is also boiled with buruburu root (*Solanum stramoniifolium*), lemon juice or peel, quashi wood (*Quassia amara*), and five bamboo leaves (*Bambusa vulgaris*) to combat malaria and fever. Some people said the tea only eased down the fever and did not really cure the malaria, but others claimed it was the most effective medicine against malaria they knew. Apocynaceae are rich in alkaloids, steroids and other active compounds. Both the white and black yarula are reported to have antimicrobial activity (Verpoorte et al., 1983).

Economy: Yarula paddles are regularly sold at local and regional markets. Their price varies from US$ 2-4, depending on the size.

Notes: (1) Apukuitya means 'paddle' in Carib.



6. *Astrocaryum aculeatum* a. habit; b. infructescence; c. fruit; d. fruit, partly opened to show seed; e. seedling.

6. **Astrocaryum aculeatum** G. Mey. **PALMAE** **Acquero**

Synonym: *Astrocaryum tucuma* Mart.

Vernacular names: Kuru (Cr), Acquero (Sp), Akuyuru, Akhoyoro, Arapipi (Ar), Tucumau (C), Akorlorlo arau (Wr).

Botanical description: Solitary palm; trunk erect, to 20 m tall and 25 cm in diam.; leaf scars to 10 cm long, circular, internodes to 20 cm long. Internodes, sheath, petiole, and rachis armed with flat, black spines to 15 cm long. Leaves 6-15, stiffly ascending; rachis ca. 4 m long; petiole and sheath ca. 2 m long, greyish lepidote; pinnae 73-130 per side, irregularly arranged in clusters of 2-5, spreading in different planes, linear, ca. 120 x 5 cm, dark green above, greyish lepidote below, midvein sometimes with a few spines. Inflorescences interfoliar, erect at anthesis and in fruit; peduncle ca. 50 cm long; outer spathe to 45 cm long, persistent, inner spathe ca. 2 m long, densely armed with spines, rachis ca. 1 m long, rachillae 200-300, to 26 cm long, basal part with female and terminal part with male flowers. Male flowers paired or solitary, yellowish, ca. 5 mm long; sepals narrowly triangular, 1 mm long; petals basally shortly connate, 4 mm long; stamens 6, slightly connate at base; small pistillode present. Female flowers 2-4 per rachilla, 1.5 cm long; calyx and corolla white, cupular, 1 cm long. Fruit yellowish to orange-green, glabrous, globose or obovoid, ca. 6 x 4 cm, including acuminate rostrum, mesocarp fleshy, orange-yellow, cupule 3-lobed; seed 1, black, very hard.

Distribution and ecology: Northern South America and Trinidad. According to Wessels Boer (1965), the species is not truly indigenous in the region and is always found near past or present human settlements, but Henderson (1995) found the species sporadically in undisturbed forests in Brazil. In northwest Guyana, the palm is widely cultivated by Amerindians. In settlements with a long history of human occupation (e.g., Warapoka and Santa Rosa), acquero is often found growing wild in old secondary forest. Agoutis carry away the seeds from cultivated fields and bury them in the forest, allowing the species to escape from cultivation. In areas where people deliberately search for 'wild' acquero trees and spare the palms when felling forest for agriculture, I consider *Astrocaryum aculeatum* as a non-timber forest product. The major fruiting season in northwest Guyana falls in January, although some ripe fruits were seen in September-October.

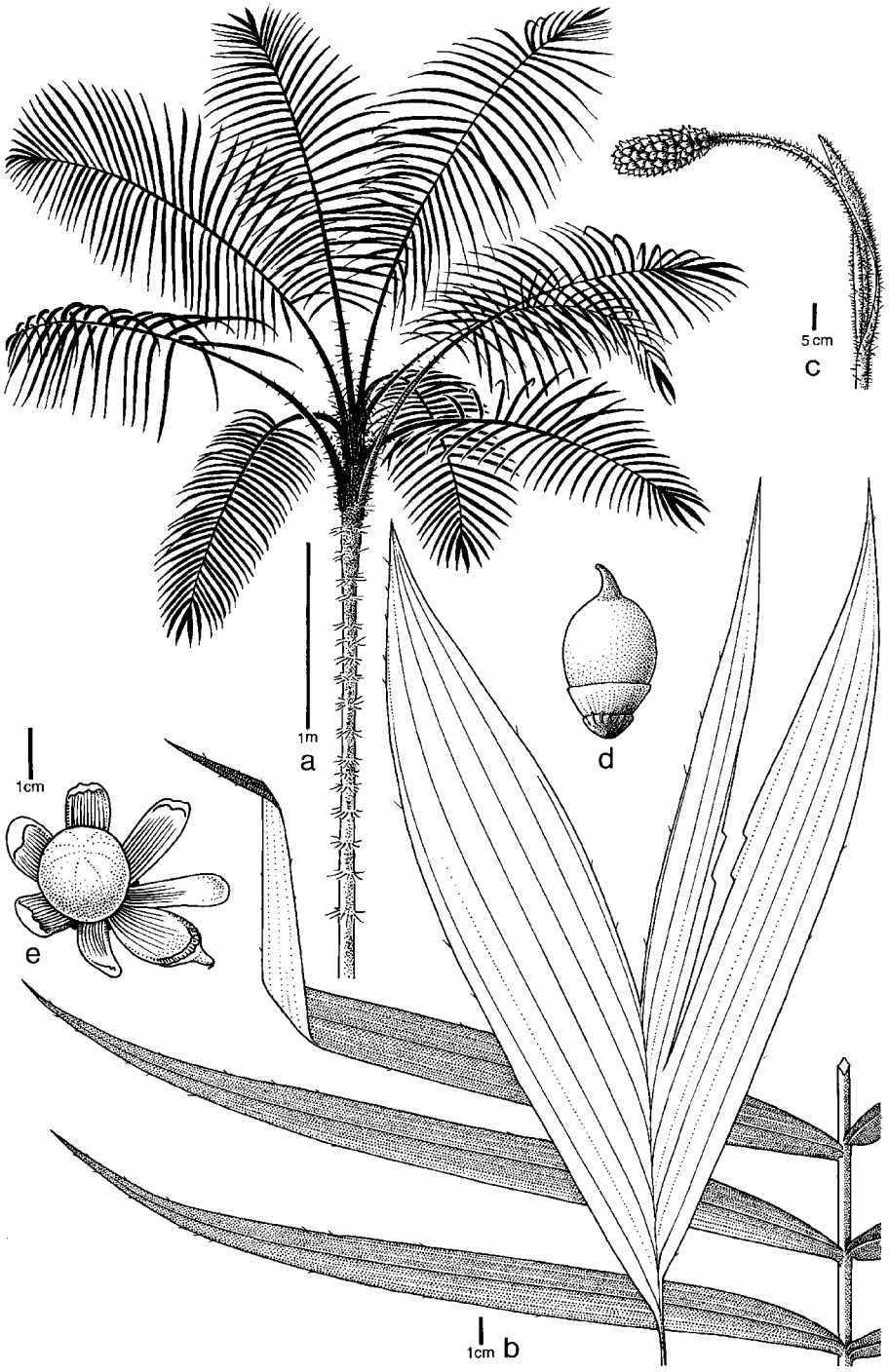
Use: The oily, orange mesocarp of the acquero fruits is much appreciated. Cut from the seed with a knife, it is preferably eaten with cassava bread. Children even consume the unripe fruits. Abandoned fields are frequently visited to look for ripe fruits. Trees may be chopped down to obtain the large bundles of fruits, which are harvested by the bag full in good years. Stories were told about fights over the ownership of wild acquero palms in the forests surrounding Santa Rosa. People also feed their pet parrots with the fruits. The mesocarp is not used anymore for oil extraction, as was reported by Roth (1924) and Fanshawe (1948).

All over Guyana, children play with the hard, black seeds of the acquero. They serve as slingshot ammunition, cricket balls, or as marbles in a game called 'gam'. Seeds are pierced with a stick and used as top. With another hole drilled in the seed, the top makes a whistling sound. Seeds are carved into bracelets and rings as amulets for small children. In traditional Carib villages, most newborn babies wear acquero bracelets to protect them against evil spirits. No elaborated jewellery is made from the seeds like it is done in Brazil (Kahn, 1997).

Children frequently dig up acquero seeds that have germinated along forest trails and in cultivated fields. They remove the seed coat to eat the white endosperm, which is now soft and spongy. The seedlings are called 'atïtapo' in Carib, which means 'something that has grown up'. The young, unfolded pinnae are cut off from the rachis and hung in the sun to dry. This 'acquero straw' is woven into the traditional, shovel-shaped Arawak fans or 'wari wari'[1], used to scrape and turn the cassava bread and to fan the fire. The Warao use the same fans, but the Caribs make quite different fans from mokru (*Ischnosiphon* spp.)[2]. In Moruca, brim hats are woven from acquero straw in a chessboard pattern with coconut leaves.

Economy: Fans are regularly sold for household purposes at local and regional markets and in Georgetown tourist shops. Fruits are sold at markets throughout the country, but most come from cultivated sources.

Notes: (1) See plate 3; (2) See Roth (1924) for more details of fan patterns; (3) The single-stemmed *A. aculeatum* is often confused with the multi-stemmed *A. vulgare* (awarra). The fruits of this cultivated species are smaller, bright orange, and very oily.



7. *Astrocaryum gynacanthum* a. habit; b. leaves; c. young infructescence; d. young fruit; e. ripe fruit.

7. **Astrocaryum gynacanthum** Mart. **PALMAE** **Widi**

Synonym: *Astrocaryum munbaca* Mart.

Vernacular names: Plimpla palm, Masoa plimpla[1] (Cr), Mapuhuri, Urishi (Ar), Widi, Wiri (C), Hi arau[2] (Wr).

Botanical description: Clustered palm; trunks ca. 5 together, to 6 m tall and 6 cm in diam., distinctly ringed, internodes ca. 3.5 cm long; internodes, sheath, petiole, and rachis heavily armed with unequal, flat or almost needle-like black spines to 15 cm long. Leaves 6-13, horizontally spreading; sheath partly closed, brown-leprose, 15-80 cm long; petiole ca. 40 cm long, brown-leprose; rachis ca. 2 m long, pinnae 21-40 per side, regularly spaced in the same plane, linear, ca. 55 x 4 cm, the apical pinnae much broader than the others, flat, not bifid at the apex, dark green above, densely white-puberulous below, margin brownish black ciliate. Inflorescences interfoliar, pendent at anthesis and in fruit, outer spathe flattened, ca. 35 cm long, sparsely armed, inner spathe ca. 70 cm long, densely armed with black spines, rachis ca. 17 cm long, rachillae numerous, ca. 4 cm long, the male part caducous after anthesis. Male flowers densely crowded along rachillae, 3 mm long; sepals narrowly triangular, 1 mm long; petals 3 mm long, basally connate; stamens 6. Female flowers solitary, 1 per rachilla; calyx cupular, 4 mm long, densely covered with small spines; corolla cupular, 3 mm long. Fruit densely clustered on rachis, obovoid, ca. 3 x 1.3 cm, with a curved, 1 cm long rostrum, light brown to brownish red or bright orange when ripe, cupule ca. 1 cm long, pericarp at complete maturity splitting regularly, mesocarp orange; seed 1, black, ca. 1.5 cm in diam.

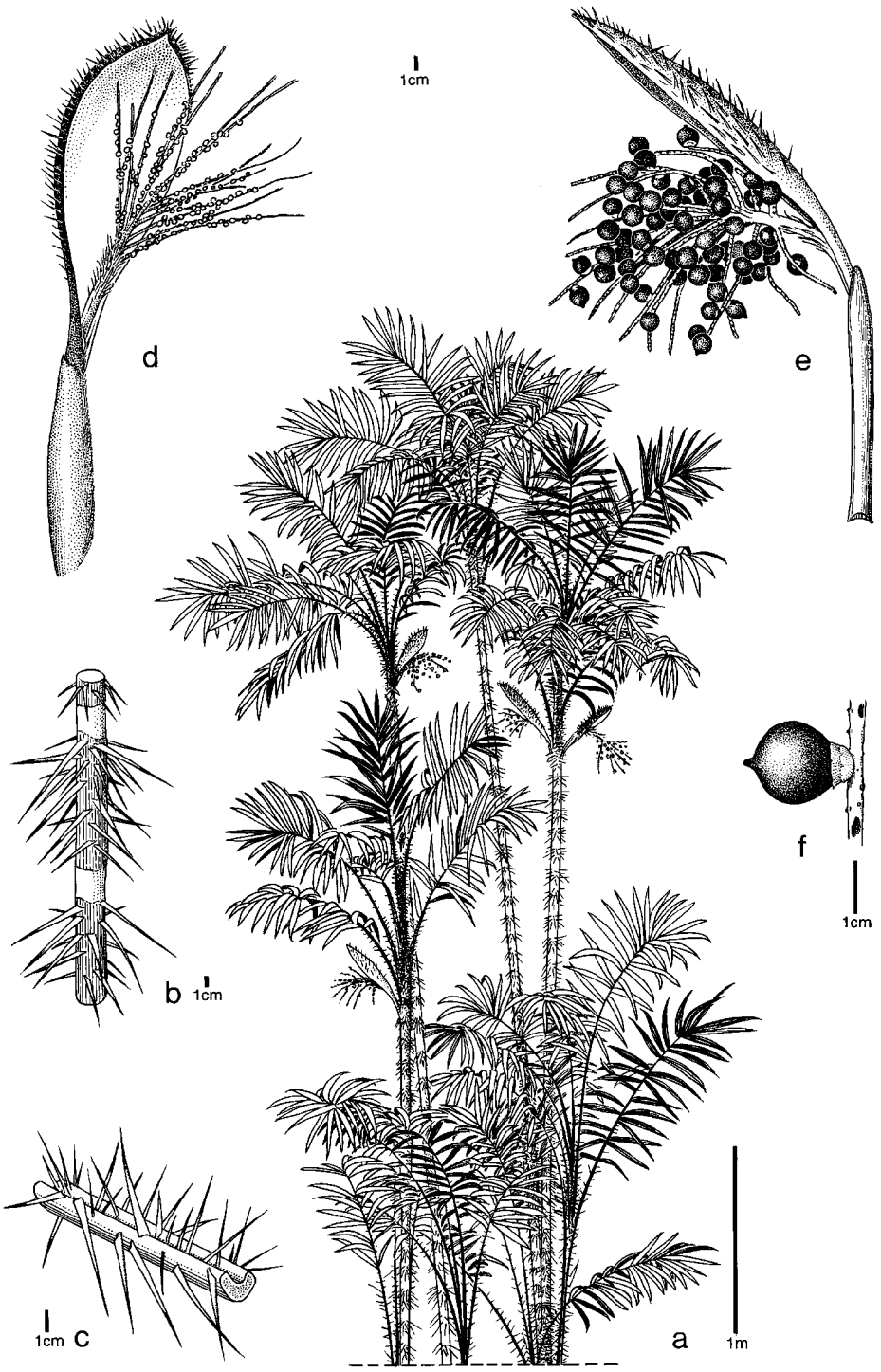
Distribution and ecology: Northern South America, in the understorey of well-drained, never or rarely flooded secondary and primary forests. In northwest Guyana, frequent in mixed and secondary forests and bamboo grooves around house yards. Pollination is probably done by beetles; seeds are dispersed by monkeys, rodents, peccaries, and macaws (Henderson, 1995; van Roosmalen, 1985). In Moruca, ripe fruits were observed in August-September, in Barama they were also seen in April.

Use: In Carib villages, widi fruits are well known and highly esteemed. The immature fruits are cut open with a knife to drink the sour, jelly-like fluid inside. The thin, dry layer of orange mesocarp of the ripe fruits is not eaten, although Fanshawe (1948) mentioned it as edible. Ripe fruits were hardly seen around Kariako, since young fruits were quickly taken home or consumed in the forest. Discarded fruit shells and seedlings were often seen along forest trails and in cultivated fields.

In the Arawak villages along the Moruca and Barima Rivers, both ripe and unripe fruits were left untouched. Few people could name the species or knew that the fruits were edible. They considered the fruits as poisonous and said they were ‘eaten by Caribs only’. However, people in the more remote Arawak and Warao villages did consume the fruits. The species seemed less abundant in Moruca than in Barama, where it was spared from weeding in the forest undergrowth along forest trails. In remote areas, where hospitals are beyond reach of most people, it is a common practise to use widi leaves to dry a newborn baby’s navel string. One leaf is burnt, its ashes ground to powder and rubbed on the remains of the umbilical cord after it has been cut. The black powder is applied continuously until the remains of the navel have dried up. The treatment is apparently very effective to prevent infection of the navel. People in Barima preferred to buy lavender powder in a shop for this purpose, although they said they sometimes still used widi leaves. Leaves of kapadula (Dilleniaceae spp.) are used similarly. The ash from widi leaves is also rubbed on the mouth sores of babies suffering from thrush. The spiny leaves are not used for roof thatch. Finally, hunters from Moruca and Assakata mentioned that the hard, fibrous wood could be used to make bows.

Economy: The species is used for subsistence only.

Notes: (1) The name ‘masoa plimpla’ is also given to other spiny palms, (e.g., *Bactris campestris* and *B. major*); (2) The Warao name ‘hi arau’ means ‘prickly tree’ and is given to several other spiny palm species as well.



8. *Bactris brongniartii* a. habit; b. part of trunk showing spiny internodes; c. petiole; d. inflorescence; e. infructescence; f. fruit.

8. **Bactris brongniartii** Mart. **PALMAE** **Kurupiyua**

Vernacular names: Bango palm (Cr), Kurupiyua (C).

Botanical description: Clustered palm, often forming large colonies by rhizomes, to 6 m tall; trunk ca. 4 cm in diam., spiny at internodes; sheath, petiole, and rachis moderately to densely covered with flattened spines, yellowish or brownish in centre and black at apex and base (spines on the sheath darker). Leaves 4-7, stiffly ascending; petiole 10-70 cm long; sheath ca. 45 cm long; rachis ca. 1.2 m long, pinnae 23-34 per side, irregularly arranged in clusters of 2-5, spreading in different planes, strongly folded, linear to narrowly elliptic, ca. 60 x 5 cm, apex briefly and asymmetrically bifid, margins with small spines.

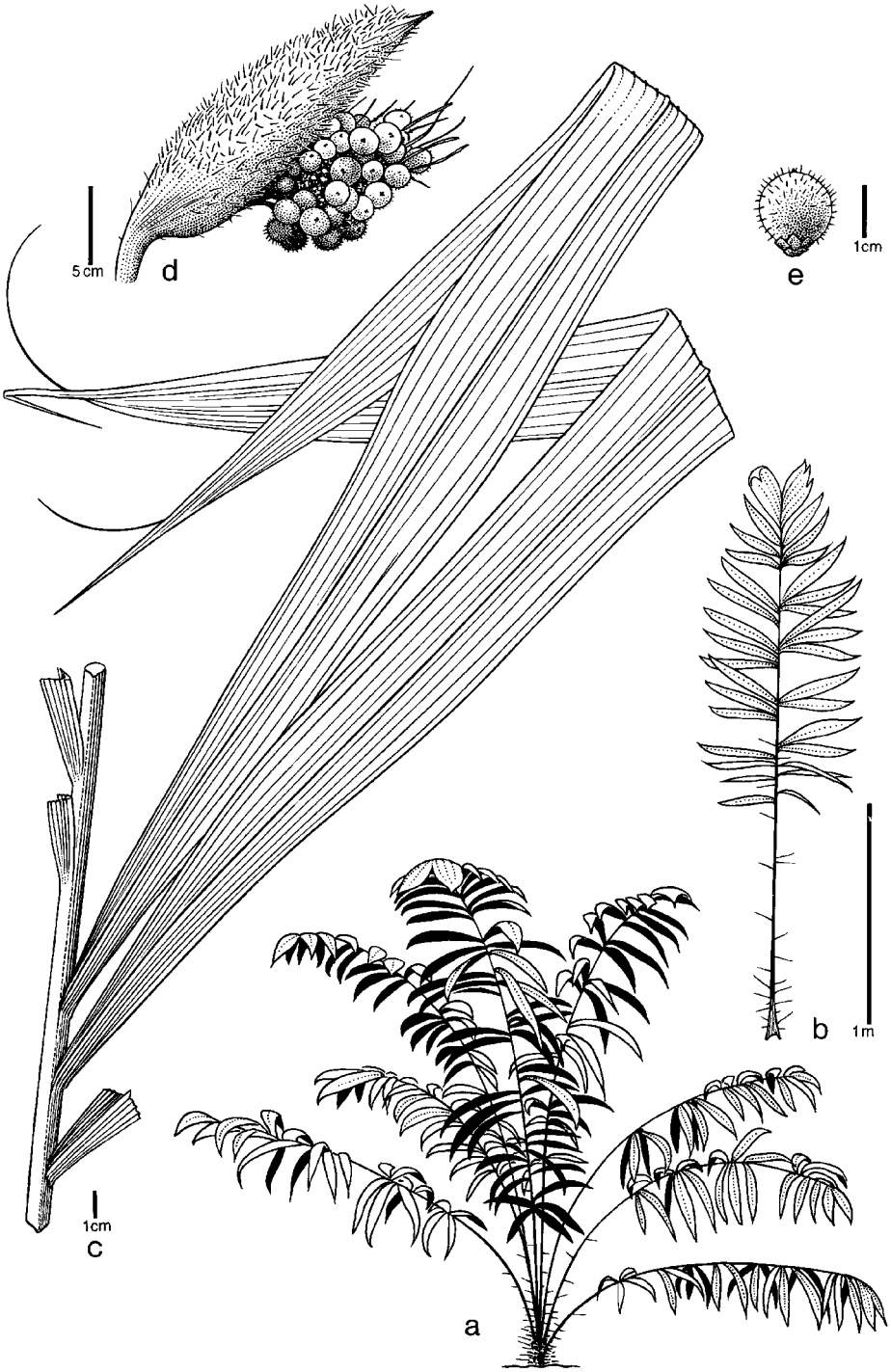
Inflorescences interfoliar, pendent; peduncle ca. 35 cm long; outer spathe ca. 25 cm long, inner spathe ca. 45 cm long, sparsely to moderately covered with flattened, yellowish spines to 2 cm long, rachis ca. 12 cm long, rachillae 15-33, ca. 20 cm long, at anthesis densely covered with brown, glandular trichomes. Flowers borne in triads, irregularly arranged among paired or solitary male flowers. Male flowers ca. 4 mm long, caducous; calyx with narrowly triangular lobes of 1 mm long; petals ca. 4 mm long. Female flowers: calyx and corolla subequal, tubular, ca. 3 mm long. Fruit purple-black, glabrous, depressed globose, ca. 1.5 cm in diam., mesocarp juicy; endocarp fibres free, numerous, cupule irregularly lobed; seed 1, black, ca. 1 cm in diam.

Distribution and ecology: In Northern South America, the Guianas, Brazil, and Bolivia, along river margins or in seasonally inundated areas, at low elevations (Henderson, 1995). In northwest Guyana, common in Mora forest, on muddy riverbanks, and along creeks. The species was only found along the Barama River. Flowers were seen in January, unripe fruits in September. Ripe fruits were not observed.

Use: The juicy mesocarp of the fruits is eaten by the Barama Caribs. The fruits are said to be tasty, but no drinks are prepared from the mesocarp. The leaves are not used for roof thatch, probably because of the spines.

In Venezuela, the Yanomami Indians use the stems to make walls of houses (Henderson, 1995). This practise was not observed in Guyana.

Economy: In Guyana, the species is used for subsistence only. In Brazil, the fruits are sold at local markets and used to flavour drinks (Henderson, 1995).



9. *Bactris humilis* a. habit; b. leaf; c. pinnae; d. infructescence; e. fruit.

9. **Bactris humilis** (Wallace) Burret **PALMAE** **Plantao**

Synonym: *Bactris acanthocarpa* Mart. var. *intermedia* Henderson

Vernacular names: Plantao (Sp), Yuruwe (Ar), Kanapure (C), Hi arau[1] (Wr).

Botanical description: Acaulescent palm, solitary or a few stems clustered together, sometimes very old specimens with a short trunk to 0.5 m tall and 4 cm in diam., very densely ringed, almost unarmed. Leaves 5-10, erect; sheath, petiole, and rachis with a few black spines to 8 cm long; sheath ca. 22 cm long, brown-leprose; petiole ca. 70 cm long; rachis grooved, ca. 1.3 m long, pinnae 12-20 per side, irregularly arranged in clusters of 2-3, spreading in slightly different planes, sigmoid or long-acuminate, ca. 30 x 7 cm. Inflorescences interfoliar; peduncle ca. 13 cm long; outer spathe ca. 10 cm long; inner spathe ca. 21 cm long, densely covered with black spines to 1 cm long, spathes soon decaying, in fruit already partly decomposed, rachis 2-5 cm long, rachillae 10-25, ca. 7 cm long. Flowers in triads with a central female flower and 2 lateral, slightly superior, male flowers, towards the end male flowers only. Female flowers: calyx and corolla urceolate, corolla longer than calyx, slightly 3-lobed at margin. Fruit orange-red at maturity, turning dark green when over-ripe, subglobose, ca. 1 cm in diam., covered with black bristles ca. 3 mm long, cupule 6 mm in diam., mesocarp starchy, pink; seed 1, black, hard, subglobose, ca. 6 mm in diam.

Distribution and ecology: Widespread in northern South America. In northwest Guyana, frequent in the understorey of mixed and secondary forest. Pollination is probably done by beetles (Henderson, 1995). Seeds are dispersed by birds (van Roosmalen, 1985). In Barama, ripe fruits were seen in December.

Use: The leaves of this palm are used for the roof thatch of forest camps, as a substitute for manicole leaves (*Euterpe oleracea*). To make a quick rain shelter, a bundle of plantao leaves is held upright against a tree. The pinnae are tied to the trunk so that the leaves form a small roof for one person. Such rain shelters are often seen along forest trails.

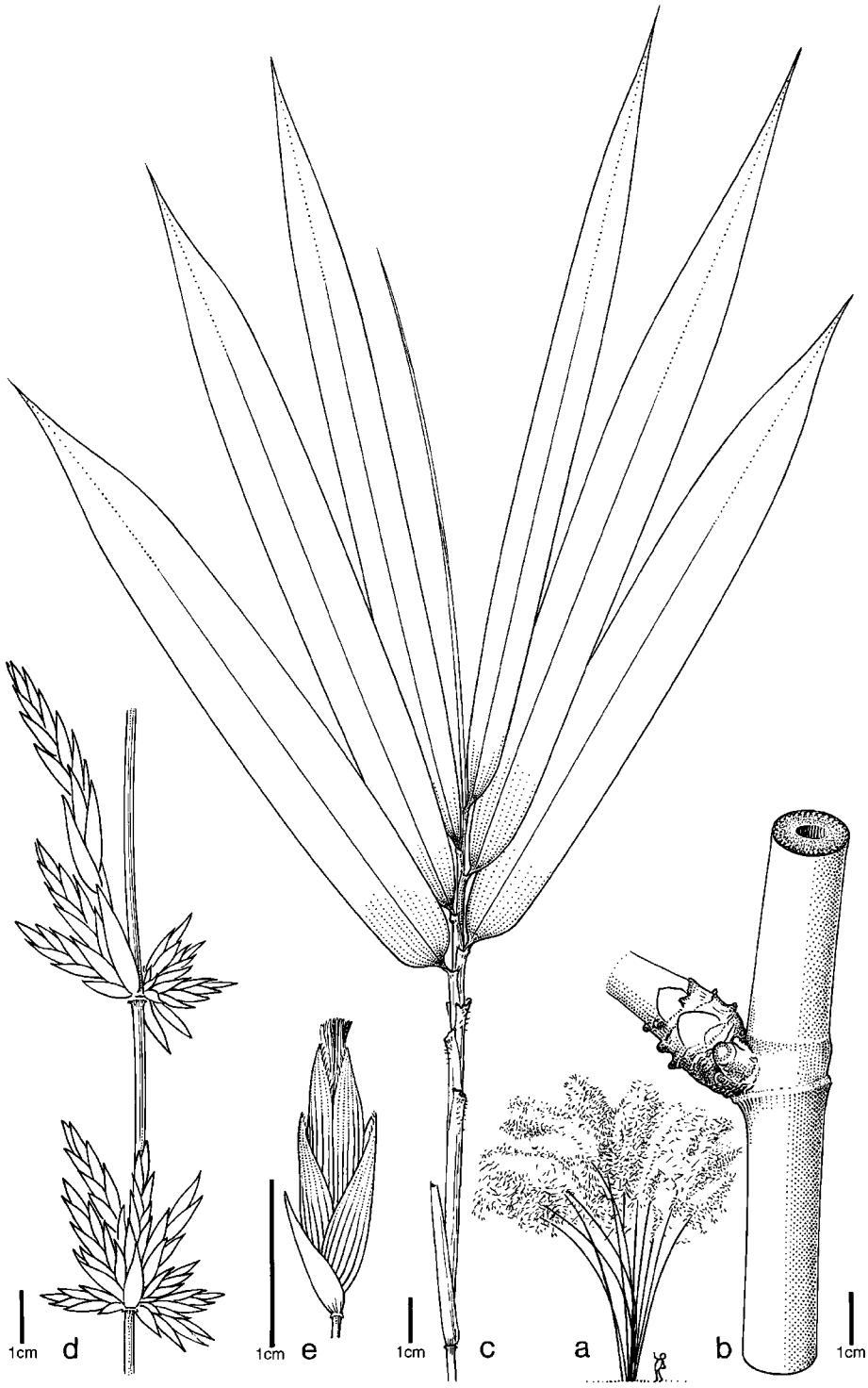
In Moruca, the midrib of the leaves is used as fishing rod. The pinnae are stripped off, after which the bare stem is stabbed vertically in the river bottom. A fishing line with a hook is then tied on top of the stem in a way that the hook reaches just under the water level. Up to a hundred stems may be planted in a shallow river or flooded savanna. After planting the last stem, the first one is checked again to see whether some fish has been caught. Spanish Arawaks call both this method of fishing and the palm species ‘plantao’, which may be derived from the Spanish ‘plantado’ (planted).

The bare midribs ‘bones’ are used in Barama as arrow shaft, when the flower stalks of the real arrowstick (*Gynerium sagittatum*) are not available. In the same region, the midribs are occasionally used for stringers to attach the leaves for roof thatch, as a substitute for ‘kokerite bones’ (*Maximiliana maripa*).

The black spines are used as a needle to take jiggers or spines from the fingers or feet. The fruits are not edible.

Economy: The species is used for subsistence only.

Notes: (1) The Warao name ‘hi arau’ means prickly tree and is given to other spiny palm species as well.



10. *Bambusa vulgaris* a. habit; b. stem; c. foliage leaves; d. inflorescence; e. floret.

10. **Bambusa vulgaris** Schrad. ex J.C. Wendl. **GRAMINEAE** **Bamboo**

Synonym: *Bambusa surinamensis* Rupr.

Vernacular names: Bamboo (Cr), Kamwata (Ar, Wr), Kuwama (C).

Botanical description: Giant, clump-forming, woody plant, to 20 m high; trunks to 12 cm in diam., unarmed, thick-walled, green and yellow, glabrous, erect, arching above, with massive nodes and hollow internodes. Culm leaves broadly triangular, ca. 40 cm long, appressed, caducous, covered with a dense layer of brown, irritating hairs. Foliage leaves in groups of 7-9; sheaths glabrous or covered with appressed, brown hairs near the apex; ligule ca. 1 mm long; blades narrowly oblong-elliptic, ca. 25 x 3 cm, glabrous, caducous, apex acuminate, base rounded. Inflorescence a series of loosely fasciculate clusters on leafless branches at least 50 cm long, pseudospikelets straw-coloured, 5-7-flowered, sessile, narrowly elliptic, ca. 15 mm long, functional florets ca. 10 mm long, ovate, apiculate, paleas narrowly elliptic, keels comb-like ciliate with brown, hispid hairs; stamens 3 or 6; ovary superior, 1-locular, styles 2.

Distribution and ecology: Native of Southeast Asia, but cultivated throughout the tropics. In northwest Guyana, dense bamboo stands are always found near past or present human settlements. Even deep in the interior, bamboo often remains as a relict on riverbanks or at abandoned Amerindian homesteads for decades after the last inhabitants left. Since newly arriving tribes harvest this 'wild' bamboo, and bamboo stands are spared when cutting forest for agriculture, it can in many cases be considered as a NTFP. In the dry season, the undergrowth of the bamboo bushes is burned to prevent the invasion of secondary forest. The species is easily propagated by its rhizome. Bamboo seldom produces flowers; the last flowering collection from Guyana was made by Fanshawe in Mazaruni around 1950 (Judziewicz, 1990).

Use: Throughout the country, bamboo stems are used for light or temporary construction, drying racks for cassava bread, and scaffolding for house and roof construction. Bamboo poles are violently pushed into tree crowns to harvest fruits or coconuts. For temporary walling, bamboo canes are split in four laths, which are tied together with strips of nibi (*Heteropsis flexuosa* or *Thoracocarpus bissectus*). Bamboo walls are chiefly made by people who cannot manage to pay for boards. A popular tradition at the turn of the year is to make bamboo guns. A hollowed-out stem of ca. 1.5 m long, with only the lowest node left in place, is filled with kerosene or methylated spirits. A match is inserted in a small hole drilled in the bottom segment to explode the gun with a loud bang. Trunks are also used as jump stick by children and as antenna pole for short-wave radios.

'Bamboo joints', segments of bamboo with one node, are used as boxes to store paint, fish hooks or valuable tree gums, as mall for melting candles or Karaman wax, flower vase, or ash tray. A remarkable method to sharpen files was observed in Moruca, where old, blunt files were placed in a bamboo segment filled with lime juice, which was said to make the files sharp again after a few days. Whistles from young bamboo stems give a high pitch and are said to attract snakes. Horns from a mature segment give a low, bellowing sound. They are used by fishermen in Moruca to announce their arrival with fresh catch. Bamboo wood is used to burn out canoes, by building a gentle fire in and outside the recently hollowed-out trunk to widen its sides. A fire from bamboo stalks and leaves produces an acid smoke that chases away mosquitoes at dusk (Grenand et al., 1987).

A concoction of five bamboo leaves, a piece of quashi wood (*Quassia amara*), lemon juice and/or peel, white yarula bark (*Aspidosperma marcgravianum*), and a buruburu root (*Solanum stramoniifolium*) is a well-known remedy to combat malaria and fever. A quarter cup of the bitter tea must be drunk three times a day, until the fever stops. Some people said the medicine eased down the fever, but did not cure the malaria completely, but others claimed this was the most effective remedy for malaria they knew. In Georgetown, a malaria therapy is brewed from a buruburu root, some bamboo leaves and a piece of sinkola bark (*Cinchona* sp.), a cultivated tree species of which the bark yields a natural form of quinine. A dark brown, highly aromatic decoction of bamboo leaves with the

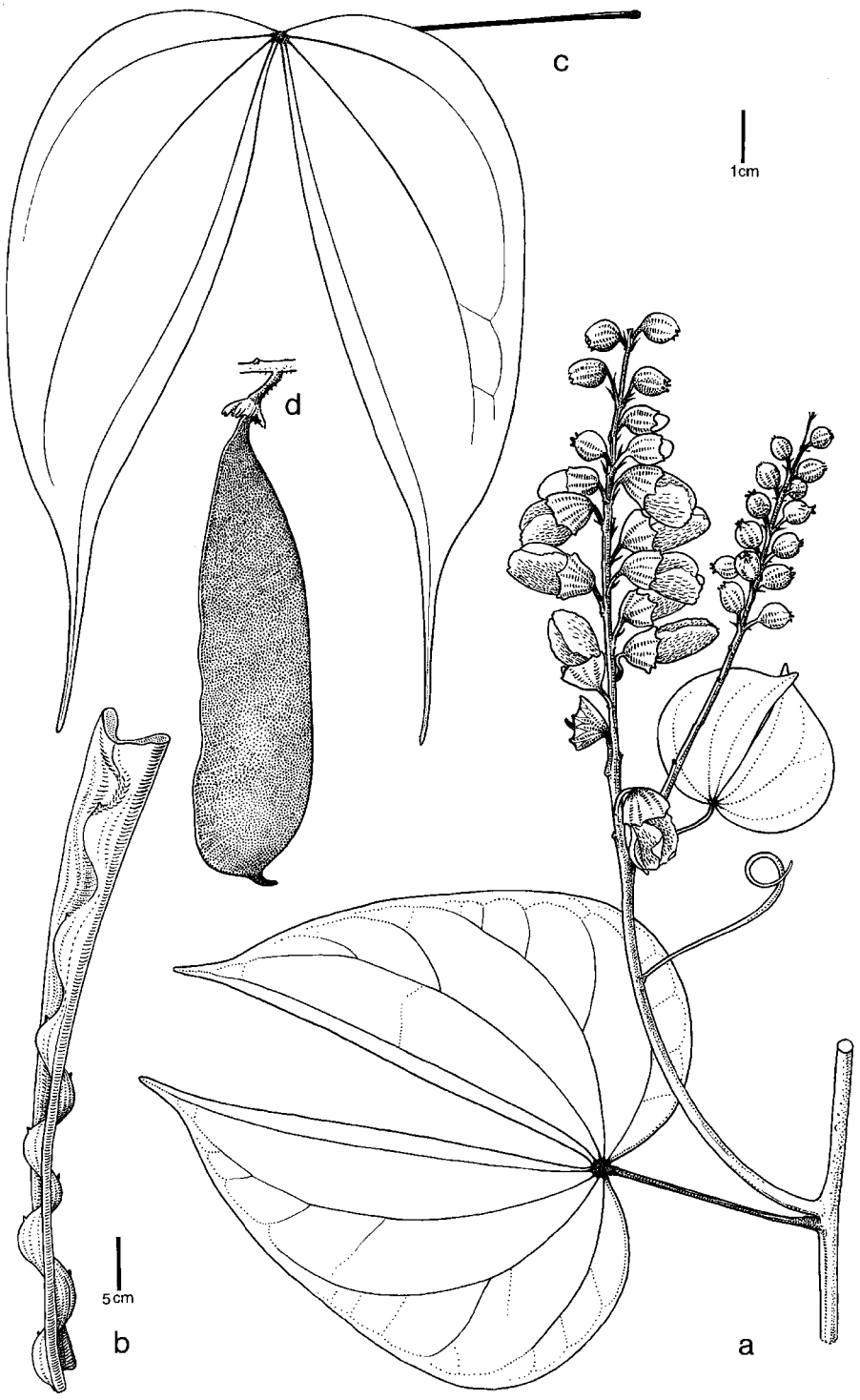
leaves of boyari rope (*Aristolochia daemoninoxia*), munuridan (*Siparuna guianensis*), sweet sage (*Lantana camara*), lemongrass (*Cymbopogon citratus*), and lime (*Citrus aurantiifolia*) is used to sweat out fever. Three leaves of bamboo, calabash (*Crescentia cujete*), and soursop (*Annona muricata*) are boiled and drunk to combat fever.

A tea from bamboo leaves is drunk for heart problems and as diuretic when people experience pain during urinating ('stoppage of water'). The boiled leaves are applied externally to the chest of patients suffering from irregular heart beating or other cardiovascular complaints. A bamboo stem of 12 joints long is chopped into pieces and boiled in water. The decoction is drunk regularly to alleviate rheumatic pains. Bamboo shoots are not eaten, but used in another anti-malaria medicine. One shoot is boiled for three hours and half a cup of the tea must be taken daily.

Bamboo leaves are given to cows when they have trouble with giving birth. Local farmers said it generally does not take longer than 20 minutes after feeding the cattle with the bamboo before the calf is born. The afterbirth will come out soon as well. A tea from bamboo leaves is given to women after childbirth as an aid to the expulsion of the afterbirth (Lachman-White et al., 1992). Women also drink the tea to 'clean out their womb', which implies widening the mouth of the uterus and initiating a curettage. Drinking high doses of the tea in an early stage of pregnancy is likely to cause abortion. A bundle of lemongrass, man grass (*Eleusine indica*), and some bamboo leaves is boiled and used as an herbal bath against evil spirits and curses put on by enemies. The medicinal uses of bamboo were only reported from coastlanders and Amerindians living in the coastal area. The Barama Caribs often used bamboo for construction, but never mentioned any medicinal application of it.

Economy: Bamboo leaves are sold on medicinal herb stalls at the Georgetown market[1]. In the capital, bamboo is occasionally used in crafts and furniture, but unless specially treated, the wood is susceptible to attack by powder-post beetles (*Dinoderus* sp.) (Judziewicz, 1990).

Notes: (1) See plate 30.



11. *Bauhinia guianensis* a. flowering branch; b. stem; c. leaf; d. fruit.

11. **Bauhinia guianensis** Aubl. **LEGUMINOSAE-CAESALP.** **Monkey ladder**

Vernacular names: Monkey ladder, Old lady backbone, Granny backbone, Turtle step (Cr), Hikori tarafoñ[1] (Ar), Wayamu patï[2] (C), Nako ataraba, Loromu ahobi arao, Tida aidamu araimuhu[3] (Wr).

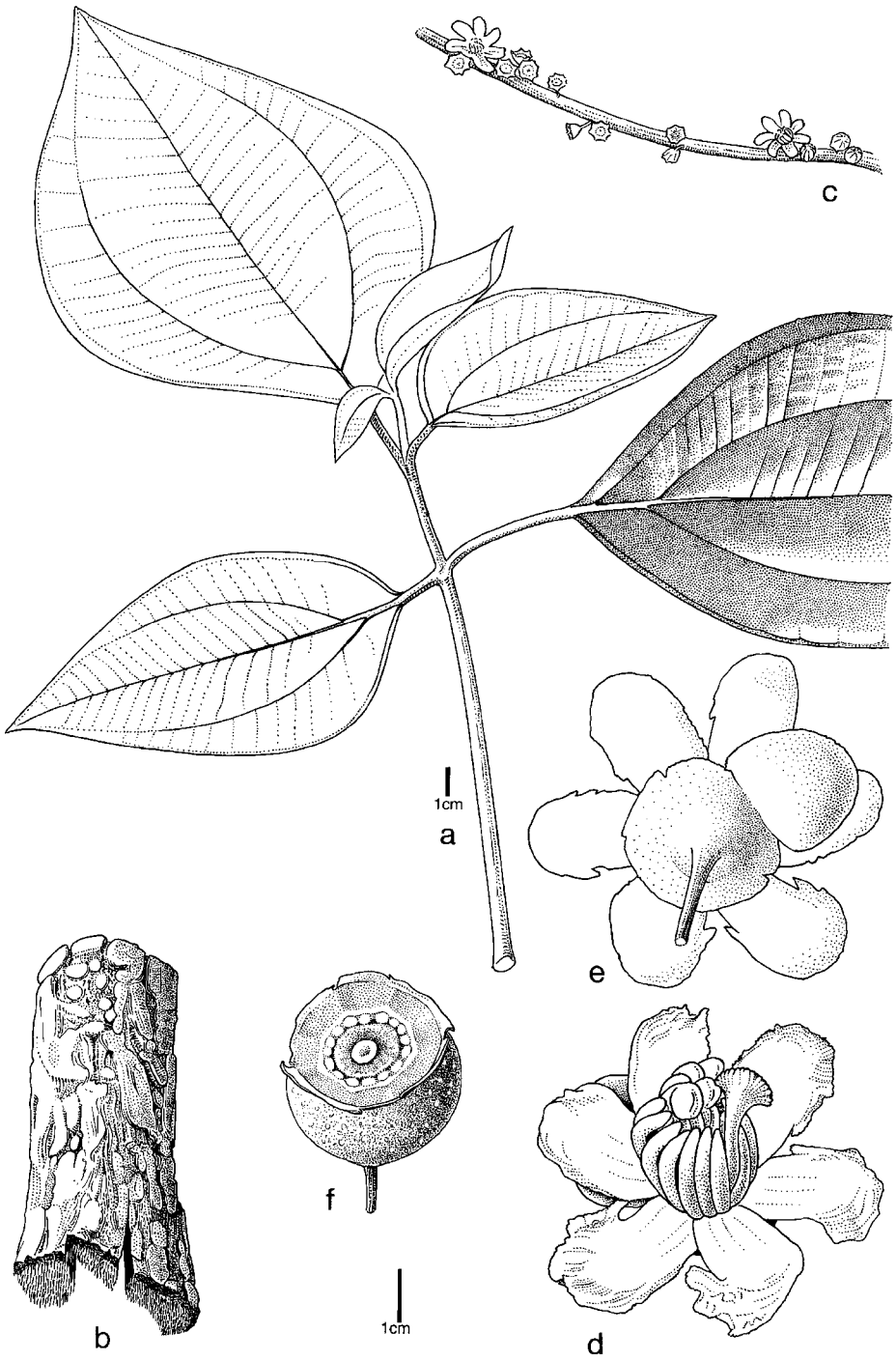
Botanical description: Liana; stem strongly flattened, undulating; tendrils woody, hooklike. Young branches and inflorescences puberulous. Leaves alternate, bipinnate, palmately veined; stipules small, caducous; leaflets leathery, acute to caudate, ca. 7 x 3 cm, glabrous, shiny above, puberulous or glabrescent below, acumen to 3 cm long. Inflorescences lax, terminal racemes; bracts minute; pedicels ca. 4 mm long. Flowers zygomorphic; flower buds subglobose, minutely 5-dentate at the apex; calyx rusty brown to green, campanulate, ca. 7 mm long; petals 5, yellow, whitish inside, obovate, clawed, ca. 13 mm long, villose outside; stamens 10, filaments white, anthers beige; ovary superior, 1-locular, villose, style 1, glabrous. Pod flat, grey-green to rusty brown tomentose, apiculate, ca. 6.5 x 2.5 cm, leathery, dehiscent, valves coiling up after dehiscence; seeds 3-5, round, flat, hilum scar crescent-shaped.

Distribution and ecology: The Guianas and the Amazon basin. In northwest Guyana, abundant in Mora forest, common in mixed and secondary forests. Often germinating massively on the forest floor. Phenology unknown.

Use: The undulating, woody stem is chopped into pieces, boiled and drunk for general body pain and bowel problems. The wood is beaten with a stick until fibrous. A brown sap is squeezed from the fibres into a cup, diluted in some water and drunk to ease diarrhoea. Fanshawe (1948) stated that in the North-West District, the species was used as a fish poison by beating the fresh stems at the water's edge, but this practise was not known by informants in this study. The tea from the stem is drunk against venereal diseases and to cure a 'weak back' (impotence). The wood is mostly boiled for an hour with one or more of the following ingredients: cockshun root (*Smilax schomburgkiana*), kapadula wood (*Tetracera* spp., *Pinzona* sp., *Doliocarpus* sp.), sarsparilla root (*Dioscorea trichanthera*), kufa root (*Clusia* spp.), locust bark (*Hymenaea courbaril*), granny backbone wood (*Curarea candicans*), and devildoer wood (*Strychnos* spp.). The pieces may also be soaked in rum or high wine to make a tonic. These aphrodisiacs or 'builders' are added to milkshakes, porridge, tea, stew, or other dishes. They are drunk in small doses and are said to protect against diseases and stimulate the sexual activities of men and women.
The long root of the liana is dug out and pounded with a stick until the cortex becomes loose and fibrous. The sap from the roots is squeezed into a cup, diluted in some water and slightly warmed. A quarter cup is drunk for diarrhoea. The dose must be small; otherwise it will cause bad feelings. The root is also grated, boiled, and drunk for the same purpose. Several informants said that monkey ladder stem was boiled with some branches of bird vine (*Phoradendron perrottetii*) into a tea which should be drunk against venereal diseases ('V.D.') Probably more ingredients have to be added to this remedy, but the exact recipe could not be traced. In Colombia, the Tikuna Indians use the stem to treat kidney ailments. Small pieces are soaked for three days and nights in sugar cane juice. The sediment is discarded and one cup of the remaining liquid is taken each morning. The Taiwanos from the same country consider the seeds to be diuretic. Tannins and flavonoid glycosides have been found in *Bauhinia* species. *B. guianensis* is a minor ingredient of the hallucinogenic Ayahuasca medicine that is employed by shamans in Peru and Brazil. The recipe is based mainly on *Banisteriopsis caapi* and *Psychotria viridis*, both plants that do not occur in Guyana (Schultes and Raffauf, 1990). In Guyana, the similar *Bauhinia scala-simiae* (also called monkey ladder) is probably used in the above-mentioned recipes as well. The leaves of this species are 2-lobed and rusty-brown below, and the stem is more longitudinally ribbed than in *B. guianensis*.

Economy: The woody stems of both *Bauhinia* species are sold at the Georgetown herbal market. Ready-made aphrodisiacs with monkey ladder are sold in litre bottles for US$ 3.50. Aphrodisiacs apparently have a large demand in the capital, as some of the vendors stay open for 24 hours a day.

Notes: (1) 'Turtle ladder'; (2) 'Turtle hammock'; (3) 'Backbone of an old woman'. The name granny backbone is given to several lianas with a flat, undulate stem, e.g., *B. scala-simiae*, *Serjania paucidentata*, *Curarea candicans*, and *Machaerium* spp.



12. *Bellucia grossularioides* a. leafy branch; b. bark; c. flowering branch; d. flower; e. flower, seen from below; f. fruit.

12. **Bellucia grossularioides** (L.) Triana **MELASTOMATACEAE** **Big jiggernet**

Vernacular names: Big jiggernet[1], Chiconit, Chiganet, Mess apple (Cr), Itara, Sakwa sepere (Ar), Asakali, Asakari (C), Sikararia (Wr).

Botanical description: Tree, to 25 m tall; trunk to 28 cm in diam. Outer bark whitish, rough, lenticellate, inner bark reddish brown to orange, exudate little, orange-red, sticky, sapwood yellowish white. Leaves opposite, 5-pliveined, leathery, glabrous; stipules absent; petiole to 6 cm long; blades broadly ovate, ca. 25 x 15 cm, apex shortly acuminate, base obtuse to rounded, margin serrulate in young leaves. Inflorescences axillary or produced from the main branches, usually 2-flowered; pedicels ca. 17 mm long. Flowers actinomorphic; hypanthium cup-shaped, subglobose, glabrous, ca. 9 mm long; calyx calyptrate, splitting irregularly and drying as a hyaline membrane, often persistent on young fruit; petals 6, white and pink flushed outside, fleshy, clawed, obovate, ca. 2.3 cm long; stamens 12, white, ca. 5 mm long, anthers yellow; ovary inferior, 13-14 celled, glabrous, style white, glabrous, ca. 2 cm long, stigma 10-16-lobed. Fruit a berry, fleshy, pale yellow, apically flattened, ca. 3.5 cm in diam., calyx lobes persistent; seeds numerous, light brown, small.

Distribution and ecology: From southern Mexico to northern South America, the Guianas, Brazil, and Bolivia. Common in secondary forest, disturbed primary forest, along riverbanks, and in open marshy places (Wurdack et al., 1993). In northwest Guyana, frequent in secondary forest and abandoned fields, occasionally in Mora forest. Seedlings regenerate abundantly in cultivated fields. Flowering from June to September; fruiting from September to January. Flowers are pollinated by bees. Fruits are eaten by monkeys, birds, and land turtles (van Roosmalen, 1985).

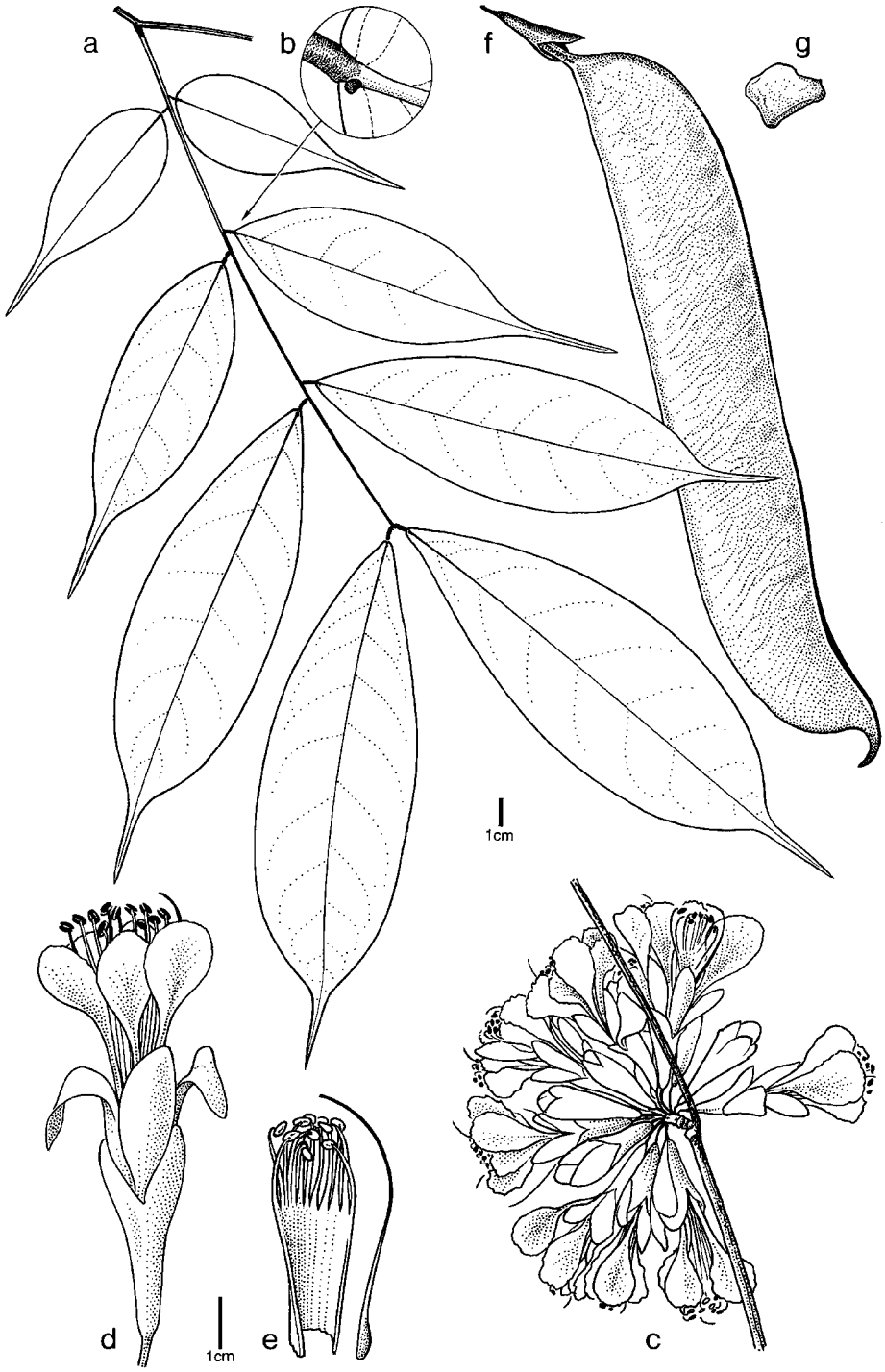
Use: The soft fruits of the jiggernet are edible. They are not considered valuable enough to gather in large quantities and take home, but are picked up when found on the forest floor. Turtles feed on the fruits as well, so when trees are fruiting abundantly, people will start looking around for turtles. Trees are occasionally spared from weeding because of their fruit. On Mount Terminus (Barima River), a landowner has planted a small orchard of jiggernets. The trees are not cultivated for commercial reasons, but the fruits are shared out among the neighbours when abundant. *Bellucia* fruits are eaten throughout Amazonia (Cavalcante, 1979; Duke and Vásquez, 1994). On one occasion, they were mentioned as being good against intestinal worms (Branch and da Silva, 1983).

The inner bark contains sticky, red latex, which is used as an orange-red colorant. The outer bark is peeled off, the inner layer is scraped off with a knife, and the bark fibres are rubbed on paddles, calabashes, or bows. The exudate gives the wooden objects a varnished look. In French Guiana, a dark brown colour is obtained by applying different layers of exudate from the grated bark of *B. grossularioides* and *Miconia egensis*. The paint is used for calabashes, arrow points, sifter frames, and other basketry. The painted objects are slightly heated over a bed of coals to dry the paint and fix the colour (Grenand and Prévost, 1994).

The bark is not used medicinally in the Guianas, but in Pará (Brazil), the inner bark is steeped in rum and massaged on the body in case of excessive vaginal discharges (Branch and da Silva, 1983). The wood is locally used as firewood.

Economy: In Guyana, the species is used for subsistence only, although painted wooden utensils may be sold every now and then. In other Amazonian countries, the fruits are sold on local markets.

Notes: (1) The fruit is named jiggernet after its tiny brown seeds that look like the eggs of the sand flea (*Tunga penetrans*, also called jigger or chigger), which lays its eggs in human and animal feet.



13. *Brownea latifolia* a. leaf; b. glands (r = 4 mm); c. inflorescence; d. flower; e. staminal tube (l) and style (r); f. fruit; g. seed.

13. **Brownea latifolia** Jacq. **LEGUMINOSAE-CAESALP.** **Rose of the mountain**

Vernacular names: Rose of the mountain (Cr), Hichi okobia[1], Bímiti-wallaban[2], (Ar), Tukusyi wokuru[2] (C), Atarno, Hukuhuku ahobi arau[2], Hotoquai aha[3] (Wr).

Botanical description: Tree, to 15 m tall; trunk to 15 cm in diam. Outer bark grey-brown, inner bark reddish brown, sweet-scented, sapwood whitish. Branches spreading. Leaves alternate, 6-12-foliolate, rachis to 30 cm long; stipules caducous; petiole 1 cm long; leaflets alternate, ovate-elliptic, to 16 x 6 cm, glabrous above, greyish green below, apex long-acuminate, with a gland on the inside at the base of the midrib. Inflorescences terminal or lateral racemes, in two or three, many-flowered clusters; bracts ovate to linear, ca. 2.5 cm long, sparsely puberulous outside. Flowers slightly zygomorphic; receptacular tube 1.2 cm long; sepals 4, red, glabrous, ca. 2 cm long, apex emarginate; petals 5, bright red, obovate, ca. 4 cm long, narrowed into a claw 1.5 cm long, apex subemarginate; stamens 10-12, connate, ca. 4 cm long; ovary superior, rusty brown puberulous, style 1, ca. 6 cm long. Pod flat, green, stipitate, acute, curved, ca. 25 x 5 x 0.5 cm, longitudinally dehiscent, valves coiling up after dehiscence; seeds 4-6, compressed, irregularly formed, ca. 2 x 2 cm.

Distribution and ecology: In Venezuela, Colombia, and Guyana. In northwest Guyana, frequent in riverbank Mora forest, occasionally in secondary forest. In Barama, flowers and fruits were seen in December. Flowers are pollinated by hummingbirds; seeds are probably dispersed by fish and water.

Use: The bark of this small tree is boiled in water, until the liquid gets brown. The tea is strained, after which sugar and milk are added to make a hot, nutritious beverage that resembles Ovomaltine. The drink is also recommended for stomach ache, diabetes, and vomiting of blood (Reinders, 1993).

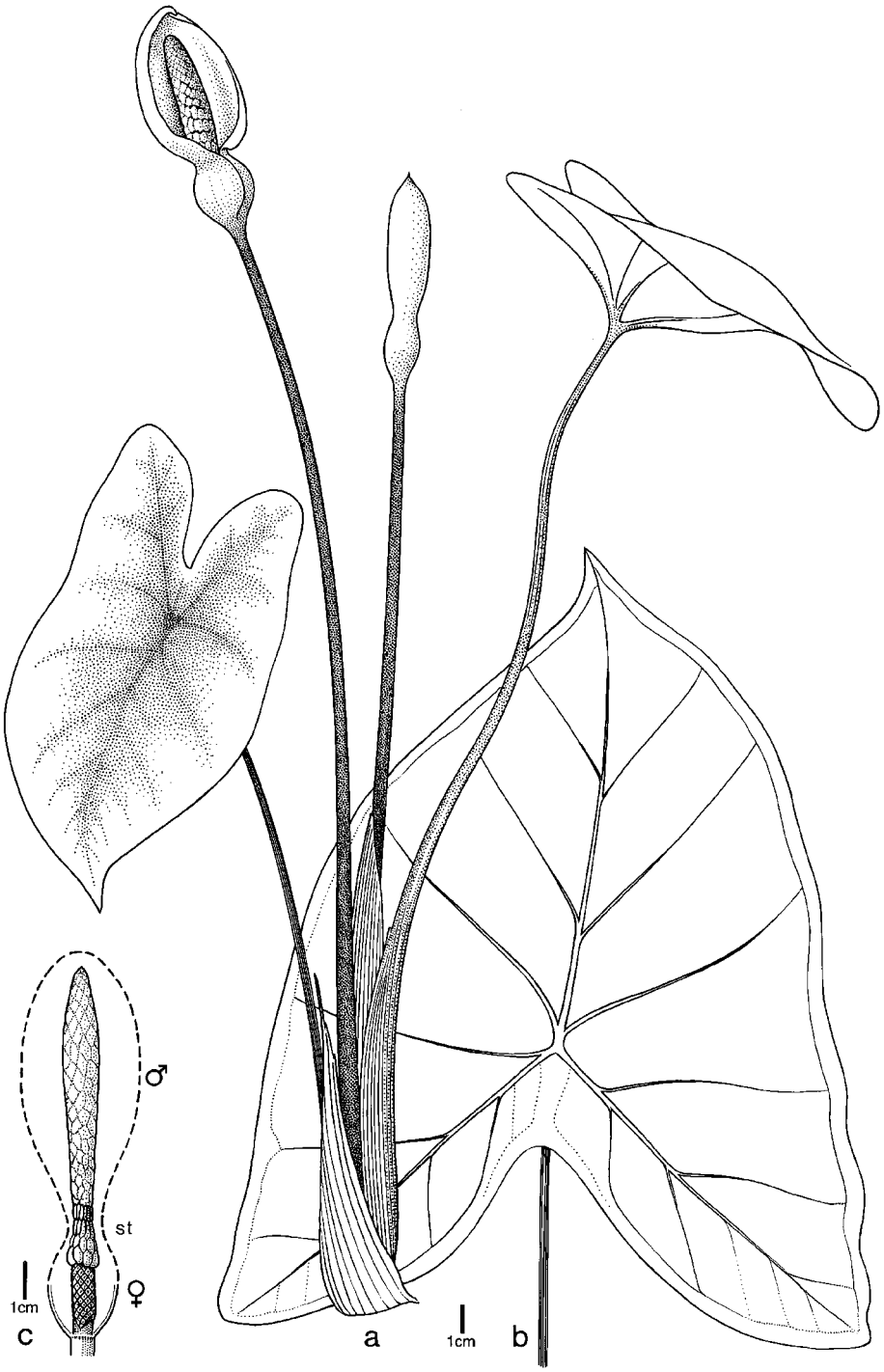
The red flowers are considered to be an effective medicine to stop haemorrhage. They must be boiled in water and the tea should be drunk until the bleeding stops. The floral tea is also taken for colds and whooping cough. When flowers are not available, the bark tea is drunk to combat haemorrhage, but this allegedly does not work as good as the tea from the flowers. The bark is also boiled with the milky bark of kakarawa (*Pouteria durlandii*) to treat tuberculosis. Greene-Roesel (1995) noted that the bark was boiled with hariba (species unknown) and drunk with a little high wine added to overcome infertility.

The chemistry of this genus has not been studied, but indigenous groups in Colombia and Ecuador employ the bark and flowers of *B. latifolia* and several other *Brownea* species as contraceptives and to control bleeding or excessive menstruation (Schultes and Raffauf, 1990; Sánchez, 1996).

The seeds are used as fish bait. Simply thrown in quiet streams without current, they attract fishes, which then are speared or shot with bow and arrow. The seeds are also put on a hook to catch morocots (*Myletes* sp.). The wood is locally used to build traditional Arawak kitchen walls in the 'wattle and stave' style, in which young stems are used entirely or split into smaller sticks and woven between a horizontal frame[4]. The wood is also used for firewood. According to an old Amerindian belief, playing with the red flowers will cause your teeth to drop out.

Economy: The species is used for subsistence only.

Notes: (1) 'Eye wash of the powis' (*Crax alector*) (Fanshawe, 1949); (2) These vernacular names all refer to the hummingbirds that visit the flowers; (3) 'Mountain tobacco' (Charette, 1980); (4) See plate 29.



14. *Caladium bicolor* a. habit; b. leaf; c. flowering spadix, showing position of spathe.

14. **Caladium bicolor** (Ait.) Vent. **ARACEAE** **Bina**

Vernacular names: Acuri bina, Deer bina, Wild eddoe, God yam (Cr); Bina, Labba bina (Ar), Yakarawa turara, Kupi (C), Zarokotaha (Wr).

Botanical description: Terrestrial herb, to 75 cm high; rhizome tuberous, subglobose, to 4 x 8 cm, inner tissue fleshy, white or yellow, with irritating sap. Young shoots pink or purple. Leaves alternate, simple, very variable in colour and shape, sheathed at the base; stipules absent; sheaths ca. 9 x 1 cm; petiole terete, fleshy, ca. 35 cm long, sheathing in the basal part, green with black spots, purple, grey, or pink with black stripes; blades peltate or sagittate, ca. 35 x 15 cm, green with bright pink veins, or with red, pink, or white spots, apex acuminate, basal lobes obtuse to rounded.
Inflorescence terminal, spadix cylindrical, to 8 cm long, erect, basal part of spathe green, tubular, ca. 3 cm long, upper part thin, white, boat-shaped, ca. 6 x 3 cm; peduncle terete, slender, ca. 35 cm long. Flowers actinomorphic, unisexual, perianth lacking. Male flowers at the upper 3-4 cm of the spadix, white, rotting away after anthesis; stamens 4. Sterile part ca. 1.5 cm long. Female flowers at the basal 1.4 cm of the spadix, truncate, greenish to yellowish white; ovary superior, incompletely 2-locular, style 1, discoid, stigma crateriform. Fruit a berry, pink, subcylindric; seeds numerous, ovoid, longitudinally grooved.

Distribution and ecology: Native of tropical America, but cultivated as ornamental plant all over the world. In northwest Guyana, frequently growing wild in the forest understorey and pastures, often spared from weeding or planted in house yards or pots, propagated by its rhizome. Flowering and fruiting throughout the year. Pollination is probably done by beetles; seeds are possibly dispersed by birds.

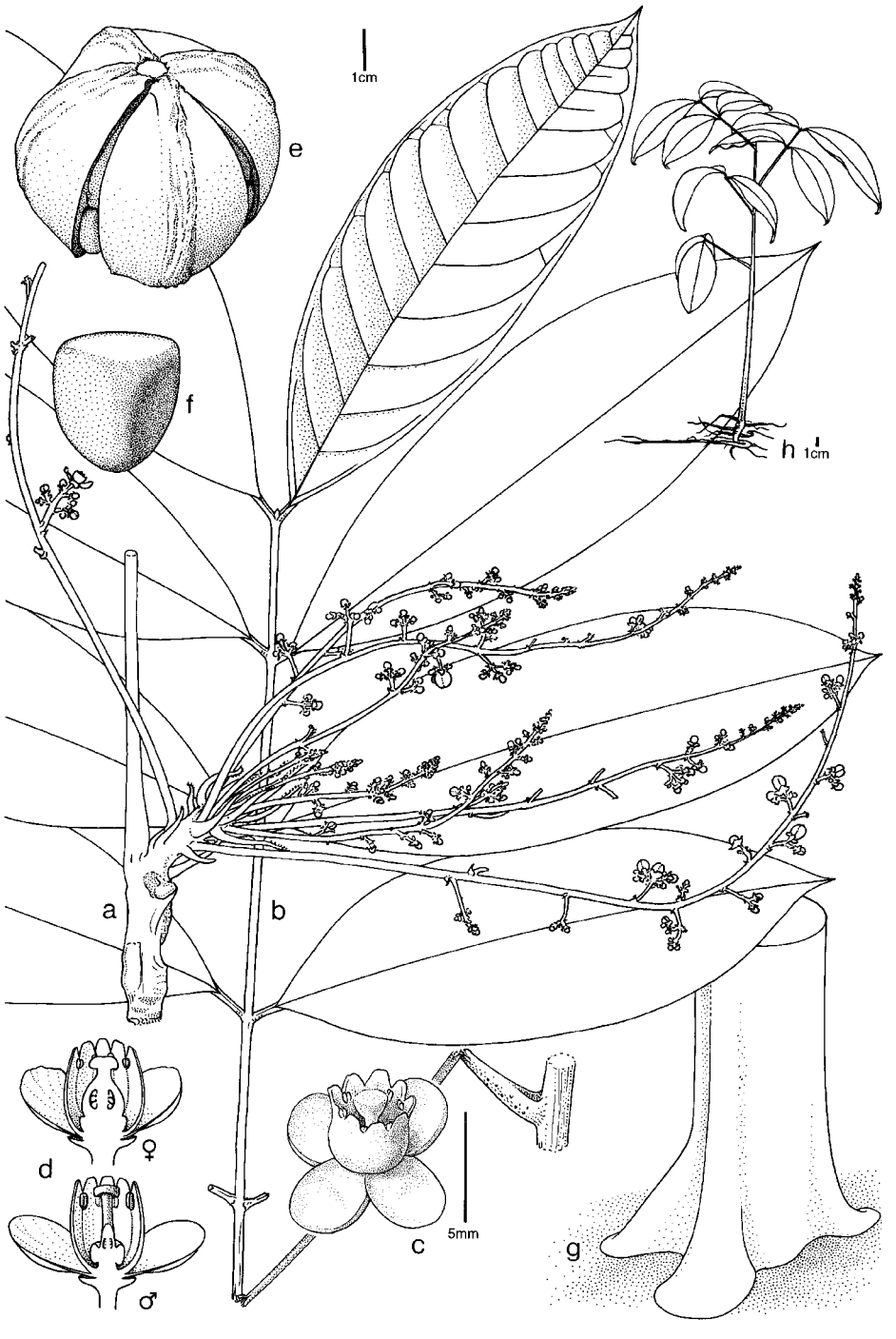
Use: Because of its bright colours, *Caladium bicolor* is a popular ornamental plant in the Guianas. In Amerindian households, however, the plant does not merely have an ornamental function: it serves secret purposes as well. Magic plants, known locally as 'binas', are used as charms for hunting, warding off evil spirits, attracting a beloved one, or pursuing other kinds of luck. Although few people admit they know or use binas, a wide range of magic plants has been collected in the study area. Some species are taken from the wild and grown in house yards (e.g., *Justicia calycina*, *Aristolochia* sp. TVA573), while others are truly cultivated species, (e.g., *Caladium humboldtii* and *Xanthosoma brasiliense*). Hunting charms were obviously more important in the past (Gillin, 1936; Coles et al., 1971), but they are still used and exchanged among indigenous groups. Caribs have the reputation to be very knowledgeable about binas, but Arawaks and Warao use and grow them as well.

Because of the variety in shape and colour in the leaves of *Caladium bicolor*, local people distinguish different types of bina within the same species. The exact uses differ between tribes and even between villages. The white-spotted form was called acuri bina in Moruca, and used as a hunting charm for agoutis (acuri, *Dasyprocta agouti*). When the hunter carries a leaf of this plant in his pocket, he will have a greater chance to catch this particular animal than when he goes in the forest without this charm. Kariako Caribs used the same form as an aid to hunt deer (*Mazama* spp.). They explained this by the resemblance of the spotted leaves with the fur of a young deer. The hunter rubs the acrid sap from a sliced rhizome on his arms and on the skin of his dog.

In Moruca, a leaf of the pink form is chosen by a hunter if he wants to track a labba (*Agouti paca*), while people in Barama are convinced that this 'species' is not a bina at all. They call it 'kupi' and use it to kill bot fly larvae ('mosquito worms') in dogs. They grate the fleshy rhizome and apply it as a poultice over the breathing hole of the larvae, which is killed shortly afterwards and can be removed easily. To catch a labba, the Caribs use *C. schomburgkii*, a plant with smaller, non-peltate leaves and white stripes instead of spots. Warao rub their fishing lines with leaves of *C. bicolor* to increase their chance of catching gillbacker (*Sciadeicthys* sp.). They also kill mosquito worms in cattle and sheep with the rhizome gratings (Reinders, 1993).

Throughout the Guianas, *C. bicolor* is known as a magic plant. It is used by shamans during their rituals and encounters with supernatural beings (Grenand et al., 1987), but also by ordinary people to pursue some luck in hunting, to ensure a good crop, or to win the love of an admired person (Ahlbrink, 1931; Stahel, 1944; Forte, 1996). The young leaves and spadices are cooked and eaten as vegetable in Suriname (Stahel, 1944).

Economy: Special bina mixtures are occasionally prepared and sold by 'experts', but these often contain other species, such as love charms or binas that are believed to influence the authorities (see *Eleutherine bulbosa* and *Aristolochia* sp. TVA573). Hunting charms are generally used for subsistence purposes only.



15. *Carapa guianensis* a. inflorescence; b. leaf; c. flower; d. longitudinal section of female flower (top) and male flower (bottom); e. fruit; f. seed; g. trunk base; h. seedling.

15. **Carapa guianensis** Aubl. **MELIACEAE** **Crabwood**

Vernacular names: Crabwood (Cr), Karaba[1] (Ar), Karapa (C), Hioru (Wr).

Botanical description: Tree, to 35 m tall; trunk to 95 cm in diam. Base swollen or buttressed. Outer bark smooth, grey-brown to reddish, lenticellate, fissured, flaky on older trees. Inner bark pinkish brown to red, exudate brown, scanty, with a bitter smell and taste. Leaves alternate, 8-16-foliolate, clustered at branch ends; petiole ca. 16 cm long; rachis to 70 cm long, lenticellate; leaflets opposite, leathery, narrowly elliptic, ca. 30 x 10 cm, glabrous, shiny above, apex acute or acuminate, provided with a gland, base acute to rounded. Inflorescences axillary or terminal, clustered spike-like panicles ca. 50 cm long; peduncle ca. 6 cm long. Flowers actinomorphic, subsessile, clustered at branch ends, waxy, sweet-scented, unisexual; calyx 4-lobed, ca. 2 mm long, margins ciliate; petals 4, free, cream, pinkish tinged outside, ca. 5 mm long; staminal tube ca. 4 mm long, anthers 8. Fruit a woody capsule, dark brown, globose to broadly ovoid, 4-angled, ca. 7 x 7 cm, glabrous, dehiscing in 4 valves with a longitudinal ridge; seeds 1-2 per valve, orange brown, pyramidal, ca. 4.5 cm in diam.

Distribution and ecology: From Belize to tropical South America and Trinidad, frequent in marsh and Mora forest (Polak, 1992). In northwest Guyana, frequent in Mora and mixed forest. Fruiting from the end of October to November; in other parts of Guyana mainly from April to July. Seeds are dispersed by rodents, monkeys, and water (Polak, 1992).

Use: Crabwood seeds yield a valuable oil that is used for many purposes. Crabwood oil is obtained by boiling a large number of seeds for at least half an hour, sometimes with a few cashew leaves (*Anacardium occidentale*). The watery seed mass is left to rot for 2-6 weeks in a bucket, after which it is dried in the sun, the shells are removed and the mass is kneaded into a dough-like paste. It is placed in the sun on an inclined piece of bark or corrugated iron, so that the heat causes the oil in the mass to melt and run down into a bowl placed beneath it. If there is no sun, the mass is squeezed out by hand or with a matapi. The milky liquid that comes out is boiled to extract the oil. A less-used method is grating the seeds, boiling and squeezing the seed mass, and scooping off the oil that floats on the surface. A few hundred seeds are needed to extract a litre of oil.

In crabwood season, people gather baskets full of the seeds. A tree with a diameter of 18 cm already produces a considerable seed crop. In Moruca, people spared crabwood from cutting and even planted it in house yards to be sure of an annual harvest and invest in the form of high-quality timber. Three medium-sized trees were said to yield a rice bag (100 lbs.) full of seeds, good for ca. five litres of oil. The oil has a creamy colour, a strong smell, and a very bitter taste. It can be stored for quite some time. For chemical contents of the oil, see Fanshawe (1948) and Grenand et al. (1987).

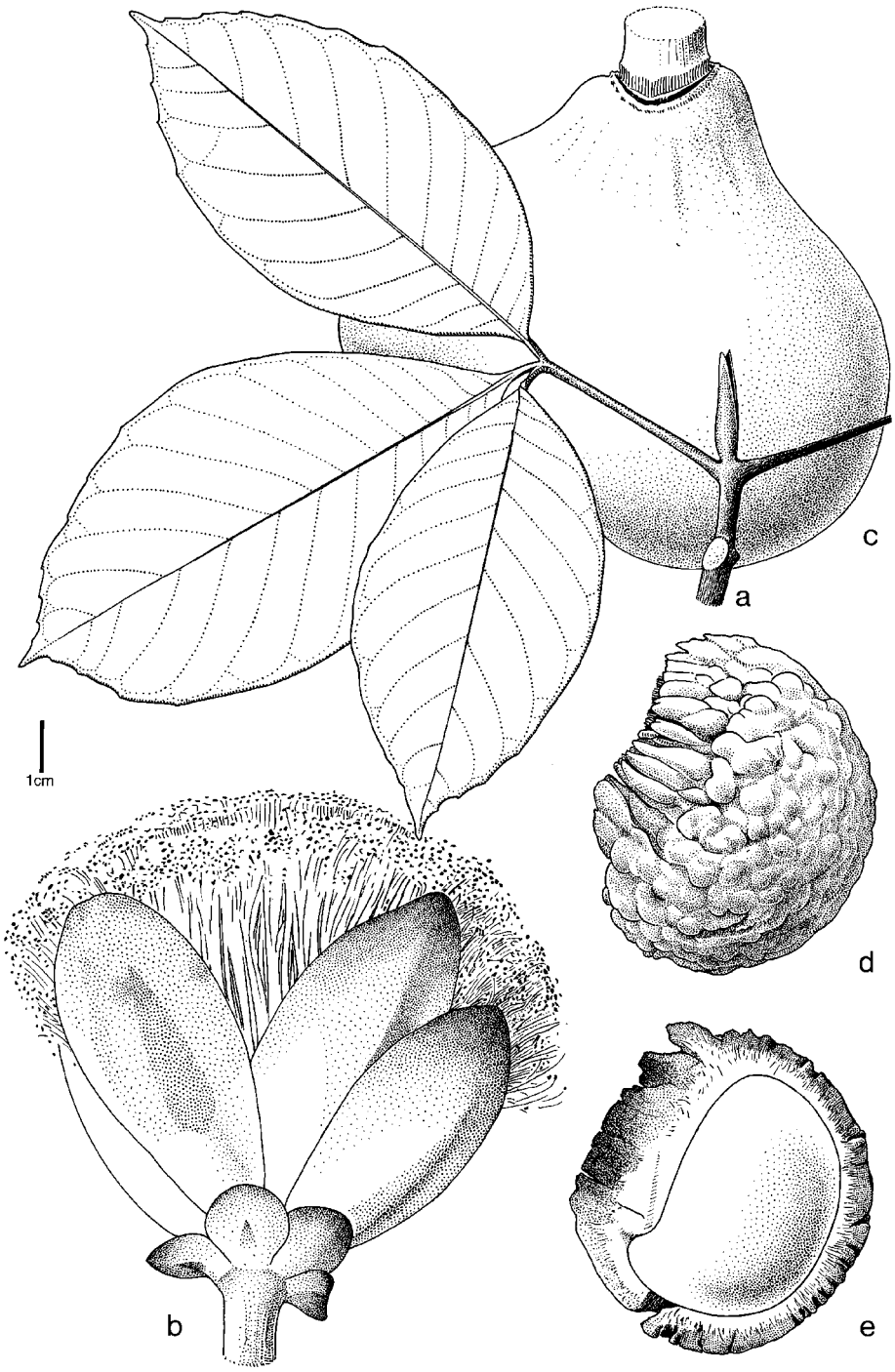
Crab oil is rubbed on dry or cracked skin, small wounds, swellings, sores, and scratches to prevent infection. The oil works both as insect repellent and to ease the itch from mosquitoes, ticks, scabies, lice, fleas, and bête rouge. The oil is used as hair oil and to kill head lice and fleas. A few drops of oil are given orally or rectally to babies suffering from thrush. The oil is also applied to ‘piles’, an illness that was defined locally as protruding guts from the anus (groin rupture), but also by swollen blood vessels in the anus (haemorrhoids). A little of the bitter oil is taken orally for colds, (whooping) cough, and malaria. One spoon of crab oil mixed with a spoon of black cassareep is taken for thrush, chest pains, stomach ache, and colds. Other illnesses treated orally with crab oil are pneumonia and asthma (Reinders, 1993). The oil is also smeared on arrows and bows to prevent them from getting mildew. Throughout South America, crab oil is extracted in a similar way and used for comparable purposes (Stahel, 1944; Grenand et al., 1987; Schultes and Raffauf, 1990). In the past, the oil was used to dilute the red body paint made from onotto (*Bixa orellana*), but this practise has almost died out in Guyana (Roth, 1924).

Grating a fresh crabwood seed and squeezing its white sap in a little water makes another cold medicine. When taken three times a day, the cold will soon be over. Fresh seeds are cut open and rubbed on bête rouges, to make them fall off and prevent new ones from coming on the skin. Seeds are roasted and put on a hook as fish bait to catch morocot (*Myletes sp.*), a fish that enters the flooded forests in the rainy season to eat fruits, leaves, and seeds (Goulding et al., 1988). Although the riparian Mora forests are not flooded in crabwood season, locals say that morocots wait at the creek mouths for the seeds to float out. Morocots are supposed to be able to detect the human smell from a long distance. When putting a seed on a hook, this should be done with a pointed stick, muddy hands, or a knife. Touching the bait with the skin must be avoided. Warao fishermen in Koriabo (Barima) have a special method of preparing morocot bait. A pointed stick is drilled through the seeds, their shells carefully peeled off, and the white nuts soaked in water until soft and spongy. The seed mass is wrapped with the stick in two dhalebana (*Geonoma baculifera*) leaves and tied firmly with a bush rope. To avoid the smell of humans, the preparation is done in the forest, away from the village and forest trails. The soft seed mass is either thrown directly in the river or put on a hook with a knife. Morocots are immediately attracted to it, and will be shot with bow and arrow or caught with a rod. The same bait package is made with an inflorescence of mokomoko (*Montrichardia arborescens*).

Crabwood is an important commercial timber (Polak, 1992). In the interior, the red wood is used for boards, house material, paddles, and canoes. In Santa Rosa, home-made guitars and banjos are made with a neck of crabwood and a body from simarupa wood (*Simarouba amara*). A handful of inner bark scrapings is applied fresh to skin sores or slightly heated and squeezed out above the sores. The scrapings are soaked in a cup of water, or boiled and drunk for stomach ache, bowel problems, headache, high blood pressure, rheumatism, malaria, and diarrhoea. The bark decoction is used to cleanse skin ulcers, especially ‘life sores’ or ‘bush yaws’ (*leishmaniasis*). After cooling down, the tea is applied to severe skin burns caused by fire or hot water.

Economy: Due to its long and complicated processing method, crab oil is relatively expensive. This was one of the reasons why Fanshawe did not see any commercial future for it in 1948. Nevertheless, the oil is still widely sold throughout South America, and it is one of the few herbal medicines traded in the interior. A bottle of crab oil costs US$ 3.50 in a northwest village, while in Georgetown the price has gone up to $ 7. Some Guyanese pharmacies are taking initiatives to industrially process crab oil into soap, candles, and insect repellent. The oil is not (officially) exported. Crabwood canoes are sold in the interior for US$ 50-60, depending on their size.

Notes: (1) The Arawak name means oil, fat, and crabwood tree (Bennet, 1994).



16. *Caryocar nuciferum* a. leafy branch; b. flower; c. fruit; d. pyrene; e. pyrene with partly removed endocarp to show seed.

16. **Caryocar nuciferum** L. **CARYOCARACEAE** **Sauari nut**

Vernacular names: Sauari nut, Sourie, Butter nut (Cr), Hora, Hura (Ar), Sawari, Alokomali (C).

Botanical description: Tree, to 45 m tall; trunk to 1 m in diam; crown large and spreading. Outer bark dark brown, rough, inner bark and wood yellow. Leaves opposite, 3-foliolate; stipules elliptic, folded together lengthways, ca. 3.5 cm long, caducous, leaving annular scars on older branches; petioles ca. 8 cm long; blades elliptic, ca. 20 x 12 cm, glabrous, margin slightly dentate, apex bluntly acuminate, base more or less rounded. Inflorescences terminal racemes, 2-8-flowered; pedicels thick, dark red, elongating in fruit. Flowers actinomorphic, shaving-brush- like, ca. 9 cm in diam, flower buds ca. 3.5 cm in diam.; sepals 5, broadly ovate, slightly connate at the base, ca. 1.5 cm long; petals 4, elliptic, concave, ca. 7 x 4 cm, dark red outside, pinkish white inside; stamens numerous, yellow, ca. 8 cm long, at the base united into a thick tube; ovary superior, 4-locular, styles 4, ca. 9 cm long. Fruit a drupe, pear-shaped, to 15 cm in diam., exocarp and mesocarp thick, fleshy, the stone separating in two, 1-seeded pyrenes, endocarp woody, hard, reddish brown, covered with warty tubercles; seed ivory white, kidney-shaped, ca. 2.5 cm in diam, wall brown.

Distribution and ecology: Venezuela, the Guianas, and Amazonian Brazil, native in primary forest, but cultivated for its seeds in the West Indies and in botanical gardens around the world (Prance and Freitas da Silva, 1973). In northwest Guyana, rare as wild tree in mixed forest. Near Amerindian settlements, the tree is often spared from cutting or planted in secondary or disturbed primary forest. Fruiting annually from May to July, with a heavy crop once every second year (Fanshawe, 1948). In Barama, a few flowers and fruits were seen from September to January, while in Moruca the species showed some flowers in late August. No massive fruiting periods were witnessed. Flowers are pollinated by bats; seeds are dispersed by agoutis and other rodents (van Roosmalen, 1985).

Use: The white seed of this tree has a taste somewhat similar to coconut, but more delicate and with a softer texture. The seeds are much appreciated by the local population. The hard, woody shell needs to be opened with a cutlass and the brown seed wall must be peeled off. The seeds are eaten raw. During massive fruiting periods, people usually collect baskets full of the seeds. Fanshawe (1948) observed trees growing in the open in Mabaruma that started fruiting at the age of 12 years. Although the species is cultivated on the West Indian Islands and occasionally in California, the nuts traded on the world market are mostly gathered from wild trees (Rehm and Espig, 1991).

Fanshawe also reported that the oil expressed from the kernels could be used for cooking. Due to the scarcity of seeds, this was not a common practise in the study area. The author further mentioned that the species was used as febrifuge, but did not provide a detailed recipe.

In northwest Guyana, the wood is harvested as a commercial timber, although Polak (1992) did not mention it as such. The wood is expensive and said to last long, both in salt and in sweet water. It is favoured by professional boat builders along the Pomeroon River to build their large, seaworthy wooden ships (‘ballahoos’).

Economy: Outside Guyana, the tree is widely cultivated for its edible nuts. Prance and Freitas da Silva (1973) reported that nuts were exported from the Guianas, but with a minor relevance at the international level. Small-scale export takes place from Suriname to the Netherlands, where the nuts are sold for US$ 1.25 per piece during special Surinamese festivities. In Guyana, commercial extraction takes place around Mabura Hill. However, during this survey, no sauari nuts were observed on regional or national markets, nor were there any records available of marketing channels or export volumes. With its delightful taste and high nutritional and commercial value, the sauari nut has a promising potential as commercial forest product. However, as much as one third of the seeds collected from the forest are spoiled or damaged by rodents. Fanshawe’s remark that ‘a small trade in nuts can only be built up if sufficient inducement in the way of price is given to people who frequent the forest…..who know where the trees are’, is still very relevant today.

17. *Catostemma commune* a. flowering branch; b. leaf; c. fruit; d. seed; e. trunk base; f. seedling, in side view and top view.

17. **Catostemma commune** Sandw. **BOMBACACEAE** **Balamanni**

Vernacular names: Common baramanni, Swamp baramanni, Balamanni (Cr), Baromalli, Baromale (Ar), Syimekuna (C), Dauhoroija[1] (Wr).

Botanical description: Tree, to 45 m tall; trunk to 70 cm in diam., straight, cylindric. Outer bark grey to dark brown, smooth, often ringed, lenticellate, inner bark whitish to pink-brown with red vertical stripes, turning orange after exposure, sweet-scented, wood light brown. Branches stout, with prominent leaf scars. Leaves alternate, simple, clustered at branch ends; stipules narrowly triangular, ca. 3 mm long, caducous; petiole ca. 5 cm long, thickened at both ends; blades stiff, glabrous, elliptic to obovate, ca. 12 x 6 cm, apex rounded to emarginate, base acute. Inflorescence an axillary cluster; pedicels ca. 12 mm long, densely covered with stellate hairs. Flowers actinomorphic, white, sweet-scented; calyx tubular, ca. 10 mm long, 5-lobed, lobes 7 mm long; petals 5, ca. 10 mm long; stamens 40-50, ca. 1 cm long; ovary superior, style 1, stigma 5-lobed. Fruit a woody capsule, greyish green to rusty brown, velvety, oblong-ellipsoid, ca. 9 x 4 cm, with 3 or 4 longitudinal ribs, sweet-scented when cut; seed 1, oblong-ellipsoid, ca. 7 x 3 cm, seed wall smooth, fleshy, bright orange, unpleasantly scented. Seedlings with palmately compound leaves, clustered at the top.

Distribution and ecology: Endemic to Guyana. In northwest Guyana (Barama region), frequent in mixed forest, common in 20-year-old secondary forest. Less frequent in the Moruca area. Flowering mainly from February to May; fruiting from October to May. Seeds often germinating massively on the forest floor. Seeds are probably partially animal-dispersed (Polak, 1992).

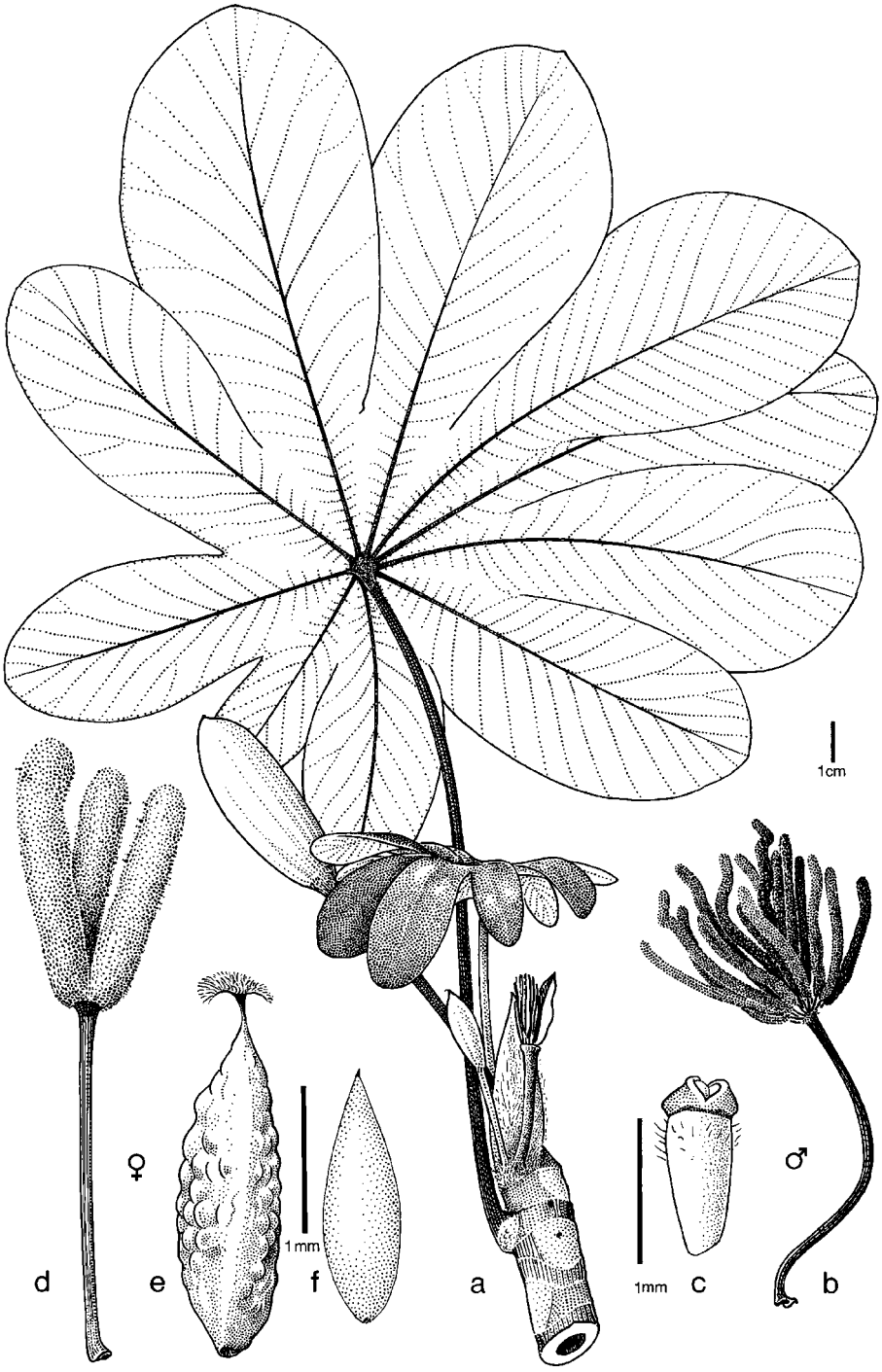
Use: The bark of the balamanni is used for the resilient floors and walls of Amerindian dwellings. To release the bark from the trunk, a longitudinal cut is made in the bark after felling an adult tree. The bark is continuously beaten with the back of an axe until it loosens from the wood. Then it is removed and spread out as a floor or attached to the sides of a house frame to form a wall. The prints from the axe heads remain visible as a pattern on the flattened bark. The bark is used in typical Arawak houses, built on stilts with walls and a floor[2]. Since the bark slabs can be made just with an axe and a cutlass, they are used by people who do not possess a chainsaw and are unable to buy boards. The species is rare in the coastal swamp region. Here walls are usually made from troolie leaves (*Manicaria saccifera*), and floors from manicole trunks (*Euterpe oleracea*).

Although balamanni occurs frequently in Barama, the bark is not often employed in housing, as traditional Carib dwellings do not have floors or walls. The waterproof bark slabs often serve other purposes, such as lids to cover drinking vessels for cassava beer and gutters for gold mining. Amerindian pork-knockers, who seldom own modern mining equipment, fold their gutters (‘sluices’) from balamanni bark. Sticks and branches are placed halfway in the drain to canalise the mud and sift the gold from the soil. The heavy stones, which contain the gold, sink down in the mud and are collected afterwards from underneath the branches. If somebody dies far away in the forest and his companions cannot manage to carry him or her to a nearby cemetery, a ‘coffin’ of balamanni bark is made. The body is wrapped in a ‘balamanni blanket’ and buried in the forest, which is generally perceived as a very sad way to die.

The fibrous bark of young balamanni trees is stripped off and used as lashing material and head straps for baskets and warishis[3]. The bark of older individuals is not suitable for lashing, since it does not strip off easily anymore. Balamanni seeds are sometimes used as an ingredient in traditional Carib pottery. Seeds are chopped into small pieces and mixed with some water in a calabash. When this is added to the clay, it becomes slimy and much easier to work with. According to a Carib belief, people who snore loud at night must be knocked softly with a balamanni seed on their throat, as this will reduce the snoring. Although mentioned as edible by Polak (1992), the red seed wall is not consumed in northwest Guyana.

Economy: Balamanni is a commercial timber, harvested for the manufacture of plywood by Barama Company Ltd. around Port Kaituma. Plywood is exported in large quantities (Sizer, 1996). Bark slabs are occasionally made for tourist facilities to serve as a 'rustic' wall around terraces.

Notes: (1) The Warao name means 'skin tree' (Charette, 1980); (2) See plate 5; (3) See plate 26 for the harvesting of lashing material.



18. *Cecropia peltata* a. flowering branch; b. male inflorescence; c. male flower; d. female inflorescence; e. tuberculate achene; f. seed.

18. **Cecropia peltata** L. **CECROPIACEAE** **Red congo pump**

Synonym: *Cecropia surinamensis* Miq.

Vernacular names: Red congo pump, Woman/female congo pump (Cr), Wanasoro (Ar), Tureke, Tapireng Sarasara (C), Waro (Wr).

Botanical description: Tree, to 15 m tall; trunk with stilt roots and hollow internodes inhabited by ants. Bark with watery sap, turning blackish in the air. Branches hollow, puberulous, inhabited by ants, with transverse stipular scars, ca. 2.5 cm in diam. Leaves alternate, simple, peltate, palmately lobed; stipules connate, ca. 8 cm long, forming a cap over the bud, hirtellous outside, caducous; petiole ca. 50 cm long, reddish, base with patch of dense indument; blades subcoriaceous, 8-14-lobed, ca. 40 x 40 cm., green, rough above, silvery-white puberulous below. Inflorescences unisexual, consisting of a digitate cluster of spikes, initially enveloped by a spathe, plants dioecious. Male inflorescence: peduncle patent to pendent, ca. 6 cm long; spathe ca. 5 cm long, densely puberulous; spikes 12-25, stipitate, ca. 5 x 0.3 cm; perianth tubular, glabrous, with few hairs at apex; stamens 2. Female inflorescence: peduncle patent, ca. 8 cm long, densely puberulous; spikes 3-6, sessile, ca. 5 x 0.5 cm; perianth tubular, hairy near the aperture; ovary superior, 1-locular, style and stigma 1. Fruiting spikes to 25 x 0.5 cm. Fruit a tuberculate achene ca. 2 mm long.

Distribution and ecology: Central America, Northern South America, the Guianas, and Brazil (Roraima and Pará), in non-inundated secondary forest In northwest Guyana, abundant in abandoned fields, secondary and disturbed primary forests. Phenology unknown. Flowers are pollinated by the wind; seeds are dispersed by bats, birds, and monkeys (van Roosmalen, 1985).

Use: Throughout Guyana, the tea from congo pump leaves is used for back pain and kidney disorders. One leaf is dried for a few days, after which it is boiled in a pint of water for ca. 40 minutes. Tree cups a day must be drunk of this tea, which acts as a diuretic. In Georgetown, men were advised to prepare the tea with the male or white congo pump (*C. sciadophylla*), while women had to use the female type (*C. peltata*). In Moruca, however, people said that the white congo pump was not effective against back pain and kidney problems.

In Barama, *C. peltata* is often confused with *C. obtusa*, which looks similar, but has more white hairs on leaves and petioles and occurs abundantly on the newly formed banks of meandering rivers. In coastal Guyana, the red congo pump is used in the treatment of high blood pressure and Bright's disease, a kidney infection leading to anuria (Lachman-White et al., 1992). Medicinal herb vendors in Georgetown advised to boil the leaves with bishop's cap (*Cardiospermum halicacabum*) and some wild green tea (*Caperonia palustris*) or wild coffee leaves (*Senna occidentalis*). The decoction is said to be effective against kidney disorders. Stahel (1944) reported that congo pump tea was drunk by forest labourers in Suriname when their ordinary tea had finished.

In Barama, a rectal medicine from red congo pump is prepared when people suffer heavily from diarrhoea. One leaf is finely crushed in water, put in a syringe and injected in the patient's anus. This treatment is considered a last option to administer a medicine to a patient too sick too hold any fluids or oral medicine. In Moruca, a strong decoction of nine leaves is taken for back pain. The leaves also used as temporary umbrellas during sudden downpours. They are dried and smoked by (Amerindian) pork-knockers when they have run out of cigarettes. A hot or cold poultice from the slimy young shoots is used to dress cuts and sores to accomplish a fast healing, and as a poultice on abscesses to break them open and release the pus. Steroids, urolic acids, and cowleyin have been isolated from the bark of *C. peltata*, and leucocyanidin has been found in the leaves (Hegnauer, 1969).

The Barama Caribs prepare a fish poison called 'kunami balls' by pounding leaves of *Clibadium surinamense*, mixing them with fresh cassava, rolling the dough in leaves and baking this in a fire. Ashes of burnt *Cecropia* leaves and pepper are added to the sticky paste, which is then pounded in a mortar and kneaded into small balls. The kunami balls are rolled in flour to make them white and more visible to fish. When thrown in the water, they are swallowed by the fish. Soon thereafter, the fish start floating belly upwards and can be collected by hand. Entire stems are used as rollers to haul canoes through the forest. Fanshawe (1948) reported that the inner bark supplied a fibre for caulking the seams of boats, but this practice was unknown in the study area.

Economy: In Fanshawe's time, congo pump leaves were already sold on local markets. Today, *C. sciadophylla* and *C. peltata* are still widely sold for kidney disorders in Georgetown.

19. *Centropogon cornutus* a. habit; b. staminodial tube; c, fruit.

19. **Centropogon cornutus** (L.) Druce **CAMPANULACEAE** **Fowl cock beak**

Synonym: *Centropogon surinamensis* (L.) Presl

Vernacular names: Fowl cock beak, Parrot beak, Watermomma pepper (Cr), Papagayo (Sp), Karoshiri[1], Emenaliballi, Karina rubarudan (Ar), Karulu (C), Karina akosansana, Hari ahi[2] (Wr).

Botanical description: Shrub, to 2 m tall, with white latex. Stem longitudinally grooved, puberulous in the young parts. Leaves alternate, simple; stipules absent; petiole ca. 1 cm long; blades membranous, glabrous, ovate to ovate-oblong, ca. 10 x 4 cm, margins slightly hairy, apex acuminate, base obtuse or rounded. Flowers solitary, axillary; pedicels ca. 5 cm long; bracteoles 2, near the base of the pedicels, linear, acute, ca. 5 mm long. Flowers zygomorphic; calyx green, tube adnate to the ovary, cup-shaped, ca. 5 mm in diam., slightly hairy, lobes 5, linear, persistent, to 1.5 cm long; corolla bright pink, ca. 4 cm long, tube more or less curved, 5-lobed; stamens 5, connate into a tube, curved downwards, ca. 5 cm long, anthers covered with white hairs; ovary inferior, 2-locular, style 1. Fruit a berry, green, subglobose, ca. 1 cm in diam., crowned by the persistent calyx lobes; seeds numerous, brown.

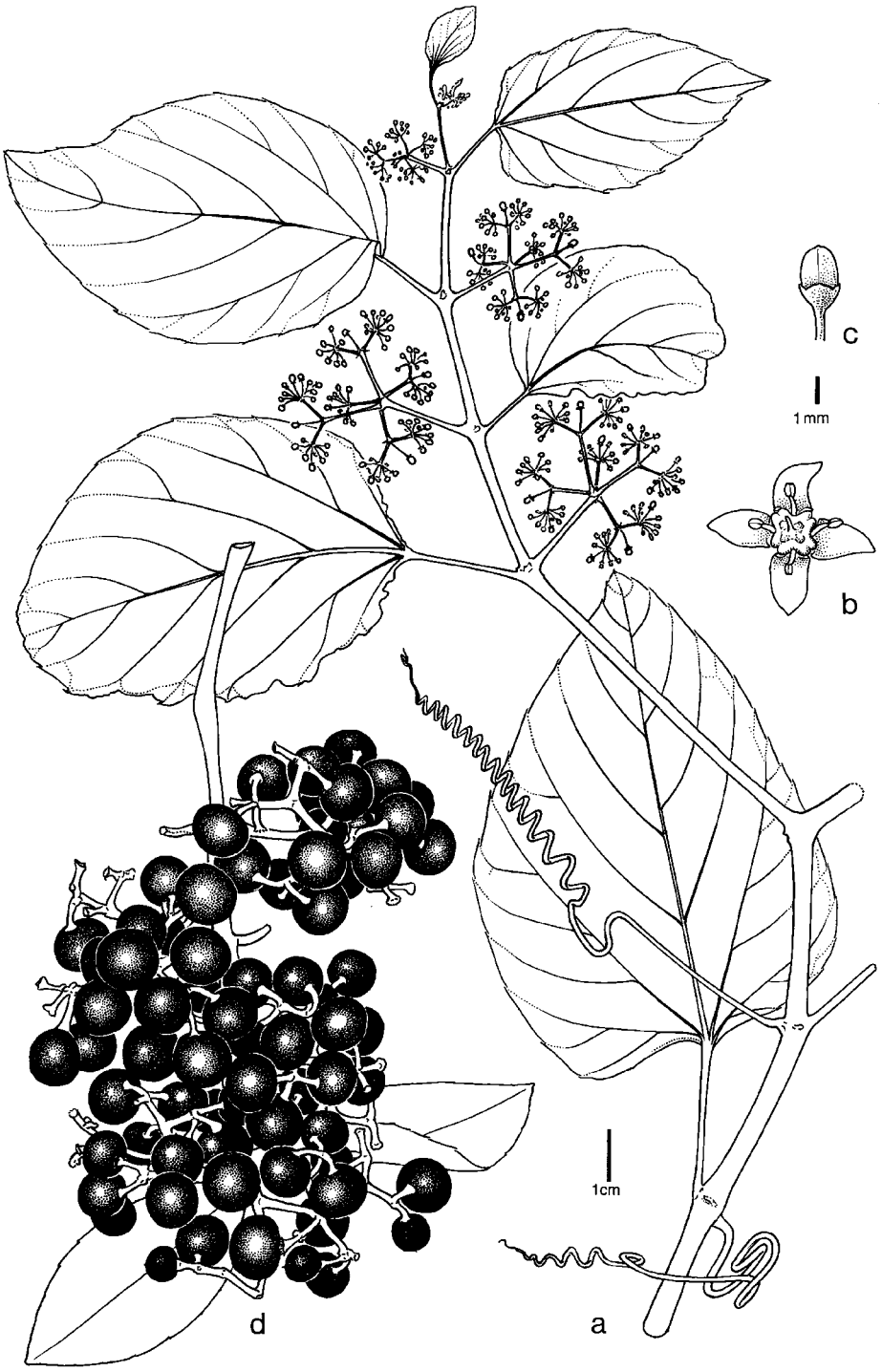
Distribution and ecology: Central America, the West Indies, and tropical South America, in moist, open areas and along rivers, from the lowlands to the Andes (Stein, 1998). In northwest Guyana, occasional in disturbed mixed forest in the interior; common in secondary shrubland along roads in the coastal region. In Moruca, flowers and fruits were seen from June to November. Flowers are probably pollinated by hummingbirds (Maas and Westra, 1993).

Use: The white latex from the leaves or fruits is dripped as a disinfectant in sore and misty eyes ('film on eye'). This treatment must be quite painful, as the latex burns when it comes in contact with the skin. This species is a renowned medicine to treat complaints of the urinary tracts. When men have trouble with urinating, known locally as 'stoppage of water', a tea is brewed from only three leaves and drunk as a diuretic. A branch of old maid flower (*Catharanthus roseus*) may be added to this decoction as well. The tea is also given to children who have problems with bed-wetting at night. In coastal Guyana, the flowers are soaked in hot water with some 'hairs' of an immature corn cob. The infusion is taken to relieve stricture of the urinary tracts and acts as a diuretic. The entire plant is boiled and drunk for the treatment of venereal diseases (Lachman-White et al., 1992).

Several branches of fowl cock beak are boiled with equal amounts of ironweed (*Desmodium* spp.) and berige (*Sabicea aspera*) in a pint of water. A warm cup is drunk every morning to relieve stomach- and backache, general body pain, and haemorrhage. The recipe prescribes that male patients should take a decoction prepared with man ironweed, while females should use the woman ironweed (Reinders, 1993). The *Desmodium* species mentioned here are probably *D. barbatum* (the 'man' type) and *D. incanum* (the 'woman' type). When a young child has difficulties with learning to speak, it is believed that repeatedly breaking a flower bud in the child's mouth will make it talk better. The shrub serves an ornamental function as well. The bright pink flowers are used as cut flowers to decorate the house or village church during festivities. Only a few people mentioned the fruits as edible. They said the taste was similar to jiggernet (*Bellucia grossularioides*), because of the numerous seeds. Ferreyra (1970) observed that the boiled fruits and leaves were eaten in Peru. In Suriname, the Javanese population cooked the leaves as spinach (Stahel, 1944). The Surinamese Carib name for the species refers to this use as well, since 'karulu' or 'karuru' is a general name for plants eaten as 'callaloo' or spinach (e.g., *Phytolacca rivinoides* and *Amaranthus dubius*).

Economy: The species is used for subsistence purposes only.

Notes: (1) 'Macaw beak', after the curved flowers (Fanshawe, 1949); (2) 'Toucan beak', after the flowers.



20. *Cissus verticillata* a. habit; b. flower; c. flower bud; d. infructescence.

20. **Cissus verticillata** (L.) Nicholson & Jarvis **VITACEAE** **Snake vine**

Synonym: *Cissus cordifolia* L., *Cissus sicyoides* L., *Vitis sicyoides* (L.) Baker

Vernacular names: Snake vine, Snake bitters, Snake tongue (Cr).

Botanical description: Vine, with simple, reddish, spring-like tendrils, arising opposite the leaves. Stem terete to 4-angled, reddish, subglabrous, soft, and flexible, with distinctive, jointed nodes. Leaves alternate, simple, palmately veined; stipules ca. 3 mm long, caducous; petioles to 4 cm long; blades ovate to subtriangular, to 11 x 7 cm, margin more or less dentate, apex acute to obtuse, base broadly cuneate to truncate or cordate, veins reddish. Inflorescences cymose corymbs, opposite the leaves, puberulous to subglabrous; peduncle to 4 cm long; pedicels to 5 mm long. Flowers actinomorphic, glabrous; calyx cup-shaped, more or less 4-partite, ca. 1 mm long; petals 4, yellowish white, free, spreading, ca. 1.5 mm long; disc completely surrounding the ovary; stamens 4; ovary superior, 2-locular, style 1, lengthening in fruit. Fruit a berry, dark purple to black, globose to obovoid, ca. 1 cm in diam., fruit pulp transparent; seed 1, obovoid, ca. 4 mm in diam.

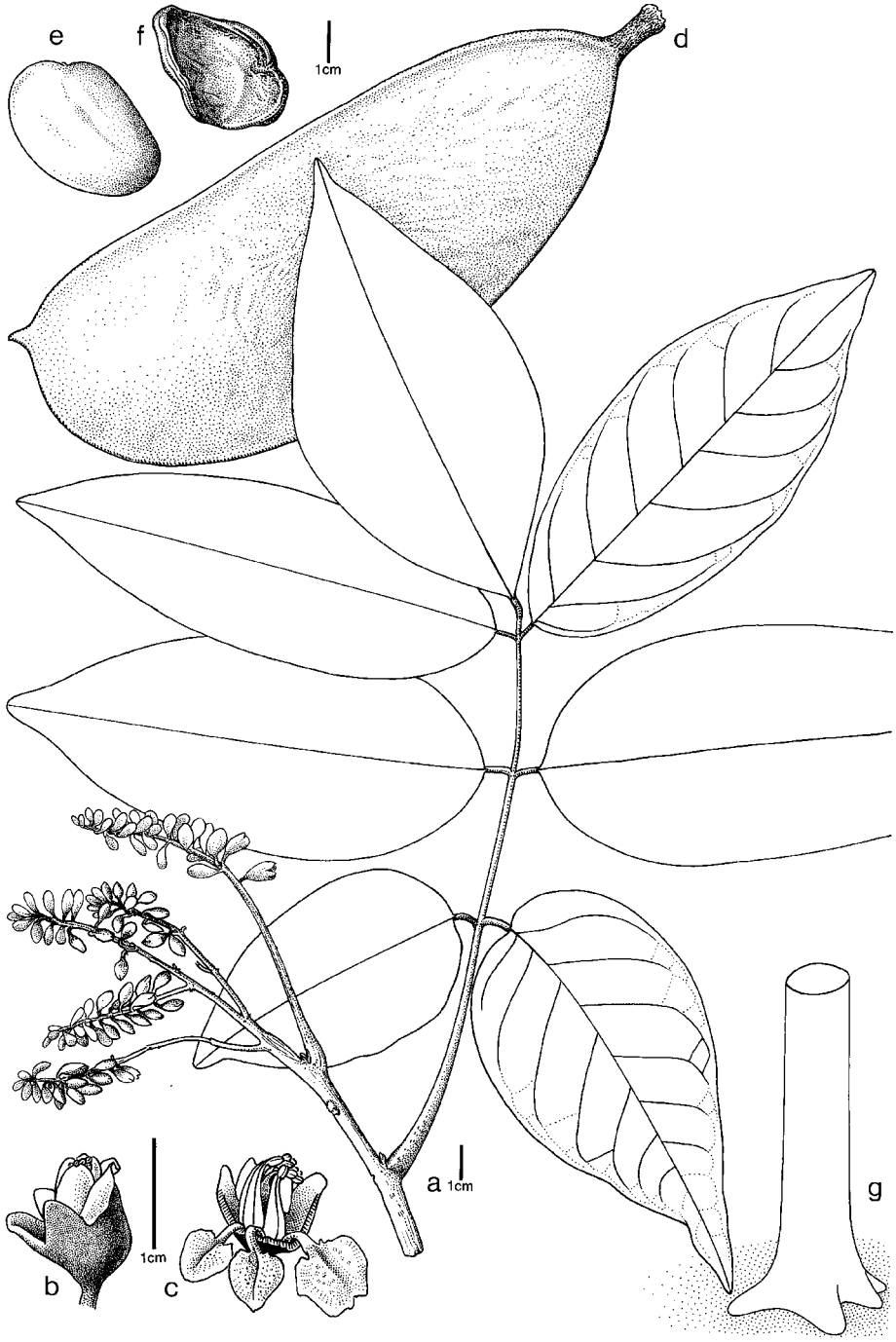
Distribution and ecology: From Mexico, the West Indies, and tropical South America to northern Argentina, common in sunny, humid, or wet places (Görts-van Rijn, 1979). In northwest Guyana, frequent in riverbank Mora forest and secondary vegetation, often creeping over the ground, sometimes spared from weeding in house yards. In Barama, flowers en fruits were seen in December. Seeds are dispersed by birds (van Roosmalen, 1985).

Use: The leaves of this vine are briefly heated over a fire until they become soft, after which they are macerated between the hands. The sap is squeezed on skin sores as a disinfectant. Leaves may also be heated, rubbed with some coconut oil and applied as a plaster to sores, itches, or swellings. A decoction from the whole vine is used to cleanse skin sores. The crushed leaves are mixed with some flour, soft grease, and breadfruit latex (*Artocarpus altilis*) in a poultice for abscesses. Although the Santa Rosa Arawaks were familiar with this plant, they did not have a vernacular name for it. Caribs did not use the species and neither had a name for it, although it was common in the Barama region.

In coastal Guyana, the crushed leaves are applied externally as a treatment for thrush, ulcers, and snakebites. The sap from the stem is taken orally to combat fever. Another treatment to cure sores is a poultice made from the crushed leaves of snake vine together with those of silk weed (*Asclepias curassavica*) and bird vine (*Phthirusa* sp.) (Lachman-White et al., 1992).

In Suriname and Venezuela, the plant is also used to break open sores and heal inflamed skin wounds (Stahel, 1944). The plant is exported from Suriname and sold in the Netherlands by traditional winti doctors for the same purpose (van ‘t Klooster, 2000). In Suriname, the tough stems are sometimes used as ‘bush rope’, a substitute for cordage. The leaves macerated in water yield a soapy lather (Görts-van Rijn, 1979). In other Amazonian countries, the crushed leaves are applied to sprained limbs. A decoction of the leaves is drunk to relieve rheumatic pains, high blood pressure, anaemia, flu, haemorrhoids, and illnesses similar to epilepsy (Duke and Vásquez, 1994).

Economy: In Guyana, the species is used for subsistence purposes only.



21. *Clathrotropis brachypetala* a. flowering branch; b. flower; c. flower with part of the calyx and two petals removed; d. fruit; e. fresh seed; f. dried seed; g. trunk base.

21. **Clathrotropis brachypetala** (Tul.) Kleinh. **LEGUMINOSAE-CAESALP. Black aromatta** var. **brachypetala**

Vernacular names: Black aromatta, Aramatta (Cr), Aromata (Ar), Munku, Muku (C), Ada karikoro (Wr).

Botanical description: Tree, to 30 m tall; trunk to 30 cm in diam. Outer bark greenish to brown, lenticellate, inner bark yellow to pink, with a strong poisonous scent, sapwood yellowish white, turning orange when exposed to air, heartwood dark brown to black. Leaves alternate, 7-foliate; stipules minute; leaflets opposite, ovate-oblong, ca. 15 x 6 cm, larger on sterile branches, leathery, glabrous, apex abruptly acuminate, base rounded to obtuse. Inflorescences terminal panicles, rusty brown tomentose; bracts small, caducous; pedicels ca. 3 mm long. Flowers zygomorphic; calyx 5-dentate, pinkish brown tomentose, leathery, lobes unequal, ca. 6 mm long; petals 5, thick, white, standard 8 x 6 mm, auriculate; stamens 10, unequal, free or nearly so; ovary superior, 1-locular, subsessile, tomentose, style 1. Pod flattened, woody, ca. 18 x 6 cm, brown to bluish black, glabrous, dehiscent, dorsal margin strongly thickened, lower margin slightly so; seeds 1-2, flattened, ca. 4 x 3 x 2 cm.

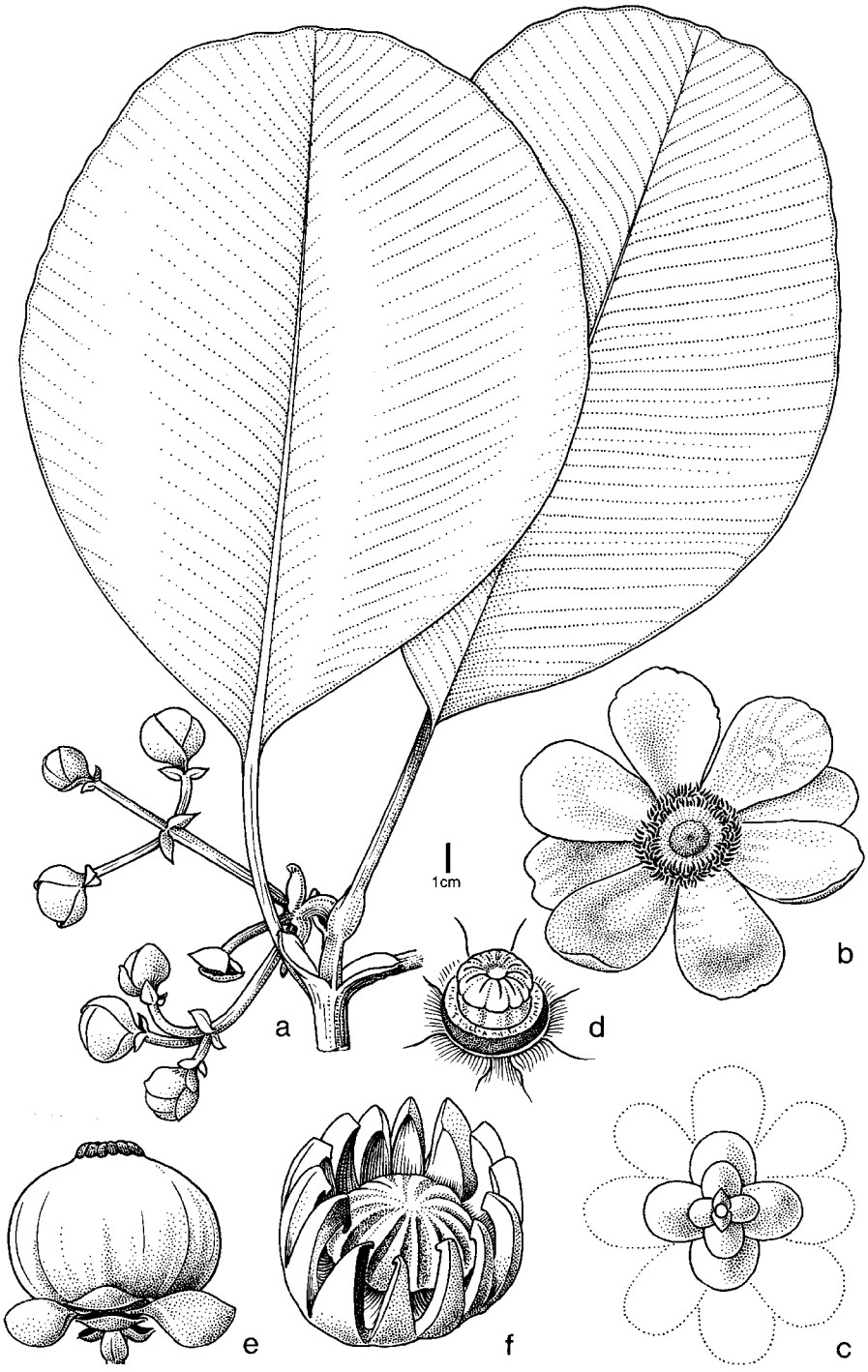
Distribution and ecology: The Guianas and Trinidad, in marsh forest along rivers and creeks. In northwest Guyana, frequent in riverbank Mora forest, occasional in mixed and secondary forests and quackal swamp. Flowering and fruiting throughout the year (Amshoff, 1939). Flowers are pollinated by hummingbirds (Snow and Snow, 1972).

Use: The bark and leaves of the black aromatta, whose pungent smell causes an immediate headache, are said to be more poisonous than those of the white aromatta (*Alexa imperatricis*). The inner bark is scraped and applied as a poultice on persistent 'life sores' or 'bush yaws'. The poison is said to kill the *leishmaniasis* parasite that causes these sores. A decoction from the bark scrapings is used to cleanse the sores. The sap squeezed from bark scrapings is mixed with coconut oil and rubbed on abscesses, swellings, or other painful parts of the body. Some of the juicy scrapings are tied on the hurting spot with a piece of cloth. The poultice must be refreshed daily until the swelling has gone down. The treatment does not work on the bumps caused by 'mosquito worms' (bot fly larvae or *myasis*). A decoction of the bark is used externally to get rid of lice, fleas, and ticks (Polak, 1992).

When a person is bitten by an aimaralli snake (water coral snake or water labaria, *Helicops angulata*), the sap from the bark is drunk in very small doses. The treatment is dangerous and the patient is likely to faint, but it is said to be very effective. It can only be taken when somebody is bitten by this particular snake, because the aimaralli venom counteracts the poison of the aromatta bark. People said the medicine was deadly when drunk in other occasions, but other informants knew that a spoonful of bark sap diluted in water was also drunk by patients bitten by the labaria snake (*Bothrops asper*). Polak (1992) noted that the bark infusion was used externally to treat insect and scorpion bites. Fanshawe (1948) reported the use of black aromatta bark as a fish poison in the North-West District, but this practise was unknown in the study area.

A day after cutting an aromatta trunk with a cutlass, the slash is filled with a transparent 'jelly', which is rubbed on the skin to cure itches and pain. The hands should be washed afterwards to avoid poisoning. In the interior, aromatta wood is occasionally used for house posts and canoes. It is sawn into boards in local sawmills. The smell fades after processing the wood. Aromatta is never used as firewood (only when it is rotten), since the smoke has an unpleasant smell.

Economy: The wood is a minor commercial timber (Polak, 1992). Other aromatta products are used for subsistence only.



22. *Clusia grandiflora* a. flowering branch; b. male flower, top view; c. male flower, seen from below; d. centre of female flower, showing styles and staminodial ring; e. young fruit; f. dehiscent fruit.

22. **Clusia grandiflora** Splitg. **GUTTIFERAE** **Kufa**

Vernacular names: Cooper, Kupa, White kufa, Big leaf kufa, Mamey kufa, Chocolate milk kufa (Cr), Kufa, Kofa (Ar), Kuwapo-u (C), Dabahi (Wr).

Botanical description: Hemi-epiphytic shrub, to 7 m high, sometimes terrestrial. Latex thick, whitish yellow to orange brown. Aerial roots sometimes nearly strangling its host, to 30 m long and 12 cm in diam., flexible when young, woody when mature, cortex pinkish to red-brown, lenticellate, warty. Leaves opposite, decussate, fleshy; petiole ca. 6 cm long, base widened into a v-shaped structure; blades stiff, leathery, orbicular to obovate, ca. 25 x 16 cm, apex rounded, base acute. Inflorescences terminal cymes, branched in 3 equal, 1-flowered parts, mostly 1 or 2 male and 1 female flower per raceme; bracts and bracteoles boat-shaped, ca. 15 mm long. Flowers actinomorphic, dioecious, at anthesis ca. 13 cm in diam., sweet-scented; sepals 6, white with pink margins, orbicular, the lowest pair ca. 2 x 2.5 cm, the two inner pairs 5 x 4.5 cm; petals 8, obovate-oblong, to 6 x 4 cm, white with pink towards the base, quickly turning brown after falling. Male flowers: corona white, to 2 cm high; stamens numerous; staminodes forming a central disc-like, yellow, viscid body. Female flowers insufficiently known; petals persistent in fruit; ovary superior, 10-15-locular, styles ca. 15, green, forming a disc of ca. 2 mm in diam., surrounded by a resin-secreting, staminodial ring. Fruit a capsule, greenish white, fleshy, globose, ca. 12 cm in diam., apex with radiate disc of persistent stigmas, valves thick, woody; seeds numerous, ovoid, aril bright orange, sticky.

Distribution and ecology: Southern Venezuela, Guyana, and Suriname. In northwest Guyana common, but patchily distributed in mixed forest, less frequent in Mora forest and brackish coastal wetlands, occasionally as shrub in secondary forest on white sand. Flowering and fruiting throughout the year. Flowers are pollinated by bees; seeds are mainly dispersed by birds, rarely by monkeys and ants (van Roosmalen, 1985; Bittrich and Amaral, 1997).

Use: The woody aerial roots are employed in the furniture industry as frames for chairs, benches, and tables. The split aerial roots of nibi (*Heteropsis flexuosa*)[1] are woven around these frames, in rattan-like designs. Kufa is the general name for several *Clusia* species. The black or small leaf kufa (*C. palmicida*) is commercially harvested as well. This species has smaller flowers and fruits and darker aerial roots that are more brittle and thus of somewhat lesser quality than those of *C. grandiflora*. Kufa roots can be harvested without killing the plant, but extractors need to climb high up in the tree crowns to cut the roots from the base of the epiphyte. The roots are beaten with a stick until the warty cortex comes off. The woody cores are transported to the market, but cannot be stored long, since they are susceptible to weevil and powder-post beetle attacks.

A small furniture industry exists around Mabaruma and extraction is planned in the Iwokrama Reserve, but the main area for commercial harvesting and processing of kufa is the Pomeroon. Here the raw material is harvested by Amerindians and cheap furniture is made by craftsmen in small workshops along the river. Some products are sold locally, but most is transported to the capital. Middlemen at the Charity market buy the kufa roots in pieces of ca. 4 m for US$ 0.14-0.35, depending on the diameter and the quality. Split, twisted or too thin roots are rejected. The roots are transported to Georgetown, where the more elaborate furniture is made in large factories[2]. The majority of the furniture is exported to the Caribbean islands; only 30% is sold on the national market.

Hoffman (1997) regarded the ecological sustainability of nibi and kufa harvesting as promising, as plants occur in relatively high abundance, people harvest fewer roots than they leave behind, and there is a year-round availability. However, uncontrolled extraction has caused a scarcity of mature roots around several Pomeroon villages. The epiphytes are still present, but only with young or unsuitable roots. The low price the extractors receive for their material does not always cover the hard work and long travel to the harvesting sites. As it takes decades before the epiphytes have settled in the canopy, nibi and kufa roots are only found in primary forest. The maintenance of this forest is thus essential for the future supply of these products. Unfortunately, most primary forest along the

Pomeroon has been designated as timber concessions. Since host trees could be worth more in aerial roots over the years than once by timber, they should be spared from logging. Extractors must also be careful not to destroy young roots.

Liana Cane Interiors, one of the major furniture producers in Guyana, is willing to cooperate in the design of an adequate management plan for nibi and kufa roots. To prevent the harvesting of immature roots, the company pays a higher price for large kufa roots than for small ones. In 1998, a workshop was organised for local extractors with the help of Conservation International, during which the possibilities for sustainable extraction plans were discussed. Although no studies were done on growth rates of kufa roots, rotation periods of five years were suggested to ensure sufficient regrowth (F. Alfonso, pers. comm.).

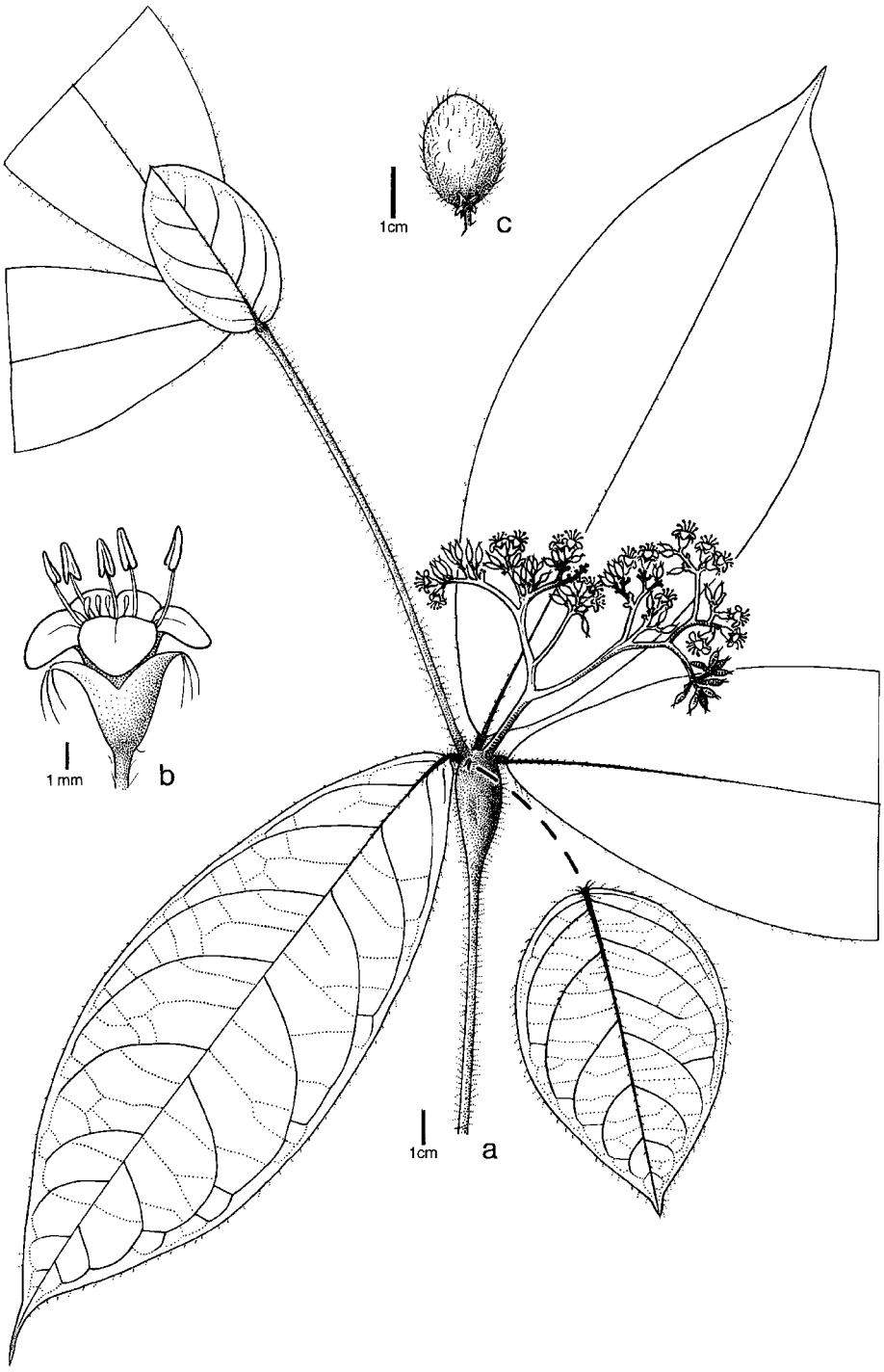
Except for furniture frames, kufa roots are also used in other craftwork. Picnic baskets with kufa frames and coarse trays plaited from split kufa roots are sold at the Charity market. Amerindians in the interior hardly ever buy or make furniture for their personal use. In remote Carib villages, kufa roots are used to make the traditional 'tondoli' basket. A piece of root is bent into a circle by binding the two ends together with a strip of maho bark (*Sterculia pruriens*). A loose wicker of maho is woven in the circular frame. The basket is used to store cassava bread and hung on the roof so that animals cannot get close to it. Roth (1924) described this basket as typical Arawak, but tondolis are nowadays only made and used by Caribs. Children make toy guns from hollowed out aerial roots, with a seed or small stone as ammunition. A slender stick is pushed in with force, so the root serves as a makeshift shot gun.

When a kufa root is cut off, a small amount of clear sap drips out. This sap is drunk to relieve back pain. Pliable young roots are boiled to prepare a tea for back pain and sprained limbs. Roots are boiled with karia leaves (*Stigmaphyllon sinuatum*) against malaria. A handful of the warty cortex from mature roots is chopped into pieces and boiled into a dark brown tea, drunk with milk and sugar like hot chocolate, but also taken as a remedy for back pain and impotence. Kufa roots are a common ingredient in the popular aphrodisiacs consisting of an alcoholic tonic or a concoction in water with the following ingredients: cockshun root (*Smilax schomburgkiana*), kapadula wood (*Tetracera* spp., *Pinzona* sp., *Doliocarpus* sp.), sarsparilla root (*Dioscorea trichanthera*), monkey ladder wood (*Bauhinia* spp.), granny backbone wood (*Curarea candicans*), locust bark (*Hymenaea courbaril*), and/or devildoer wood (*Strychnos* spp.). The concoction is added to milkshakes and various other dishes. It is said to protect against diseases and stimulate sexual activities.

The sticky, yellow latex serves as a plaster on 'mosquito worms' (bot fly larvae). By sealing its breathing hole, the maggot will die and can be taken out the day after. The latex does not work that well, as it remains sticky and is hard to remove. Local people believe that stepping barefoot on a kufa fruit will cause ground itch. In Colombia, the latex of other *Clusia* species is rubbed on the teeth to relieve tooth ache (Schultes and Raffauf, 1990).

Economy: The cheap furniture is sold for ca. US$ 20 per chair, while the more elaborate creations go up to US$ 700 a piece. In 1996, more than 30 Georgetown craft shops were exporting furniture, with a total value of US$ 137,120. The real export figure may be higher, as prices on invoice forms were kept low to avoid taxes. Kufa basketry is sold on regional markets only. Pieces of roots are sold at the Georgetown herbal market.

Notes: (1) See plate 6; (2) See plate 7.



23. *Cordia nodosa* a. flowering branch, with leaf removed to show ant domatium; b. flower; c. fruit.

23. **Cordia nodosa** Lam. **BORAGINACEAE** **Ants bush**

Synonym: *Cordia collococa* Aubl.

Vernacular names: Ants bush, Cat seed (Cr), Hurue reroko[1] (Ar), Aware emurutano[2], Awata epï[3] (C), Muha arau[4] (Wr).

Botanical description: Shrub or small tree, to 10 m tall. Bark strips off easily. Branches covered with stiff, brownish hairs, and with conspicuous, asymmetric cavities below each fork, inhabited by ants. Leaves in whorls of 4, heteromorphic; stipules absent; petiole ca. 3 mm long, hairy; blades elliptic, ca. 20 x 15 cm, apex acuminate, base obtuse, margin and midrib covered with few hairs. Inflorescences cymose-paniculate, loosely branched, borne at the forks of the stem, ca. 6 cm in diam., minutely brownish puberulous. Flowers actinomorphic, subsessile; calyx 5-lobed, ca. 5 mm long, lobes irregular, papery, apiculate, breaking up into fibres; corolla 5-lobed, white, tube ca. 5 mm long, lobes ca. 3 mm long; stamens 5, filaments hairy at the base; ovary superior, 4-locular, hairy, style 1, stigmas 4. Fruit a drupe, red, juicy, ovoid, to 1 x 1.7 x 0.8 cm, covered with stiff, brown hairs; pyrene 1, ovoid, ca. 15 mm long.

Distribution and ecology: Northern South America and the Amazon basin, in evergreen lowland and montane forests (Gaviria, 1997). In northwest Guyana, common as shrub in the undergrowth of mixed and secondary forest, occasional in Mora forest. In Barama, flowers were seen in December; ripe fruits were observed from September to January. Seeds are dispersed by birds and monkeys (van Roosmalen, 1985).

Use: The leaves of the ants bush are a well-known remedy against high blood pressure, used by all three indigenous groups in northwest Guyana. Some leaves are briefly heated over a fire or dried in the sun. When dry, they are boiled in water. The tea is drunk regularly to ease the pressure.

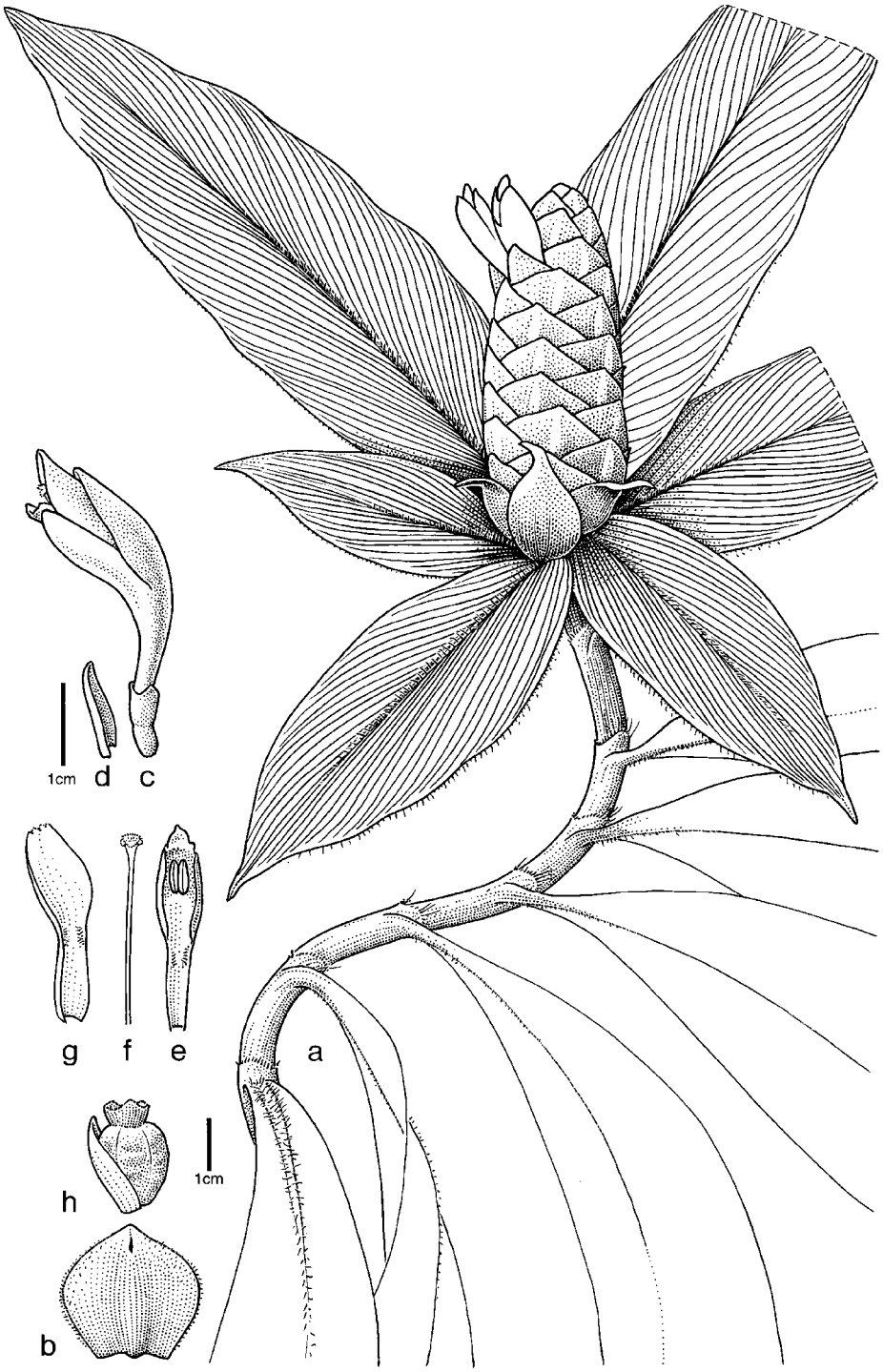
In Barama, the tea was also taken to relieve headache and back pain. Among the Warao in Warapoka, the tea was prescribed against whooping cough.

The red berries have a slimy, soursweet pulp, but only the Barama Caribs mentioned them as edible. Small red ants inhabit the stems. They are known as ‘kurbetti’ ants, whose sting is quite painful.

In French Guiana, the Wayãpi Indians grate the inner bark and boil this into a tea for lung ailments and rheumatism. The Palikur Indians bathe their dogs with a decoction of the leaves to make them more obedient (Grenand et al., 1987). In Colombia, the natives of the Río Vaupes make the leaves into a poultice and apply it to bot fly larvae (‘mosquito worms’), embedded in the flesh of humans and animals (Schultes and Raffauf, 1990). In the Amazon region, a poultice of the leaves is applied to snakebites (Duke and Vásquez, 1994).

Economy: The species is used for subsistence purposes only.

Notes: (1) ‘Lip of the white-faced monkey’ (*Pithecia pithecia*), after the swollen ant domatia in the branches (Fanshawe, 1949); (2) ‘Opossum balls’, after the shape of the fruits; (3) This name refers to the kurbetti ants (‘awata’) living on the plant; (4) In the Warao name, ‘muha’ stands for ants and ‘arau’ for tree.



24. *Costus scaber* a. flowering branch; b. bract; c. flower; d. bracteole; e. stamen; f. style; g. labellum; h. fruit with bracteole.

24. **Costus scaber** Ruiz & Pav. **COSTACEAE** **Red congo cane**

Vernacular names: Red congo cane, Wild cane, Mauby, Rivercorner congo cane (Cr), Eseyundu, Haisayundi (C).

Botanical description: Large perennial herb with rhizome, to 3 m tall. Leaves spirally arranged, simple, sheaths closed, ligule 5-15 mm long. Blades narrowly elliptic to narrowly obovate, to 32 x 11 cm, glabrous or sparsely puberulous above, densely minutely puberulous below, midrib often densely sericeous; apex acute to slightly acuminate, base acute. Inflorescences terminal, ovoid to narrowly cylindric, 4-22 cm long, to 4.5 cm wide. Bracts orange red, leathery, broadly ovate, 2-3.5 cm long and wide, glabrous to rather densely puberulous. Flowers zygomorphic; sepals 3, reddish, connate into a tube, 3-7 mm long, persistent; petals 3, basally connate, orange to yellow, 3.5-4 cm long, glabrous; labellum yellow, oblong-ovate, ca. 2.5 x 2 cm, lateral lobes rolled inward and forming a tube of 5-10 mm in diam.; stamen equalling or slightly exceeding the labellum, orange-red, yellowish at apex; ovary inferior, 3-8 mm long. Fruit a white capsule, ellipsoid to subglobose, 7-12 mm long, glabrous to densely puberulous at the apex; seeds numerous, black, aril white.

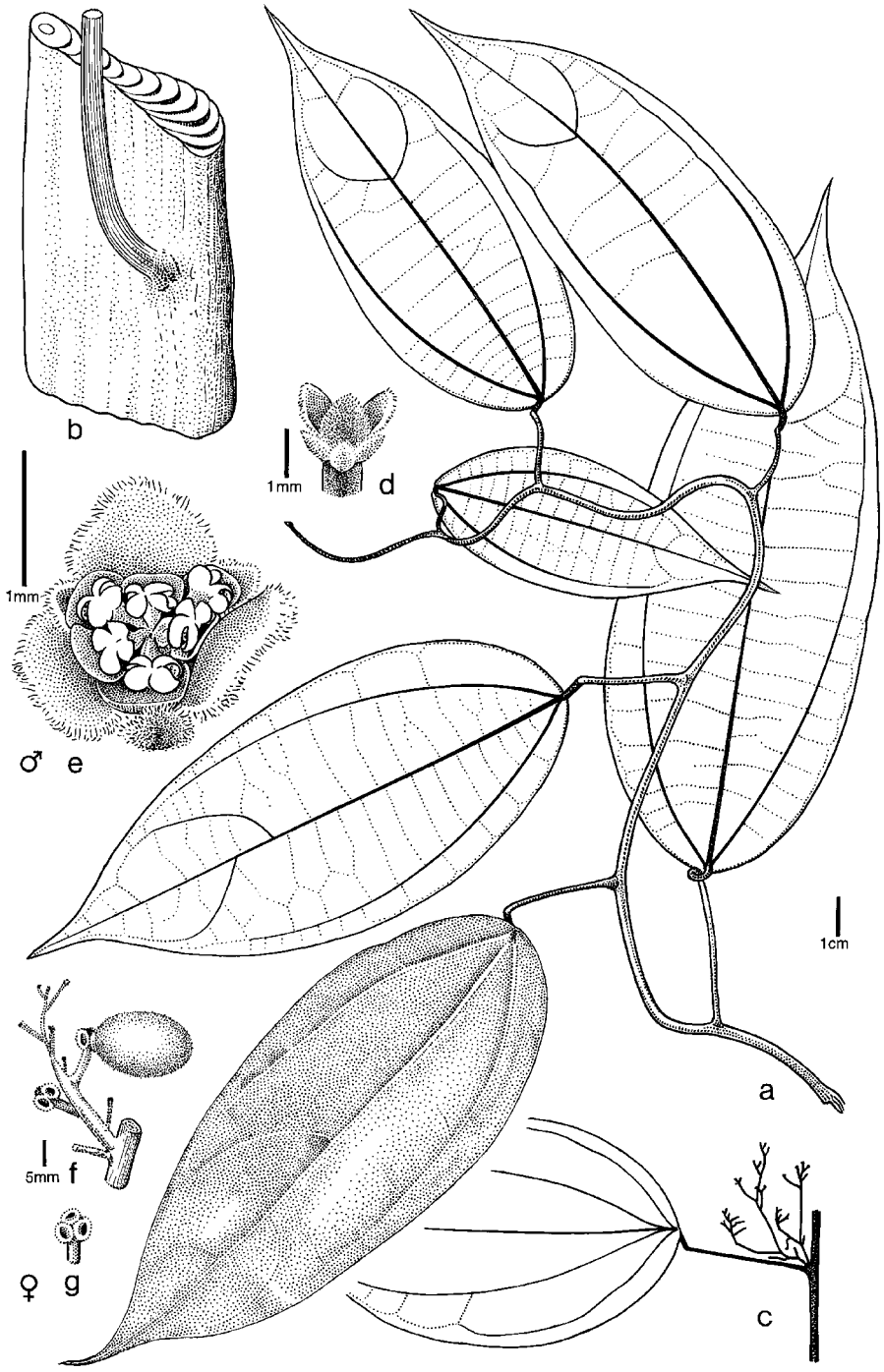
Distribution and ecology: Central America, the West Indies and tropical South America. Rather common in clearings, along forest edges, riverbanks, and streams (Maas, 1972). In northwest Guyana, frequent in pastures, secondary vegetation, abandoned fields, and newly formed riverbanks of meandering rivers. The flowers are visited by black ants, but pollinated by hummingbirds. Flowering and fruiting throughout the year.

Use: The plant is used widely as a medicine for colds. Young shoots are boiled and drunk as tea, or boiled with sugar into a syrup, of which one tablespoon is given to babies and adults. The whole stem is warmed in the fire, pounded, and squeezed to release its sap. One spoon of the sap is drunk for colds. The leaves are boiled as a tea and drunk for pneumonia and colds. Similar cold medicines are made from white congo cane (*Costus arabicus*) and old field congo cane (*C. erythrothyrsus*). The stem is stripped from its leaves, cut into pieces, boiled in two pints of water and drunk for malaria. The tea is said to 'keep the patients liver clean'.

The inflorescences often contain small amounts of slimy water with a strong ginger smell. The inflorescence is held upside down and the water is squeezed into sore eyes to ease the pain and to clear misty eyes ('film on eye'). Immature inflorescences are warmed in water and rubbed on 'outer pile'. This painful illness is locally defined as 'guts hanging down from the anus', which includes groin rupture and haemorrhoids (swollen blood vessels in the anus). A decoction of the rhizome is drunk for the same disease. The guts are said to 'go back in place' after the treatment. A tea from nine leaves is taken for back pain.

A strong alcoholic drink is made by boiling the young shoots in water, adding sugar, some black potato root (*Ipomoea batatas*), and a little yeast if needed. The concoction is drunk after fermenting for one day. The same beverage is made with the white congo cane. Fanshawe (1948) mentioned the use of a *Costus* as anti-syphilitic. Gillin (1936) saw the raw stems of *Costus* being chewed for cough along the Barama River. Both authors did not reveal the particular species used. In coastal Guyana, the stem of *C. scaber* is boiled with sorrel (*Hibiscus sabdariffa*) and toyeau (*Justicia pectoralis*), and drunk for the relief of whooping cough. A decoction of the whole plant is used to treat high blood pressure and bladder disorders (Lachman-White et al., 1992). In French Guiana, the boiled flowers are used to treat urogenital infections and gonorrhoea. The boiled stem or shoots are drunk to treat excessive vaginal discharge (Grenand et al., 1987), an ailment known in Guyana as 'passing too much white'. Many *Costus* species contain saponins, sapogenins, and diosgenins, which have weak spasmolytic, hemolytic, cardiovascular, anti-inflammatory, and oestrogenic properties. For more details about chemical contents, see Lachman-White et al. (1992) and Schultes and Raffauf (1990).

Economy: Congo cane leaves are sold in medicinal herb stalls at the Georgetown market for pneumonia and colds. The alcoholic drink is occasionally sold in the interior.



25. *Curarea candicans* a. leafy branch; b. stem; c. male inflorescence; d. male flower bud; e. male flower; f. infructescence; g. receptacle with carpophores.

25. **Curarea candicans** (Rich.) Barneby & Krukoff **MENISPERMACEAE Granny backbone**

Synonym: *Chondodendron candicans* (Rich.) Sandw.

Vernacular names: Granny backbone (white type) [1] (Cr), Tete ahabo[2], Teteabo (Ar), Awarepuya andïkïrï[3] (C).

Botanical description: Woody climber. Stem flat, to 10 x 1.5 cm. Bark brown, wood yellow, with a strong poisonous smell. Older branches black, puberulous to glabrous, younger branches greyish purple, densely tomentose; internodes 1-6 cm long. Leaves alternate, simple, 5-veined to 5-pliveined; petioles minutely tomentose, to 8 cm long, making and angle of 90 degrees with the branches, pulvinus flexed at the petiole apex; blades ovate-elliptic, to 17 x 10 cm, glabrous, dark green above, densely greyish white tomentose below, apex cuspidate, base acute to obtuse. Inflorescences axillary, paniculate racemes. Flowers unisexual, small, greenish white, plants dioecious. Male inflorescences densely greyish tomentellous, to 15 x 10 cm; pedicels ca. 8 mm long; bracts ovate, 0.5 x 0.3 mm; flower buds globose, 1 mm in diam.; sepals 6, in 2 whorls, free, the 3 outer sepals minute, the 3 inner ones large, ovate, densely tomentose outside, glabrous inside; petals 6, obovate, glabrous on both sides, in 2 whorls; stamens 6. Female inflorescences poorly known; receptacle of the female flower after anthesis bearing 3 free, depressed, drum-shaped carpophores. Fruit oblong-ovoid, 2.2 x 1.5 cm, tomentose.

Distribution and ecology: Venezuela, Guyana, and Brazil (Pará), in upland rainforests (Krukoff and Barneby, 1971) In northwest Guyana, occasional in mixed forest. Phenology unknown. Seeds are dispersed by monkeys and bats (van Roosmalen, 1985).

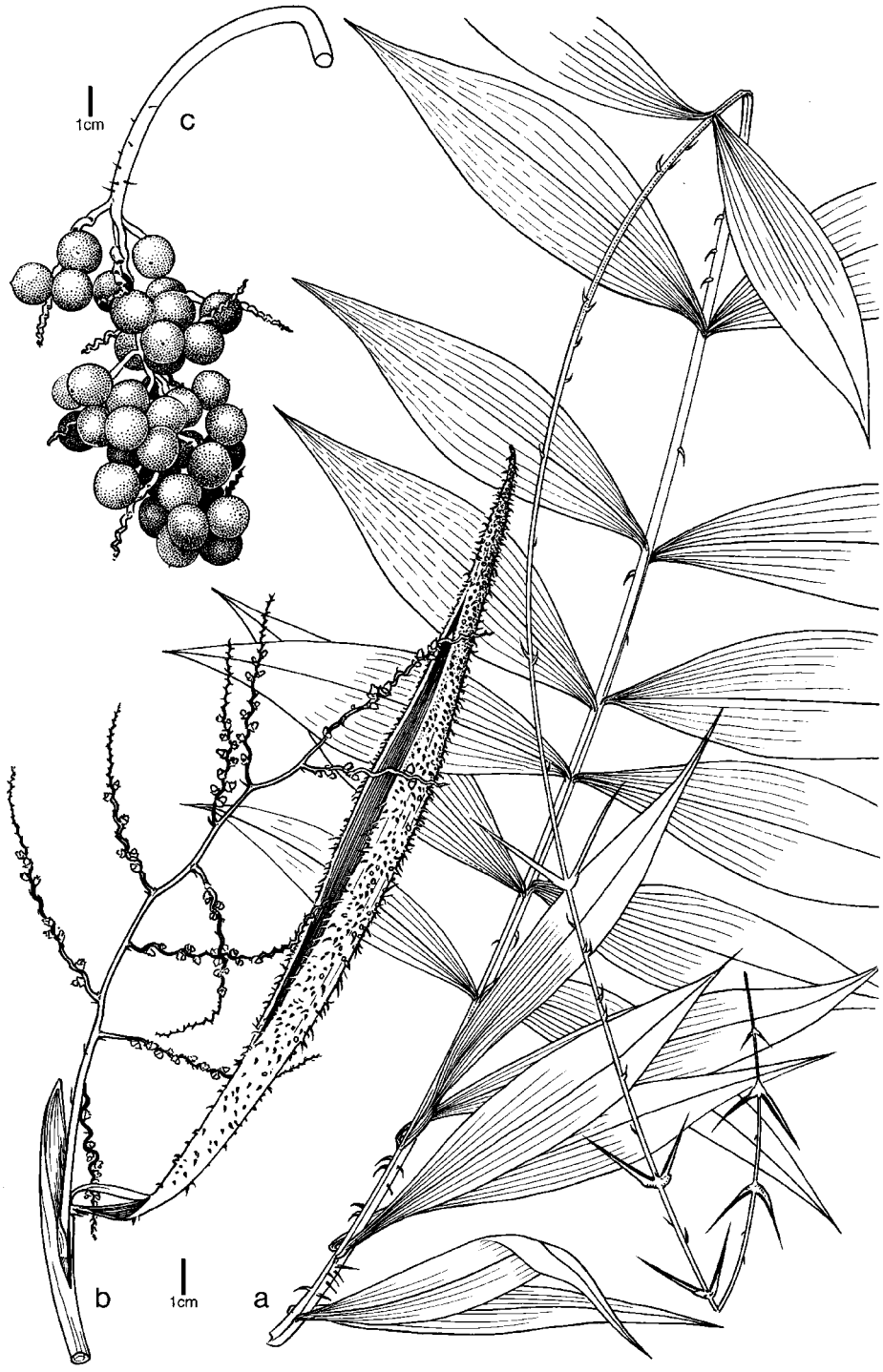
Use: The woody stem is scraped or chopped into pieces and boiled, or soaked in water or alcohol. The bitter tea or tonic is drunk daily against malaria, diabetes, skin sores, and impotence. The liquid is said to 'bitter the blood', which prevents diseases and works as a general builder. People suffering from diabetes ('sugar') or quickly developing skin sores are said to have 'sweet blood'. This condition calls for a regular intake of 'bitters', tonics or decoctions made with various bitter tasting barks, roots, and herbs (e.g., *Quassia amara*, *Aspidosperma* spp., *Scoparia dulcis*). The leaves of wild poppy (*Psychotria poeppigiana*) are boiled with granny backbone bark and fire ashes. A warm cupful should be drunk at midnight to stop menstrual bleeding.

Granny backbone is a common ingredient in aphrodisiacs consisting of an alcoholic tonic or a concoction in water with one or more of the following ingredients: cockshun root (*Smilax schomburgkiana*), kapadula wood (*Tetracera* spp., *Pinzona* sp., *Doliocarpus* sp.), sarsparilla root (*Dioscorea trichanthera*), monkey ladder wood (*Bauhinia* spp.), kufa root (*Clusia* spp.), locust bark (*Hymenaea courbaril*), and devildoer wood (*Strychnos* spp.). These builders are added to milkshakes, porridge, tea, stew, and various other dishes. They are said to protect against diseases, stimulate sexual activities, and help against a 'weak back' (impotence). Aphrodisiacs are popular in the capital, but also among coastlanders working in gold mines and logging operations in the interior. Amerindians sometimes classify these drinks as 'pork-knocker medicine', implying that they do not use the builders themselves. Nevertheless, they know exactly how to prepare the concoctions. Amerindians are often asked to collect the ingredients from the forest, since many coastlanders cannot identify the species. Young Amerindian men working as pork-knockers admitted that they tried out these drinks and told wild stories about their effects.

When Jenman collected the species in 1883 from Hosororo, local Warao told him that they used the plant as an arrow poison, comparable to the curare of the Macushi Indians (Krukoff and Moldenke, 1938). Today this practise seems to be forgotten in the North-West District. Some alkaloids have been isolated from the wood of *Curarea candicans*, but species of *Curarea* that occur outside Guyana contain much more of these chemicals. *C. tomentosa* and *C. toxifera* are essential ingredients of curare in Ecuador and Brazil (Krukoff and Barneby, 1971).

Economy: Pieces of the flat, woody stem are sold in medicinal herb stalls at Georgetown markets under the name 'granny backbone'. Confusingly, pieces of wood from *Serjania paucidentata* and *Bauhinia guianensis* are offered for sale under the same name. Ready-made aphrodisiacs of the above-mentioned species are sold in litre bottles for US$ 3.50. Some of these herb stalls stay open for 24 hours a day.

Notes: (1) The red granny backbone is a *Machaerium* species, a woody climber with a similar flat stem and red latex; (2) 'Spine of an old woman' (Bennet, 1994); (3) 'Water dog tail', after the flat stem resembling the tail of the river otter (*Pteronura brasiliensis*).



26. *Desmoncus polyacanthos* a. leaf; b. inflorescence; c. infructescence.

26. **Desmoncus polyacanthos** Mart. **PALMAE** **Kamwari**

Vernacular names: Hold-me-back, Small leaf kamwari (Cr), Kamwari, Weheyu (Ar), Kamuwari, Asitaremu (C).

Botanical description: Climbing palm, to 15 m long, highly variable in size and armature, depending on the available amount of light and water: in light and wet places tall and heavily armed, in shade and dry places much smaller and less armed; trunk to 2 cm in diam., completely covered with leaf sheaths. Leaves 17-26, usually distichous, sheaths ca. 33 cm long, closed, with a prominent ocrea, densely covered with 2 cm long, black or brown, curved spines with white, bulbous base; petiole ca. 5 cm long, petiole, rachis and cirrus with short recurved spines, especially on lower surface; rachis to 1 m long, cirrus whip ca. 35 cm long, with 4-6 pairs of slender hooks to 5 cm long; pinnae 4-14 per side, narrowly elliptic to elliptic, ca. 24 x 4 cm. Inflorescences interfoliar; peduncle ca. 50 cm long, mostly included within the subtending leaf sheath; outer spathe ca. 18 cm long, inner spathe ca. 23 cm long, covered with small, brown, recurved spines, rachis ca. 12 cm long, rachillae 5-17, to 12 cm long. Male flowers ca. 5 mm long; sepals dentate, 1 mm long; petals irregularly obovate, 5 mm long, apiculate; stamens 6, filaments connate. Female flowers ca. 4 mm long; calyx cupular, to 1.5 mm long; corolla cupular, 2.5 mm long. Fruit turning yellow, orange, and finally red at complete maturity, obovoid, ca. 1.6 x 1.3 cm, narrowed at base, cupule 6 mm in diam.; seed 1, black, globose.

Distribution and ecology: Tropical South America and Trinidad, widespread in lowland rainforest, riverbanks, forest gaps, secondary forest, and forest margins. In northwest Guyana, frequent in Mora and secondary forest, and shrubby vegetation on white sand (Moruca). Absent from the coastal swamps. In Suriname, flowering from October to November; fruiting from March to July (Wessels Boer, 1965). Henderson (1995) noted that plants could grow without flowering for several years, after which flowers and fruits developed together at the same time. In Barama, ripe fruits were observed in June-July and November. Pollination is probably done by beetles; seeds are dispersed by birds (Henderson, 1995).

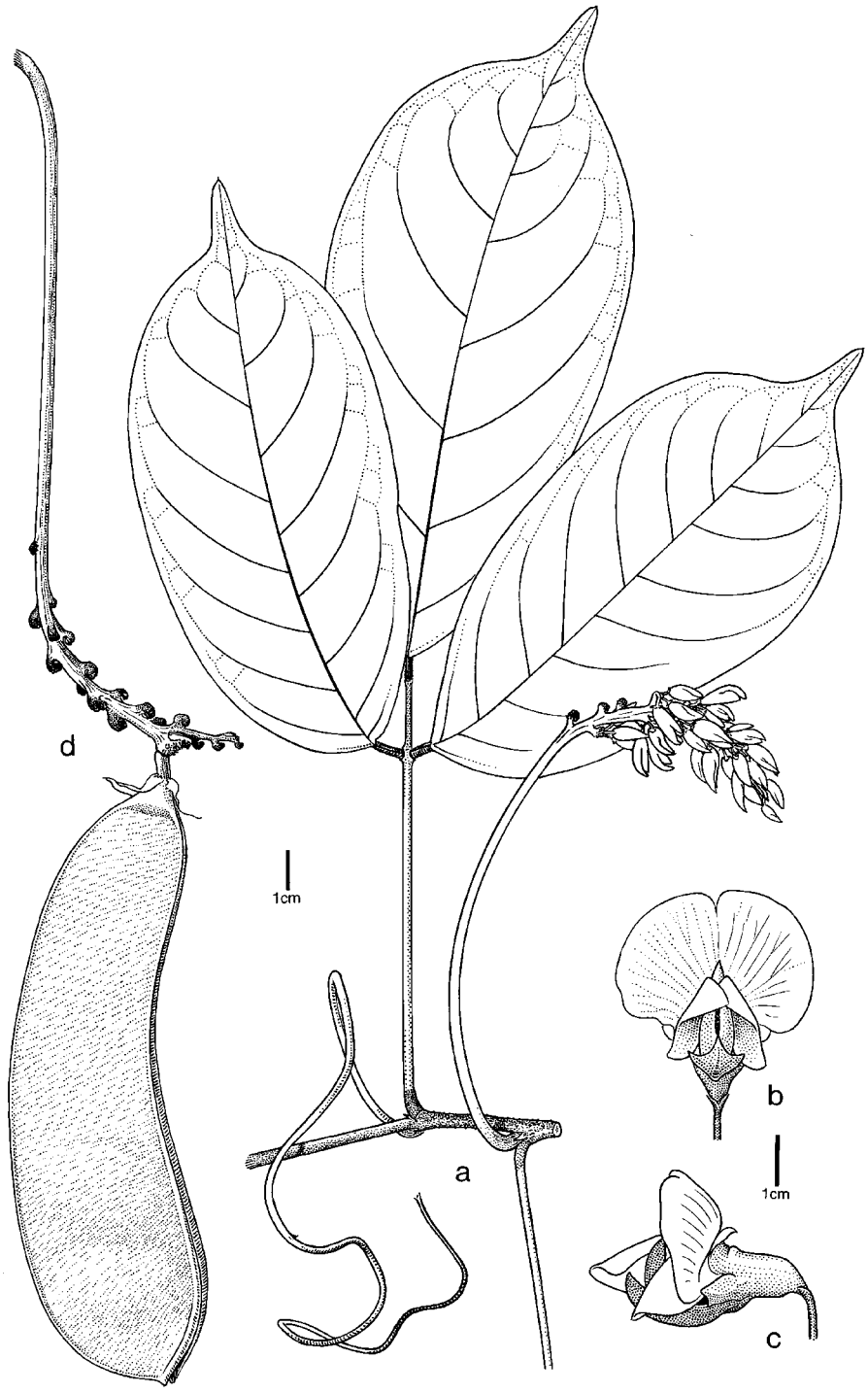
Use: The core of the stem base yields a sturdy, elastic cane, which is split and used as handicraft fibre. Kamwari strips are mainly used to give more strength to fan handles and basket edges. The rim of a traditional square basket standing on four feet, known locally as matutu (C), haba (Ar), or bihi (Wr), is lined with kamwari fibre. The stems are also used as general binding material.

In the interior, both the stripped cane and the spiny stem base are used by primary schoolteachers as a whip. Many elder people recalled they had been beaten with a kamwari cane in school, but pupils told that the kamwari cane is still in practise today. The ripe fruits of the kamwari are occasionally eaten by children.

Fanshawe (1948) thought that *Desmoncus* could serve as a substitute for the Southeast Asian rattan (*Calamus* spp.), but the cane is less smooth and more brittle. He mentioned that kamwari was used in other parts of Guyana for strong, durable baskets and the framework of cassava strainers, but this practise was not observed in northwest Guyana.

The larger and more vigorous *Desmoncus orthoacanthos* (big kamwari) is found abundantly in the coastal swamps of the North-West District. It is more or less used for the same purposes.

Economy: Kamwari is not a major commercial craft fibre in Guyana. Both species are predominantly used for subsistence, although baskets with kamwari rims are occasionally sold in Amerindian communities.



27. *Dioclea scabra* var. *scabra* a. flowering branch; b. flower, front view; c. flower, side view; d. infructescence.

27. **Dioclea scabra** (Rich.) Maxwell var. **scabra** **LEGUMINOSAE-PAPIL.** **Blood rope**

Vernacular names: Blood rope[1] (Cr), Tïmenureng (C).

Botanical description: Liana, to 30 m tall; stem to 12 cm in diam., with elliptic, raised lenticels and thick, red exudate. Branches glabrous, lenticellate, twining, with long tendrils. Leaves alternate, 3-foliate, rachis ca. 2 cm long; stipules acute, to 3 mm long, persistent; petiole to 10 cm long; leaflets leathery, elliptic, ca. 12 x 7 cm, glabrous, brownish below, apex acuminate, base rounded. Inflorescences axillary, rusty-brown puberulous, becoming glabrous, rachis strongly angular, ca. 35 cm long, with swollen sections inhabited by ants; bracts ovate, ca. 2 mm long. Flowers zygomorphic, ca. 2.5 cm long; calyx rusty-brown puberulous, 4-lobed, lobes strongly curved backwards, ca. 10 x 5 mm; corolla clawed, purple, whitish inside, standard reflexed, broadly oblong to suborbiculate, ca. 20 mm long, wings obliquely oblong to ovate, ca. 15 x 10 mm long, keel ca. 10 mm long; stamens 10, partly connate; ovary superior, style 1. Pod flat, dry, brown, obovate, ca. 17 x 3 cm, twisting at dehiscence; seeds 2, flat, soft, subcircular, ca. 2.5 cm in diam.

Distribution and ecology: Venezuela, the Guianas, and Brazil. In northwest Guyana, common in Mora and mixed forest along the Barama River. Not observed in the coastal region. Flowers and fruits were seen in Barama from June to January.

Use: The thick exudate is used as paint. It is rubbed on paddles, cricket balls, and other wooden utensils to give them a red colour.

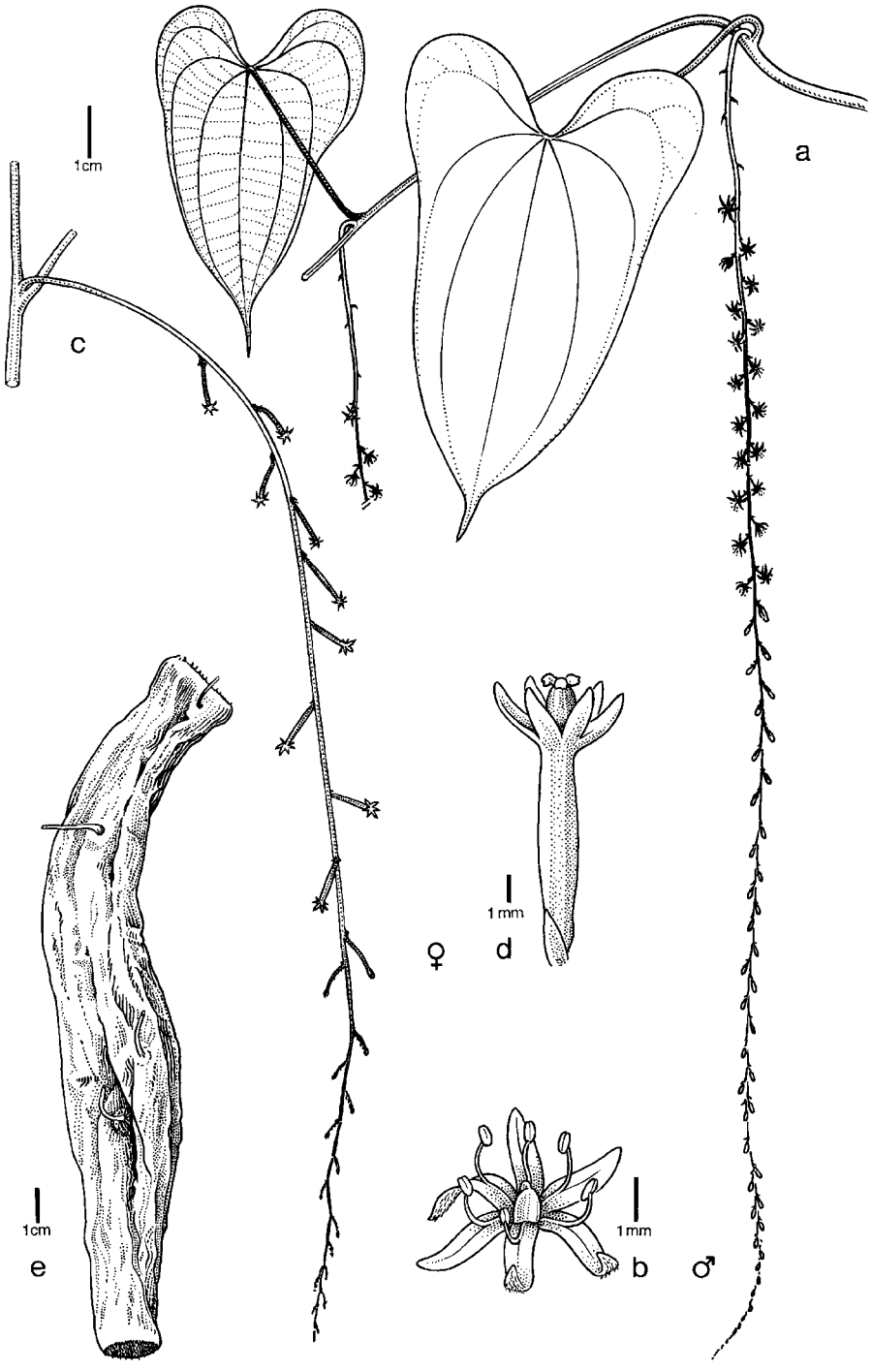
The red exudate is also used medicinally. A large stem is cut and the exudate is collected in a spoon, diluted with some water and drunk for stomach problems and diarrhoea. One or two spoons a day are given to children suffering from ‘gastro’, a local term for dysentery and severe, bloody diarrhoea. Gastro was mentioned as an important cause of child mortality in Barama, especially during prolongued periods of drought, when clean drinking water was scarce.

The latex is also rubbed on sores in and around the mouth, in the same way as it is done with the red sap of dalli (*Virola* spp., *Iryanthera* spp.), shiriballi (*Andira surinamensis*), and corkwood (*Pterocarpus officinalis*). The astringent sap is said to disinfect and dry the mouth sores.

In Barama, large amounts of the purple flowers can be found on the forest floor. Caribs believe that if a pregnant woman plays with or blows on these flowers, she will get a baby girl. When she desires a boy child, she should play with the pink flowers of *Schlegelia violacea*.

Economy: The species is used for subsistence only.

Notes: (1) The Creole name is a translation of the Carib name, as ‘tïme nure’ means ‘bloody’ (Hoff, 1968).



28. *Dioscorea trichanthera* a. branch with male inflorescences; b. male flower; c. female inflorescence; d. female flower; e. root tuber.

28. **Dioscorea trichanthera** Gleason **DIOSCOREACEAE** **Sarsparilla**

Vernacular names: Sarsparilla, Grand sarsaparilla, Wild yam (Cr).

Botanical description: Woody climber. Tuberous rhizome spongy, soft, cortex dark brown, inner tissue dark red. Stem angular, glabrous, twining to the left. Leaves alternate, simple, cordate, palmately veined; stipules absent; petiole purple, flattened, to 10 cm long, articulate at the base; blades membranous, broadly ovate, ca. 13 x 8 cm, young leaves hirsute and bright purple below, older leaves subglabrous, green, with purple veins, apex acuminate, basal lobes rounded. Inflorescences axillary spikes to 20 cm long; plants dioecious. Flowers actinomorphic, green to yellow, unisexual. Male flowers: tepals 6, basally connate into a very short tube, lobes spreading, ca. 3 mm long, slightly pilose on the outside; stamens 6, turned inwards, pistillode columnar, 3-fid. Female flowers: tepals 6, connate into a tube ca. 6 mm long, lobes ca. 2 mm long; ovary inferior, 3-locular, style 1, stigmas 3. Fruit a 3-winged, loculicidal capsule, ca. 3.5 x 2 cm; seeds winged all around.

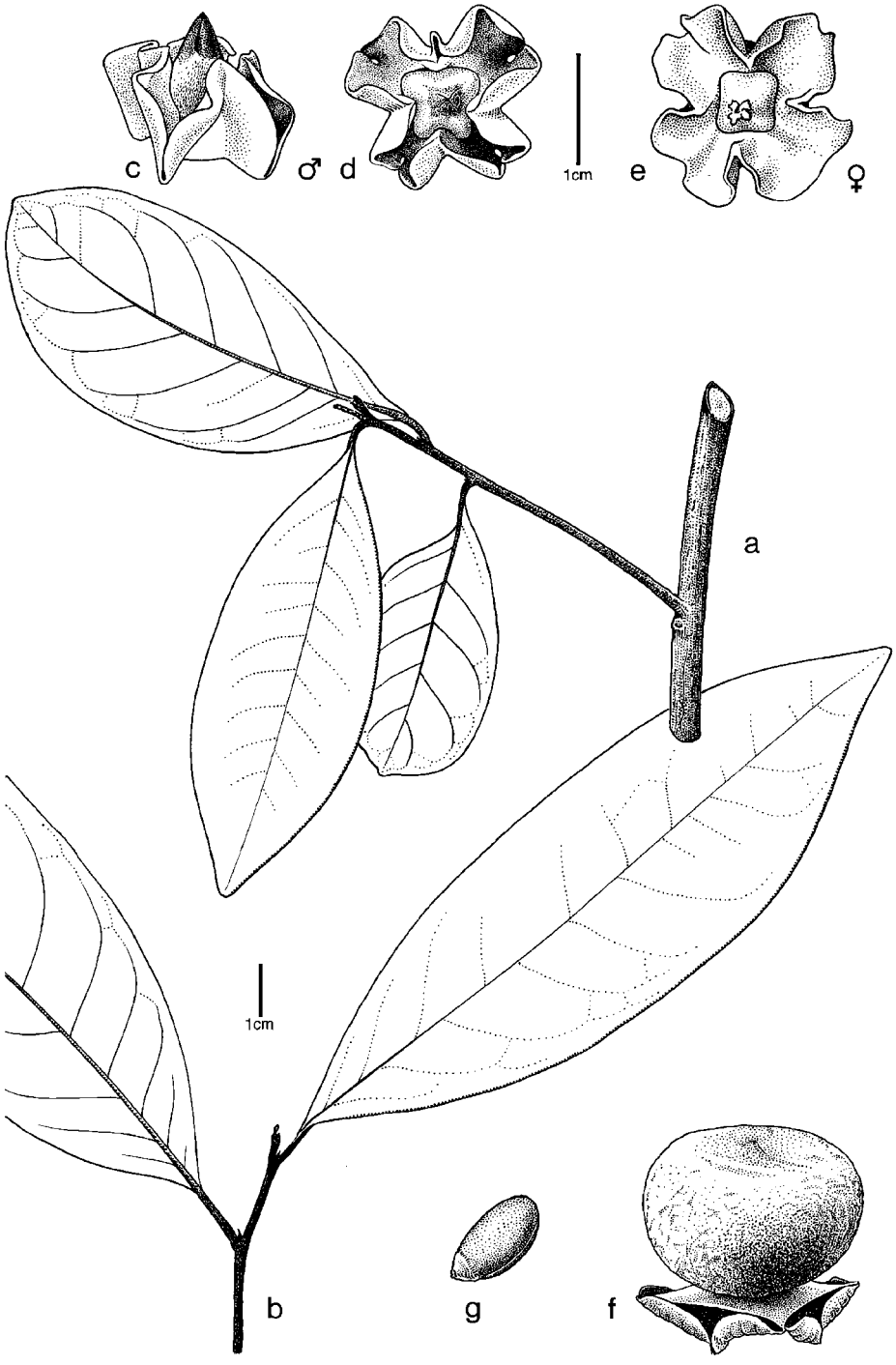
Distribution and ecology: Venezuelan Guayana, Guyana, and Brazil, in lowland forest, disturbed forest, and granite outcrops (Téllez, 1998). In northwest Guyana, rare in mixed and secondary forest. Phenology unknown. The seeds are wind-dispersed.

Use: The spongy, tuberous rhizome of sarsparilla is famous for its aphrodisiac properties. The 'root' is first dried in the sun, after which the cortex is scraped off and the tuber is sliced into flakes and boiled. The bright red tea is drunk just as beverage, but more often to cure a 'weak back' (male impotence). Sarsparilla tubers are a common ingredient in aphrodisiacs, made of a concoction of one or more of the following ingredients: cockshun root (*Smilax schomburgkiana*), kapadula wood (*Tetracera* spp., *Pinzona* sp., *Doliocarpus* sp.), granny backbone wood (*Curarea candicans*), monkey ladder wood (*Bauhinia* spp.), kufa root (*Clusia* spp.), locust bark (*Hymenaea courbaril*), and devildoer wood (*Strychnos* spp.). The concoction is boiled for an hour. The ingredients may also be soaked in a bottle of rum or high wine and drunk as an alcoholic tonic. Aphrodisiacs are added to milkshakes, porridge, stew, or other dishes. They are said to protect against diseases and stimulate sexual activities.

Aphrodisiacs are popular in the capital, but also among coastlanders working in gold mines and logging operations in the interior. Amerindians often classify the drinks as 'pork-knocker medicine' or 'black man's tea', implying that they do not use the builders themselves. Nevertheless, they know exactly how to prepare them and are often asked to collect the ingredients from the forest, as coastlanders cannot identify the species themselves. Young Amerindian men working as pork-knockers admitted they tried out these drinks and told wild stories about their effects. The tuber of the tree sarsparilla (*Philodendron fragrantissimum*), a large epiphyte, is used similarly. The plant is often confused with *D. trichanthera*. Outside Guyana, the name 'sarsaparilla' is used for several species of *Smilax*, of which the rhizomes are commercially processed into herbal extracts, used for a variety of illnesses.

Steroid hormones are the most valuable chemical compounds of plant origin in the pharmaceutical industry. Cortisones and human sex hormones are derived from diosgenins, found in several wild *Dioscorea* species. Most of the commercial extraction takes place in Central America and Asia (Rehm and Espig, 1991). *D. trichanthera* is not commercially exploited on such a large scale, but its roots are likely to contain compounds that mimic the action of human hormones.

Economy: Sarsparilla tubers are sold on medicinal herb stalls at the Georgetown market. Most of them come from the Essequibo or Demerara forests. Ready-made aphrodisiacs are sold for US$ 3.50 per litre bottle. Some of these stalls are open for 24 hours a day.



29. *Diospyros ierensis* a. young leaves; b. adult leaves; c. male flower, side view; d. male flower, top view; e. female flower; f. fruit; g. seed.

29. **Diospyros ierensis** Britton **EBENACEAE** **Barrabarra**

Vernacular names: Barrabarra, Graterwood (Cr), Barabara (Ar), Simyarï epï[1], Tarara (C).

Botanical description: Tree, to 25 m tall; trunk to 20 cm in diam. Outer bark grey, with black and white patches and fine, sharply fissured, inner bark yellow, wood yellowish white, turning darker when exposed to air. Branches glabrous, young branches ribbed and black. Leaves alternate, simply, leathery; stipules absent; petiole stout, ca. 12 mm long; blades yellowish green, elliptic, ca. 13 x 7 cm, glabrous, apex rounded to bluntly acuminate, base acute, often somewhat unequal. Flowers solitary, axillary, pedicellate, unisexual, plant dioecious; calyx green, lobes 4, folded, ovate-orbicular, ca. 10 mm long, persistent in fruit; corolla yellowish green, tubular, lobes 4 or 5, conspicuously folded, obtuse, spreading or reflexed in open flower. Male flowers: stamens 4, opposite the petals. Female flowers: staminodes present; ovary superior, sessile, 2-16-locular, styles and stigmas 2-8. Fruit a berry, greenish yellow, subglobose, smooth, ca. 4.5 cm diam., subtended by persistent calyx ca. 2.5 cm in diam., lobes nearly flat, wrinkled, epicarp leathery, mesocarp black; seed 1 per locule, brown, convex, ca. 2 x 1 cm, flattened on one side.

Distribution and ecology: Venezuela, the Guianas, Trinidad, and Brazil, in riparian lowland forest and lower montane forests (Sothers and Berry, 1998). In northwest Guyana, occasional in mixed forest. Flowers were observed in January and fruits were seen from September to October. Seeds are dispersed endozoochorously (van Roosmalen, 1985), probably by tapirs.

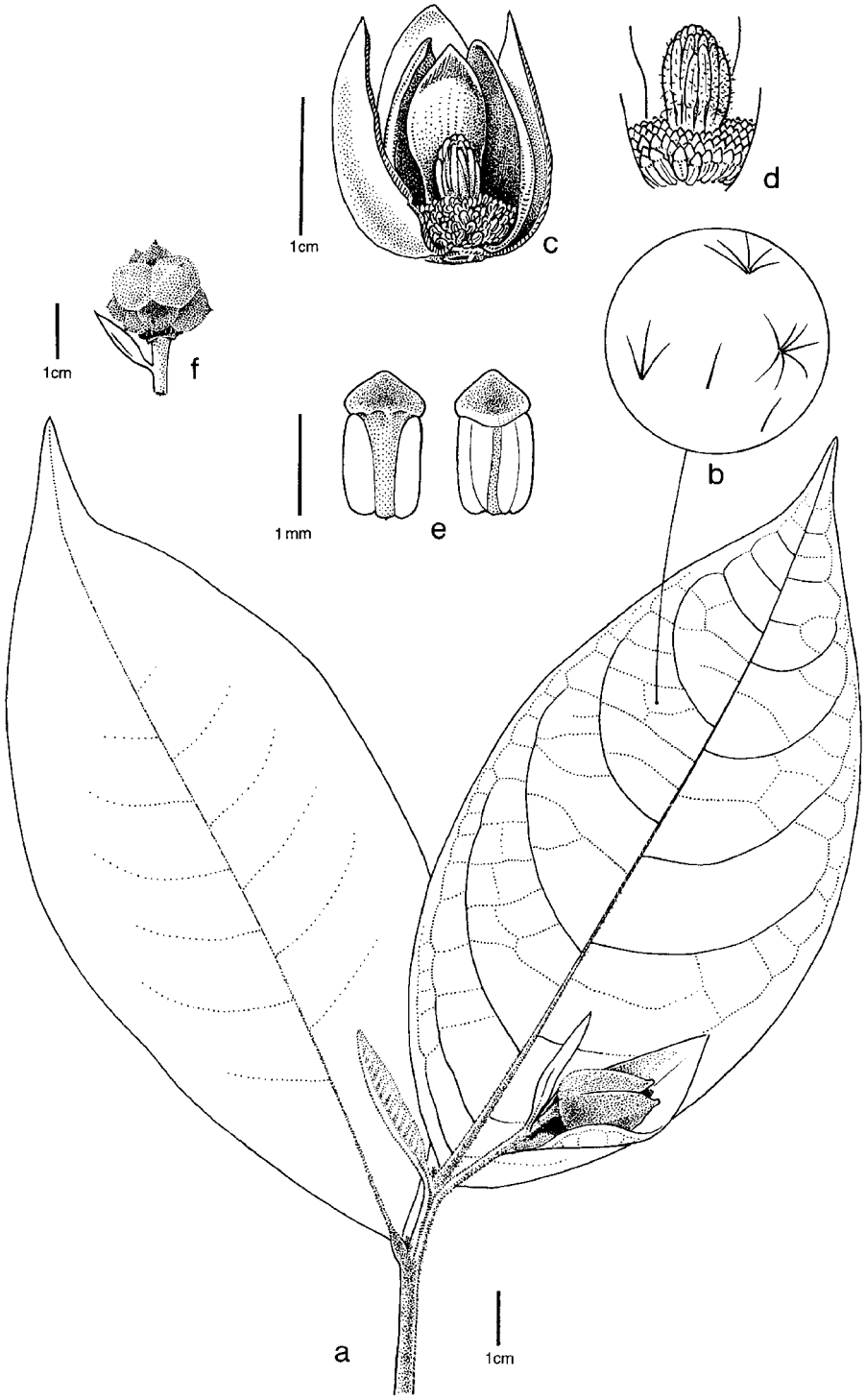
Use: Only a limited number of people mentioned the fruits as edible. The leathery fruit skin is broken open and the sweet, black pulp around the seeds is eaten. Tapirs were said to feed on the fruits as well. In Barama, this tree was occasionally spared when cutting forest for cultivation, probably because of its edible fruits.

The wood is supposed to be hard, heavy, and durable. It is locally used for construction and boards, but it was not mentioned as a commercial timber species by Polak (1992). Trees that are not straight are only used for firewood.

Fanshawe (1948) reported that a decoction of *Diospyros* bark was used as a febrifuge, but no details were given on the particular species used.

Economy: The species is used for subsistence purposes only.

Notes: (1) 'Graterwood', after the sharply fissured bark, which resembles a grater for cassava roots.



30. *Duguetia pycnastera* a. flowering branch; b. stellate hairs (r = 9 mm); c. flower, partly opened to show stamens and carpels; d. receptacle; e. stamens, front view (l), side view (r); f. infructescence.

30. **Duguetia pycnastera** Sandw. **ANNONACEAE** **White yariyari**

Vernacular names: Rod tree, White yariyari (Cr), Yarayara (Ar), Tupuru araya (C), Hoiju[1], Zarazara (Wr).

Botanical description: Tree, to 15 m tall; trunk to 12 cm in diam. Outer bark brown, inner bark light brown, strong resin-scented, wood light brown to white. Young branches distinctly grooved, branches, petioles, and young leaves totally covered with pale yellow, stellate hairs. Leaves alternate, simple, in two distichous rows along the branches; stipules absent; petiole ca. 3 mm long; blades papery, elliptic, ca. 19 x 8 cm, dark green, glabrous above, dull green, covered with pale yellow stellate hairs below, apex acuminate, base acute. Inflorescences between the leaves, 1-2-flowered, most parts densely covered with stellate hairs; bracts leaflike, to 3 cm long, caducous; pedicels to 2 cm long. Flowers actinomorphic, dull yellow, densely covered with stellate hairs, broadly ovoid in bud; sepals 3, free, ovate, ca. 14 x 8 mm, acute; outer petals 3, ovate, ca. 15 x 7 mm, acute, inner petals 3, oblong-ovate, ca. 13 x 5 mm; stamens numerous, ca. 1 mm long, pink to red, spirally disposed on a receptacle; carpels 15-25, free, each with 1 basal ovule, ovary and stigma densely covered with stellate hairs. Fruit syncarpous, composed of sessile carpels, pale green when immature, peach-coloured when ripe, covered with caducous stellate hairs; seed 1 per carpel, red-brown, globose to ellipsoid, ca. 5 mm in diam.

Distribution and ecology: Venezuela, the Guianas, and Amazonian Brazil, in swamp forest, Morabukea forest and along small streams (Maas, *in prep*.). In northwest Guyana, abundant in the understorey of Mora forest, occasional in mixed forest, absent from the brackish coastal swamps. Flowering mainly from April to October and fruiting from May to January. Flowers are pollinated by small beetles; fruits are probably dispersed by monkeys and rodents (Maas, *in prep*.).

Use: White yariyari is considered the best wood to make fishing rods and bows, since it is very strong and pliable. Small and irregular trees are used for rods. To make a bow, large, straight individuals with few branches are needed; knots will weaken the bow. The tree is felled and its branches are removed. To obtain a maximum elasticity, the trunk is briefly heated over a fire before the bark is removed. Arawak, Carib, and Warao bows are quite similar, with a concave or straight outer side and a strongly convex inner side. The bow tapers towards the ends, where the bowstring is firmly attached with a few loops (see Roth, 1924).

A yariyari bow is made in a few hours, including the search for a suitable tree. The bows are smoothed with sandpaper or with the leaves of the sandpaper tree (*Pourouma guianensis*). Most trees are irregularly shaped or have many branches, so the majority is only suitable for fishing rods. Only few other species yield better bows: e.g., letterwood (*Brosimum guianense*) and washiba (*Tabebuia serratifolia*), but these are quite rare in the study area. Other *Duguetia* species are used as well, but their bows tend to break more rapidly.

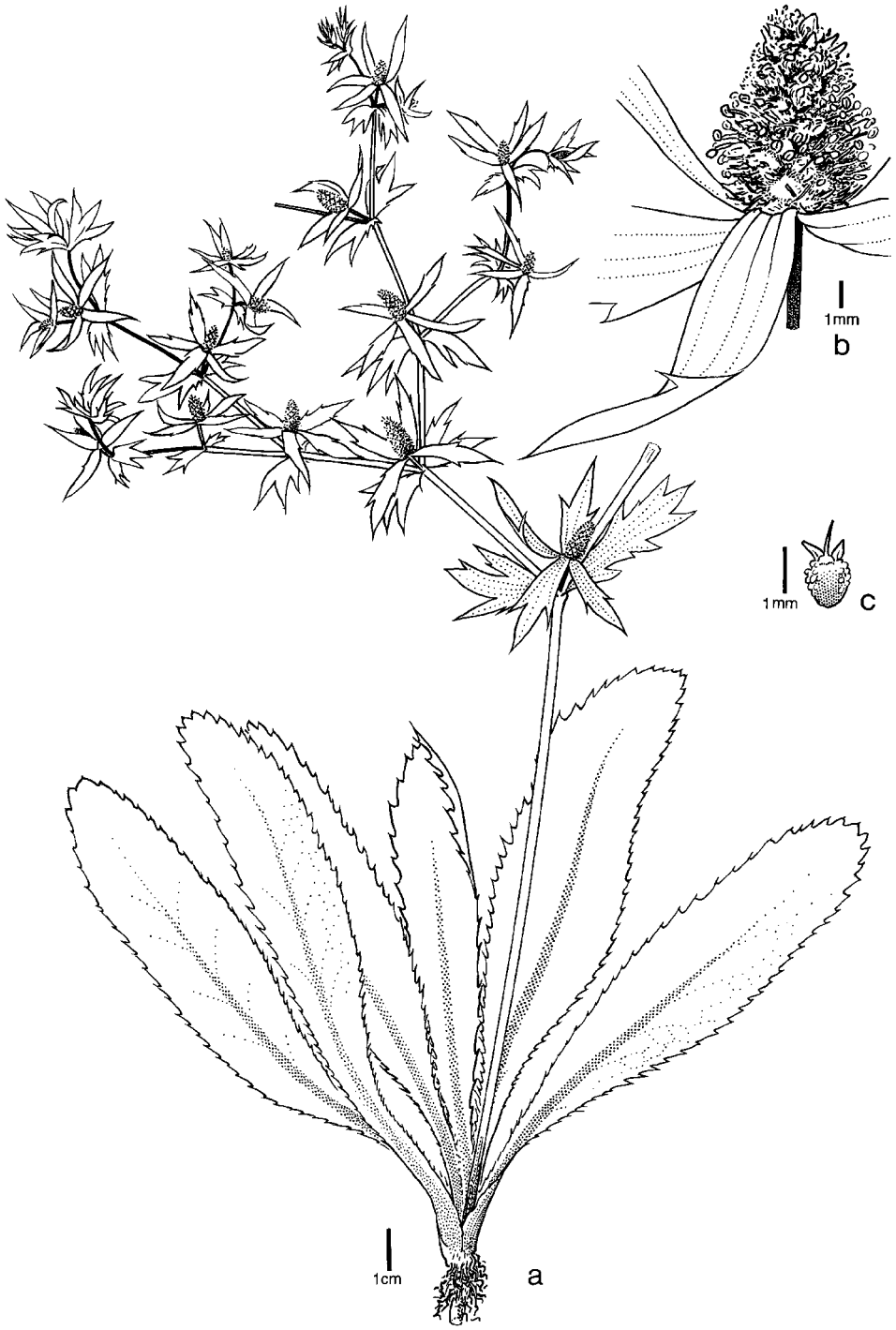
The trunks are also carved into handles for axes, shovels, peacocks, and other tools. A long yariyari stick is sharpened and used as a spear to stab fish or other animals. In the interior, these spears are even occasionally used during fights. Yariyari sticks are used in a variety of animal traps. A young tree is cut, stripped bare and stuck firmly in the ground, or a living tree is stripped from its branches and bent down to the ground. A piece of rope is attached to the top and made into a loop around a piece of bait, with the aid of some small sticks[2]. When an animal touches the bait, the trigger is released. The loop tightens, the spring flies back and the creature will be hanging from the stick, strangled by the loop.

Yariyari also plays an important role in house construction. It is regarded as the best quality of wood for rafters to hold palm-thatched roofs. The pliable wood is able to withstand strong winds and does not break easily when drying out. According to a widespread belief, trees should not be harvested during full moon, because then the wood is thought to be softer and liable to cracking. Because of their typical architecture and their hanging, whitish leaves, yariyari trees are frequently decorated as

Christmas tree. The bark of the tree is dried, boiled in water and drunk for colds, asthma, and cough. Sugar is added to boil it down into a cough syrup.

Economy: Yariyari fishing rods are sold in Moruca shops for US$ 0.70. Bows are occasionally sold.

Notes: (1) This Warao name means 'fishing rod'; (2) See plate 8.



31. *Eryngium foetidum* a. habit; b. inflorescence; c. fruit.

31. **Eryngium foetidum** L. **UMBELLIFERAE** **Culantro**

Vernacular names: Fitweed (Cr), Culantro (Sp), Kolantro (Ar), Kurandono (C), Kolancho, Obo aibihi[1] (Wr).

Botanical description: Biennial herb, ca. 50 cm tall, with a large pen root. Stems solitary, erect, hollow, repeatedly cymosely branched at the top, the main axis abbreviate above each joint, the lateral axes elongate and repeating the ramification, the uppermost axils terminating in the inflorescences. Basal leaves forming a rosette, simple, glabrous, narrowly elliptic, to 25 x 4 cm, margin coarsely toothed, apex obtuse or rounded, base gradually narrowing; petioles clasping the stem at base. Leaves with a strong coriander scent. Inflorescence capitate, many-flowered, cylindric, ca. 1 x 0.3 cm; involucral bracts 5-6, leaflike, free, narrowly elliptic or linear, apex 3 to 5-lobed. Flowers actinomorphic, greenish white; sepals 5, narrowly elliptic or ovate, ca. 0.8 mm long, apex acuminate; petals 5, elliptic-oblong, ca. 7 mm long, apex inflexed; stamens 5, filaments longer than the sepals; ovary inferior, 2-locular, styles and stigmas 2. Fruits subglobose, ca. 2 mm in diam., densely covered with vesicular scales.

Distribution and ecology: Central and South America and the West Indies, in pastures and secondary shrubland along roads. In northwest Guyana, the species is spared from weeding and planted in house yards, both by Amerindians and coastlanders. Flowering and fruiting throughout the year.

Use: Throughout its range, the species is used as a medicine for a wide variety of ailments (Seaforth et al., 1983; Duke and Vásquez, 1994). In northwest Guyana, the leaves are briefly heated above the fire, rolled between the hands, and squeezed above a spoon. A pinch of salt is added to the green, bitter sap. A few spoonfuls are taken daily for common colds, strong chest colds, and coughs. The medicine is particularly efficient for babies and young children. For colds, the leaves are also rubbed on the skin. Inhaling the smell has an effect similar to that of Eucalyptus oil.

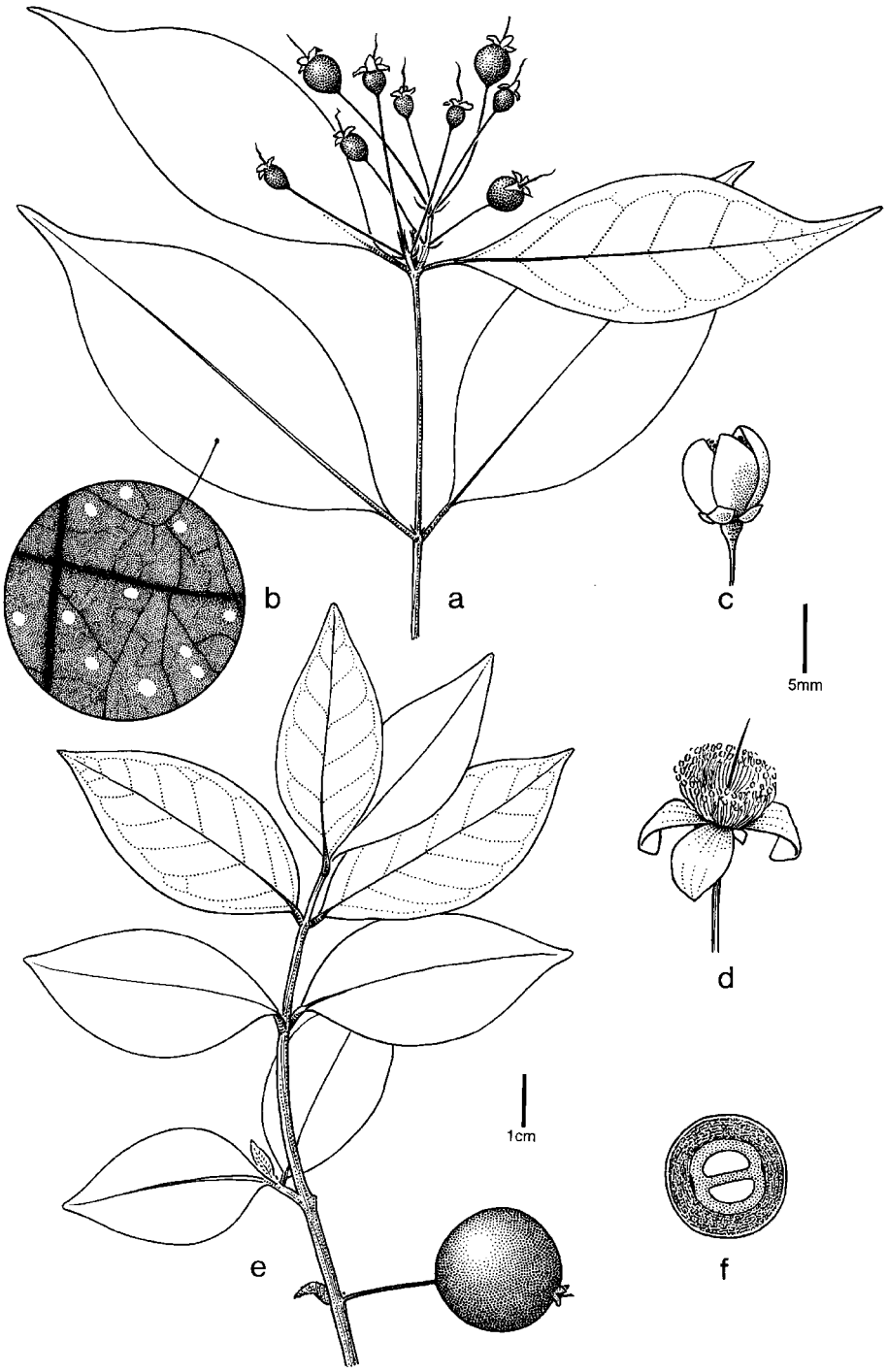
The plant is employed in cases of epilepsy or 'fits', by holding the crushed leaves under the nostrils of the patient. The leaves may also be soaked in cold water, which is then used to wash the person's face. The strong scent of the leaves is said to bring the patient back to consciousness and chase away the bad spirits that cause the fits. It is said to be particular helpful for young patients. The whole plant (with the root) is boiled and drunk to stop haemorrhage. To combat fever, nine culantro leaves are crushed and squeezed, mixed with some baking powder and lime juice, and boiled in coconut oil. The whole body is rubbed with the foamy substance. The sap of nine culantro leaves with a little salt, lemon and lime juice is drunk for asthma and cough.

To cure headache, the leaves are heated and macerated between the hands. The leaf pulp is applied as a poultice on the forehead. A couple of spoons a day from a leaf decoction is given to people suffering from pneumonia, stomach pain, and asthma (Reinders, 1993).

The strong odour of the leaves is almost identical to that of the true coriander (*Coriandrum sativum*) and its leaves are used similarly in stews and soups. The plant is not appreciated unanimously as a spice. In one Arawak village people said that the leaves were only used by Caribs, while in another Arawak settlement the herb was commonly grown as a condiment.

Economy: The rosettes of basal leaves are sold as spice and medicine at herb stalls at the Georgetown market.

Notes: (1) The Warao name means 'charm against colds' (Charette, 1980).



32. *Eugenia patrisii* a. branch with young fruits; b. pellucid glands (r = 9 mm); c. flower bud; d. flower; e. branch with ripe fruit; e. fruit, cross-section.

32. **Eugenia patrisii** Vahl **MYRTACEAE** **Turtle cherry**

Vernacular names: Turtle cherry, Turtle berry (Cr), Pendanga (Sp), Hichu (Ar), Kuwapitsyano (C), Waku ahuka[1] (Wr).

Botanical description: Shrub or tree, to 20 m tall; trunk to 17 cm in diam. Outer bark reddish brown, inner bark yellow, wood yellow. Young branches puberulous, soon becoming glabrous. Leaves opposite, simple, densely dotted with pellucid glands; stipules absent; petiole to 6 mm long; blades papery, oblong-elliptic, ca. 10 x 4 cm, glabrous, apex acuminate, base acute to attenuate. Inflorescences axillary or lateral, fasciculate, 2-6-flowered, or solitary in the axils of bracts at the base of young shoots; bracts linear, to 6 mm long; pedicels threadlike, ca. 3 cm long, glabrous, glandular. Flowers actinomorphic, white, sweet-scented; sepals 4, free, imbricate, ca. 2 mm long, the outer sepals slightly smaller than the inner ones; petals 4, membranous, oblong-elliptic, ca. 5 mm long; stamens numerous; ovary inferior, 2-locular, subglobose, glabrous, style 1, persistent. Fruit a berry, red, juicy, globose to pear-shaped, ca. 2.5 cm in diam., crowned by the persistent sepals; seed 1, light brown, ca. 1 cm in diam.

Distribution and ecology: The Guianas and Amazonian Brazil, common in rainforest. In northwest Guyana, common in the understorey of mixed and secondary forest in Barama, locally abundant as shrub on white sand hills in the coastal swamp region. Flowers were occasionally seen in August. A short, massive fruiting period was observed in mid November. Fruits are dispersed by monkeys and birds (van Roosmalen, 1985).

Use: The juicy, cherry-red fruits are tasty and popular among children, although Fanshawe (1948) classified them as watery and insipid. The local abundance of the species on white sand might have an anthropogenic origin. Several Amerindian villages in the coastal swamp region are located on white sand hills (e.g., Assakata, Waramuri), and schools are often built on top of these hills. Children collect the fruits along forest trails on their way to school and spit out the seeds in the school yard, causing a local abundance of the species. Trees growing on white sand have a more shrubby appearance than those growing on other soil types. The species is spared from weeding in secondary forest around house yards.

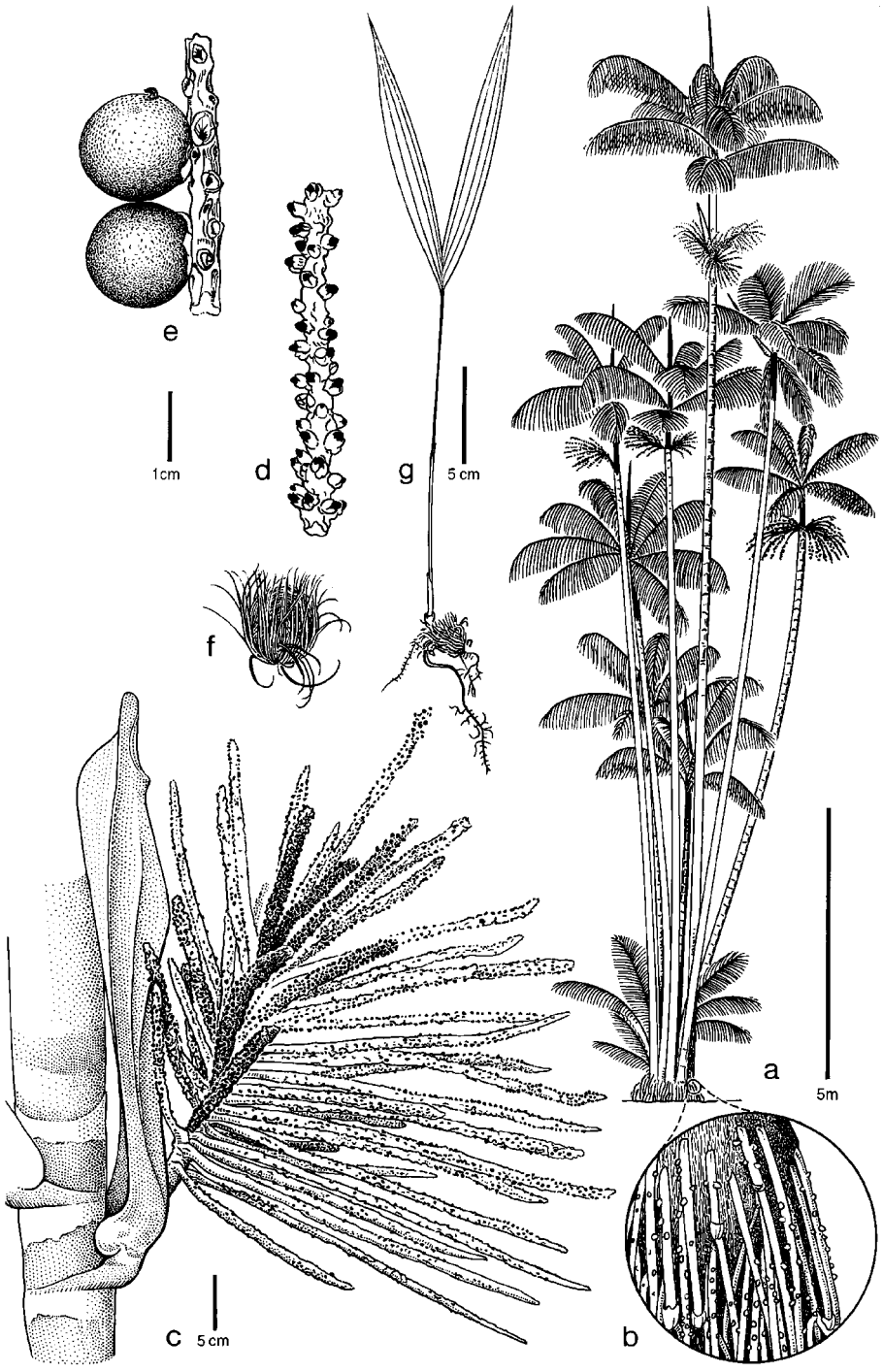
Land turtles are fond of the cherries as well. When the tree is in season, people will start searching around for turtles feeding on the fallen fruits. More than 60 species of *Eugenia* occur in the Guianas (Boggan et al., 1997), many of them with edible fruits, but *E. patrisii* is one of the most common and most appreciated species.

The wood is extremely strong and hard, and favoured to make cotton spindles. A thin, tapering wooden shank is carved from a turtle cherry branch or stem. It is passed through a circular guard made from a coconut shell to form a typical Carib spindle, known as ‘kuitya’ (C). Cotton is predominantly grown in traditional (mostly Carib) villages, where people still weave their own hammocks and baby slings. In coastal villages, where imported Brazilian hammocks have replaced the home-made ones, cotton spindles are hardly used anymore. Additionally, the wood is used for the frames of cassava flour sifters and warishis, the backpack-like baskets for carrying heavy loads[2].

The wood is also carved into arrow sockets, hardwood pegs pushed inside the hollow arrow shafts made from an inflorescence of *Gynerium sagittatum*. The iron arrow point is inserted into the socket, fastened tightly in the wood with a twine, and covered with melted karaman wax (from the latex of *Symphonia globulifera*). A smaller piece of hardwood is inserted in the bottom end of the shaft to form the arrow ‘foot’, which will rest on the bow string. Except for turtle cherry, arrow sockets are also made from the hard wood of wokunse (*Quiina guianensis*) or wild mangro (*Tovomita obscura*). The species is not used medicinally in Guyana, but in Colombia, the Barasana Indians prepare a tea from the twigs, leaves, and fruits as a remedy for repeated coughs and other respiratory problems (Schultes and Raffauf, 1990).

Economy: Arrows and cotton spindles are sold in (traditional) Amerindian communities, but the wood alone or the fruits are not commercialised.

Notes: (1) The Warao name means 'turtle pepper', as 'waku' signifies land turtle (*Geochelone denticula*) and 'ahuka' is the name for pepper (*Capsicum annuum*); (2) See front page.



33. *Euterpe oleracea* a. habit; b. aerial roots (r = 10 cm); c. inflorescence; d. flowering rachilla; e. fruits; f. old seed; g. seedling.

33. **Euterpe oleracea** Mart. **PALMAE** **Manicole**

Synonym: *Euterpe edulis* Mart.

Vernacular names: Manicole, Green manicole, Pale yellow manicole, Savanna manicole, Red manicole (Cr), Manaka (Ar), Wasei (C), Anare (Wr).

Botanical description: Multi-stemmed palm; clumps with up to 25 stems and numerous basal shoots; trunks to 20 m tall and 18 cm in diam., obscurely ringed, with a mass of red aerial roots at the base. Leaves 8-14; sheaths forming a compact crown shaft to 1.5 m long, green, reddish, purple, or pale yellow, with few, flat scales; petiole ca. 33 cm long; rachis ca. 2.6 m long, pinnae 40-80 per side, regularly spaced and spreading in one plane, linear, ca. 90 x 3 cm, long-acuminate. Inflorescences below the leaves; peduncle ca. 10 cm long; outer spathe ca. 55 cm long, inner spathe green, ca. 80 cm long, acumen ca. 10 cm long, rachis ca. 70 cm long; rachillae 80-160, white-tomentose, ca. 50 cm long, at first erect, spreading at anthesis, drooping in fruit. Male flowers ca. 5 mm long; sepals triangular to ovate, ca. 3 mm long; petals ovate, ca. 4 mm long. Female flowers broadly triangular, 3 mm long; sepals 2 mm long, ciliate; petals ca. 3 mm long. Fruit purple-black, globose, ca. 1.5 cm in diam., cupule 6 mm in diam.; seed 1, light brown, ca. 1 cm in diam. Seedlings with bifid leaves.

Distribution and ecology: Northern South America, the Guianas, Trinidad, and Brazil, growing in large numbers in tidal swamps, less frequently occurring inland. In northwest Guyana, almost forming pure stands in the brackish coastal swamps on pegasse. In the interior, restricted to swampy places along creeks and in Mora forest. Flowering and fruiting simultaneously throughout the year. Small black bees were seen visiting the flowers; seeds are dispersed by birds (especially parrots and macaws), monkeys, fish, and water (van Roosmalen, 1985; Fanshawe, 1954).

Use: The heart of the manicole palm (‘cabbage’) consists of the young, rolled leaves in the crownshaft that have not yet been exposed to sunlight. This palm heart is consumed raw or cooked and considered a delicacy in Europe and the United States. It is commercially harvested and processed on a large scale in the North-West District. People involved in palm heart harvesting distinguish three different types of manicole. The most common green manicole has a bright green crown shaft and is preferred by the canning factory.

The rare red manicole has a orange-red crown shaft, hard wood, and a soft heart that falls apart in the can. This type is occasionally accepted. Finally, the savanna manicole has a pale yellow crown shaft and hard wood that is difficult to cut. This type is seldom harvested, because of the soft texture of the cabbage. According to A. Henderson (pers. comm.) all three forms belong to *Euterpe oleracea*, but further taxonomic research should be done on these varieties to see whether they could be considered different (sub-) species. Fresh palm heart is also consumed as a snack in the forest. The ones rejected by the factory are often cooked in stew or fed to domestic animals.

Manicole fruits are edible and can be made into a drink by soaking the fruits in warm water, removing the skins and seeds and adding milk and sugar. The drink is not popular in Guyana; only children seem to eat the manicole fruits every now and then. They also use the fruits and seeds as slingshot ammunition. Ripe and unripe fruits are split with a knife to drink the sour jelly inside. Fruits are also fed to pet birds. People travelling long distances by boat to trade their captured parrots, bring along full infructescences to feed the birds during the journey. In the coastal swamp region, floors and walls made of manicole trunks are common. The stems are split in four with an axe to make flat floors and walls. These are more comfortable, but require extra work. Entire trunks are used for temporary river camps and stellings.

Young stems are woven between crossbeams in the typical Arawak kitchen walls[1]. Manicole leaves are used to thatch the roofs of temporary camps and more permanent houses, in absence of dhalebana (*Geonoma baculifera*) or troolie (*Manicaria saccifera*) leaves. Dhalebana roofs always have a few manicole leaves on the ridge. Two manicole leaves are rapidly woven into a temporary basket or 'waiari' (Ar) to carry home forest products[2]. The leaves are laid down on the ground with their midribs slightly separated. They form the frame of the basket, while the pinnae are woven together to make the sides. The midrib stripped from its pinnae ('manicole bone') is used as fishing rod, as a substitute for yariyari wood (*Duguetia* spp.). A climbing belt is made by twisting the pinnae around the rachis, twisting the leaf around the wrist, and tying the two ends together. The belt is placed around the feet when climbing a tree (see also Strudwick and Sobel, 1988).

Women suffering from haemorrhage drink the sap squeezed from a palm heart, boiled with an eastward growing root of a coconut palm. The sap is also collected by beating a young manicole palm with a piece of wood and squeezing out the stem. This liquid is dripped into cuts to stop the bleeding, but can also be drunk to relieve scorpion stings. It is considered as an emergency medicine, useful when somebody is far away in the forest. The sap is rubbed in grey hair to bring back the original (black) colour, which is said to last longer than synthetic dye.

The inflorescence ('manicole broom') is used as sweeping broom, but also hung above the doorway to ward off evil spirits. Very young inflorescences can be eaten raw or cooked. Before kerosene was widely available, Amerindians filled manicole leaf sheaths with haiawa gum (*Protium* spp.), strapped the sheath tightly with a bush rope, and burned it as a torch. These 'flambeaus' smelled nice, burned whole night, and chased away mosquitoes. Most of the uses of manicole were reported by Arawak and Warao from the coastal swamp region. Caribs from the deep interior, where manicole is less abundant, did not mention many other uses than roof thatch and food.

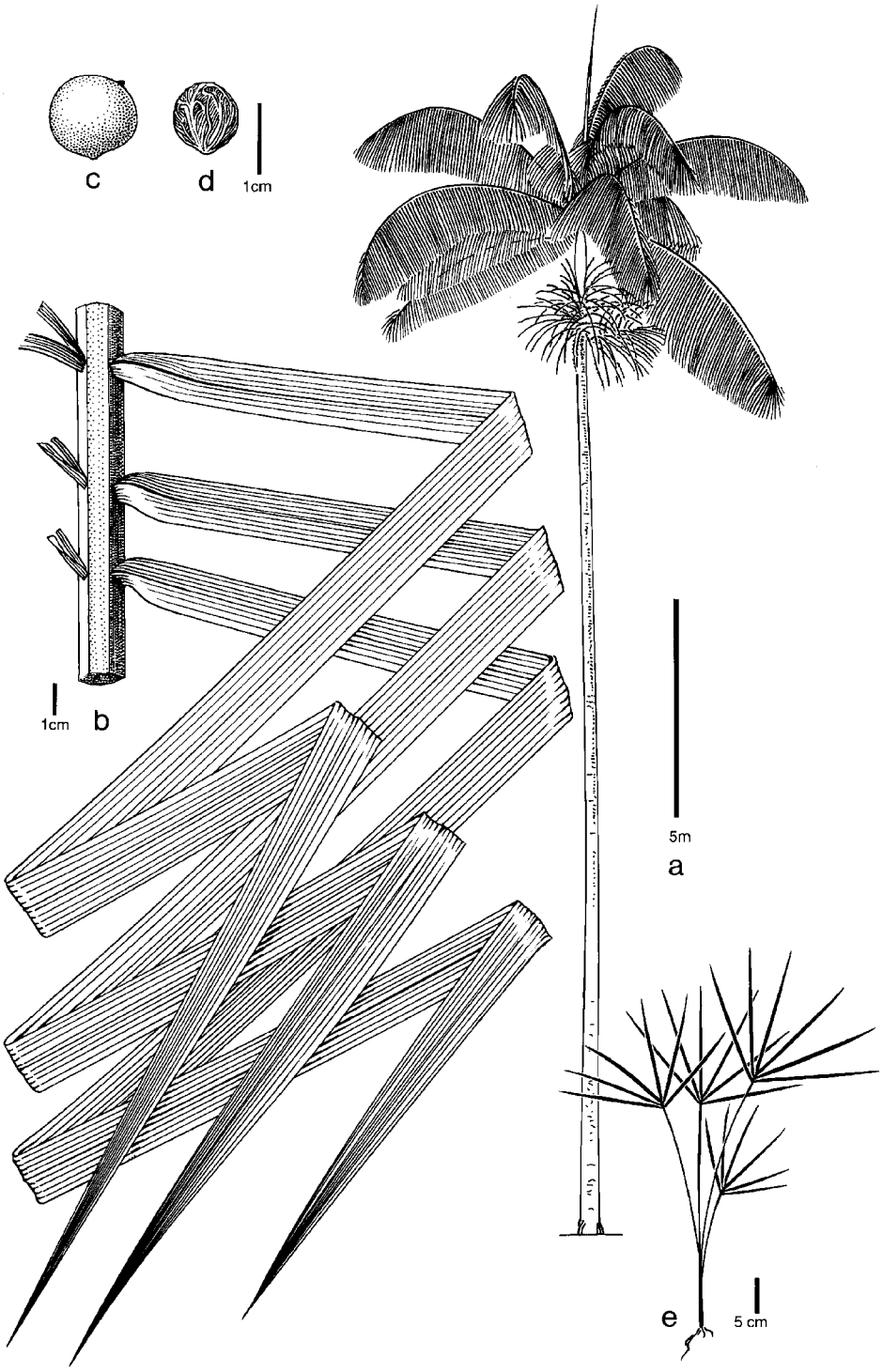
Economy: Palm heart is one the most important commercial NTFPs of Guyana. The canning factory at Drum Hill (Barima) is processing some 20,000 palm hearts daily, employing around 160 people[3]. Some 1000 cutters sell their palm hearts to factory agents, who travel by boat trough the region and purchase the cabbage for US$ 0.06 per piece or exchange them for food and other necessities. The factory exports palm heart for ca. US$ 2 million annually, mostly to France. The cans were only recently introduced on the national market. The bulk of the canned palm heart on the world market is produced in the Brazilian Amazon, where overharvesting has already led to the closure of many factories (Pollak et al., 1995).

Palm heart is harvested exclusively from the wild. 'Cabbage cutting' is the main source of income for Amerindians in the coastal swamp region. The clump-forming palm offers good opportunities for sustainable extraction, since it grows in large quantities and is capable of fast regrowth after stems have been cut. However, in *Euterpe* populations that were harvested for several years without adequate time to regenerate, stems were smaller in size and diameter and clump mortality was much higher than in undisturbed swamps. Neglect of traditional farming and dependency on the palm heart industry has led to overharvesting and socio-economic problems in several regions. Where people combine subsistence farming with palm heart harvesting, fallow periods tend to be longer and less damage is done to the vegetation (see chapter 5 of Part I).

The drink from manicole fruits ('açai' in Portuguese) supports a huge domestic economy in Brazil, where it is extracted mechanically and processed into ice cream and other food items. Mixed with cassava flour, rice or sugar, poor Amazonian people may consume two litres of the liquid a day (Strudwick and Sobel, 1988). In Brazil, the species is widely cultivated for its fruits. For some reason, the Guyanese do not fancy the manicole juice. A product with such an enormous potential thus remains unused, because it lacks opportunities on the domestic market. If an export market could be found, and the canning factory would develop a fruit processing system, revenues from the coastal manicole swamps could increase significantly, creating more income for local people.

Palm heart harvesting does not necessarily have negative consequences for fruit collection, because leaving intact one mature (fruiting) stem per cluster increases the vitality of the clump. Manicole brooms are sold in the Georgetown streets for ca. US$ 1.80. They are used in floral arrangements or sprayed silver during Christmas, but are also sold for their ability to chase away evil spirits.

Notes: (1) See plate 29; (2) See plate 12; (3) See plate 4; (4) The multi-stemmed manicole is often confused with the single-stemmed winamoro (*Euterpe precatoria*), although the latter is much larger in size, inflorescence, and palm heart and has a multi-pinnate seedling.



34. *Euterpe precatoria* a. habit; b. pinnae; c. fruit; d. seed; e. seedling.

34. **Euterpe precatoria** Mart. **PALMAE** **Winamoro**

Synonym: *Euterpe stenophylla* Trail ex Burret, *Euterpe precatoria* Mart. var. *precatoria*

Vernacular names: Big manicole, Man type of manicole, Green winamoro, Dusty winamoro (Cr), Winamoro (Ar, Wr), Reho (Ar), Wapu (C), Abua, Warunamsebe (Wr).

Botanical description: Solitary palm; trunks to 27 m tall, to 23 cm in diam., obscurely ringed, base with few red aerial roots. Leaves 10-20; sheaths closed and forming a crown shaft to 1.6 m long, glaucous, greyish green to yellow; petiole ca. 35 cm long; petiole and rachis dense to moderately covered with small, flat, reddish brown scales; rachis ca. 2.6 m long, pinnae 43-91 per side, regularly spaced, spreading in one plane, linear, ca. 80 x 1.5 cm. Inflorescences below the leaves; peduncle ca. 12 cm long; outer spathe ca. 80 cm long, inner spathe ca. 60 cm long; rachis to 95 cm long, rachillae 70-200, white-tomentose, ca. 70 cm long, at first erect, later spreading and drooping. Male flowers at end of rachilla, pinkish white, ca. 5 mm long; sepals broadly ovate, ca. 3 mm long; petals narrowly ovate, ca. 4 mm long. Female flowers white, ca. 4 mm long; sepals broadly ovate, ca. 3 mm long; petals broadly ovate, ca. 4 mm long. Fruit purple-black, globose, ca. 1 cm in diam., cupule ca. 1 cm in diam.; seed 1, light brown, hard. Seedling with pinnate leaves.

Distribution and ecology: Tropical South America, common along rivers and periodically flooded areas, less frequent in non-inundated forest (Wessels Boer, 1965). In northwest Guyana, occasional in mixed forest, frequent in the coastal wetlands dominated by *Euterpe oleracea*. Flowering in September-November; fruiting from late September to February. Flowers are pollinated by beetles, bees, and the wind (Küchmeister et al., 1997). Seeds are dispersed by birds (especially parrots and macaws), monkeys, and fish (Henderson, 1995).

Use: Winamoro fruits are edible and can be made into a drink by soaking them in warm water and removing the skins and seeds. However, this beverage is even less popular than that of manicole (*Euterpe oleracea*). Only children eat the fruits occasionally. In central and eastern Amazonia, *E. precatoria* fruits are commercially processed into 'açai' drink, although this industry is less important than the processing of *E. oleracea* in the Amazon Estuary (de Castro, 1993).

Local people distinguish two types: the common 'green winamoro', easily recognised by its large, bright green crown shaft, and the rare 'dusty winamoro' or 'abua', with smaller, darker, more drooping leaves, and a yellowish brown crown shaft covered with rusty brown scales that irritate the skin. Both forms belong to *Euterpe precatoria*, but further taxonomic research is needed to see whether they could be considered as different (sub-)species (A. Henderson pers. comm.). The palm heart canning company rejects winamoro cabbages because of their large size and soft texture, but locals consider them better than the palm hearts from manicole.

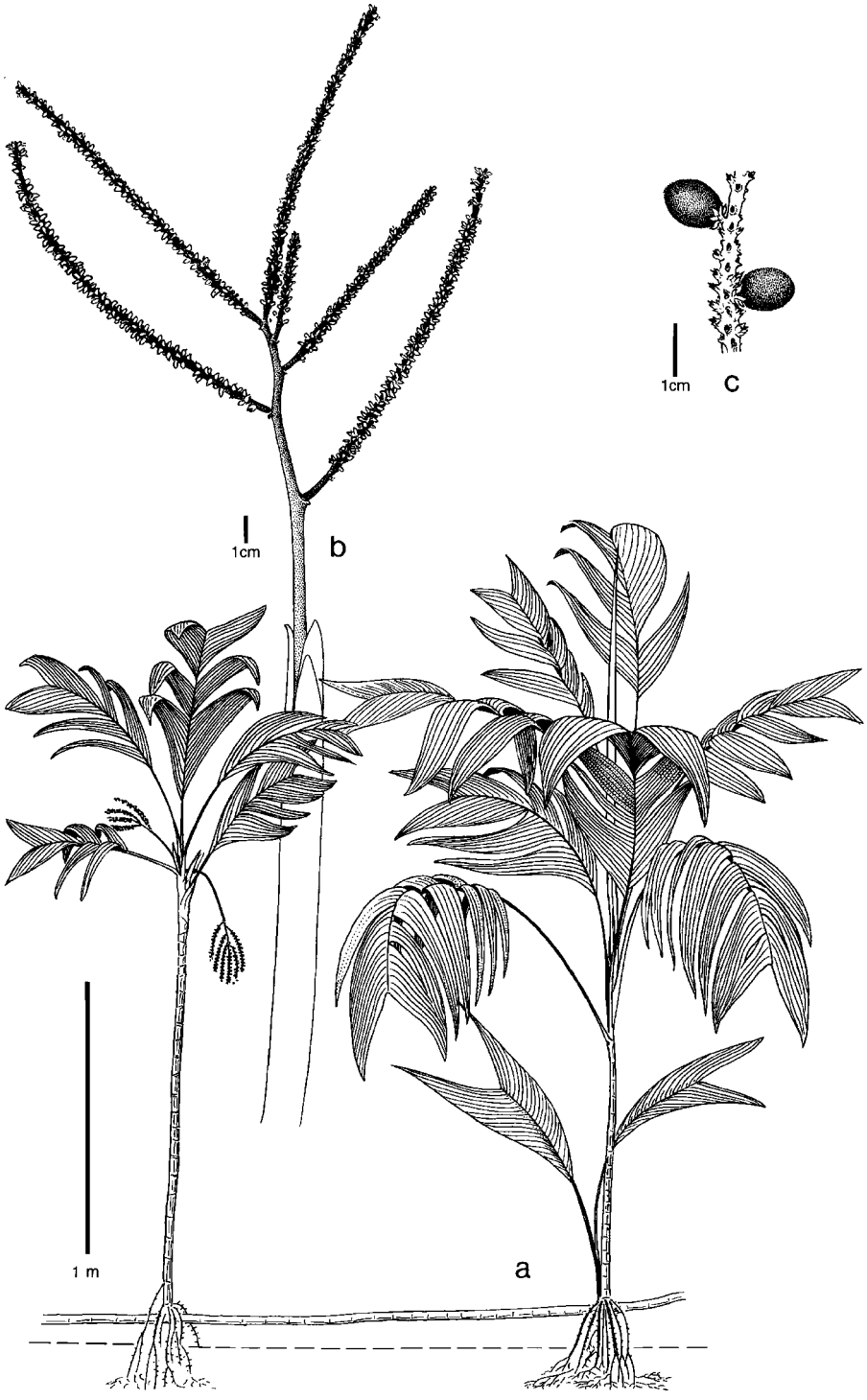
The large crown shaft ('boat') is used as plate when eating in the forest, and as wrapping material to store fish, bait or other small forest products. The Warao used to tear the inner layer of the crown shaft into papery strips, and rolled these around a tobacco leaf. The name 'winamoro' is derived from 'wina', meaning cigarette paper in Warao. In the past, the Warao 'obeiahman' (shaman) smoked a long winamoro cigar before he started his conversation with the spirits. Winamoro leaves are used to thatch forest camps and houses, in absence of dhalebana (*Geonoma baculifera*) or troolie (*Manicaria saccifera*). Dhalebana roofs always have a ridge of manicole or winamoro leaves. Two winamoro leaves can are woven into a temporary basket or 'waiari' to carry home forest products. The leaves are laid down on the ground with their midribs slightly separated. They form the frame of the basket, while the pinnae are woven together to make the sides[2]. The large inflorescence is used as a sweeping broom.

The sturdy winamoro trees are climbed to catch parrots and macaws feeding on the fruits. The trapper makes a 'nest' by bending down the leaves and tying them to the trunk. He hides under the leaves and holds a tame call bird out of the tree crown on a branch. Wild parrots approaching the tame bird are caught with a lasso. This technique is quite dangerous, as the palms can attain up to 27 m, but it is rewarded by the high price the trapper receives for his birds at the regional market. Trappers feed their parrots with manicole and winamoro fruits. Manicole palms are not climbed, since they are too thin and bend down under the trapper's weight.

Most uses of winamoro were reported by Arawak and Warao from the coastal swamp region. Caribs living deeper in the interior were less familiar with its uses. Winamoro is scarce here, and some Carib informants did not even know the fruits were edible. The Chácabo Indians in Bolivia use the aerial roots for muscle aches and snakebites. A decoction of the leaves is used to alleviate chest pains (Boom, 1987; Henderson, 1995). No medicinal uses were reported from the North-West District.

Economy: *Euterpe precatoria* cannot produce new shoots from its root system and thus does not survive the harvesting of its palm heart. The species takes about 100 years to attain a height of 12-15 m, and sustainable extraction of palm hearts is not economically viable because of the high management costs and long fallow periods (30 years) (Peña et al., 1998). In Peru and Bolivia, where the multi-stemmed *E. oleracea* is rare or absent, canning companies still process palm hearts of *E. precatoria* on a large scale. They are responsible for the destruction of the large populations in the region (Kahn, 1988; Peña and Zuidema, 1999). In Guyana, winamoro is harvested for subsistence only, except in areas where manicole is overharvested. Here cabbage cutters fell small winamoros and try to sell them to the canning company personnel, who cannot always tell the difference with manicole. However, there is no direct threat for *E. precatoria* populations, since most people do not want to argue with the canning company.

Notes: (1) The Warao consider the winamoro as 'the mother of manicole'. When they see large winamoros they believe that a reef of manicole will be close by; (2) See plate 12; (3) The single-stemmed winamoro is often confused with manicole, although the latter is multi-stemmed, much smaller in size, and has a bifid seedling.



35. *Geonoma baculifera* a. habit, showing creeping rhizome; b. inflorescence; c. infructescence.

35. **Geonoma baculifera** (Poit.) Kunth **PALMAE** **Dhalebana**

Vernacular names: Dallibana, Swamp dhalebana (Cr), Dhalebana[1] (Ar), Sïrïyarï (C), Dakwasimo (Wr).

Botanical description: Clustered palm, creeping at base and rooting at the nodes, with basal and lateral shoots; trunk to 2 m tall, ca. 2 cm in diam., smooth and prominently ringed, internodes 4-9 cm long. Leaves 7-12, entire or irregularly pinnate; sheaths ca. 18 cm long; petiole ca. 20 cm long; rachis ca. 40 cm long, pinnae 3 to several per side, ca. 45 x 3 cm. Inflorescences interfoliar, branched, erect at anthesis, pendent afterwards; peduncle ca. 30 cm long; outer spathe ca. 25 cm long; inner spathe ca. 23 cm long, strongly flattened, persistent, rachis ca. 6 cm long, rachillae 3-10, green at anthesis, orange in fruit, ca. 20 cm long. Male flowers reddish pink, to 4 mm long; sepals narrowly elliptic, ca. 3 mm long; petals elliptic, ca. 4 mm long; stamens 6, pinkish white. Female flowers ca. 6 mm long; sepals elliptic, ca. 4 mm long; petals narrowly elliptic to ovate, ca. 4 mm long. Fruits black at maturity, ovoid, ca. 1 x 0.7 cm, cupule ca. 4 mm long; seed 1, black, ovoid, ca. 7 x 6 mm.

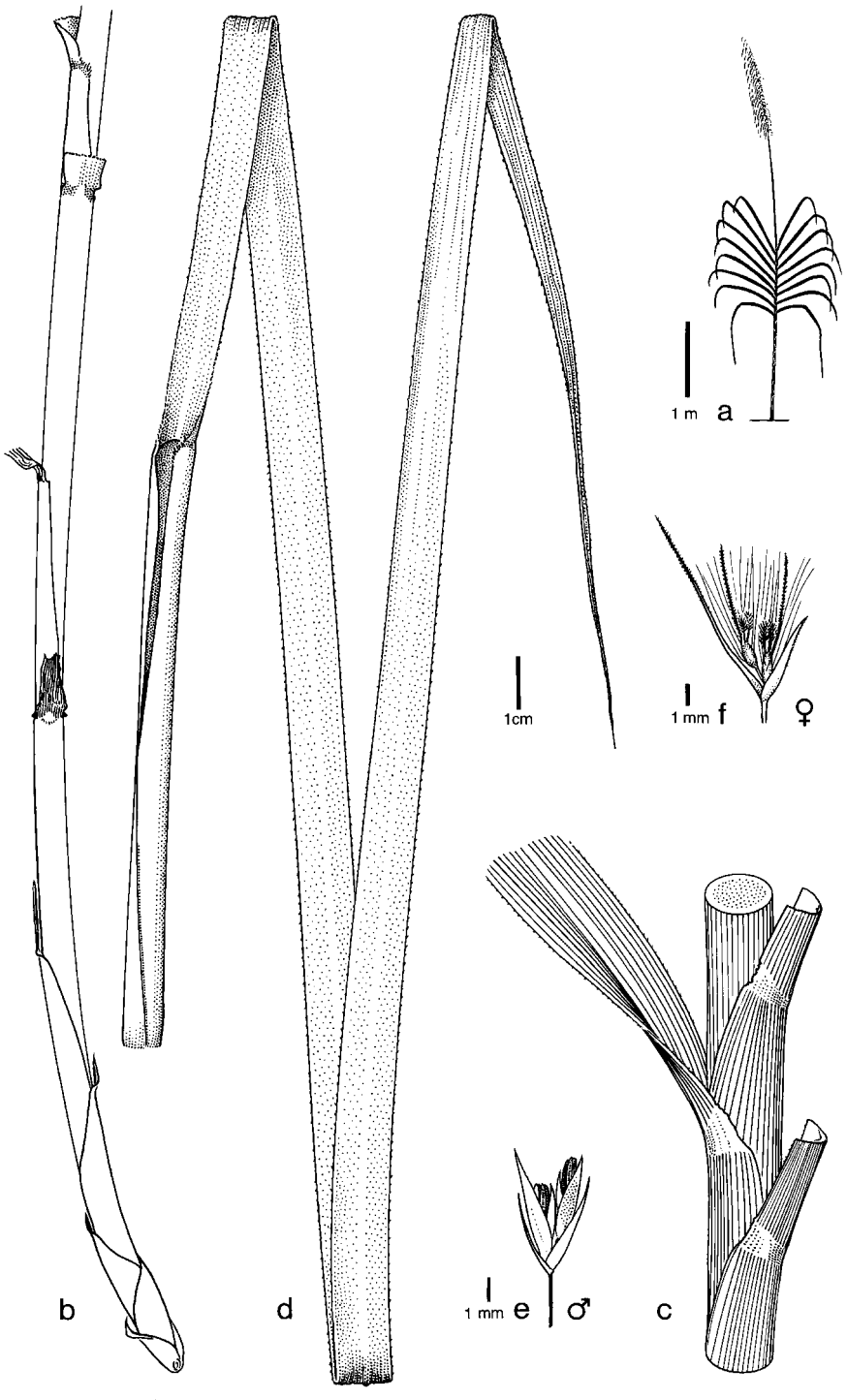
Distribution and ecology: Northern South America, widespread in swamp forest and along creeks in dense shade. In northwest Guyana, locally abundant but patchily distributed in Mora swamps. The species is flowering and fruiting throughout the year, but in Suriname most mature fruits were seen in October-January (Wessels Boer, 1965). In Barama mature fruits were observed in December.

Use: Dhalebana leaves provide an excellent, highly durable thatch. Young leaves are cut without felling the individual palms; older leaves are left on the plant. Some 32 'handfuls' of leaves will make a standard bundle of 110 lbs. (± 50 kg). About three bundles are needed for a gabled roof of ca. 6 x 4 m. A roof of this size is built in two days, while one or two days are spent in collecting the leaves. The leaves are folded over a 'kokerite bone', a stringer made from the midrib of a kokerite leaf (*Maximiliana maripa*), in a way that each petiole is inserted in the blade of the preceding leaf. Leaves have to be used fresh; otherwise they will crack when they are bent. The stringers are attached to vertical wooden rafters with nibi (*Heteropsis flexuosa* or *Thoracocarpus bissectus*). The following course of thatch is laid above so that its end overlaps the preceding course[2]. Leaves are densely packed together and the plaiting is labour-intensive. A well-made roof is waterproof and cooler than corrugated iron. It can last up to 12 years, especially when continuously subjected to smoke from the cooking fire.

Due to frequent harvesting, dhalebana tends to be scarce in the periphery of Amerindian settlements. In areas away from the riverine Mora swamps, where dhalebana is not available, leaves of manicole (*Euterpe oleracea*) or hill dhalebana (*Geonoma maxima*) are used as substitute roof thatch. At times, only parts of the roof are made with dhalebana, alternating with rows of manicole or kokerite. This technique was also observed by Gillin (1936) and Roth (1924) in the Barama area. *Geonoma baculifera* is commonly used as roof thatch in the Guianas, Venezuela, and Brazil, both by Amerindians and Bush Negroes (Wessels Boer, 1965; Henderson, 1995). Dhalebana is only used in the interior North-West District; the species is rare in the coastal swamp region. Here the majority of the roofs is thatched with troolie (*Manicaria saccifera*). The small black fruits of dhalebana are eaten, mainly by children.

Economy: In the Barama region, gold miners and shopkeepers hire Amerindians to collect dhalebana leaves and construct roofs. Prices of US$ 55 are paid for a roof of ca. 4 x 3 m, including the collection of leaves and the journey to the harvesting site. No dhalebana is transported to the coastal areas.

Notes: (1) The Arawak name means 'flange-leaf', as 'dhale' is buttress and 'bana' means leaf (Fanshawe, 1949); (2) See plate 9.



36. *Gynerium sagittatum* a. habit; b. lower section of stem; c. upper section of stem; d. leaf; e. male spikelet; f. female spikelet.

36. **Gynerium sagittatum** (Aubl.) P. Beauv. **GRAMINEAE** **Arrowstick**

Synonym: *Gynerium saccharoides* Humb. & Bonpl.

Vernacular names: Arrowstick (Cr), Bira, Biara, Ihi (Ar), Mapuru (C), Hata, Hatabu[1] (Wr).

Botanical description: Giant, reedlike, dioecious grass, to 5 m tall, forming large colonies by creeping rhizomes; stems erect, solid, ca. 2 cm in diam. Leaves strongly overlapping, lower portion of the culm bearing sheaths from fallen leaves, upper portion with a palmate complement of large, shiny leaves; ligule minute, ciliolate; blades ca. 150 x 5 cm, flat, glabrous except densely woolly at base above, margins extremely rough to serrulate. Inflorescence a terminal, densely flowered panicle over 1 m long, feathery or bushy, with drooping branches; peduncle ca. 65 cm long, smooth, hard, solid. Spikelets typically laterally compressed; male spikelets ca. 3 mm long, sparsely puberulous; stamens 2; female spikelets ca. 10 mm long, plumose, v-shaped, base with bearded callus tapering into an awn-like beak, lemma with silky hairs at the base; ovary superior, 1-locular, styles and stigmas 2, feathery.

Distribution and ecology: From Mexico, the West Indies to Paraguay and Brazil, in wet lowland areas (Judziewicz, 1990). In northwest Guyana, forming dense colonies on riverbanks and in secondary vegetation along roads, often cultivated or spared near Amerindian villages. Flowering throughout the year, but not simultaneously.

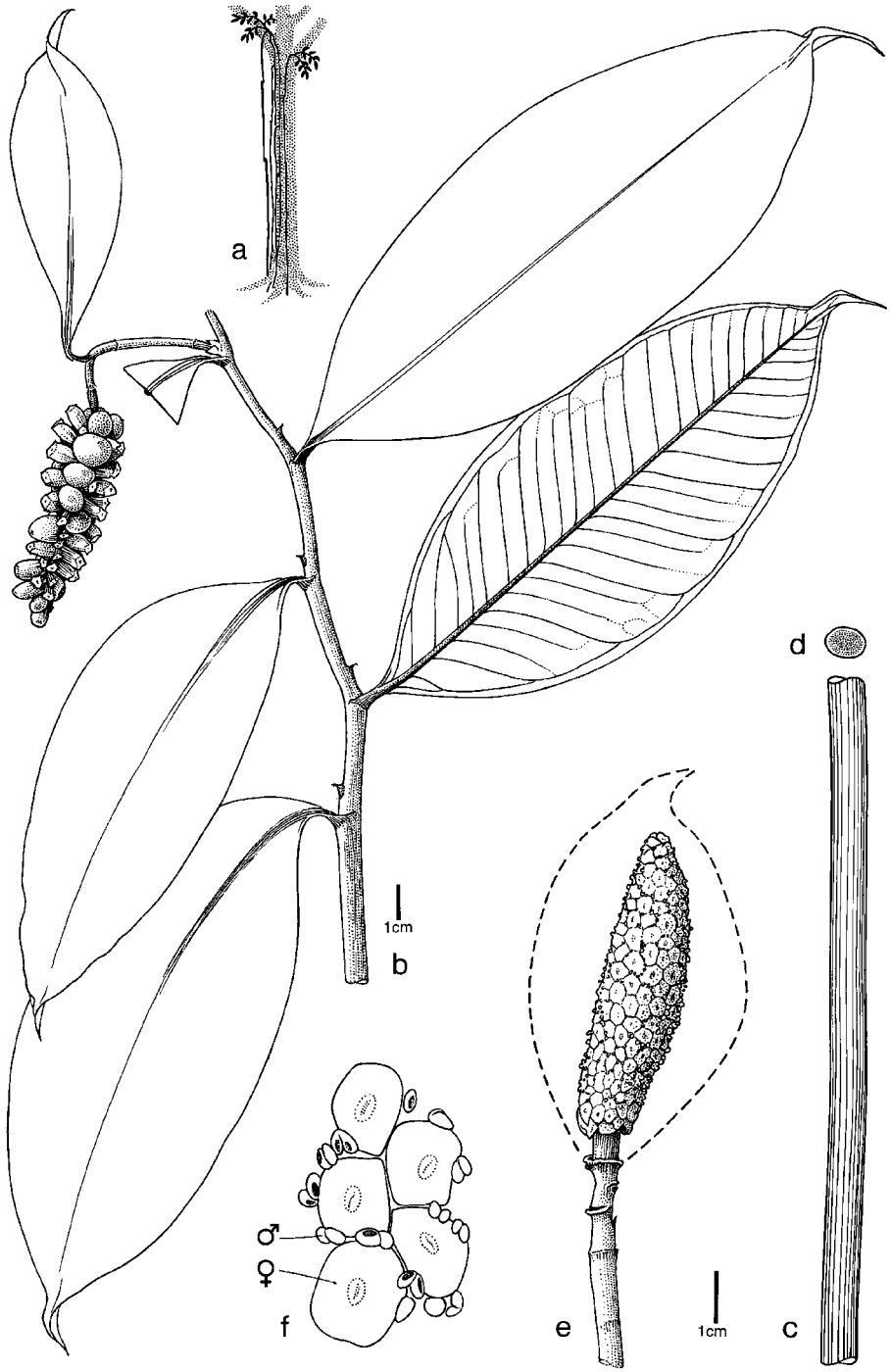
Use: Throughout its range, the peduncles of the inflorescences are favoured by indigenous tribes for their arrow shafts (Judziewicz, 1990). In areas where hunting is still practised with bow and arrow, this species yields an important NTFP. Rhizomes of wild plants are dug out from riverbanks and planted in home yards. Most of the time, only a few plants per colony are flowering. The flowers stalks are much sought after, and in some villages arguments occur about the ownership of arrowstick bushes. The woody, hollow flower stalks must be sun-dried or heated above a fire to prevent them from getting mildew.

When dry, a socket is made from a hardwood peg made of wokunse (*Quiina guianensis*), turtle cherry (*Eugenia patrisii*), or wild mangro (*Tovomita obscura*). This 'arrow bridge' is pushed inside the hollow shaft. The arrow head, filed from a piece of old iron or carved from Annonaceae wood, is inserted into this socket. The head is fixed firmly in the wood with a twine, made from homespun krawa fibre (*Ananas comosus*) or synthetic polyethylene cord. The twine is rubbed in with melted karaman wax (from the latex of *Symphonia globulifera*), to secure the attachment[2]. A smaller piece of hardwood is inserted in the bottom end of the shaft to form the 'arrow foot', which will rest on the bow string. A tail feather of a powis (*Crax alector*) is split along its midrib, attached to the arrow base and cut with scissors into different ornamental patterns. For more details on traditional arrow making and tribal designs, see Gillin (1936) and Roth (1924).

Caribs tie a piece of split arrowstick to a rectangular piece of plaited mokru (*Ischnosiphon arouma*) as a fan handle. A remarkable antidote for snakebites is prepared from arrowstick. A dry shaft is burned, after which the ashes are diluted in some water and given to the victim to drink. Some of the ashes are rubbed on the bite. In other parts of Amazonia, the fresh stems are planted around gardens, often forming living fences. The flowers stalks are used for fishing poles, handicrafts, and darts. A tea from the young leaves is used against asthma, while a decoction of the roots serves as a diuretic (Duke and Vásquez, 1994).

Economy: The flowers stalks are sold in traditional Amerindian villages, for US$ 0.30-0.70 per piece, depending on the abundance of the species. Arrows sold in tourist shops in the capital are mostly made from wood instead of arrowstick. In more 'westernised' Amerindian villages, guns have replaced the bow and arrow and the plant has lost its economic importance.

Notes: (1) The Warao name signifies arrow or spear (Charette, 1980); (2) See plate 27 and 28.



37. *Heteropsis flexuosa* a. habit; b. fruiting branch; c. aerial root; d. aerial root, cross section; e. flowering spadix, showing position of spathe; f. flowers, showing stamens surrounding ovaries and central style.

37. **Heteropsis flexuosa** (Kunth) Bunting **ARACEAE** **Nibi**

Synonym: *Heteropsis jenmanii* Oliver

Vernacular names: Nibi, Peeling nibi (Cr), Mibi, Sarebanaro (Ar), Akawari[1], Simyo sising (C), Ini[1] (Wr).

Botanical description: Hemi-epiphyte; stem elongate, flexible, woody, with thorn-like bud scales above each petiole. Aerial roots strong, greyish black, extending to the ground. Leaves alternate, simple; stipules absent; petiole narrowly sulcate, ca. 5 mm long; blades leathery, elliptic, ca. 20 x 5 cm, dark green above, bluish green below, drying blackish, apex sharply acuminate, base acute. Inflorescence terminal, spadix cylindrical, ca. 5 x 1.3 cm, greenish yellow to white, stipitate, subtended by a spathe to 8 cm long, coiled up longitudinally, barely opening at anthesis, greenish white outside, white inside, caducous. Flowers actinomorphic, bisexual, truncate at apex; perianth lacking; stamens 4; ovary superior, 1-locular, style 1. Fruiting spadix to 12 x 4 cm. Fruit a berry, orange, ovoid to pyramidal, ca. 8 mm in diam.; seeds 1-5, kidney-shaped.

Distribution and ecology: Venezuela, the Guianas, and Amazonian Brazil. In northwest Guyana, common, but patchily distributed in mixed forest, absent from secondary and swamp forests. Flowering more or less throughout the year (Hoffman, 1997). Flowers are probably pollinated by beetles; seeds are dispersed by toucans and spider monkeys (van Roosmalen, 1985).

Use: The aerial roots of nibi are a major source of binding and plaiting material. The pliable roots are pulled down from the trees, coiled up in bundles, and stored in water for some time when not directly needed. The cortex is easily removed with the fingers, after which the roots are split lengthways into long, flat ribbons. The inner cores, too stiff to be used for plaiting, are tied together into brooms. Teachers of primary schools in the interior often use a piece of inner core ('nibi cane') to whip their pupils. Entire roots are used as 'bush rope', while the thin strips are woven into warishis, quakes, and various other baskets. About nine roots of 15 m long are needed for a warishi, and ca. 30 pieces of 1 m long are sufficient for a quake. The strips are used to tie walls or floors together, or to attach rafters on a roof frame[2]. Flat strips are rounded by hauling them through a hole in a piece of iron. The round strips are woven into straw hats and other crafts.

Nibi roots are harvested on a large scale for the commercial furniture industry[3]. The strips are woven around frames of kufa roots (from several *Clusia* species), to form chairs, benches, and tables[4]. The main area for commercial nibi extraction is the Pomeroon, where the raw material is harvested by Amerindians and cheap furniture is made in small workshops along the river. Some craftwork is sold locally, but most is transported to the capital. Extractors sell their unprocessed nibi at the Charity market. Bundles of 100 root pieces of ca. 4 m long are sold for US$ 5-8, depending on the length and quality of the roots. Middlemen transport the material to the capital where the more elaborate furniture is made in larger factories.

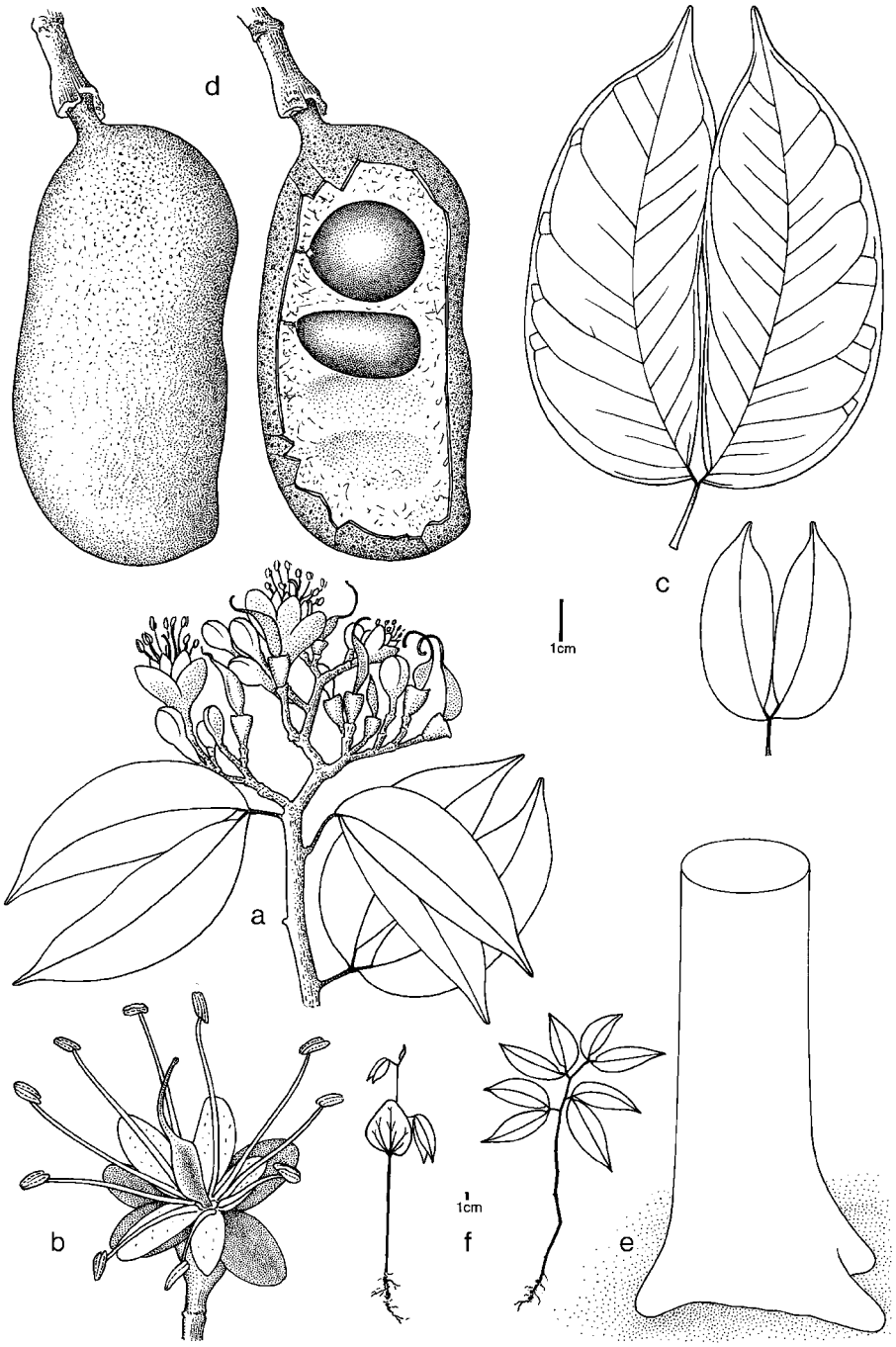
The roots can be harvested without killing the plant. New roots require approximately five years to reach the soil, after which they mature and become suitable for craft making. The majority of the roots wrap around the tree trunk or contain many knots, which makes them unsuitable for plaiting. The roots preferred for craft production are the ones that drop straight from the branches of the tree to the ground. Hoffman (1997) considered the ecological sustainability of nibi harvesting to be promising, since plants are relatively abundant, people harvest fewer roots than they leave behind, and there is a year-round availability. However, uncontrolled extraction has caused a scarcity of mature roots around Pomeroon villages. The plants are still there, but only with young or unsuitable roots. Extractors complain that the low price they receive for their material does not always cover the hard work and long travel to the harvesting sites.

Since it takes decades before the epiphytes have settled in the canopy, nibi is only found in primary forest. The maintenance of this forest is thus essential for the future supply of the product. Since host trees for epiphytes can be worth more in aerial roots over the years than once by timber, they should be spared from logging, but extractors must also be careful not to destroy young roots. As most primary forest in the Pomeroon has been allocated to timber companies, there is a great need for adequate management plans for this valuable forest product. In 1998, one of the major furniture producers in Guyana (Liana Cane Interiors), organised a workshop for Pomeroon extractors, during which the possibilities for sustainable extraction plans were discussed.

Peeling nibi roots are of finer structure, lighter coloured, and easier workable that the roots of the scraping nibi (*Thoracocarpus bissectus*), of which the cortex needs to be scraped off with a knife. Peeling nibi is currently preferred for the furniture industry, but if it becomes scarce due to overharvesting or logging, scraping nibi might be a suitable alternative.

Economy: The cheaper furniture is sold for ca. US$ 20 per chair, while the more elaborate creations go up to US$ 700 a piece. In 1996, more than 30 Georgetown craft shops were exporting furniture, with a total estimated value of US$ 137,120 (see *Clusia grandiflora*). Nibi baskets are sold on regional and national markets. Gold miners regularly buy warishis for US$ 4 per piece to carry provisions and gasoline to their camps.

Notes: (1) The Carib ‘akawari’ and the Warao ‘ini’ stand for both types of nibi: *H. flexuosa* and *T. bissectus*; (2) See plate 10; (3) See plate 6; (4) See plate 7.



38. *Hymenaea courbaril* a. flowering branch; b. flower; c. leaves; d. complete fruit (l) and fruit with part of the wall and pulp removed (r); e. trunk base; f. seedling, young (l) and older (r).

38. **Hymenaea courbaril** L. var. **courbaril** **LEGUMINOSAE-CAESALP.** **Locust**

Vernacular names: Locust, Stinking toe (Cr), Kawanari (Ar), Simiri (C), Kahawanaru arau (Wr).

Botanical description: Tree, to 45 m tall; trunk to 1 m in diam., cylindrical, base straight or buttressed, with superficial roots to 5 m long,. Outer bark light to red-brown, smooth or warty lenticellate, cracked, inner bark pink to red-brown, turning dark orange when exposed to air, sapwood light brown, heartwood dark red-brown. Exudate colourless, coagulating into a white, brittle resin. Leaves alternate, bipinnate, asymmetric; stipules linear, to 3 cm long, enclosing the leaf bud, caducous; petiole ca. 1.5 cm long; leaflets sessile, leathery, obovate to elliptic, sickle-shaped, to 10 x 5 cm, glabrous, glandular-punctate, shiny above, apex shortly acuminate, base oblique, rounded. Inflorescence a terminal panicle ca. 10 cm long. Flowers zygomorphic, ca. 3 cm long; calyx cup-shaped, 1 cm long, 4-lobed, lobes leathery, ca. 15 mm long; petals 5, whitish, (ob)ovate, ca. 2 cm long; stamens 10, free, ca. 3 cm long, exserted. Pod woody, dark to light brown, oblong-ellipsoid, to 14 x 6 x 2 cm, glabrous, shiny, dotted with numerous resinous pockets, indehiscent; seeds 2-4, flattened, red-brown, broadly obovoid to ellipsoid, ca. 2 cm in diam., embedded in a mealy, yellowish, unpleasantly scented pulp.

Distribution and ecology: Central America, northern South America and the West Indies, occasional along rivers in mixed and Mora forest, also in marsh forest, particularly common in eastern Guyana (Polak, 1992). In northwest Guyana, common as juvenile in secondary forest and as large adult in mixed forest in Moruca. In the Barama area the species is rare. Flowering mainly in May and June; fruiting almost throughout the year (Polak, 1992). In Moruca, fruits were ripe in December-February. Flowers are pollinated by bats; seeds are dispersed by monkeys and rodents, who eat the fruit pulp (van Roosmalen, 1985).

Use: The woody pods are broken open with a hammer or cutlass to consume the powdery, soursweet seed pulp. In spite of their smell of stinking feet, the fruits are much prized. When gathering the pods, they must be shaken: if they rattle, weevils have infested the seeds; if they produce no sound, they are still good. Locust trees are spared when farmers clear forest for agriculture.

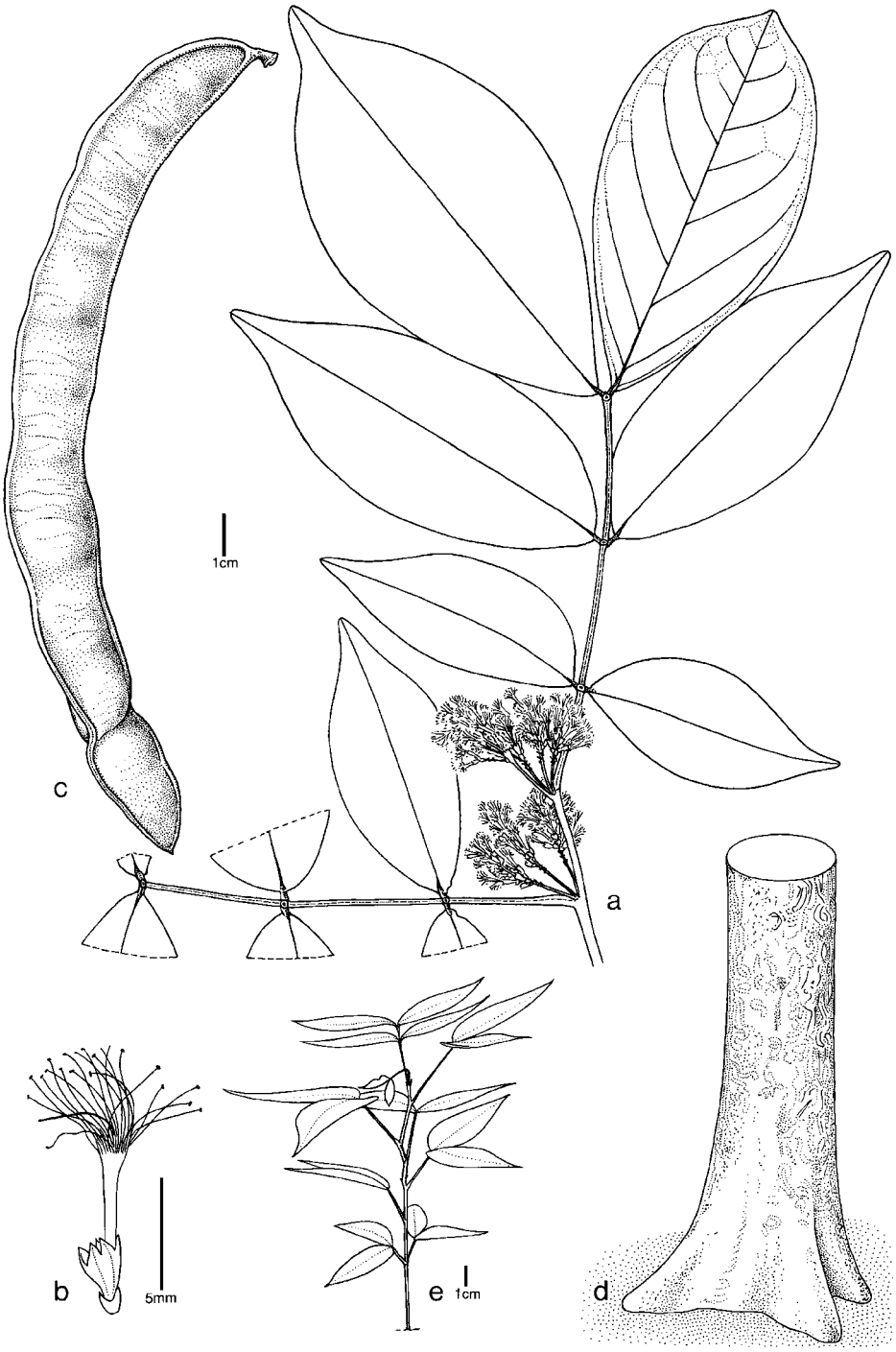
A popular beverage is made from the bark. A piece of ca. 25 x 5 cm is cut off and the rough outer layer is scraped off. The bark is dried in the sun; fresh bark is not used. When dry, the bark is chipped, boiled, and drunk with milk and sugar, just like chocolate milk. Locust trees along frequently used forest trails in Moruca were stripped from nearly all their bark at man's height. The bark tea is also drunk against colds, back pain, diabetes, and general body pain. Aphrodisiacs are made with locust bark and some of the following ingredients: cockshun root (*Smilax schomburgkiana*), kapadula wood (*Tetracera* spp., *Pinzona* sp., *Doliocarpus* sp.), kufa root (*Clusia* spp.), sarsparilla root (*Dioscorea trichanthera*), monkey ladder wood (*Bauhinia* spp.), granny backbone wood (*Curarea candicans*), and devildoer wood (*Strychnos* spp.). The ingredients are soaked in alcohol or boiled in water, and added to milkshakes, porridge, or other dishes. These 'builders' are said to protect against diseases, stimulate sexual activities, and help against a 'weak back' (impotence). Stories were told of coastlanders who accidentally took the bark of soapwood (*Abarema jupunba*) or aromatta (*Alexa imperatricis*) for locust and died of poisoning after drinking the tea.

In coastal Guyana, locust bark is boiled with the barks of guava (*Psidium guajava*), jamoon (*Syzygium cumini*), starapple (*Chrysophyllum cainito*), the skins of pomegranate (*Punica granatum*), and orange (*Citrus sinensis*). A small glass is taken three times a day for the relief of 'bilious diarrhoea' (Lachman-White et al., 1992). Fanshawe (1948) reported an excellent cure for dysentery from a decoction of the barks of locust, tauroniro (*Humiria balsamifera*), and bulletwood (*Manilkara bidentata*). He also reported about an infusion of the bark to bathe ulcers, and that continuous drinking of locust tea caused constipation. Various terpenes and acids have been isolated from the bark (Grenand et al., 1987; Lachman-White et al., 1992). The heavy, hard, and durable wood is commercially marketed for house construction and furniture. In the interior, locust wood is preferred for canoes.

When the bark of the tree is damaged, resin trickles down the stem and hardens into lumps at the base. When the tree rots inside, a large amount of resin is formed internally, which becomes buried when the tree falls and decays. As much as a barrel full can be collected by digging around a fallen trunk. This resin, known locally as American or West Indian copal or Demerara gum, was exported from Guyana in colonial times for the manufacture of artificial amber and varnish (Fanshawe, 1948). However, since the quality appeared to be inferior to copaiba balsam from *Copaifera* spp. and to Asian and African copal (from other species of Caesalpiniaceae), the resin is not exported anymore from Guyana. Copal from the other species is still used for expensive lacquering and fumigating materials, since the resin contains chemicals toxic to fungi and termites (Rehm and Espig, 1991).

Amerindians formerly used the gum as incense or as torch, by inserting a piece of gum between a split twig and lighting it. Nowadays, the coagulated resin is used by elder Arawak musicians in Moruca to smoothen their violin strings. The traditional Banshikili music is still played there on home-made violins. In Suriname, the gum was rubbed on pottery as a varnish (Ostendorf, 1962). Roth (1924) mentioned that Amerindians were chewing the gum for stomach pains and windiness and inhaled the smoke from the burning gum to cure headache and rheumatism.

Economy: Locust pods harvested from Essequibo forests are occasionally sold around February at the Georgetown market. Locust bark is sold throughout the year at medicinal herb stalls. Ready-made aphrodisiacs cost US$ 3.50 per litre bottle. In the interior, locust canoes are sold according to their size, for ca. US$ 55. Locust is a highly prized timber on the domestic and international market (Polak, 1992).



39. *Inga alba* a. flowering branch; b. flower; c. fruit; d. trunk base; e. seedling.

39. **Inga alba** (Sw.) Willd. **LEGUMINOSAE-MIMOS.** **Maporokoñ**

Vernacular names: Whitey (Cr), Maporokoñ (Ar), Apurukuni (C), Maborokoni, Doho arau (Wr).

Botanical description: Tree, to 35 m tall; trunk to 75 cm in diam, base with buttresses to 1.5 m high. Crown often spreading. Outer bark red- to orange brown, lenticellate, with mosaic pattern from fallen scales; inner bark pink to dark red-brown, exudate clear, slimy, bitter, sapwood white, turning black when exposed to air, heartwood orange brown. Young branches angular, white-lenticellate, puberulous when young. Leaves alternate, 6-foliolate, rachis terete or winged in the upper part, with flat, interpetiolular glands, ca. 2 mm in diam.; stipules triangular, ca. 2 mm long, caducous; petiole ca. 3 cm long; leaflets opposite, elliptic to obovate, ca. 10 x 5 cm, glabrous, apex acute to acuminate, base acute to obtuse. Inflorescence an axillary panicle of spikes, ca. 5 cm long, covered with brown hairs. Flowers actinomorphic, sessile; calyx white, cup-shaped, ca. 1 mm long, puberulous; corolla white, tubular, ca. 3.5 mm long; stamens numerous, united at base, ca. 15 mm long; ovary superior, glabrous, style and stigma 1. Pod green-brown, flat, narrowly oblong-ellipsoid, ca. 14 x 2 x 1 cm, glabrous, swollen over seeds, margin thickened, irregularly dehiscent; seeds 5-10, oblong-ellipsoid, ca. 1.2 cm in diam., embedded in white, fleshy pulp. Seedlings 2-foliolate, with slightly winged petiole, interpetiolular glands red, wider than the rachis.

Distribution and ecology: From southern Mexico to central Brazil and Bolivia, in well-drained primary and secondary lowland forest, occasionally on periodically flooded sites. In northwest Guyana, frequent in mixed and secondary forests. Seedlings germinate in cultivated fields and secondary shrubland. Flowering mainly from May to September; fruiting from October to March (Polak, 1992). In Barama, ripe fruits were seen in May-July and September-October. Seeds are dispersed by monkeys and birds.

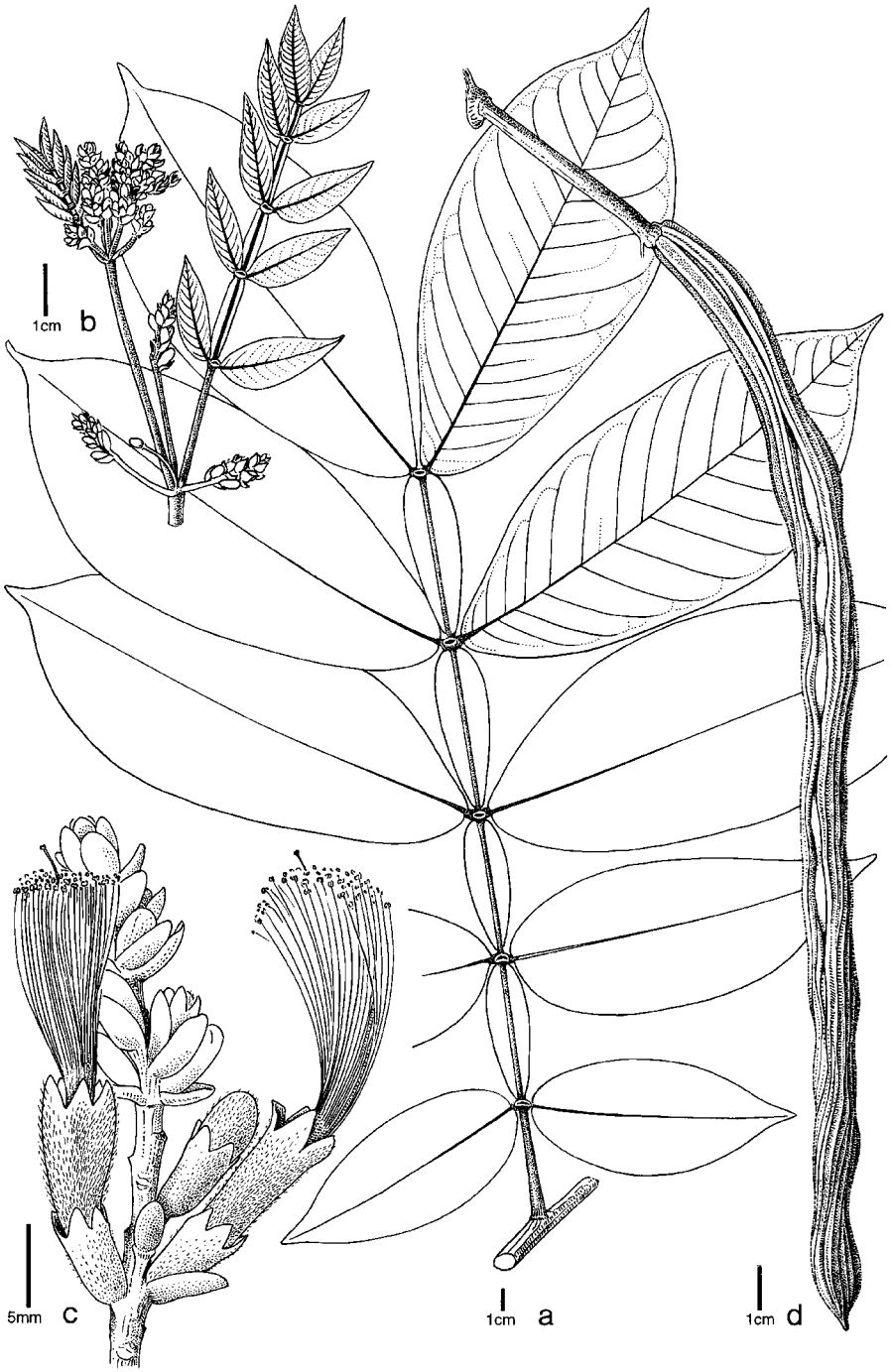
Use: The exudate of several *Inga* species, in particular *Inga alba*, is used as a colorant in tropical America, either pure or mixed with other colouring substances (Grenand and Prévost, 1994). The slimy bark scrapings are rubbed on clay pottery before this is baked in the fire. It gives the ceramic a purple-black stain; if not treated with the bark, the pots will soon break[1]. In remote Carib communities, traditional clay pots are used on a daily basis to cook and to brew cassava beer. Because of their valuable bark, maporokoñ trees are often spared when felling forest for agriculture. Trees growing close to the village are regularly stripped from their bark. The bark is also rubbed as a varnish on home-made guitars and banjos, and dries like shellac. To obtain a black paint, bark scrapings are mixed with battery acid, charcoal from *Trema micrantha*, or soot from kerosene lamps or cooking pots. The dye is used to paint calabashes, basketry, and black boards in schools. Fishing rods are sometimes painted black to prevent the fish from being distracted by the white yariyari wood (*Duguetia* spp.). Mixed with onotto (*Bixa orellana*), the bark yields a red dye, used to paint calabashes.

Bark scrapings are put as a poultice on swellings and abscesses to keep them down or to draw out the pus. The inner bark is boiled or soaked in hot water and drunk by women to induce permanent sterility. After drinking the bark, a woman will be unable to produce children, even though her menstruation continues. It is believed that if a menstruating woman urinates in a piece of the outer bark, her womb will shrink just like the maporokoñ bark coils up when dry, and she will be unable to become pregnant. The process is said to be irreversible. Fanshawe (1948) reported that an infusion of the bark was used to bathe skin ulcers. Fresh bark was rubbed on the skin to ease munuri ant stings. In French Guiana, the bark tea is drunk against dysentery and applied externally on skin infections and bush yaws (*leishmaniasis*) (Grenand et al., 1987).

Fresh bark scrapings are stuffed in creases in canoes or boats. When left to dry on the land, the caulking will be hard within a day. The fruit pulp around the seeds is edible, but not much esteemed because the flesh is thin and slightly bitter. The orange wood of maporokoñ is used to make canoes, but they apparently do not to last very long. In the past, drinking vessels for cassava beer (paiwari, cassiri) were made from this wood. These large 'cassiri canoes' were still used in remote Carib communities in Barama and Barima. The cassava beer will quickly obtain its required sour taste in a maporokoñ vessel, because the wood is said to be a little sour. The wood is locally used for firewood.

Economy: Maporokoñ bark is not sold by itself, but it is indispensable for the production of clay pottery, which is sold on a regular basis in Carib communities. The paint is also used for tourist pottery, basketry, and crafts. The wood is a commercial timber (Polak, 1992).

Notes: (1) See plate 13.



40. *Inga edulis* a. leaf; b. inflorescence with young leaves; c. flowers; d. fruit.

40. **Inga edulis** Mart. **LEGUMINOSAE-MIMOS.** **Rope whitey**

Vernacular names: Rope whitey, Baboon tail whitey (Cr), Warakosa[1], Korokoroshiri (Ar), Paidyawa (C), Doho arau (Wr).

Botanical description: Tree, to 40 m tall; trunk to 65 cm in diam., buttresses to 1 m high. Outer bark smooth, brown with white patches, inner bark pink, sapwood whitish yellow. Young branches lenticellate, yellowish to purple-brown puberulous. Leaves alternate, to 12-foliolate, rachis ca. 14 cm long, broadly winged, to 1.6 cm wide, puberulous, interpetiolular glands sessile, ca. 3 mm in diam.; stipules oblong to narrowly elliptic, ca. 4 mm long, puberulous, caducous; petiole terete, ca. 3.5 cm long, puberulous; leaflets opposite, elliptic to obovate, terminal pair ca. 15 x 6 cm; basal pair ca. 6 x 3 cm, apex acute to attenuate, base rounded, slightly asymmetrical, midrib puberulous above. Inflorescences axillary spikes, sometimes clustered at the shoot apex in the axils of undeveloped leaves; peduncle ca. 3 cm long, yellowish brown puberulous, floral rachis ca. 3 cm long; bracts ca. 6 mm long, caducous. Flowers actinomorphic, tubular, sessile, puberulous to silky villose, sweet smelling; calyx green, tube ca. 6 mm long, lobes ca. 1.5 mm long; corolla white, tube ca. 1.5 cm long, lobes ca. 3 mm long; stamens 55-100, staminal tube ca. 1.5 cm long, filaments partly free, pale yellow, ca. 2 cm long; ovary superior, 1-locular, glabrous, style 1, slightly longer than stamens. Pod greyish green, cylindrical, ribbed, to 1 m long and 3.5 cm in diam., straight or spirally twisted, puberulous; seeds 20-30, ca. 2.5 x 1.3 cm, embedded in sweet, white pulp. Seedlings with reddish leaves, rachis broadly winged.

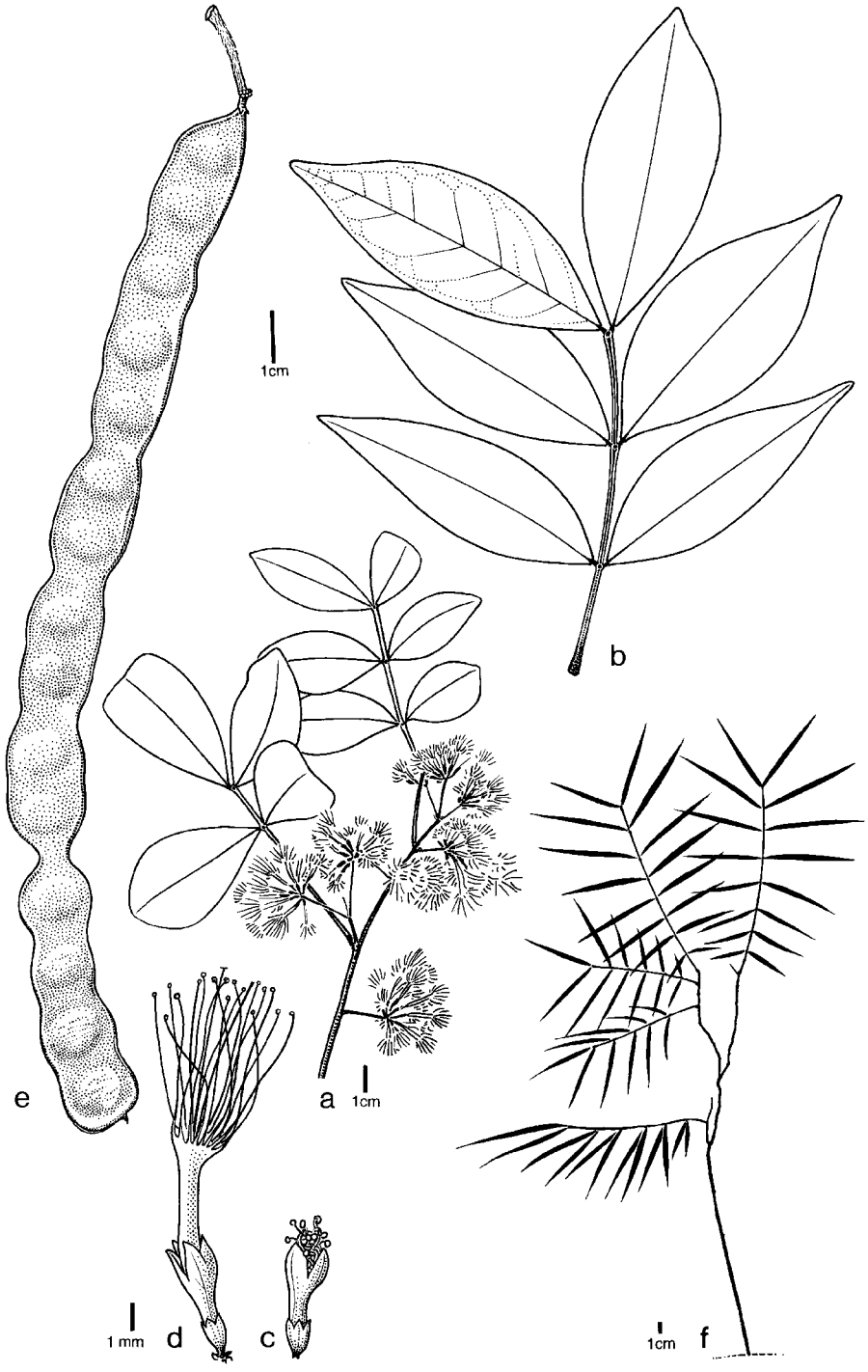
Distribution and ecology: Northern South America to northern Argentina and the Atlantic coast of Brazil, in gaps in lowland rainforest (Pennington, 1997). In northwest Guyana, locally common in non-flooded secondary vegetation around villages. Seedlings germinate in secondary forest, in cultivated and abandoned fields. In Barama, trees were flowering in October and fruiting around January, while most other *Inga* species were fruiting in October. The tree is capable of resprouting after the trunk has been cut.

Use: The white pulp around the seeds is sweet and much esteemed. Although a wild species, *Inga edulis* is widely cultivated throughout South and Central America for its edible fruits. Some of the best cultivars are grown in Peru, where the fruit can attain a size of 2 m long and 6 cm in diam. (Pennington, 1997). The species is commonly planted as shade tree in coffee plantations, because of its rapid growth and broad crown. In northwest Guyana, the tree is frequently spared in secondary vegetation and kept as fruit tree, but the species is not deliberately planted.

The wood is used as firewood. The species is not used medicinally and was found to be alkaloid-negative (Schultes and Raffauf, 1990).

Economy: In Guyana, the species seems to be used for subsistence only. The fruits have not been observed at local or regional markets. In many other Amazonian countries, the fruits are commercialised.

Notes: (1) The names ‘whitey’ (Cr), ‘warakosa’ (Ar) and ‘doho arau’ (Wr) are given to most *Inga* species.



41. *Inga lateriflora* a. flowering branch; b. leaf; c. flower bud; d. flower; e. fruit; f. seedling.

41. **Inga lateriflora** Miq. **LEGUMINOSAE-MIMOS.** **Shirada whitey**

Vernacular names: Shirada whitey, Turtle foot whitey (Cr), Shirada (Ar), Doho arau (Wr).

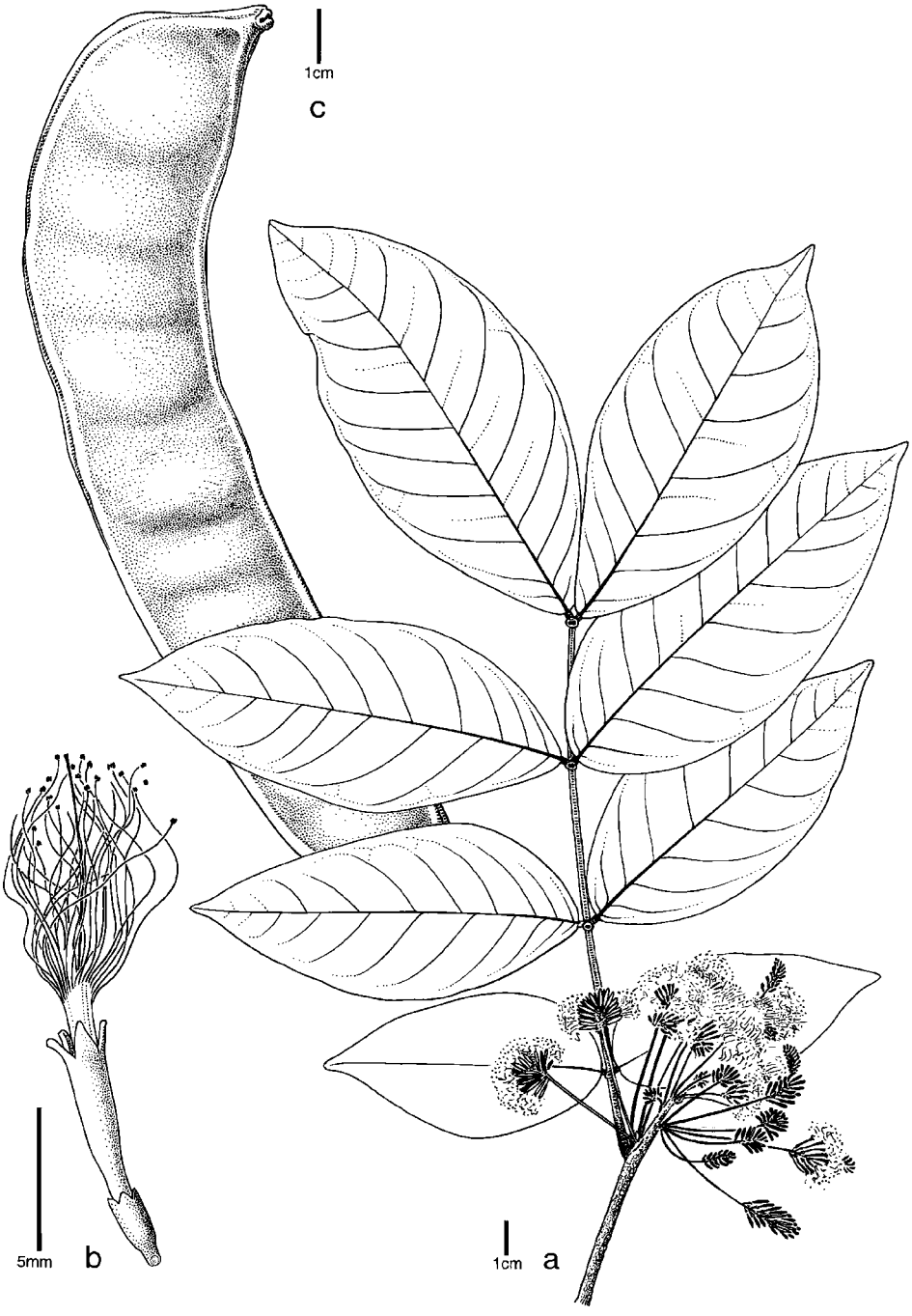
Botanical description: Tree, to 30 m tall; trunk to 70 cm in diam. Outer bark smooth, lenticellate, inner bark occasionally with some reddish resin. Young branches terete, lenticellate. Leaves alternate, to 8-foliolate, rachis ca. 3.5 cm long, narrowly winged, glabrous, interpetiolular glands sessile, cup-shaped, ca. 1.5 mm in diam.; stipules narrowly elliptic, ca. 1 mm long, puberulous, persistent; petiole narrowly winged, ca. 1 cm long; leaflets elliptic, ca. 6 x 2.3 cm, glabrous, apex narrowly acute, base acute to cuneate. Inflorescence axillary, umbellate, mostly below the leaves, umbels clustered on small woody protuberances and on short, leafless shoots, rachis ca. 1 mm long; peduncle ca. 1 cm long, puberulous; bracts minute, caducous; pedicels ca. 1 mm long. Flowers actinomorphic, tubular, sweet smelling; calyx green, tube ca. 0.7 mm long, lobes ca. 0.2 mm long, sparsely puberulous; corolla green, glabrous, tube ca. 2 mm long, lobes ca. 2 mm long; stamens 20-30, white, staminal tube ca. 8 mm long, filaments free, ca. 5 mm long; ovary superior, glabrous, 1-locular, style 1, slightly exceeding the stamens. Pod yellowish green, ca. 12 x 1.5 x 1 cm, first flat, later becoming swollen around the seeds, glabrous; seeds 16-18, ca. 1 x 0.7 cm. Seedlings with feathery, linear leaflets.

Distribution and ecology: Venezuela, the Guianas, Amazonian Brazil, Peru, and Bolivia. In primary or disturbed rainforest, dry forest and savannas, usually on white and brown sands, often in poorly drained sites. In northwest Guyana, frequent along sandy roads in the Moruca area, occasional in mixed forest. Only observed in the coastal region. Flowering in the Guianas from July to December (Pennington, 1997). In Moruca, the species was flowering for only two days in the second week of October. The flowers were visited by large numbers of bees. Fruiting probably around January-February. Seeds are dispersed by monkeys and birds (van Roosmalen, 1985). The tree is capable of resprouting after the trunk has been cut.

Use: The sweet, white pulp around the seeds is eaten. The abundance of shirada whitey trees along the village roads in Moruca is probably caused by passers-by spitting out the seeds after consuming the fruits.

The inner bark of the tree is scraped and applied as poultice on cuts to prevent infection. The bark is boiled with a pinch of salt, and the decoction is used to cleanse skin sores. Similar to the bark of maporokoñ (*Inga alba*), the juicy bark scrapings are mixed with the soot from underneath cooking pots to obtain a black dye, used to paint paddles, basketry, calabashes, and furniture. The paint gives a glossy appearance. If no soot is added and the bark is rubbed directly on the wood, the dye will become purple. The species not used to strengthen clay pottery.

Economy: Pennington (1997) mentioned that the wood was used for construction in Guyana, but the species was not listed as a commercial timber species by Polak (1992). The paint is employed in small-scale commercial craft production, although probably to a lesser extent than maporokoñ.



42. *Inga pezizifera* a. flowering branch; b. flower; c. fruit.

42. **Inga pezizifera** Benth. **LEGUMINOSAE-MIMOS.** **Mora whitey**

Vernacular names: Mora whitey[1], Whitey (Cr), Warakosa (Ar), Anakara, Anakoro (C), Doho arau (Wr).

Botanical description: Tree, to 35 m tall; trunk to 40 cm in diam., sometimes with low buttresses. Crown flat. Outer bark pale grey to pinkish brown, smooth or slightly rough, inner bark pink, sapwood white. Young branches red-brown, puberulous, with pale lenticels. Leaves alternate, to 12-foliolate, rachis flat but not winged, ca. 11 cm long, interpetiolular glands cup-shaped, ca. 2 mm in diam.; stipules oblong to narrowly elliptic, ca. 7 mm long, puberulous, caducous; petiole ca. 2.5 cm long, puberulous; leaflets opposite, elliptic, ca. 15 x 6 cm, apex shortly acuminate, base acute to rounded, slightly asymmetrical. Inflorescences axillary, in bundles of 5-7 racemes, clustered near the apex of young branches; peduncle ca. 3.5 cm long, puberulous; bracts minute, caducous. Flowers actinomorphic, tubular, sweet smelling; calyx green, tube ca. 1 mm long, lobes ca. 0.3 mm long, puberulous; corolla white, ca. 5 mm long, lobes ca. 1.5 mm long, sparsely appressed puberulous; stamens 37-55, white, staminal tube ca. 6 mm long, filaments ca. 7 mm long; ovary superior, glabrous, 1-locular, style slightly exceeding the stamens. Pod pendent, dark green, glossy-verrucose, asymmetrical, ca. 18 x 3 x 1.5 cm, apex and base rounded, strongly swollen over seeds, margins ca. 5.5 mm thick, slightly raised, glabrous; seeds 16-18, ca. 2 x 1 cm, surrounded by thick, white pulp. Tree is capable of resprouting after the trunk has been cut.

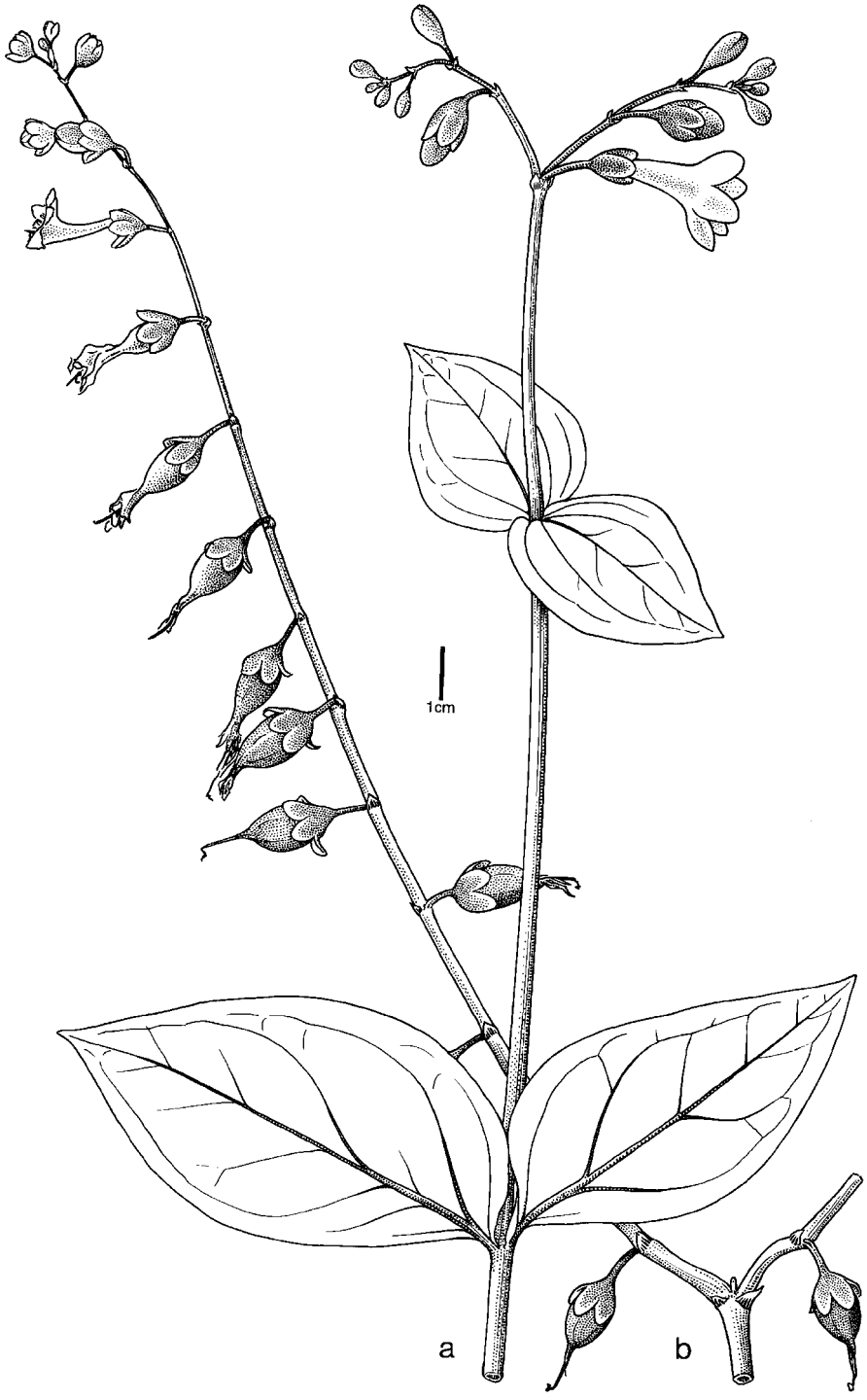
Distribution and ecology: From Costa Rica to northern South America and Amazonian Brazil. Mostly in disturbed forest, along riverbanks and roadsides, but also in primary lowland rainforest (Pennington, 1997). In northwest Guyana, frequent in disturbed mixed forest and secondary forest around villages. Flowering and fruiting throughout the year (Pennington, 1997). In Barama, the species was flowering massively in January. Ripe fruits were seen from late August to early November. Seeds are dispersed by monkeys and macaws.

Use: The white seed pulp is thick and sweet and loosens easily from the seeds. Trees often bear a heavy fruit crop. Mora whitey is considered to be one of the best 'wild whiteys'. Trees are often cut down to harvest the fruits, which are then taken home. The species is not planted, but is occasionally spared from weeding around house yards. The wood is locally used for firewood.

In French Guiana, the bark scrapings are mixed with soot to obtain a black dye, which is used to paint calabashes and basketry. A similar technique is used as with the bark from other *Inga* species (Grenand and Prévost, 1994). In the same country, the bark tea is drunk to combat dysentery and applied externally on skin infections, ant bites, and bush yaws (*leishmaniasis*). These practises were not observed in Guyana. The bark appears to be rich in tannins, which could explain its effectiveness against dysentery (Grenand et al., 1987).

Economy: The species is used for subsistence only.

Notes: (1) The wood of this species is hard like Mora wood (*Mora excelsa*), hence the name 'Mora whitey'.



43. *Irlbachia alata* subsp. *alata* a. habit; b. infructescence.

43. **Irlbachia alata** (Aubl.) Maas subsp. **alata** **GENTIANACEAE** **Wild tobacco**

Synonyms: *Lisianthus alatus* Aubl., *Chelonanthus alatus* (Aubl.) Pulle

Vernacular names: Wild tobacco (Cr), Yuriballi[1], Tawakiu, Oriyo yurithe[2] (Ar), Salidore (C), Aha muhuka[1] (Wr).

Botanical description: Terrestrial herb, to 2 m tall. Stem 4-angled, glabrous, 4-winged at the base, woody. Leaves opposite, simple, sessile; stipules absent; petioles absent; blades fleshy, ovate to elliptic, ca. 10 x 5 cm, apex acute, base decurrent. Inflorescence a terminal cyme, bifurcate, to 25-flowered; pedicels ca. 10 mm long. Flowers actinomorphic; calyx green, ca. 8 mm long, 5-lobed, each lobe with distinct central, glandular, thickened zone; corolla yellowish green, funnelform to salverform, ca. 2.5 cm long, 5-lobed; stamens 5; ovary superior, 2-locular, style and stigma 1. Fruit a septicidal capsule, almost woody, ellipsoid, ca. 15 x 5 cm, crowned by the persistent style base and corolla remnants; seeds numerous, cubical, less than 0.5 mm in diam.

Distribution and ecology: From southern Mexico to Bolivia and Brazil, in non-inundated forest, on sandy and clayey soil (Maas, *in press*). In northwest Guyana, common as weed in cultivated and abandoned fields. Flowering and fruiting in June and February (Maas, *in press*). Flowers were seen in Barama around December.

Use: As its name already suggests, this plant is used as a tobacco substitute. The crushed leaves are rolled in paper or winakakaralli bark (*Lecythis corrugata*) and smoked when people have run out of cigarettes. However, the plant is more often used in herbal medicine. A tea from wild tobacco leaves is drunk against malaria, fever, colds, stomach disorders, and biliousness. The exact dosage depends on the disease and the recipe. For malaria, 6-14 leaves should be boiled in a pint of water. A small glass of the tea is drunk for nine days. For biliousness, the medicine was said to work only if three, five, seven, or any other odd number of leaves were used. Other informants told that only a few leaves should be boiled, otherwise the medicine would become too strong.

Following yet another formula, the whole plant, (including roots, leaves, and flowers), must be boiled in a pint of water with a little salt. The tea must be cooked down to a half a pint and drunk at once to treat malaria. A spoonful of fresh sap, squeezed from the leaves, is taken for the same disease. Wild tobacco tea is very bitter and obviously has a strong laxative effect. Patients said they experienced a 'flush clean out' after taking the medicine. The use of laxatives to treat intestinal disorders and other illnesses is common in Guyanese herbal medicine.

Wild tobacco is also used to ward off the 'bad eye'. Seven leaves must be picked alternatively from the eastern and the western side of the plant. The laxative tea from these leaves helps to get rid of bad spells put on by a malevolent enemy. People in Moruca said this medicine was of Surinamese origin. There the plant is probably used in religious winti practises, although the species was not mentioned in literature on herbal medicine in Suriname (Stahel, 1944; Heyde, 1987; Raghoenandan, 1994; van 't Klooster, 2000).

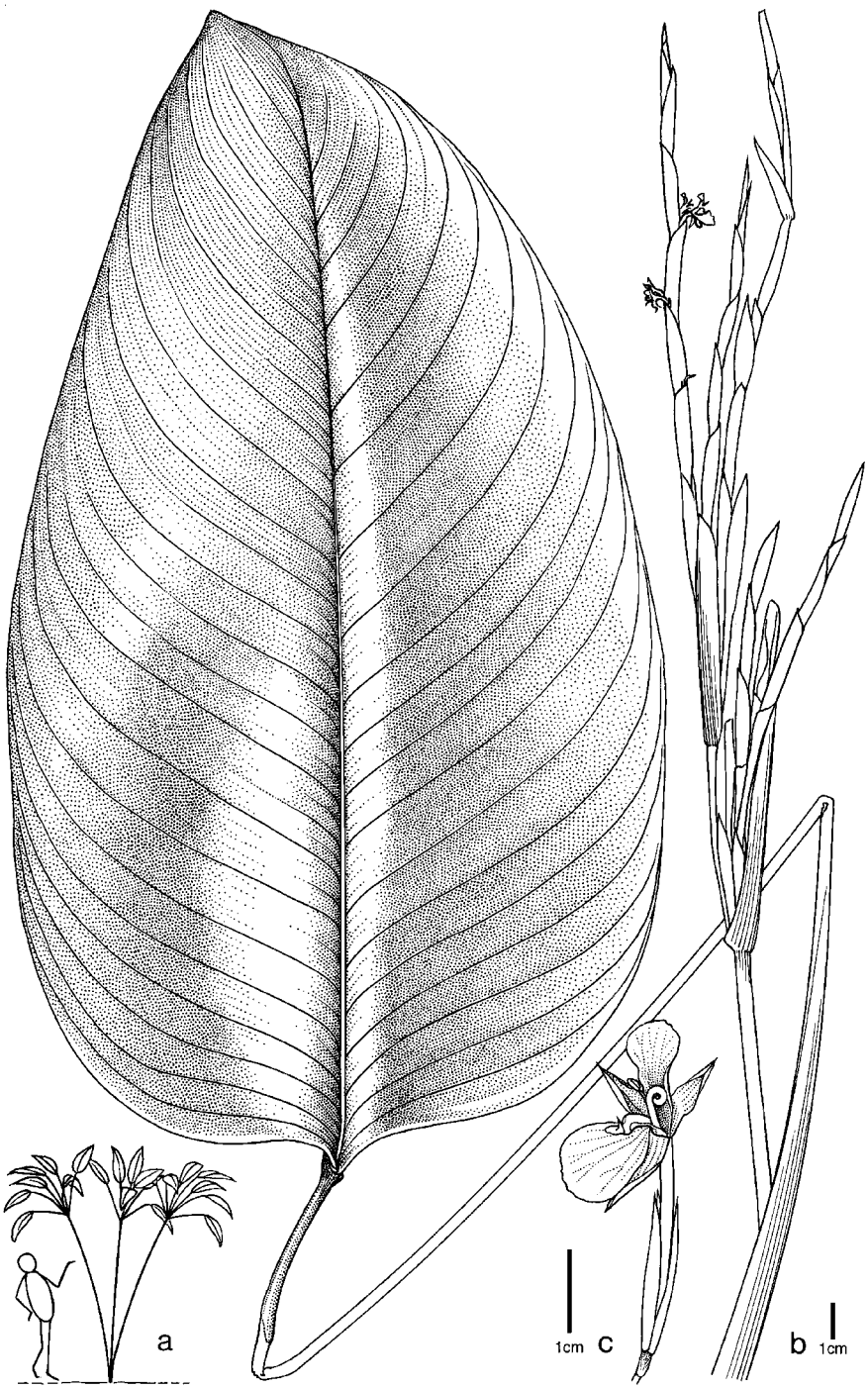
The leaves appear to have disinfectant properties as well. The sap from briefly heated and macerated leaves is squeezed in skin sores, bush yaws (*leishmaniasis*), and eczema. It is rubbed between the toes to cure ground itch (foot fungus) and on the skin of children suffering from itches. The sap, which gives a burning sensation, is rubbed on the body to prevent the attacks of bête rouge and to relieve the itch from this tiny orange tick. The body is bathed with a decoction of the leaves to ease bête rouge itch and fever.

In Georgetown, a tea from the leaves was recommended to give to babies suffering from thrush. This seems rather dangerous, considering the purging effect of the tea. A hot decoction of the leaves is used to cleanse skin sores and eczema. Afterwards, some of the boiled leaves are put as a poultice on the skin.

In Colombia, Witoto Indians dry and pulverise leaves and flowers for powdering clothing and bed sheets to ward off insects (Schultes and Raffauf, 1990). In the same country, a decoction of the leaves is used to bathe cattle suffering from skin worms, after which the crushed leaves are applied as a poultice on the worms. The bitter leaves rubbed on a woman's breast will stop her child feeding from her milk (Persoon, 1982).

Economy: The plant is sold on medicinal herb stalls at the Georgetown market.

Notes: (1) The Arawak and Warao names signify 'wild tobacco', after the resemblance with the cultivated tobacco (*Nicotiana tabacum*); (2) 'Tobacco of the water spirits' (Bennet, 1994).



44. *Ischnosiphon arouma* a. habit; b. inflorescence with leaf; c. flower.

44. **Ischnosiphon arouma** (Aubl.) Koern. **MARANTACEAE** **Mokru**

Vernacular names: Real mokru, Strong mokru, Hard mokru, Land mokru, Hill mokru (Cr), Itiribissi, Sarabana, Mokoro (Ar), Waruma, Tukusyi waruma (C), Sehuru, Sehoro (Wr).

Botanical description: Herb, to 3.5 m tall; stem erect, glabrous, canelike, ca. 2 cm in diam. Leaves arranged in a fanlike cluster on top of the stem; sheaths open, subglabrous to puberulous, papery; petiole to 45 cm long, pulvinus ca. 4 cm long; blades ovate, strongly excentric, ca. 30 x 15 cm, shiny green above, dull greyish to purplish green below, apex obtuse, base rounded. Synflorescence terminal, fasciculate, florescences 3-9, to 40 x 0.5 cm, with up to 15 spirally arranged spathes, spathes acute, puberulous, whitish, waxy, ca. 3 cm long; peduncle ca. 20 cm long. Flowers zygomorphic; sepals 3, free, ca. 2.5 cm long, pilose on the outside; corolla 3-lobed, ca. 5 cm long, lobes yellowish at the base, salmon pink to purplish at apex; fertile stamen 1, staminodes 3, two purplish, one yellow, hood-like; ovary inferior, 3-locular, densely pilose, style 1. Fruit a 3-valved, almost woody capsule, pilose at apex, ca. 2.5 x 0.8 cm; seed 1, arillate, ca. 1.5 x 0.5 cm.

Distribution and ecology: Panama, the pacific coast of Colombia, Venezuela, the West Indies, the Guianas, and the Amazon basin. Common along streams and edges of swamp forests, often forming extensive stands in moist secondary vegetation (Mori et al., 1997). In northwest Guyana, common in disturbed primary and secondary forest. Flowers are autogamous or pollinated by bees (Andersson, 1997).

Use: Mokru stems provide a very important fibre for the manufacture of household equipment. The cane is split into thin strips and the pith is scraped off with a knife. The strips are woven into sifters, fans, and matapis, the necessary equipment for the processing of bitter cassava (*Manihot esculenta*). The matapi, a long, tightly woven tube, is open on one side, and ends on the other side in a ring[1]. Some 8 to 15 stems are needed to make a matapi, which only lasts for a few months if used frequently. Various designs are made, with geometrical patterns named after plants and animals (see also Roth, 1924).

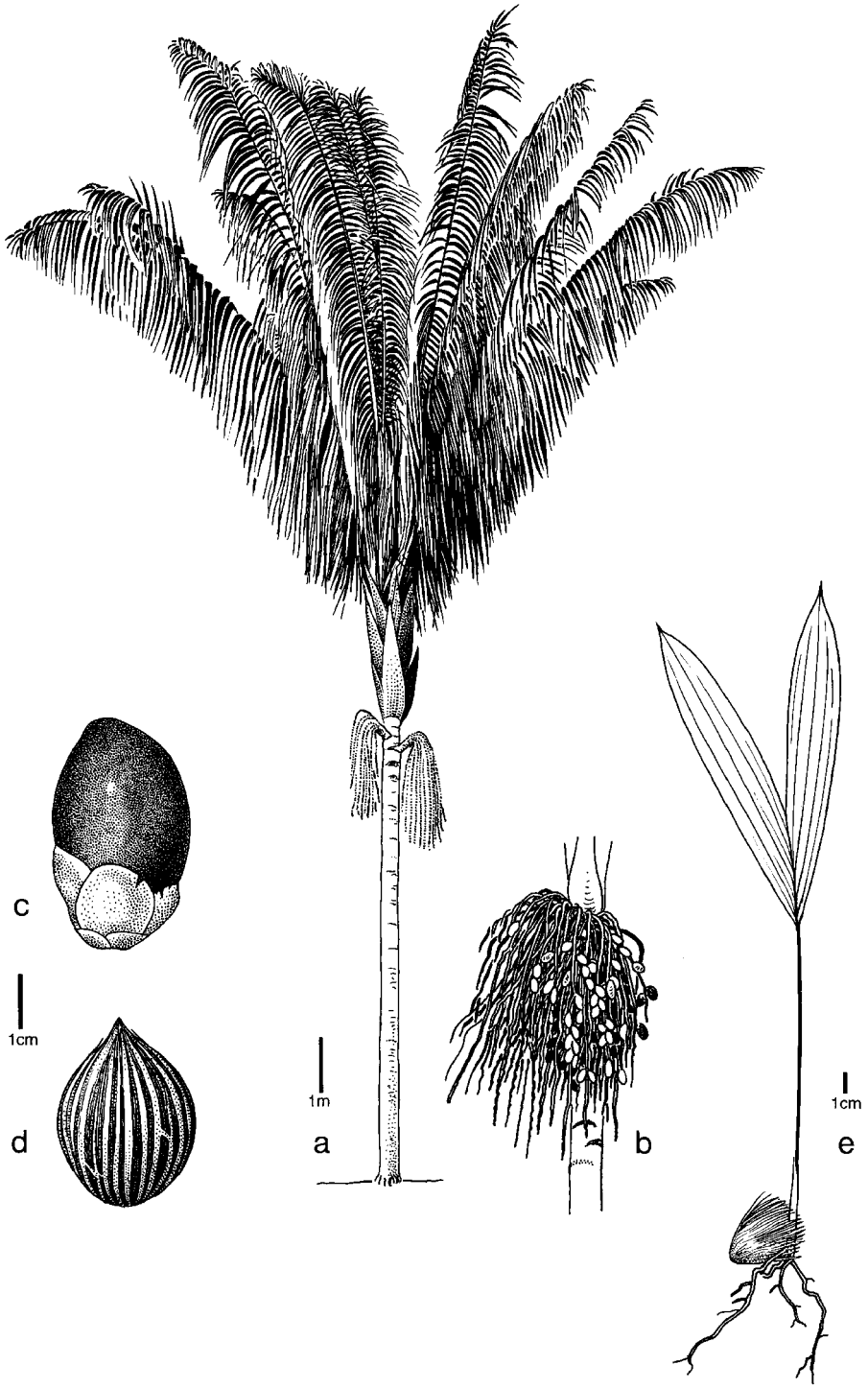
The matapi is filled handful by handful with the fresh, juicy mass from grated cassava roots. The tube is hung on a beam and a strong pole is passed through the ring at the bottom. When a woman puts her weight on this stick, the matapi is elongated, and the poisonous sap from the cassava is squeezed through the interstices of the plait and runs down the matapi into a pot placed beneath it. The cylindrical blocks of cassava flour are taken out of the matapi and dried. After a few days, they are crushed and sieved through a mokru sifter. The loose flour is baked into flat, circular breads[2]. Bitter cassava is the staple food of most indigenous tribes in Amazonia. Since a matapi is essential to extract the poisonous sap from these tubers, mokru is used on a daily basis throughout the Amazon basin.

Mokru is also used for a wide variety of other baskets: pegalls, small quakes, fish traps, and square trays to store cotton. Cassava processing equipment is traditionally made by men and used by women. However, in traditional communities quite some women and children knew how to weave a matapi. In the coastal villages, basketry is made and sold by specialised craftspeople, mostly elderly men. Mokru is one of the main materials for tourist souvenirs. Hard mokru (*I. arouma*) yields a stronger fibre than soft mokru (*I. obliquus*), and is preferred because its crafts tend to last longer. Both species are common and may occur in the same habitat. They are quite similar in appearance and often confused in literature (Fanshawe, 1948). *I. obliquus* has yellow flowers, a broader inflorescence, and somewhat larger leaves that are whitish waxy below. Soft mokru is used when *I. arouma* is scarce, or when crafts do not need to be strong.

In the coastal swamp region, mokru strips are used to stitch troolie leaves (*Manicaria saccifera*) to the roof frame. Due to frequent harvesting, mokru tends to be scarce in the periphery of indigenous villages. However, local craftsmen said they were able to collect sufficient material in a few hours to weave a matapi. Mokru leaves are used as wrapping material. Maize flour with meat and pumpkin is wrapped in a leaf and boiled. Fish is often roasted in mokru leaves. Small shelters ('stoppers') to protect goods from rain are made by inserting mokru leaves into split stems.

Economy: Sifters, fans, and matapis are sold in most Amerindian villages. Prices on regional markets vary from US$ 3.50 for a matapi to US$ 0.70 for a fan. Craft shops hardly sell these items, but focus rather on tourist items (ornamental baskets, mini matapis, etc.). Mokru crafts are widely for sale in Georgetown and exported in small volumes to the Caribbean islands, where they are sold again in tourist shops at higher prices.

Notes: (1) See plate 11; (2) See plate 23.



45. *Jessenia bataua* subsp. *oligocarpa* a. habit; b. infructescence; c. fruit; d. seed; e. seedling.

45. **Jessenia bataua** (Mart.) Burret subsp. **oligocarpa** (Griseb. & H. Wendl.) Balick **PALMAE** **Turu**

Synonym: *Oenocarpus bataua* Mart. var. *oligocarpa* (Griseb. & H. Wendl.) Henderson

Vernacular names: Chocolate palm (Cr), Turu (Ar), Patawa (C), Muhi (Wr).

Botanical description: Solitary palm; trunk to 26 m tall, ca. 30 cm in diam., base with small mass of slender roots. Outer bark gray to black, smooth or covered with sheath fibres and spines. Leaves 9-20, first erect, later spreading; sheaths open and not forming a crown shaft, ca. 1.5 m long, persistent on young trees, margins with a dense mass of black fibres; petiole ca. 1.2 m long; rachis 3-11 m long; pinnae 70-163 per side, regularly arranged and spreading in one plane, linear to narrowly elliptic, ca. 140 x 10 cm, grey-waxy below. Inflorescences below the leaves, pendent; peduncles ca. 17 cm long; outer spathe 90 cm long, inner spathe 1.7 m long, caducous, rachis ca. 35 cm long, rachillae 120-370, ca. 1 m long, yellowish brown, glabrous. Male flowers ca. 5 mm long; sepals triangular, ca. 1.3 mm long; petals ovate-oblong, ca. 5 mm long; stamens 8-19. Female flowers 6 mm long; sepals very broadly ovate, ca. 5 mm long; petals very broadly ovate, 4 mm long. Fruit purple-black, ellipsoid or oblong, ca. 3.5 x 2.5 cm, rounded at apex, cupule ca. 1.5 cm long; mesocarp purple; seed 1, smooth, with brown stripes, ovoid, ca. 2.5 x 2 cm, becoming fibrous on the outside when decaying.

Distribution and ecology: Northern Venezuela, Trinidad, and the Guianas, in swampy areas subject to periodic flooding, but also in upland forest (Balick, 1986). In northwest Guyana, frequent in coastal manicole swamps, rare in mixed forest. In Suriname, flowering from May to August; fruiting from January to April (Wessels Boer, 1965). In northwest Guyana, ripe fruits were seen from September to January. Fruits are dispersed by monkeys, peccaries, and birds (parrots, macaws and toucans) (van Roosmalen, 1985).

Use: A popular drink is made from the ripe fruits. They are soaked in warm water for ca. 10 minutes, until their shells become soft and burst. The water should not be too hot, otherwise the pulp becomes hard. The purple flesh is scooped out from the shells, seeds and shells are removed, and the thick liquid is strained, boiled for a short period, and mixed with milk and sugar. The dark brown and oily 'turu tea' resembles chocolate milk, but has a rather dry taste. The drink is occasionally fermented into an alcoholic beverage ('turu local'), but it is not very popular.

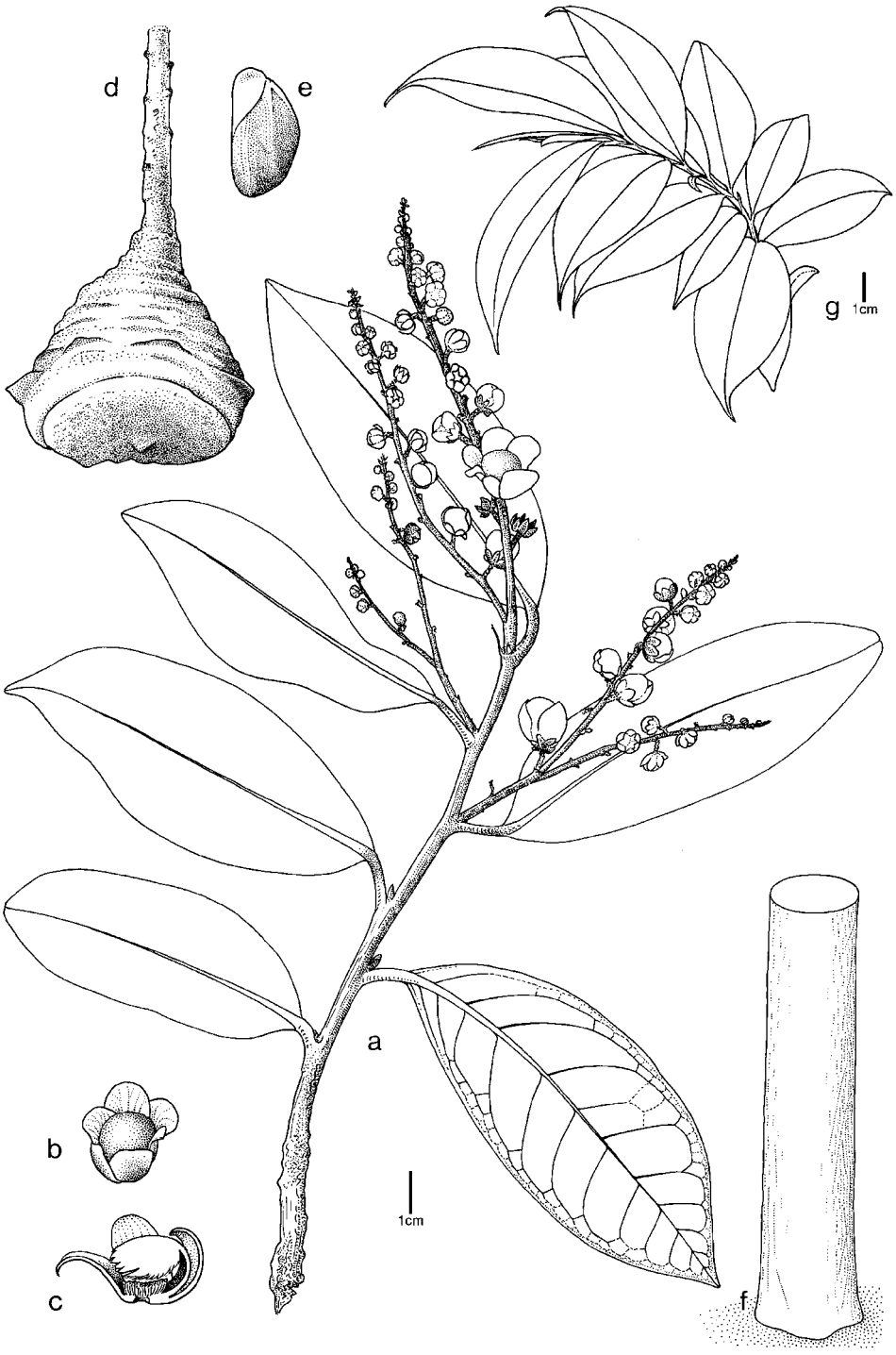
Because of the hard mesocarp, fruits cannot be consumed directly. Fresh fruits are sometimes kept inside the cheek pouches for about 15 minutes, until the shells have softened sufficiently to be removed and the fruit flesh can be eaten. 'Turu cook-up rice' is made by mixing the fruit pulp with rice. The large fruit bundles may bear more than 50 fruits on a single rachilla and weigh up to 35 kg, which makes them difficult to harvest without felling the tree. Turu palms may be spared from felling when forest is cut for cultivation, but will be chopped down when they start to bear fruits. In the coastal wetlands, turu is common and often consumed. About 75% of the households interviewed by Sullivan (1999) in this region mentioned turu as one of the main plants harvested from the forest. Deeper in the interior, turu is rare, and the felling of trees for fruits has led to local extinction.

The purple oil floating on top of the turu tea can be scooped off and used as frying oil. This high-quality oil, which has a physical and chemical composition identical to olive oil, is used by several ethnic Amazonian groups as hair oil and medicine for tuberculosis, bronchitis, asthma, and chest colds (Balick and Gershoff, 1981; Balick, 1986; Schultes and Raffauf, 1990). These applications were unknown in the study area. The palm heart from turu is eaten raw or cooked, but it is not industrially processed, since it is too large for the cans. Locals consider turu cabbage better than the cabbage from manicole (*Euterpe oleracea*). Turu leaves are used to thatch forest camps and ridges of dhalebana (*Geonoma baculifera*) roofs.

Two leaves are woven into a temporary basket ('waiari') to carry home forest products. The two midribs form the frame, while the pinnae are woven together to make the basket's sides[1]. The midrib ('turu bone') is used in arrow traps to catch large birds. The leaf is stripped from its pinnae, stuck in the soil and bent down to make a trap, to substitute the stronger yariyari stems (*Duguetia* spp.). A turu fruit or seed is put as bait for the birds. The larvae from the palm grub beetle *Rynchophorus palmarum* are collected from the rotten wood and eaten raw or fried.

Economy: In the 1940s, turu oil was exported from Brazil to the USA, but nowadays, it has lost its importance. In Colombia and Peru, the oil is still mechanically extracted and sold as medicine. In Guyana, the fruits are mostly used for subsistence, but occasionally, the fruits are sold at local markets for US$ 0.25 per pound.

Notes: (1) See plate 12.



46. *Lecythis corrugata* subsp. *corrugata* a. flowering branch; b. flower, top view; c. corolla and stamens, longitudinal section; d. fruit; e. seed with aril; f. trunk base; g. seedling.

46. **Lecythis corrugata** Poit. subsp. **corrugata** **LECYTHIDACEAE** **Winakakaralli**

Synonym: *Eschweilera corrugata* (Poit.) Miers

Vernacular names: Black kakaralli, White kakaralli, Tobacco skin (Cr), Winakakaralli[1], Karibiswina[2] (Ar), Tamïpipyo[3] (C), Aha wina[4], Kakarari (Wr).

Botanical description: Tree, to 35 m tall; trunk to 50 cm in diam. Branches smooth to slightly fissured, lenticellate. Outer bark purple-brown to greyish brown, rough, with vertical fissures, inner bark pink to orange-red, fibrous, stripping off easily, sweet-scented, turning brown after exposure, sapwood yellowish white, heartwood maroon. Leaves alternate, simple; stipules absent; petiole ca. 2 cm long; blades oblong-elliptic, ca. 17 x 7 cm, apex acute to obtuse, base acute, obtuse, or rounded. Inflorescence terminal or axillary, simple racemes, rachis ca. 10 cm long, puberulous. Flowers zygomorphic, ca. 3 cm in diam., sweet-scented; calyx 6-lobed, lobes ovate, ca. 4 x 3 mm; petals 6, pink or reddish purple, with tinges of white, obovate, ca. 15 x 10 mm; staminal hood flat, pink or reddish, ca. 12 x 9 mm; stamens ca. 170, filaments white, ca. 1.5 mm long; ovary inferior, style and stigma 1. Fruits broadly conical, turbinate, or globose, horizontally wrinkled, style persistent on lid as dull spine; seeds few, brown, ca. 23 x 17 mm.

Distribution and ecology: Venezuela, the Guianas, and Amazonian Brazil, relatively common on poorly drained clay soils, sandy soils and in secondary forests. In northwest Guyana, frequent in seasonally flooded Mora forests, occasional in mixed and secondary forest, and the edges of flooded savannas (Moruca). Flowers were observed in July and from October to December. Flowers are pollinated by large bees (Mori and Prance, 1990); seeds are dispersed by monkeys and rodents (van Roosmalen, 1985).

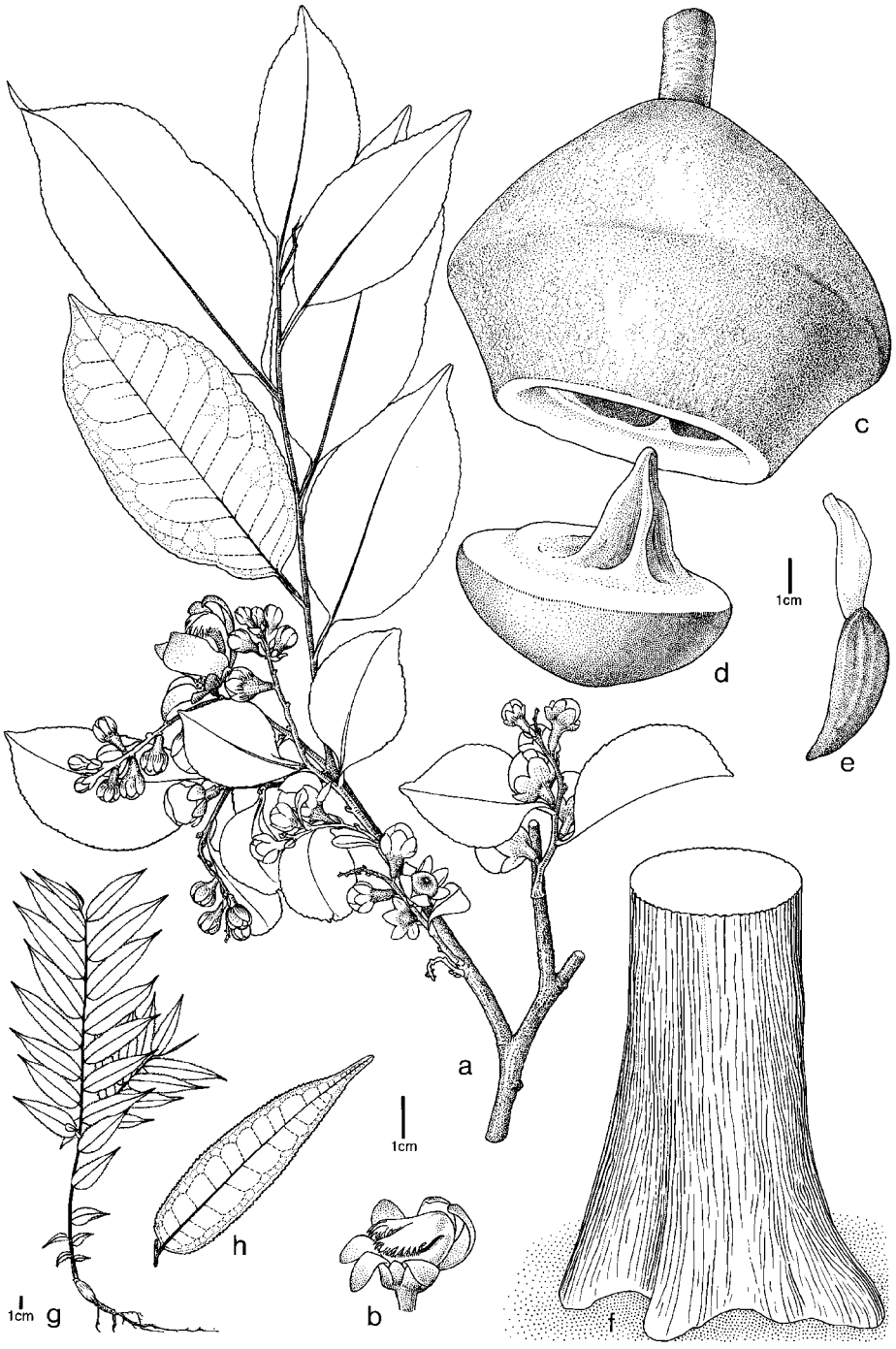
Use: In traditional Amerindian communities, where people still grow their own tobacco, the bark of this tree is used as cigarette paper. A piece of bark of ca. 75 x 8 cm is cut off and beaten with a small wooden club until it splits in numerous, papery thin layers. The bark strips are carefully separated and dried for a few days over a house beam, after which they are cut to size and rolled around a dry tobacco leaf. The bark can also be cut directly to a rectangular size, with the thin sheets still connected on one end, like a booklet of ready-to-use cigarette papers[5]. The cigarette is closed by tying a thin strip of bark around it. Although most people in the interior prefer 'modern' cigarettes, winakakaralli and home-grown tobacco (*Nicotiana tabacum*) are free of charge and their effect is much stronger. Besides that, the broad bark strips of winakakaralli are handy to roll marihuana joints. In gold mining areas, where marihuana is smoked frequently, Amerindian men collect and prepare winakakaralli bark and sell it to pork-knockers, who often cannot identify the tree in the forest. In less traditional villages, where tobacco is not widely cultivated, people have difficulties to recognise the winakakkaralli and confuse it with other kakarallis (*Eschweilera* spp.).

The bark strips of young trees are occasionally used as lashing material, but they are of lesser quality than the bark strips from *Eschweilera* species.

The hard and durable wood is locally used in house construction: trunks serve as house posts and smaller stems as runners. Large trees are made into canoes and sawn into boards. The timber is of limited use in industrial carpentry, as it is hard to saw and plane, takes nails poorly, turns badly, and is hard to polish (Mori and Prance, 1990).

Economy: The wood is a commercial timber in Guyana (Polak, 1992). Bark strips are occasionally sold in the interior gold mining area, but they are mostly used for subsistence only.

Notes: (1) 'Wina' means 'paper' in Arawak and Warao; (2) 'Carib paper'; (3) 'Tobacco skin'; (4) 'Cigarette / tobacco paper'; (5) See plate 17.



47. *Lecythis zabucajo* a. flowering branch; b. flower; c. fruit; d. lid; e. seed with aril; f. trunk base; g. seedling; h. seedling leaf.

47. **Lecythis zabucajo** Aublet **LECYTHIDACEAE** **Monkey pot**

Synonym: *Lecythis davisii* Sandw.

Vernacular names: Monkey pot (Cr), Waduduri (Ar), Tongo, Toko, Yarakaru tumarï epï[1] (C).

Botanical description: Tree, to 40 m tall; trunk to 90 cm in diam., buttresses to 2 x 1.2 m. Outer bark light brown to grey-brown, lenticellate, fissured, stripping off easily, inner bark cream to yellow, soft, fibrous, sweet-scented, sapwood cream, heartwood red-brown. Branches lenticellate, puberulous when young. Leaves alternate, simple; stipules absent; petiole ca. 7 mm long, grooved above; blades papery, elliptic, ca. 9 x 4 cm, glabrous, margin crenate, serrate in young leaves, apex shortly acuminate, base obtuse. Inflorescence an axillary, many-flowered raceme, rachis ca. 7 cm long. Flowers zygomorphic, ca. 4.5 cm in diam.; calyx 6-lobed, lobes ca. 7 mm long, persistent; petals 6, yellowish white, often with purple margin, ca. 2 cm long; staminal hood flat; stamens ca. 400, ca. 2 mm long; ovary inferior, 4-locular, style and stigma 1. Fruit a woody capsule with a lid, globose to turbinate, ca. 11 x 13 cm, glabrous, calyx remnants at ca. one third from the top; seeds 10-15, brown, spindle-shaped, 3-angled, ca. 3 x 1.5 cm, grooved, aril white, basally attached.

Distribution and ecology: Venezuelan Guayana, the Guianas, and Amazonian Brazil, occasional to frequent in mixed forest and seasonally flooded forest. In northwest Guyana, common in mixed and secondary forest. Flowering from August to November, fruiting in March and April (Polak, 1992). In northwest Guyana, the species was said to fruit only once every few years. Individuals with ripe fruits were observed twice: once in September (Barama) and once in December (Moruca). Although birds and monkeys feed on the seeds, they contribute little to their dispersal. Bats feed on the aril and may play a role in seed dispersal (Mori and Prance, 1990).

Use: The seeds are eaten raw and are occasionally fried in oil. In spite of their slight cyanide smell, they are very popular among locals. The seeds yield an oil suitable for cooking and industrial purposes (Fanshawe, 1948), but ripe seeds are rarely found on the forest floor. Trees are fruiting only sporadically, and then there is a heavy competition from monkeys, birds, and other animals. When the fruits are still in the tree, woodpeckers drill holes in the woody shell to take out the seeds, while wild pigs feed on the fallen seeds. Monkeys hit the fruit repeatedly on a branch until the lid comes off and the seeds fall out. In one Arawak settlement, monkey pot trees were spared during the cutting and burning of the surrounding forest.

Although the aril is said to be sweet and edible (Polak, 1992), it is not eaten in northwest Guyana. Children sometimes use the empty fruit shell as toy.

The bark from young trees is used as lashing material, but it breaks rapidly and is only used to substitute the bark of maho (*Duguetia* or *Sterculia*) or kakaralli (*Eschweilera* spp.). The thin bark strips may be used as tobacco paper when winakakaralli (*Lecythis corrugata*) is not available. In the past, Amerindian women used to cut a piece of monkey pot bark, beat it with a club until it became soft and fibrous and used it as a sanitary napkin. It is possible that the bark is still used every now and then, as napkins are not always for sale or quite expensive in the interior.

Economy: The species yields a commercial timber (Polak, 1992). The seeds are not commercialised in Guyana, but since their flavour is suitable for chocolates (Wickens, 1995), they might become a promising forest product if grown in cultivation or enrichment planting. A related species, *L. pisonis*, is cultivated and commercially harvested in Brazil. Its seeds are occasionally marketed as paradise nuts in Europe and the USA (Mori and Prance, 1990).

Notes: (1) This Carib name means ‘monkey pot tree’.

48. *Lonchocarpus chrysophyllus* a. flowering branch; b. flower; c. flower with only keel present; d. flower with all petals removed, showing staminal tube and style; e. young fruit.

48. **Lonchocarpus chrysophyllus** (Poir.) DC. **LEGUMINOSAE-PAPIL. Black haiari**

Vernacular names: Black haiari (Cr), Haiari (Ar, C), Wakorokoda (Ar), Inyeku (C), Aiari (Wr).

Botanical description: Liana, to 20 m tall; trunk to 20 cm in diam. Roots with white exudate. Outer bark brownish grey, lenticellate, with strong cucumber scent. Older branches dark green to black, young branches and leaves golden brown puberulous. Leaves alternate, 7-foliolate, rachis to 25 cm long; stipules minute, caducous; petiole to 10 cm long; leaflets opposite, oblong, ca. 17 x 7 cm, glabrous, dark green above, golden puberulous below, apex acuminate, base rounded or obtuse. Inflorescences axillary, many-flowered, often branched racemes, rachis puberulous, to 13 cm long; bracts minute. Flowers zygomorphic; calyx campanulate, ca. 6 mm long, shortly 5-dentate, densely golden sericeous; petals 5, purple, puberulous outside, clawed, standard with a white centre, suborbiculate, ca. 12 mm in diam., wings falcate-oblong, ca. 11 mm long, keel ca. 7 x 3 mm; stamens 10, connate; ovary superior, minutely puberulous, style 1. Pod not known.

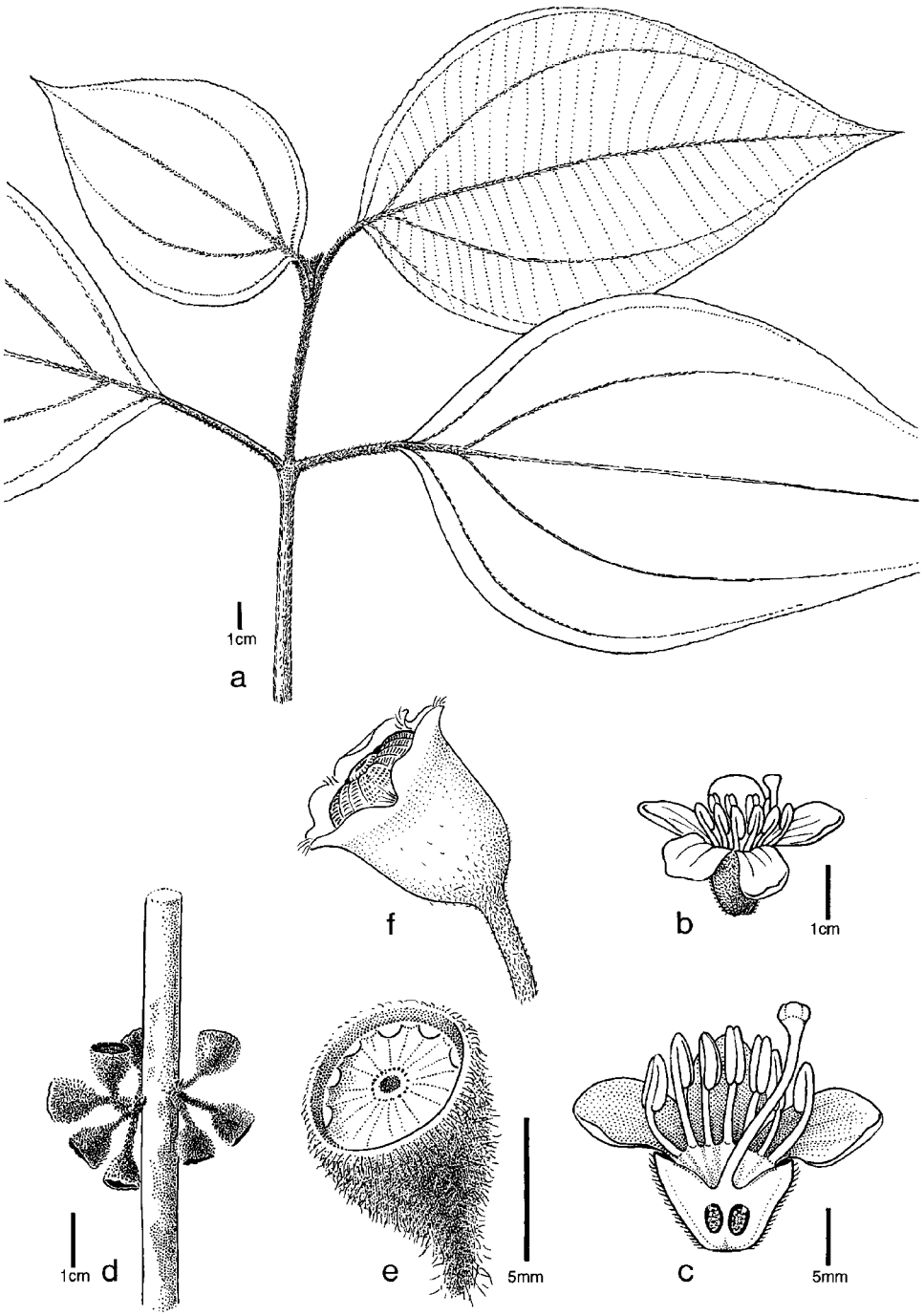
Distribution and ecology: Central America, northern South America, the West Indies, and the Guianas. In northwest Guyana, occasionally in Mora and mixed forest. In sparsely populated areas, haiari still occurs in the wild, but in densely populated regions, the species is found only planted in house yards or abandoned fields. Most species only occasionally bear flowers or fruits (Moretti and Grenand, 1982). In Moruca, flowers were observed once in October.

Use: Black haiari is considered one of the strongest fish poisons in northwest Guyana. The light brown, shallow roots are dug out and cut in pieces of ca. 75 cm long. Young stems can be used as well, but they are less effective. About six pieces are sufficient to poison a small creek. The roots are pounded at the edge of a forest creek or pond. After repeated beating, the roots become soft and fibrous and release a white sap. The shredded fibres are soaked in the water. After several minutes, the fish start floating towards the surface. Although stupefied, they quickly disappear when touched, and it still requires good skill to catch them. Large fishes like the haimara (*Hoplias macrophtalmus*) tend to sink down when poisoned. Fishermen have to dive down to catch them by hand. Black haiari is said to be particularly efficient to catch yarau (*Hoplerythrinus unitaeniatus*). Baskets full of fish are caught with this method. The surplus is often sold among villagers. The creek mouth may be closed off by a fence of mokru (*Ischnosiphon* spp.) to intercept the fish floating downstream. Should the fish reach the fresh river water, the poison will rapidly loose its effect.

The poisonous principle is comprised in an isoflavonoid complex, of which rotenone is the most potent. This compound causes a respiratory depression in fish. Small quantities of rotenone are relatively harmless to birds and mammals, but they kill insects and other cold-blooded animals. The Guyanese law prohibits the use of fish poison, since it has caused a severe decline in fish stocks around Amerindian settlements. However, the local police only occasionally arrests people using fish poison. Deeper in the interior, no control takes place at all.

Haiari is also used in the treatment of cancer and AIDS. The sap is applied externally on skin sores caused by these diseases. Small doses of black haiari sap (varying from three drops in a glass of water to one spoonful of undiluted sap) are drunk on a daily basis in the early stages of AIDS and intestinal cancer. The root sap of white haiari (*L. martynii*) and yaraukunam (*Tephrosia toxicaria*) is used similarly. The fish poison is believed ‘to kill the germs causing cancer and AIDS’. The side effects are quite bad (fainting, vomiting), but they last only a few days. Stories were told about the miraculous healing of terminal cancer patients (and occasional AIDS-infected persons) after using this treatment. Incidents were reported of desperate patients taking an overdose of a whole calabash full of haiari sap and recovering afterwards. The root sap is also diluted in a bucket of water and used as a bath for eczema, ground itch, and skin sores. For more information on the use of fish poisons and their (medicinal) uses, see chapter 7 (Part I of this thesis).

Economy: When rotenone was discovered as insecticide in 1929, an export trade in *L. utilis* and *L. urucu* developed in Peru and Brazil. The dried roots of these species contain 5-12% rotenone. They were quickly depleted in the wild and are now almost exclusively produced in plantations around Iquitos (Rehm and Espig, 1991). Krukoff and Smith (1937) considered the rotenone content of *L. martynii* and *L. chrysophyllus* too low to be commercially competitive with species from Peru and Brazil. Even though planting trials were carried out in Mabaruma in the 1930s, the species never became an export product. Haiari roots are sometimes sold at regional markets for US$ 0.10 per pound.



49. *Loreya mespiloides* a. leafy branch; b. flower; c. flower, longitudinal section; d. infructescence; e. fruit, densely puberulous type; f. fruit, glabrescent type.

49. **Loreya mespiloides** Miq. **MELASTOMATACEAE** **Small jiggernet**

Synonym: *Bellucia mespilioides* (Miq.) J.F. Macbr.

Vernacular names: Small jiggernet[1], Buck varnish (Cr), Itara (Ar), Pakiyapotai (C).

Botanical description: Tree, to 10 m tall; trunk to 8 cm in diam., with little red exudate. Leaves opposite, 5-7-pliveined; stipules absent; petiole ca. 4 cm long; blades membranous, with red veins, broadly elliptic to ovate, ca. 23 x 15 cm, moderately to densely strigose above, sericeous below, margin entire or dentate, apex acute to acuminate, base rounded to obtuse. Inflorescences in sessile clusters on old wood below the existing leaves; pedicels ca. 13 mm long. Flowers actinomorphic, 5-merous; hypanthium cup-shaped, ca. 8 mm long, sparsely to densely strigose; calyx lobes minute; petals fleshy, white and flushed pink outside, ovate to broadly triangular, ca. 13 x 10 mm; stamens 10, white; ovary inferior, 5-locular, glabrous, style 1, white, stigma capitate, 5-lobed. Fruit a berry, white to yellowish white, glabrous to densely puberulous, ca. 1.5 cm in diam.; seeds numerous, light brown, ovoid, very small.

Distribution and ecology: From Nicaragua to Colombia, Ecuador, the Guianas, and northeast Brazil, in primary and secondary lowland vegetation on non-inundated soils (Wurdack et al., 1993). In northwest Guyana, common in secondary forest and abandoned fields. Seedlings regenerate abundantly in cultivated fields. Ripe fruits were seen in Barama from December to January and from July to September. Seeds are usually dispersed by birds (van Roosmalen, 1985).

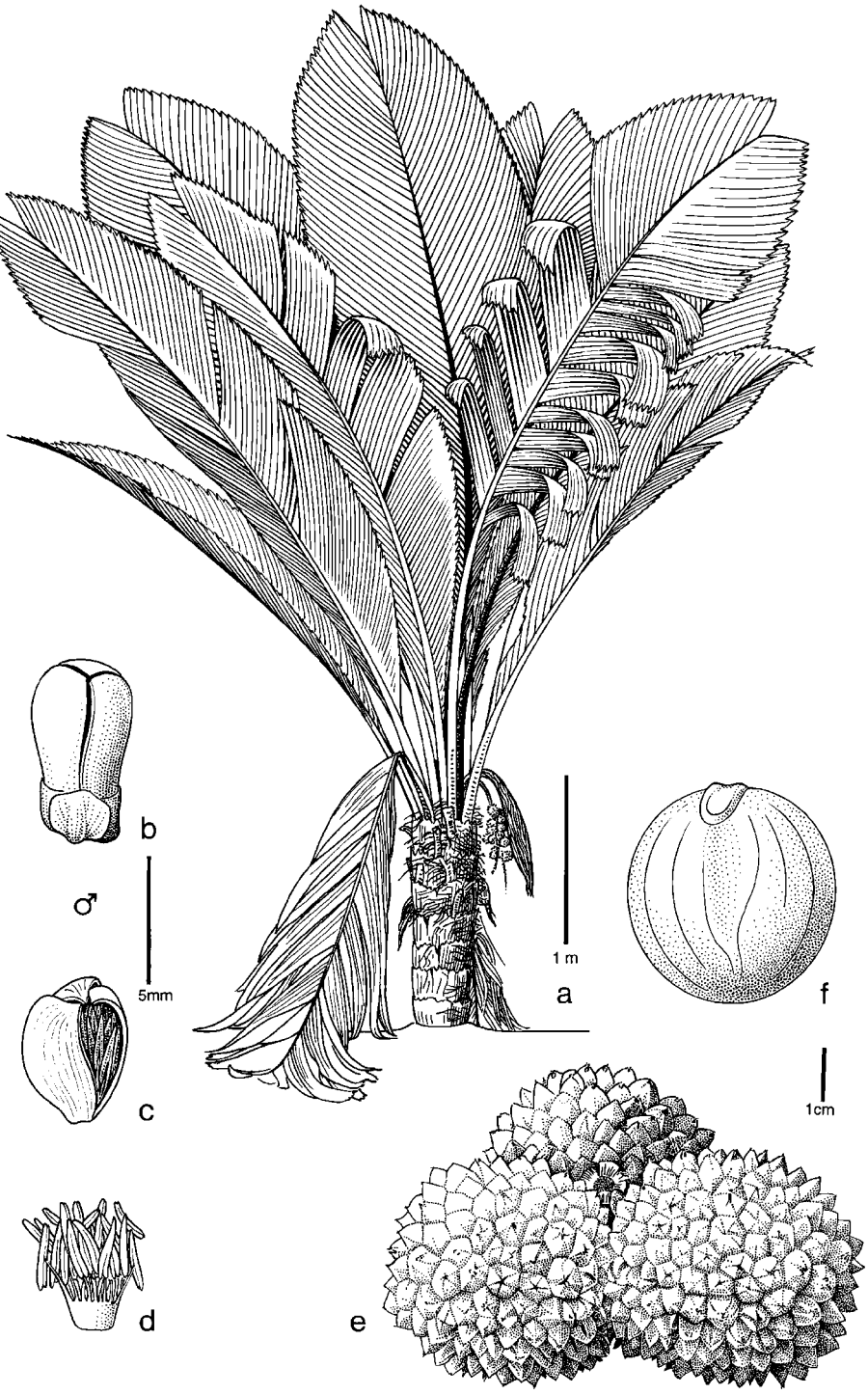
Use: The white fruits of the small jiggernet have a soursweet taste, but they are not highly esteemed. People eat them as a minor snack in the forest, but do not gather them to take home. Small fruits with many seeds and a watery or acid taste often remain untouched by adults. They are, however, popular among children, who often have to walk or paddle long distances to school, while they have not always enjoyed a decent breakfast. Their diet of cassava bread and fish or meat does not always provide young children with sufficient vitamins. Malnutrition is a serious problem in the interior of Guyana, especially among infants in the age of three to seven. As soon as breast milk no longer forms part of their diet, children have to learn from their siblings which forest fruits are edible and which ones are poisonous. The contribution of wild fruits to the diet of children in rural communities should not be underestimated.

The youngsters break off the fruiting branches of jiggernet trees growing along forest trails, and climb the sturdier whitey trees (*Inga* spp.) to pick their pods. They even consume the fruits when they are still immature. The youngest children often stick to small shrubs and herbs that are easy to reach and fruiting all year round. The most important families in this category are Melastomataceae (*Aciotis purpurascens*, *Clidemia* spp., *Miconia* spp.), Solanaceae (*Solanum stramoniifolium*, *Physalis pubescens*), and Rubiaceae (*Sabicea glabrescens*, *Gonzalagunia dicocca*). Parents often feel ashamed that their children eat these berries and disdainfully call them ‘monkey fruit’ or ‘bird seeds’. Shrubs growing in places only accessible to adults, such as mining camps, were mostly full of fruits, while the same species growing in the village were always stripped bare.

Fanshawe (1948) and Wurdack et al. (1993) mentioned that the watery red exudate of the bark was used by Arawaks as a varnish to stain paddles and other wooden implements, but this was not observed in northwest Guyana. The exudate of the big jiggernet (*Bellucia grossularioides*) is preferred for this purpose.

Economy: The species is used for subsistence only.

Notes: (1) The name jiggernet is derived from the tiny brown seeds that look like the eggs of the jigger (sand flea, *Tunga penetrans*), which lays its eggs in human feet; (2) The small jiggernet is easily distinguished vegetatively from the big jiggernet by its hairy leaves and red veins.



50. *Manicaria saccifera* a. habit; b. male flower; c. male flower, partly opened to show stamens; d. staminal tube; e. fruit; f. seed.

50. **Manicaria saccifera** Gaertn. **PALMAE** **Troolie**

Vernacular names: Troolie (Cr), Waruta, Timiti (Ar), Turuli (C), Dahuhi, Yahuhi[1], Nakoro[2] (Wr).

Botanical description: Solitary palm, to 10 m tall; trunk ca. 20 cm in diam., usually covered with dead leaf bases. Leaves 5-25, rigid, erect, strongly folded; sheaths ca. 80 cm long; petiole ca. 1.3 m long; rachis ca. 3 m long, pinnae 26-55 per side, irregularly arranged, spreading in one plane, linear, ca. 1.4 m long, unequal in width, margins serrate, becoming split with age. Inflorescences interfoliar; peduncle ca. 90 cm long; outer spathe ca. 60 cm long, inner spathe ca. 80 cm long, brown, very fibrous, persistent over developing fruits, rachis ca. 50 cm long, rachillae 21-56, to 40 cm long, densely reddish brown tomentose. Male flowers densely crowded in the upper part of the rachillae, sunken in small pits and subtended by elongate bracteoles; sepals imbricate, ovate, ca. 4 mm long; petals ovate, ca. 5 mm long. Female flowers few, near the base of the rachilla, ca. 1 cm long; sepals 3, ovate, ca. 9 mm long; petals 3, triangular, ca. 9 mm long. Fruit globose or 2- to 3-lobed, ca. 5 cm in diam., larger when lobed, brownish, covered with short, corky, pyramidal tubercles; seeds 1-3, brown, ca. 4 cm in diam.

Distribution and ecology: From Guatemala to northern South America, in tidal swamps and other inundated forests within the influence of the sea water. In northwest Guyana, either absent or abundant in manicole swamps on pegasse along the Waini, Pomeroon, Barima, Aruka, Kaituma, Baramanni, and Morebo Rivers. The species occurs in narrow patches of 100-200 m wide, parallel along the river (Fanshawe, 1952). Flowering and fruiting throughout the year. Seeds are dispersed by rodents, monkeys, birds, and water (Wilbert, 1976).

Use: Troolie leaves are a major source of roof thatch throughout coastal Amazonia (Kahn, 1997). A medium-sized palm yields four to eight suitable leaves, which are cut without felling the tree. Higher palms are seldom harvested, as their leaves tend to get shorter. Fresh leaves are folded double along their midrib and placed neatly on the ground in long rows, held down by some heavy wooden beams. Rain and sun will cause the leaves to shrink a little. After a few days of curing, the leaves are stitched with strips of mokru (*Ischnosiphon* spp.) on horizontal crossbeams, placed on the roof frame in a way that the midribs run from the ridge to the eaves[3].

The quality of a roof depends on the space between the midribs and thus on the amount of leaves used. A well-made roof with the midribs nearly touching could last for 12 years, but most roofs are spaced further apart (till 25 cm) and last 4-8 years. About 800 hundred leaves are needed for a gabled roof of 9 x 6 m. Troolie roofs lack the characteristic ridge of manicole leaves (*Euterpe oleracea*). Well-maintained roofs are waterproof and much cooler than corrugated iron. In areas where troolie is abundant, the leaves are also used for walls, following the same technique[4] (see also Roth, 1924). Because of the large leaves, the roofs are made easily and fast, the reason why troolie is preferred above all other palms (Wilbert, 1976).

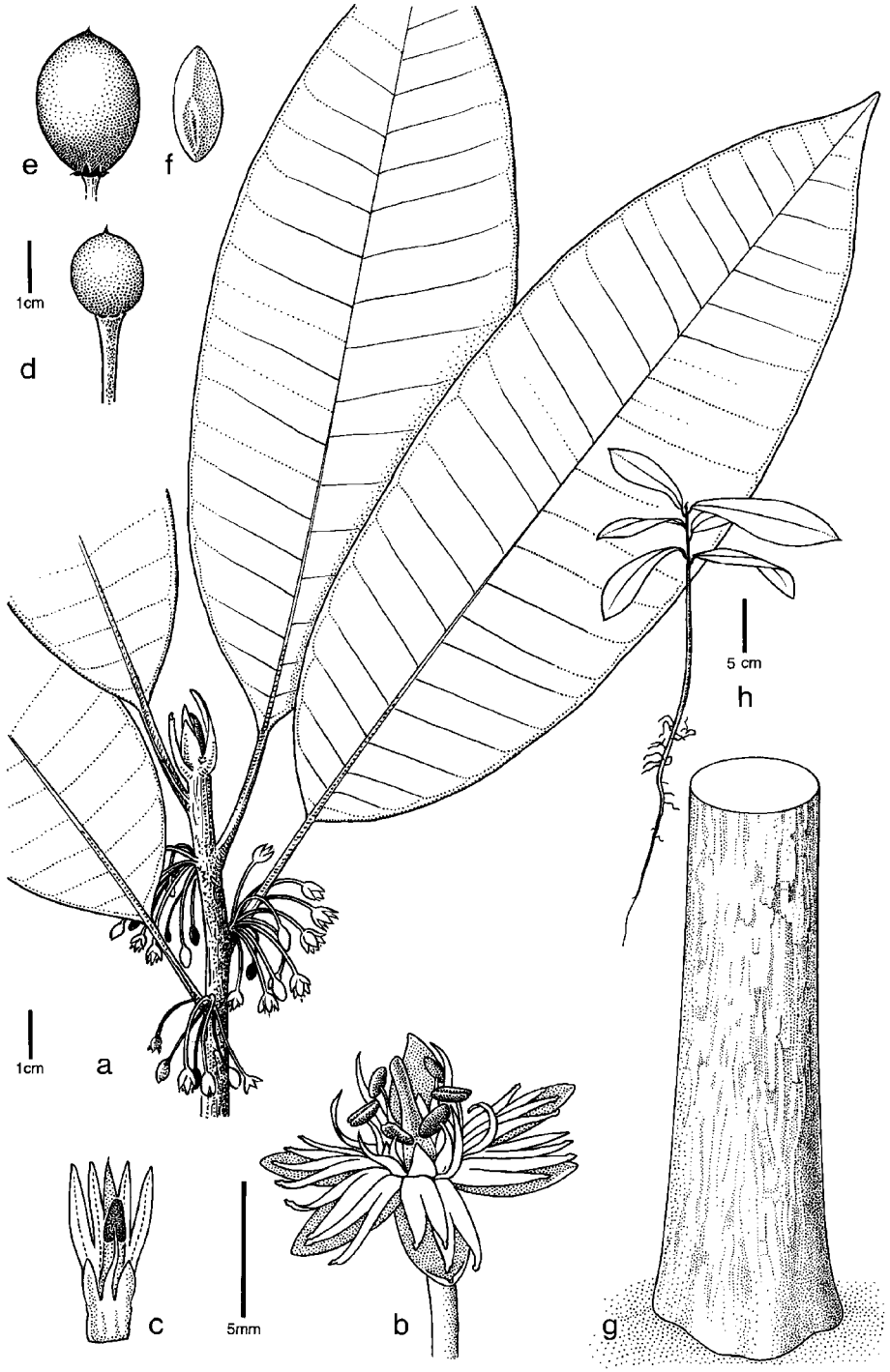
Deeper in the interior, troolie does not occur. Here dhalebana (*Geonoma baculifera*) and manicole are used for roofs. Dhalebana is used fresh, plaited much tighter, and lasts longer, but the work is more labour intensive. It is believed that troolie should not be harvested during full moon, since insects lay their eggs on the leaves and their larvae will destroy the leaves. Entire leaves are used in boats to protect goods from rain. Pieces of leaves are folded into a cup to drink creek water. Young fruits are cut open to drink the liquid jelly inside, which is sometimes mixed with milk and said to relieve diarrhoea. Large numbers of empty fruit shells were lying around homesteads along the Barima River.

The white endosperm is normally too hard to eat, but it is used by children to make tops. The seeds become soft when they have been rotting for a while on the forest floor. Seedlings and rotten fruits are peeled to eat the sour ‘nut’. The woody peduncle (‘bone’) is carved like a pencil and swizzled in another piece with a hole in it to cause sparks and light a fire[5]. In the past, troolie was even more important to the Warao from the coastal wetlands than it is today. They processed starch from the trunks as emergency food, made hats from the fibrous spathes, and sails from the leaves to push their canoe along by the wind (Wilbert, 1976). These uses seem to be forgotten nowadays.

Economy: Troolie hardly ever reaches the capital, but has an important regional value. Most commercial extraction takes place in the upper Pomeroon. Amerindians are hired to construct roofs or paddle with boats full of leaves to the Charity market, where they are sold, according to their size, in bundles of 50 for US$ 0.03-0.10 per leaf. Several trucks per week leave Charity to the Essequibo Coast, where bundles are sold for US$ 2.50-9 for tourist accommodations and to commercial poultry farmers, who keep their animals cool under troolie roofs. Prices for roof construction vary from US$ 130 for a small beer garden in Charity to US$ 410 for a chicken pen in Georgetown. In the coastal swamp region, the roof of an average Amerindian house costs about $ 35, labour costs not included.

Due to the patchy distribution of troolie, leaves are not always widely available. The palm does not occur around Santa Rosa, and has to be brought from elsewhere to meet the large demand in this town. In the dry season, when boat traffic becomes difficult, the price of the troolie rises. People in Santa Rosa complained that troolie was becoming as expensive as corrugated iron. Cabbage cutters were blamed for damaging troolie palms, causing a shortage of the product. However, troolie is seldom damaged during palm heart harvesting and the palm is still abundant along the Waini and Barima. No signs of overharvesting were observed. First signs of domestication were noted in Moruca, where people planted troolie saplings in a nearby swamp to see whether they could be grown at home and provide a cheaper resource.

Notes: (1) The Warao name yahuhi (Venezuela) or dahuhi (Guyana) means ‘plumes of the sun’, as the leaves look like giant bird feathers (Wilbert, 1976); (2) This name means ‘troolie fruit’; (3) See plate 15; (4) See plate 14; (5) See plate 16.



51. *Manilkara bidentata* subsp. *bidentata* a. flowering branch; b. flower; c. petal with 2 staminodes and 1 stamen; d. young fruit; e. ripe fruit; f. seed; g. trunk base; h. seedling.

51. **Manilkara bidentata** (A. DC.) Chev. subsp. **bidentata** **SAPOTACEAE** **Bulletwood**

Synonyms: *Mimusops bidentata* A. DC., *Mimusops balata* (Aubl.) C.F. Gaertn., *Manilkara balata* (Pierre) Dubard

Vernacular names: Bulletwood, Balata (Cr), Burue, Barata (Ar), Parata (C), Kobero, Kube arau (Wr).

Botanical description: Tree, to 40 m tall; trunk to 90 cm in diam. Outer bark grey-brown to dark red-brown, fissured, scaly, inner bark pink, with abundant white, sticky latex, sapwood light brown, heartwood dark red-brown. Leaves simple, alternate, clustered at branch ends; stipules ca. 3 mm long, leaving an obvious scar; petiole ca. 3 cm long, angular; blades stiff, leathery, elliptic, ca. 16 x 5 cm, glabrous above, waxy golden-brown below, margin often recurved, apex obtuse to acuminate, base acute. Inflorescences 3- to 20-flowered fascicles, in upper leaf axils; bracts small; pedicels ca. 2.5 cm long, in fruit to 5 cm long. Flowers actinomorphic, bisexual, pendent, sweet-scented; sepals 6, free, in 2 rows, ca. 5 mm long, persistent in fruit; corolla basally tubular, 6-lobed, white, tube ca. 1 mm long, lobes ca. 5 mm long, glabrous, each lobe divided into 3 segments; stamens 6, staminodes 6; ovary superior, 6-locular, style and stigma 1. Fruit a berry, yellow to reddish orange, broadly ellipsoid, ca. 3 cm in diam., glabrous, with sticky latex and sweet pulp; seeds 1-2, depressed-ellipsoid, ca. 2 x 1 x 1 cm, dark brown, hilum light brown, ca. 1 x 0.8 cm.

Distribution and ecology: From Panama, the lesser Antilles and northern South America to Amazonian Brazil and Peru. Dominant in seasonal forest, in Guyana common in Wallaba and Morabukea forest (Polak, 1992). In northwest Guyana, rare to locally common in mixed forest. Flowering mainly from May to August; fruiting in February-April, with a peak every 3-4 years (Polak, 1992). Flowers are probably pollinated by bats; seeds are dispersed by monkeys, bats, and large birds (Pennington, 1990).

Use: Bulletwood is the source of balata gum, a rubber-like latex that used to be Guyana's major commercial NTFP. After its discovery in 1859, it was heavily exploited, especially during the boom years of 1913-1924. It was harvested by Creole and Amerindian 'balata bleeders', who would fix a small bag at the trunk base to collect the latex and make v-shaped incisions in the bark in a feather stitch pattern, from the foot of the tree till as high as possible, climbing the trunk by means of iron spurs, ropes, and a leather belt. The latex flowed down the grooves into the bag on the ground. In forest camps, the bleeders strained their day's output of latex through sieves into large receptacles. They dried the balata in the sun in shallow wooden trays, until a thick skin was formed on top. This skin was removed, hung in the sun for a day to acquire a deep brown colour and was finally cured under an open drying shed for a few months. An inferior quality was made by boiling the latex and setting it in moulds (Fanshawe, 1948).

Bark which has been bled once cannot be bled again until it has been wholly renewed by cambium, which may take 8 to 10 years. The bleeding is optimal in the height of the wet season (June-October). Depending on the individual tree, the weather and moisture of the soil, latex yields vary from 1 to 7 litre per tree, which may produce 0.5 to 4.5 kilos of balata gum. On a second tapping, after the bark has healed, latex production is only a third of the original yield and poorer in quality. Repeated tapping over the full circumference and scars from the climbing irons eventually lead to exhaustion and fungal infections in the wood (Fanshawe, 1948).

The true balata, also known as American or Surinam gutta-percha, is produced by cleaning and chemically purifying the latex. Its chemical inertness and property of becoming plastic but not elastic at high temperature and then becoming hard again when cooled, made it very suitable for submarine and (telephone) cable insulation (Pennington, 1990). It was widely used for the manufacturing of golf ball covers and for a range of minor industrial uses, varying from machine belting to flax spinning rollers. In the heydays of the balata industry, commercial firms like Bancroft and Bayley exported

several hundred tons of balata per year. (Fanshawe, 1948). Production decreased in the 1930s, as no virgin balata areas could be profitably exploited anymore. Extraction costs from inaccessible areas became higher, even though air transport was developing in the interior. Balata was also largely replaced by synthetic materials. Nowadays, it is used only in dentistry for root canal fillings, where it remains superior to any synthetic replacement (Pennington, 1990), and as chewing gum ingredient (Rehm and Espig, 1991).

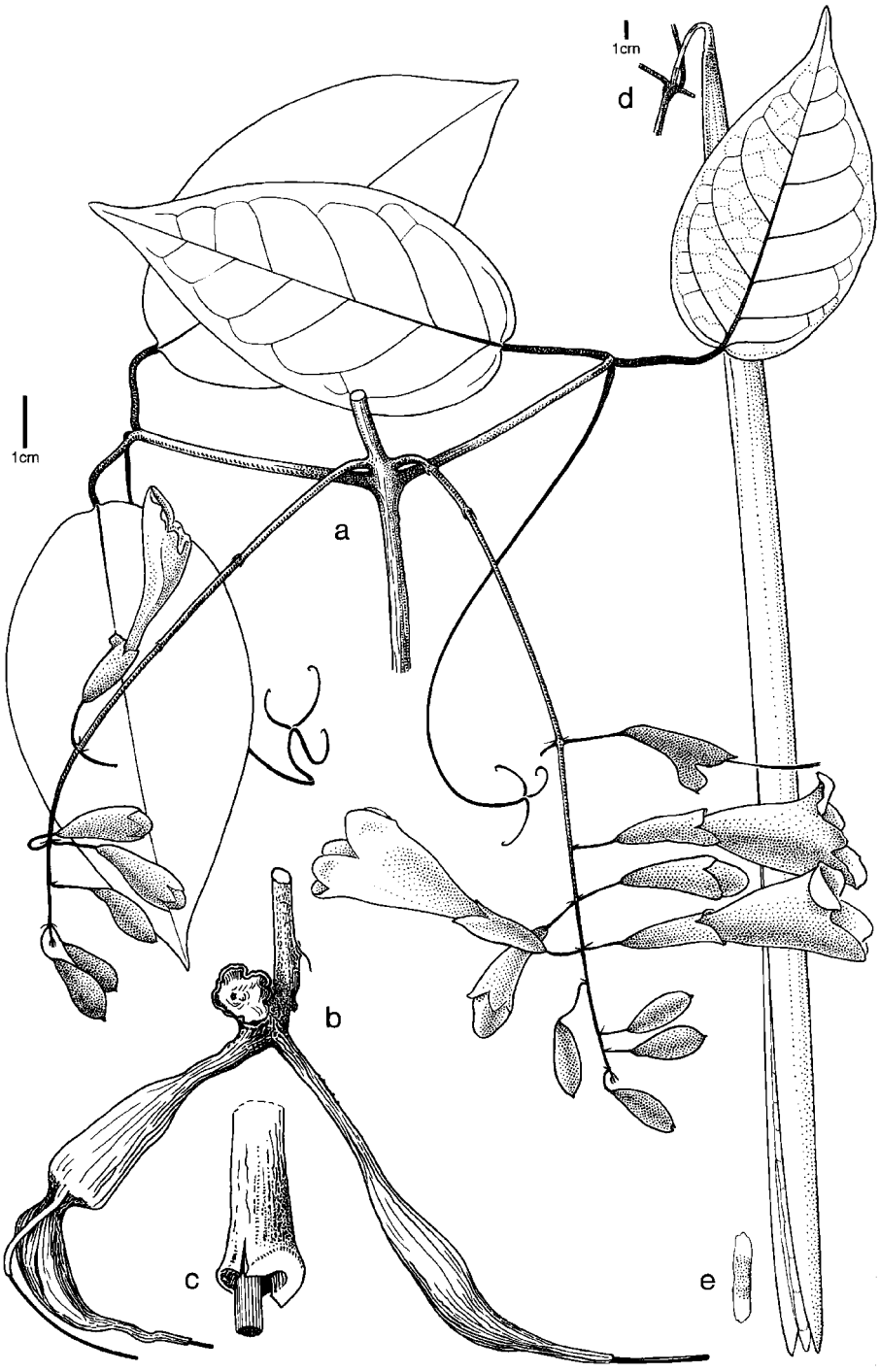
Bleeding scars were seen on old bulletwood trees as far inland as Kokerite, Barama River. People said that in times of scarcity, they mixed the balata with latex from *Macoubea guianensis* and planted rubber trees (*Hevea brasiliensis*). The North-West District was mentioned as one of the richest areas in bulletwood, especially the Aruka area. For a long period, bulletwood trees in that region were felled to harvest balata. This yields much more latex than if tapped standing, but obviously destroys the source of future harvests (Fanshawe, 1948).

Bulletwood is not evenly distributed throughout the country. In some areas, it is even totally absent or replaced by the black bulletwood (*Manilkara bidentata* subsp. *surinamensis*). The latter is more confined to periodically flooded forests. It is distinguished by the absence of stipules (or rare presence, but then less than 1 mm long), somewhat smaller leaves, and fruits that ripen reddish purple to black. The latex of the black bulletwood is not used commercially, although it was formerly exploited in Colombia, Venezuela, and Brazil as a source of chewing gum (Pennington, 1990).

Nowadays, balata is occasionally used by children to make cricket balls, soft bumper balls, or little animals, or by adults for caulking boat creases. Amerindians in northwest Guyana never used the latex to make the large storage jugs to hold water or fermented cassava drinks, known from the Macushi and Wapishana Indians in southern Guyana. Recently, Conservation International started to promote small-scale balata harvesting in the Kanuku Mountains to produce animal figures, traditional balata goblets (‘gobies’), and other tourist crafts (Conservation International, 1998).

Although bulletwood is nowadays protected by law, trunks are frequently felled for their durable timber. The wood is extremely hard and heavy and locally used for house construction, scantling, boards, and pestles for mortars to grind coffee beans. Bulletwood is not used medicinally in the northwest, although Fanshawe (1948) mentioned that the latex and a decoction of the bark mixed with the bark of locust (*Hymenaea courbaril*) and tauroniro (*Humiria balsamifera*) provided an excellent cure for dysentery. Bulletwood fruits are edible and highly esteemed by locals, but excessive consumption might lead to constipation. Land turtles are also fond of the fruits, and people search around fruiting trees for turtles feeding on fallen berries.

Economy: The wood is a commercial timber (Polak, 1992). In the North-West District, it is harvested by the Mazaharally sawmill in Kwebanna (Waini), and employed industrially in bridge construction, railroad ties and shingles. Balata craft work is successfully marketed in tourist shops in the capital. Although it provides some additional income for Amerindian communities in the Kanukus, the latex trade of today is only a very small fraction of its glorious past. In Brazil, however, 400 tons of balata gum are still produced annually for the chewing gum industry (Rehm and Espig, 1991).



52. *Martinella obovata* a. flowering branch; b. rhizome; c. rhizome, partly opened to show fleshy tissue surrounding stele; d. fruit; e. seed.

52. **Martinella obovata** (Kunth) Bureau & K. Schum. **BIGNONIACEAE** **Wansimai**

Vernacular names: Monkey belt, Once-a-mile[1] (Cr), Wansimai, Kamoro, Waikabina, Wikabeena (Ar), Wosimei, Wongsimyai (C), Ero akahu[2], Mu ahi ibihi[3] (Wr).

Botanical description: Liana, stem to 7 cm in diam. Outer bark smooth. Tuberous rhizome light brown, ca. 1 cm in diam., inner tissue fleshy, white, stele woody, light brown. Young branches, petioles, petiolules, and inflorescence glabrous or with scattered minute, gland-tipped hairs. Branchlets green, subterete, ribbed, usually drying brown; stipules and interpetiolar glands lacking. Leaves opposite, 2-foliate, terminal tendril to 23 cm long, trifid; petiole ca. 6 cm long, petiolules ca. 4 cm long, often twisted; leaflets papery, glabrous, ovate to narrowly elliptic, ca. 11 x 7 cm, apex shortly acuminate, base rounded, glands scattered along the basal part of the midvein, young leaves and petioles purple. Inflorescence an axillary raceme of 1-21 flowers, to 28 cm long, rachis with scattered, oblong, sessile glands; bracts threadlike, ca. 3 mm long. Flowers actinomorphic, 5-merous; calyx tubular-campanulate, ca. 1.5 cm long, lobes ca. 6 mm long; corolla tubular, dark red, ca. 6 cm long, limb pale purple, ca. 2.5 cm in diam., minutely lepidote; stamens 4, staminode 1; ovary superior, linear-cylindric, 2-locular, style 1. Fruit a strongly flattened capsule, green when young, brown when mature, glabrous, linear, to 100 x 1.5 cm, with a poisonous scent; seeds numerous, winged, yellowish brown, flat, thin, ca. 1.2 x 4.5 cm.

Distribution and ecology: Central America, the West Indies, northern South America, the Guianas, and the Amazon. Common in non-flooded, evergreen lowland forest and fringes of white sand savannas (Gentry, 1997). In northwest Guyana, frequent in riverbank Mora forest. Phenology unknown. Seeds are dispersed by the wind.

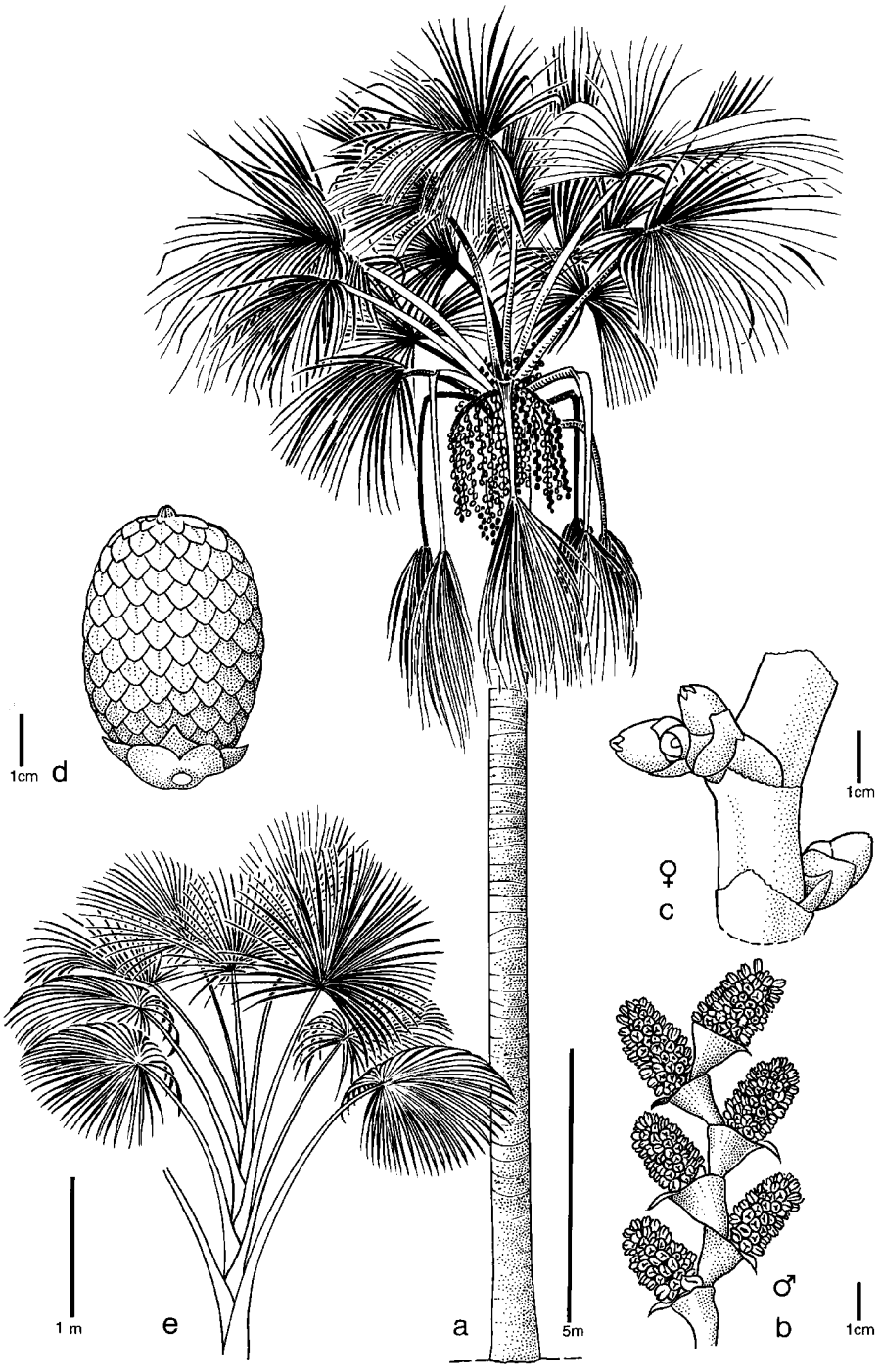
Use: This liana is widely used as a medicine against sore eyes. The tuberous rhizome (‘root’) of the plant is dug out, cleaned and the brown cortex is scraped off with a knife. The inner tissue is grated and the gratings wrapped in a clean piece of cloth. The cloth is squeezed in a way that the sap drips into the inflamed eye. This treatment burns a lot, but it is said to be very effective. The sap squeezed from heated leaves is diluted in water and used for the same purpose. Although the species is common in riverbank forest, the rhizome is often dug out and replanted in home gardens, in order to have the medicine at hand when needed. The reason people gave for this cultivation, was that sore eye was a common ailment and wansimai was a very good remedy.

Sore or red eye is an inflammation of the conjunctiva, causing a red, itchy eye (Lachman-White et al., 1992). In the interior, it is very common among children and adults and it is highly contagious. Some people think sore eye is caused by swimming under water with the eyes open. This could be true if the water is polluted by bacteria, but in most cases, it is caused by rubbing the eyes with dirty (bacteria-contaminated) hands or clothes.

The fresh root sap is used to treat skin sores as well. The root is fried with some oil in a tin, crushed and applied as a poultice on sores. The bitter tea from the boiled leaves is taken for colds, fever, typhoid, and malaria (Lachman-White et al., 1992; Reinders 1993). Similar uses of the root sap against eye infections and skin sores have been found in Peru (Duke and Vásquez, 1994), Colombia (Schultes and Raffauf, 1990), Suriname (Ahlbrink, 1931), and Venezuela (Gentry, 1982). The Yukuna Indians in Colombia even employ the sap to treat blindness by elderly people (Sánchez, 1996).

Economy: The species is used for subsistence only.

Notes: (1) It is not known if the names wansimai (Ar) and wosimei (C) are derived from the Creole once-a-mile, or vice versa. A Carib informant said that ‘wosimei’ meant ‘let me hurry’ in Carib, but he did not understand why the plant was called like that; (2) This name signifies ‘root of a liana’; (3) ‘Eye medicine’.



53. *Mauritia flexuosa* a. habit; b. rachilla with male flowers; c. rachilla with female flowers; d. fruit; e. sapling.

53. **Mauritia flexuosa** L.f. **PALMAE** **Ité**

Vernacular names: Ité (Ar, Cr), Morichi (C), Ohidu, Ohi arau[1], Haukuaharu[1] (Wr).

Botanical description: Solitary, dioecious palm; trunk erect, columnar, to 35 m tall, to 50 cm in diam.; circular leaf scars spaced ca. 25 cm apart; base often with pneumatophores and a large aerial root mass. Leaves 8-20, spirally arranged, pendent, persistent when dead; sheaths open, ca. 1.5 m long, with few coarse fibres circling younger leaves; petiole ca. 3 m long; rachis ca. 70 cm long, recurved; blade palmate, divided into 120-250 segments, each ca. 170 x 5 cm. Inflorescences interfoliar; peduncle ca. 2 m long; spathes not seen; rachis ca. 2 m long, covered with sheathing bracts; primary inflorescence branches 18-46, pendent, ca. 1 m long, rachillae numerous, distichous, catkin-like, to 5 cm long. Male flowers bright orange, densely crowded on rachillae, ca. 1 cm long; sepals 3, ca. 4 mm long; petals 3, ca. 1 cm long; stamens 6, connate at base. Female flowers: sepals 3, ca. 8 mm long; petals 3, ca. 6 mm long. Fruit subglobose to ellipsoid, ca. 5 cm in diam., covered with reddish brown scales, mesocarp orange-yellow, fleshy, ca. 2 mm thick, cupule ca. 1.5 cm long; seed 1, subglobose, endocarp white, solid.

Distribution and ecology: Tropical South America, widespread in poorly drained and periodically inundated places. In northwest Guyana, frequent in coastal quackal swamps and dominant in natural and man-made (burned) 'ité savannas' on pegasse. In coastal Guyana, often spared from cutting or planted in house yards; rare in the deep interior. In the Orinoco Delta, flowering from May to December; fruiting from August to March (Heinen and Ruddle, 1974). In Moruca, the species seemed to be flowering and fruiting throughout the year. Fruits are eaten by macaws, parrots, turtles, rodents, peccaries, deer, iguanas, and fish. Seeds are dispersed by (some of) these animals and by water (Goulding, 1989; Henderson, 1995).

Use: The red scales need to be peeled off before the yellow mesocarp can be eaten. With their taste of sour cheese, ité fruits are not very popular in northwest Guyana. Some people relish them, however, and say the taste improves after soaking the fruit in water for two days. Fruits that have been laying on the swampy soil for some time are preferred. The pulp is mixed with sugar and water to make a sweet drink which lacks the cheesy taste. This juice is occasionally fermented into an alcoholic beverage known as 'ité local'. Young fruits are cut open with a knife to drink the soft jelly inside. The kernels of the seeds yield a low grade vegetable ivory, used in the 1920s to make buttons (Fanshawe, 1948).

Ité trunks are laid down in the flooded savanna to serve as walking bridges. The soft petioles ('ité bones') are cut at equal length and tied together with mokru (*Ischnosiphon* spp.) to make temporary walls. The spongy petioles are carved into small sticks for the frames of temporary birdcages, held together with coconut pointers as bars[2]. Children carve ité bones into helicopters, boats, toy guns, and kite frames. The Assakata primary school used a counting frame carved out of ité bone[3]. The leaves are a major source of roof thatch in the Rupununi savannas (Forte, 1996). No single roof from ité leaves was observed in the northwest, even in areas where the species was abundant. People preferred to buy troolie leaves (*Manicaria saccifera*), which often had to be brought from elsewhere. Those who could not afford troolie, made ramshackle roofs of kokerite (*Maximiliana maripa*). It remains unclear whether the skill of making ité roofs has been lost or was never known in the North-West District.

A soft, but strong fibre named 'ité straw' or 'tibisiri' (Ar) is obtained from the young shoots. Unfolded leaves are cut by climbing the trees, the shoots are opened and the extreme tips of the leaves are folded double. With the right thumb and forefinger the transparent cortex is stripped off till the base[4]. This is repeated for each segment of the leaf. The fibrous cortical strips are either soaked in water for a week or thrown in boiling water for 15 minutes, after which they are beaten, rinsed and hung in the sun to dry. The fibres obtained from one leaf are usually tied up at one end into a knot. The length of such a strip will be about 70 cm. According to the size of thread required, each strip is employed whole or split by the thumbnail to make a very fine twine (Roth, 1924). The fibres are

rolled on the naked thigh into twine, which is then woven into hammocks, bags, baby slings and carpets. The unspun fibre is made into basketry, violin strings, dolls, skirts, and other crafts. The fibre can be dyed in different colours. Tibisiri making is a rather labour-intensive work. An average hammock takes about 12 shoots. For detailed descriptions of tibisiri weaving techniques, see Roth (1924, 1929).

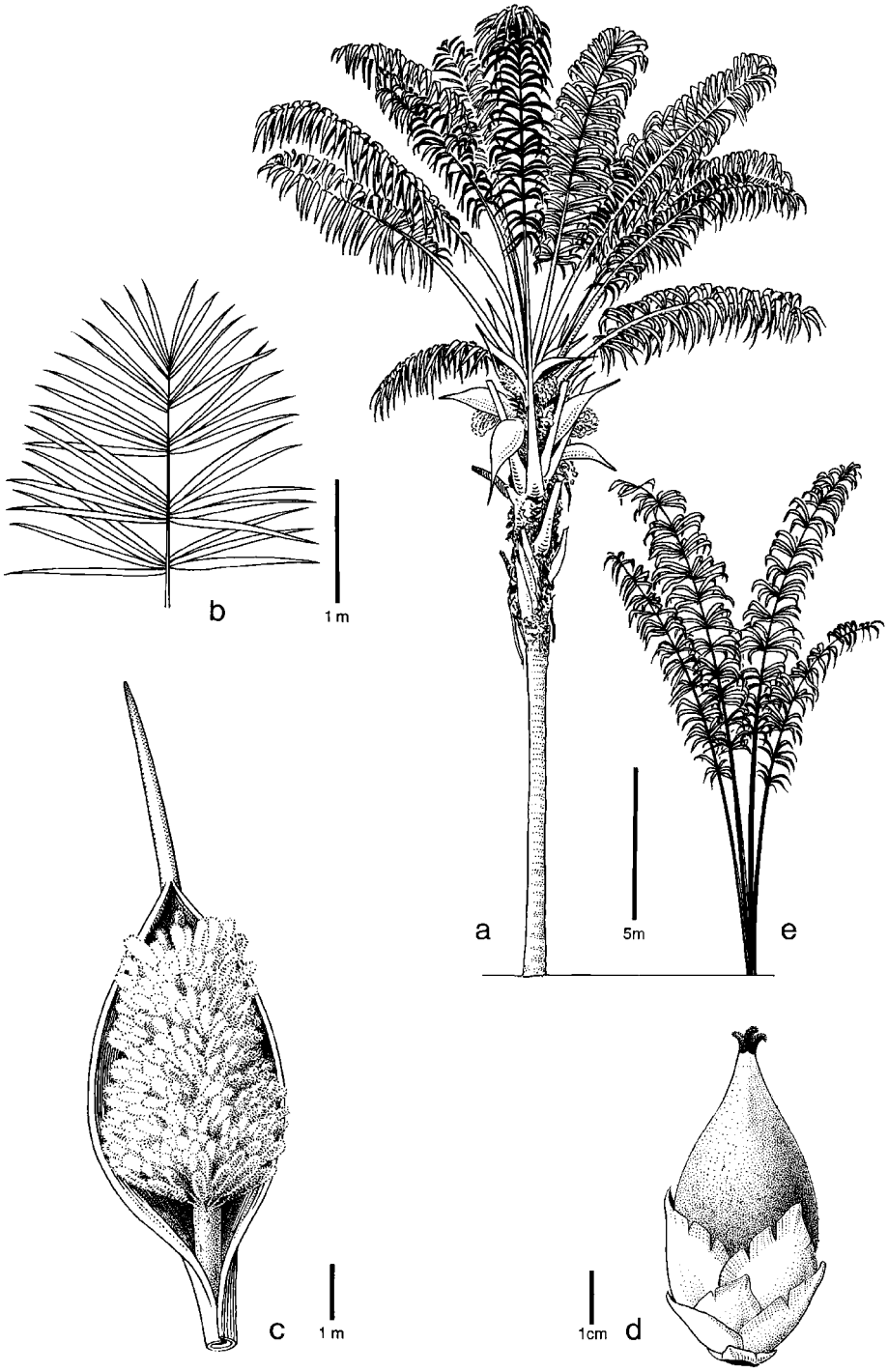
The shoots are harvested in the wet season, when the trees on the flooded savanna can be easily reached by boat. Crafts people complained that the savanna fires in the dry season made it difficult to obtain the raw material. Most adult palms survive the burning, but the juvenile individuals are killed. Tibisiri makers prefer to harvest from young trees, since their shoots are easier to reach. The seasonal burning of ité savannas thus limits the availability of the raw materials for the craft industry. Nevertheless, no clear signs of overharvesting were observed, and huge stands of *Mauritia flexuosa* occur on the savannas along the Moruca and Haimaracabra River. The reasons for the annual burning of savannas and quackal forest are discussed in chapter 3 (Part I of this thesis).

In other parts of Guyana, entire ité leaves are woven into baskets and handbags, but this practise was not observed in the northwest. Old leaves, dry grass, and waste of tibisiri straw are used to burn out canoes. The larvae from the palm grub beetle (*Rynchophorus palmarum*) are collected from the rotten wood. They are eaten raw or fried in their own fat and considered a delicacy. In the past, *M. flexuosa* had a much greater value for the Warao living in the coastal wetlands Lacking dry land for agriculture, they extracted starch from the pith of the trunks to bake their daily bread. Up to 60 kg of starch could be harvested from one tree (Heinen and Ruddle, 1974). Today, this practise has died out completely. Most Warao have engaged in cassava cultivation or buy rice and flour in shops.

Economy: In areas where toa toa finches (*Oryzoborus angolensis*) are trapped, temporary birdcages from ité bone are sold for US$ 0.70. Small craft centres for tourists exist in the main tibisiri producing villages in northwest Guyana (Santa Rosa, Kabakaburi, and Hosororo). Some crafts are sold to shop owners in Charity and Georgetown. However, the bulk of the country's tibisiri craft (especially carpets and car seats) is produced outside the North-West District, in the Arawak villages Santa Mission and St. Cuthberts Mission. Crafts are exported to the Caribbean islands, where they are sold again in souvenir shops. Tibisiri fibre is also employed in the (export) furniture industry. A tibisiri hammock in Georgetown would cost US$ 18, while in the regional craft shop the price lies around US$ 10.

The fruits, leaves, and fibres of *M. flexuosa* are widely used and commercialised by indigenous groups throughout South America. In large Amazonian towns like Iquitos (Peru) and Manaus (Brazil), the fruits are sold in large quantities, both fresh and processed into ice cream, cakes, and fruit drinks (Balick, 1988; Padoch, 1988; Kahn, 1997). According to Peters et al. (1989), *M. flexuosa* is the most intensively harvested and commercially important forest fruit of western Amazonia. Although the ité palm covers large areas of swampy savannas in Guyana, the fruits do not have a substantial commercial value. If an export market could be found for this product, or if local consumption would be stimulated (the fruit contains significant amounts of fat, vitamin A and C), the ité savannas could bring in much more revenue than they do today.

Notes: (1) 'Haukuaharu' is the Warao name for the male ité palm, while 'ohi arau' is the female palm (Heinen and Ruddle, 1974); (2) See plate 18; (3) See plate 21; (4) See plate 19.



54. *Maximiliana maripa* a. habit; b. leaf apex; c. inflorescence; d. fruit; e. sapling.

54. **Maximiliana maripa** (Corrêa) Drude **PALMAE** **Kokerite**

Synonym: *Attalea regia* (Mart.) W. Boer, *Maximiliana regia* Mart., *Attalea maripa* (Corrêa) Mart.

Vernacular names: Kokerite (Cr), Kokoriti (Ar), Maripya (C), Doi arau (Wr).

Botanical description: Solitary palm; trunk erect, columnar, to 20 m tall, ca. 25 cm in diam. Leaves 10-22, erect, arranged in a few spirals; sheaths ca. 85 cm long, fibrous at margins; petiole ca. 3 m long; rachis ca. 7 m long, pinnae 150-300 per side, irregularly arranged in clusters of 2-10, spreading in different planes, linear, ca. 130 x 5 cm. Inflorescences interfoliar, persistent for some time below the crown among dead leaves; peduncle ca. 50 cm long; outer spathe ca. 1 m long, inner spathe deeply sulcate, ca. 2 m long, including the ca. 40 cm long acumen; rachis ca. 70 cm long, rachillae ca. 600, ca. 13 cm long, silvery-white. Male flowers: sepals triangular, to 1 mm long; petals narrowly elliptic, ca. 4 mm long. Female flowers 6-10 per rachilla; sepals broadly ovate, ca. 1 cm long; petals very broadly ovate, ca. 1 cm long; ovary tomentose. Fruit ovoid-oblong with a long terminal point, ca. 5 x 3 cm, cupule brown-lepidote, enclosing the fruit to about the middle, mesocarp pink, fleshy, endocarp thick; seeds 2-3, ovoid, ca. 2.5 x 1 cm, albumen white, oily.

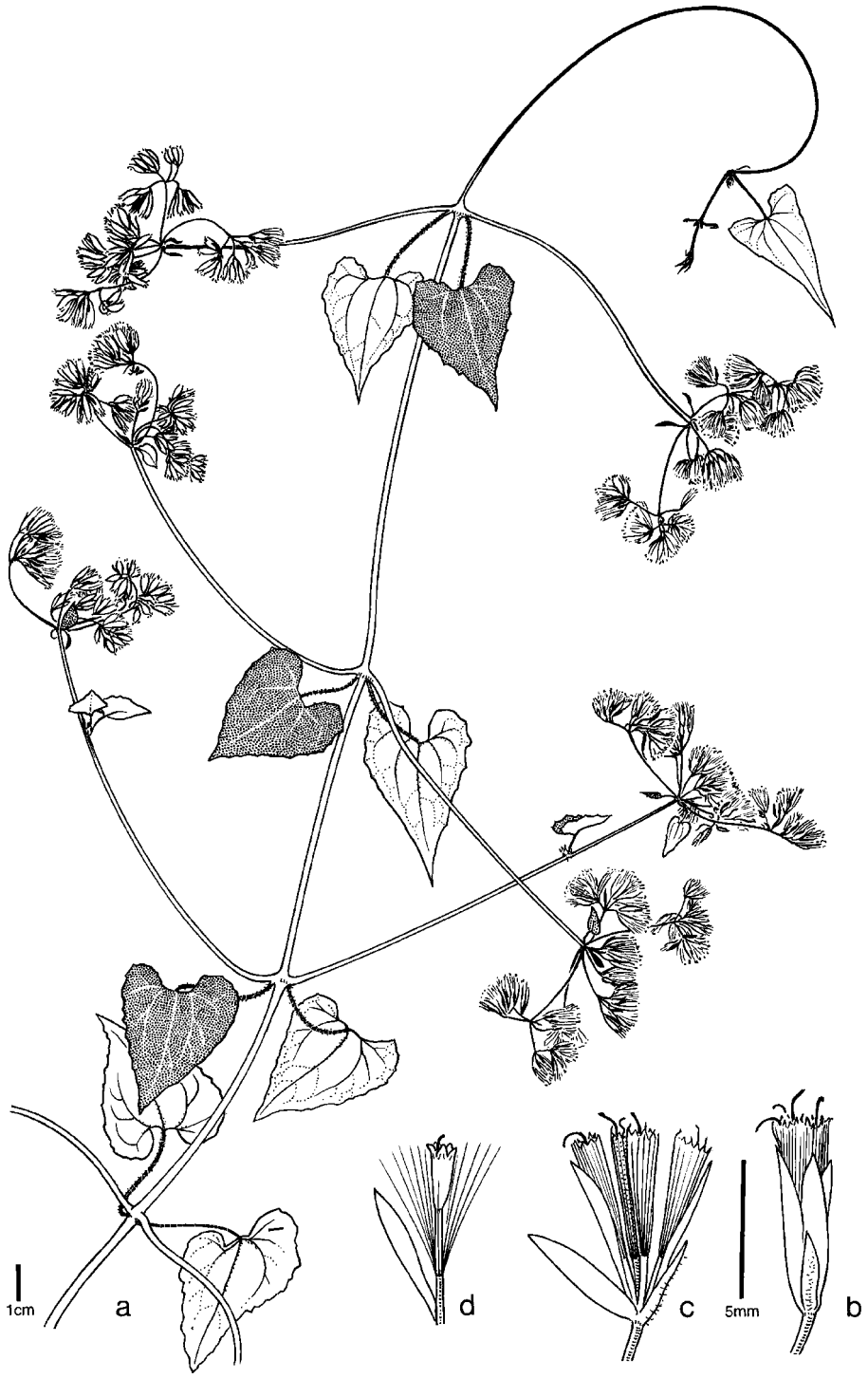
Distribution and ecology: Widespread in northern South America, Peru, Brazil and Bolivia. In northwest Guyana, frequent in manicole swamps and mixed forest, common in secondary forest. The species is especially abundant near human settlements, since trees are spared when felling forest for agriculture[1], seedlings are saved from weeding, and seeds are deliberately planted in home gardens. In northwest Guyana, flowering from November to February; ripe fruits were seen from June to September. Fruits are dispersed by monkeys and rodents (van Roosmalen, 1985).

Use: Kokerite fruits are sweet, juicy, and highly appreciated. They are eaten raw, but the flesh and juice are also used instead of coconut milk in the traditional Guyanese dish 'cook-up rice'. The kokerite palm heart is much larger than the heart of the manicole (*Euterpe oleracea*). It is eaten raw or cooked as vegetable, but it is not commercialised. In the past, indigenous people extracted a cooking oil from the mesocarp and seeds, but this does not seem to happen anymore. Fanshawe (1948) analysed the contents of the oil, but predicted that even with a de-kernelling machine cracking the nuts, the oil could not compete commercially with African palm oil. Thus, in spite of its good quality and the abundance of kokerite trees, the oil never became an export product. Bush Negroes in Suriname still extract cooking oil from kokerite seeds. The leaves are stripped from their pinnae and the midribs used as a stringer in roof thatch constructions with dhalebana (*Geonoma baculifera*). In Barama, the bare midrib ('kokerite bone') is used as arrow shaft when the real arrowstick (*Gynerium sagittatum*) is not available.

To make blowgun darts, a midrib is split with a knife into small, pointed slivers ('pointers') of ca. 25 cm long. A piece of cotton is put around one end. The blowgun is made from a hollowed trunk of *Bactris campestris*. Just one person in Moruca knew about blowpipe hunting, he had learnt this from Akawaio Indians along the Cuyuni River. Without arrow poison, this hunting method is not very successful, but the Akawaio had not revealed any recipes for curare to him. Blowguns and arrow poisons probably never formed part of the traditional hunting methods of the indigenous tribes in northwest Guyana (Gillin, 1936; Lewin, 1923). Entire kokerite leaves are used for roof thatch, but only when leaves of dhalebana, manicole, or troolie (*Manicaria saccifera*) are unavailable or too expensive. These roofs are often badly made and leaking. More elaborate kokerite roofs are made by Macushi and Wapishana Indians in southern Guyana (Roth, 1924; Forte, 1996). Newly made canoes are filled with dry kokerite leaves and set on fire to widen the opening of the boat. Children sometimes use the large spathe as a toy canoe and make roofs of their dolls houses with kokerite leaves.

Economy: Fruits are sold at regional and national markets, but most come from cultivated sources.

Notes: (1) See plate 22.



55. *Mikania micrantha* a. habit; b. capitulum; c. capitulum, opened to show 4 florets; d. floret.

55. **Mikania micrantha** Kunth **COMPOSITAE** **Bitter tally**

Synonym: *Eupatorium denticulatum* Vahl, *Mikania orinocensis* Kunth

Vernacular names: Bitter tally (Cr), Pakama maituru, Wayamaka ereparï[1] (C).

Botanical description: Vine or subwoody climber; stem subterete, glabrous or sparsely puberulous. Leaves opposite, simple, palmately veined, strong-scented; stipules absent; petioles ca. 5 cm long; blades cordate to sagittate, ca. 7 x 6 cm, glabrous above, slightly puberulous and glandular below, margin undulate to dentate, apex acuminate. Inflorescences pedunculate, in paniculate corymbs, the capitula (sub)sessile, discoid, 4-flowered, in clusters at the branch ends, ca. 5 mm long; involucral bracts 4, acute, ca. 4 mm long, persistent. Florets white or greenish, fragrant; corolla ca. 3 mm long, funnelform, 5-lobed, lobes rarely glandular, shorter or equal than tube; stamens 5; ovary inferior, 1-locular, style 1, stigmas 2. Fruit an achene, pentagonous, brownish black, glandular, ca. 2 mm long; pappus white, ca. 3 mm long.

Distribution and ecology: Widely distributed in tropical America, Asia, and the Pacific, in gallery forests and disturbed areas. In northwest Guyana, common in secondary shrubland and riverbank vegetation, and as weed in cultivated and abandoned fields. Flowering and fruiting seemingly throughout the year. Flowers are probably pollinated by insects; seeds are dispersed by the wind (Maas and Westra, 1993).

Use: Bitter tally is renowned as a medicinal plant throughout its range. In Guyana, it is most frequently used as an anti-malaria drug. Five pieces of vine of ca. 30 cm long are boiled in a litre of water. Half a cup of the bitter tea should be drunk for three times a day.

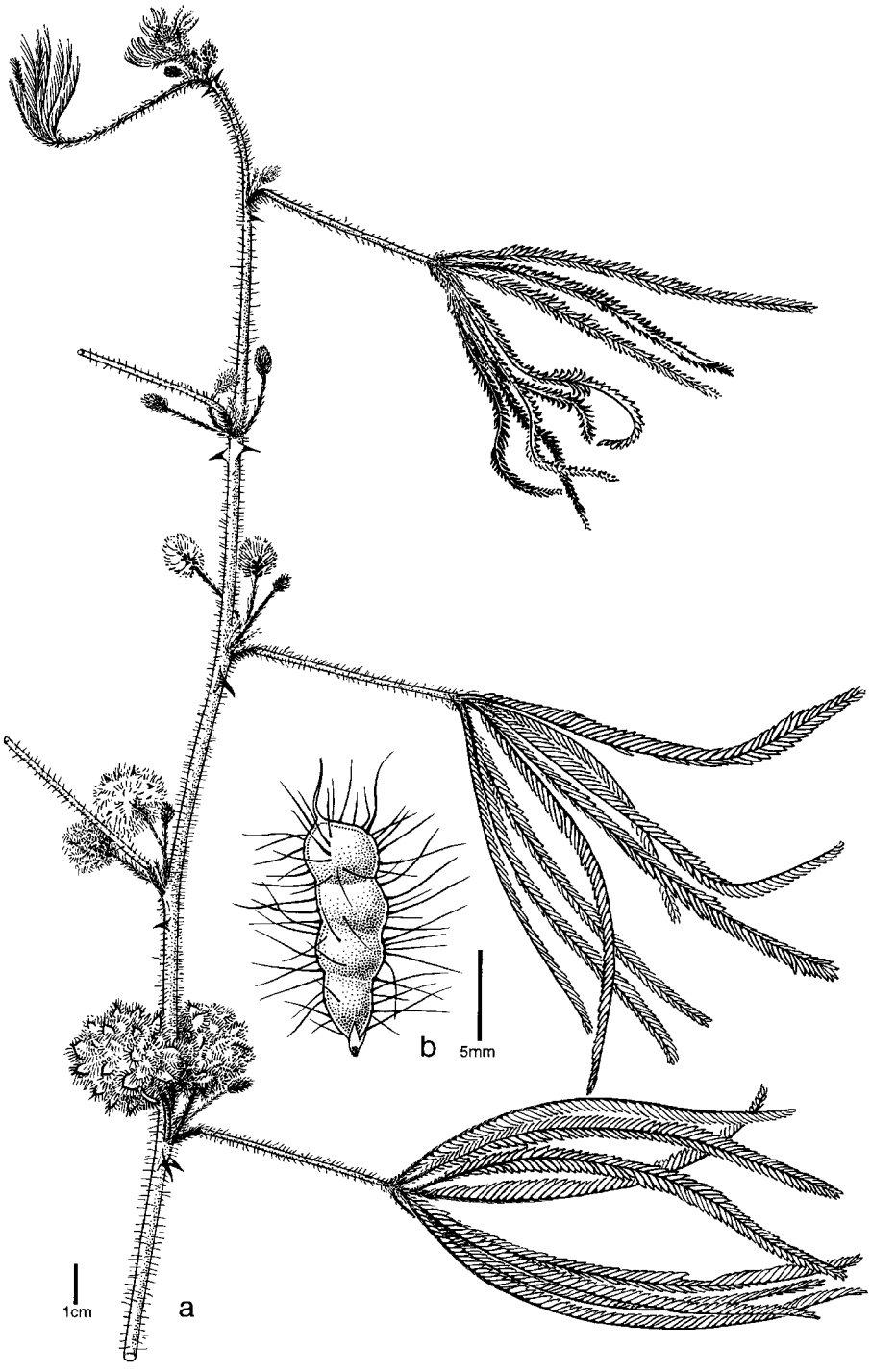
In coastal Guyana, the vine is often boiled with neem leaves (*Azadirachta indica*), caryla (*Momordica charantia*), and sand bitters (*Unxia camphorata*). The tea causes sweating and thereby reduces the fever, and further helps to build up resistance against malaria (Lachman-White et al., 1992). The authors also mentioned that bitter tally tea is drunk for cleaning out the uterus (dilatation and curettage). Young leaves are crushed with salt and the liquid is given orally to babies suffering from thrush, while the bruised leaves are applied to the skin rash that often accompanies the thrush.

In the interior, a large piece of bitter tally is boiled and used as an herbal bath for scabies, itching, sores, and eczema. In Georgetown, the tea from bitter tally was recommended for biliousness. Fanshawe (1948) reported that the acrid sap from the young leaves was drunk as an antidote for snakebites, to treat syphilis, and to relieve indigestion. He further observed that crushed leaves were applied to ulcers, and that a decoction of the leaves and stems was used as a clyster, especially for children.

In Brazil, the tea is used as a diuretic (Stahel, 1944). In French Guiana, the Creoles drink the sap of heated and bruised leaves as an aperitif, three times a day, sometimes boiled in water with red wine. The leaf decoction is used as a blood purifier, against malaria, and as laxative. In the same country, Wayãpi Indians use the leaves in herbal baths to reduce fever, while the Palikur drink the tea to stimulate gall secretion. Active compounds (e.g., diterpenes and saponins) have been isolated from several species of *Mikania* (Grenand et al., 1987; Lachman-White et al., 1992).

Economy: Bitter tally is sold on medicinal herb stalls at the Georgetown market.

Notes: (1) The Carib name means ‘iguana food’: ‘wayamaka’ is the green iguana (*Iguana iguana*) and ‘erepa’ means cassava bread (Ahlbrink, 1931). The animal is said to be fond of the leaves.



56. *Mimosa polydactyla* a. habit; b. fruit.

56. **Mimosa polydactyla** Hum. & Bonpl. ex Willd. **LEGUMINOSAE-MIMOS. Shame bush**

Vernacular names: Shame bush (Cr), Haburiballi[1] (Ar), Okuyu yerï[2], Tïpïihsyeng itu[3] (C), Bebe tomanasebe (Wr).

Botanical description: Shrubby herb, to 1.6 m tall; stem terete, straw-coloured or reddish brown, armed with a pair of recurved spines shortly below each node, stem and branches covered with stiff, brown hairs. Leaves alternate, bipinnate, ca. 12 cm long, rachis ca. 8 cm long; stipules erect, ca. 6 mm long; petiole ca. 4 cm long; leaflets in 30 to 60 pairs, linear, ca. 7 x 1.3 mm, ciliate, sensitive to touching. Inflorescences solitary, or in bundles of 2-3 together in the axils, flowers numerous, arranged in heads of ca. 1 cm in diam.; peduncle ca. 2 cm long. Flowers 4-merous, pink or violet, all bisexual and fertile; calyx ca. 0.3 mm long, corolla ca. 1.5 mm long; stamens numerous, filaments pale pink or whitish; ovary superior, style and stigma 1. Pod subsessile, ca. 12 x 5 mm, entirely covered with stiff, black hairs, arranged in dense spherical clusters of 2.5 cm in diam.; seeds 3-4, brown, flat, ca. 4 x 4 mm.

Distribution and ecology: From Costa Rica to northern South America and the Guianas, in disturbed forest, brush woodland, and pasture thickets. In northwest Guyana, the plant is a notorious weed in pastures and secondary shrubland around villages. Flowering and fruiting throughout the year, except in extreme droughts (Barneby, 1997).

Use: The leaves of this species rapidly close when they are touched; the reason why various ethnic groups in the Guianas believe the plant has magic powers. In Guyana, it is used to control adultery and domestic violence. If a husband has a habit of beating his wife, she will secretly burn a couple of shame bush leaves, mix the ashes with some coconut oil, and rub them on her swellings and bruises. The next time he tries to beat her, his hands will be seized with cramps and droop down like the leaves of this plant when touched. He will be powerless, unable to hit her anymore, and neither be able to defend himself in fights with other men. He always ends up being beaten by others. Coles et al. (1971) reported from Baramita that when a man cut another man in a fight or disagreement, the victim rubbed shame bush leaves into the cut. This was claimed not only to cure the wound, but also to act on the attacker, in a way that his arms started to weaken and flop like the leaves of this plant.

If a husband commits adultery, his wife can put this to an end by secretly beating his pants seat with a branch of shame bush. The next time he tries to make love to his ‘sweet woman’, he will not be able to get an erection. He becomes so embarrassed that his girlfriend leaves him soon. In the future, he will only be successful in having intercourse with his own wife. If the leaves are mixed with some oil and rubbed on the husband’s arm without his knowledge, he will not get involved with other women at all. No matter how he behaves, the only person he can get intimate with is his own wife.

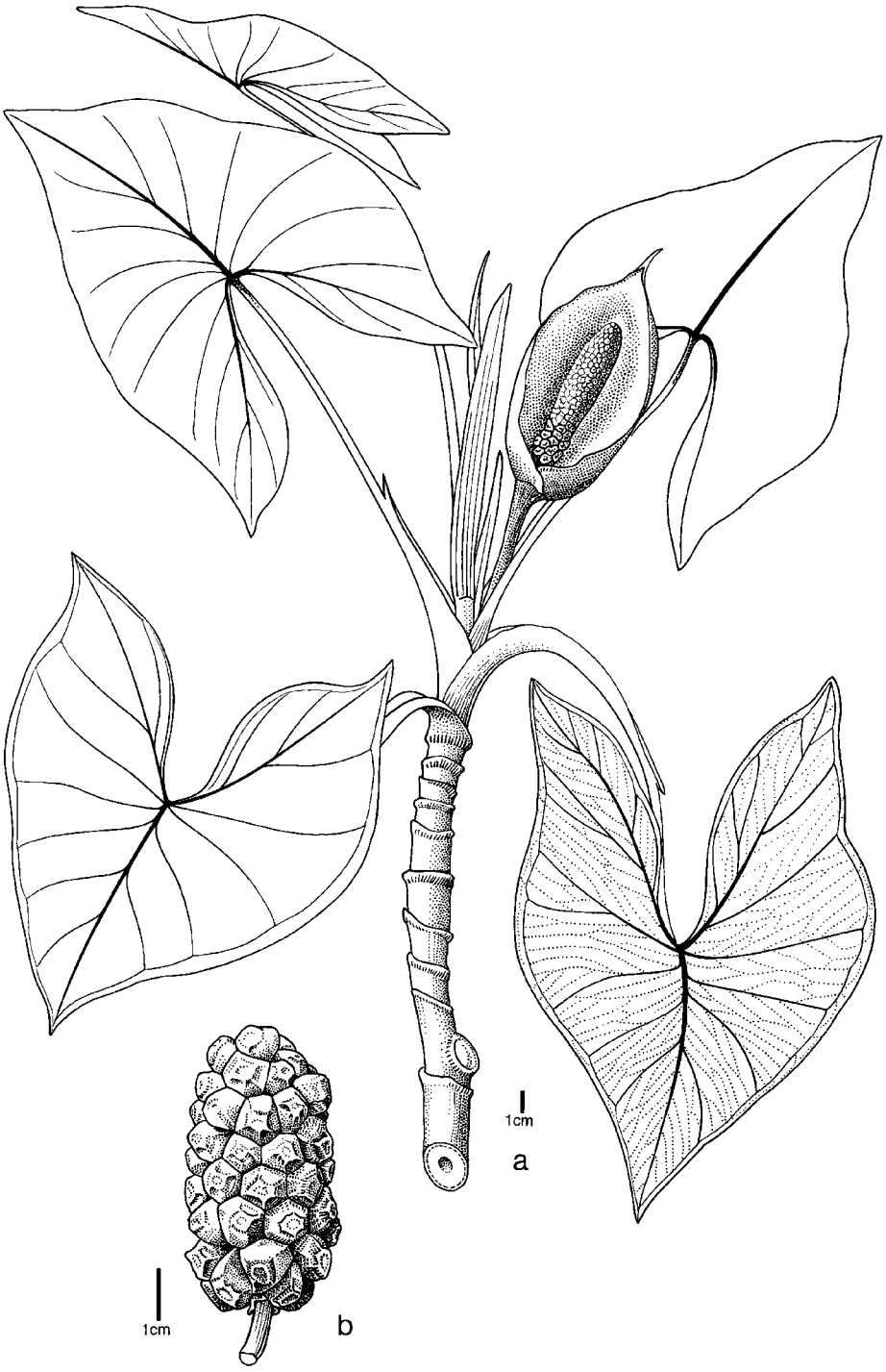
On the other hand, if a woman is tired of her man wanting too much sex, she will secretly put some shame bush under his pillow. At night he will not be able to get an erection, and shamefully leaves his wife in peace. Women admitted they used this plant to prevent their spouses from beating them or getting involved in fights when drunk. Men feeling guilty about their behaviour often fear that women will use these spells upon them so that they become impotent. They are afraid to be killed by their enemies when being under influence of this plant. Men advise each other always to look under the pillow or sheet before going to bed with a woman, and to be careful not to beat their wives too often. The widespread belief in the magic properties of this plant thus seems to prevent domestic violence to a certain extent.

In times of warfare, the Wayãpi from French Guiana used to touch the leaves of the plants growing closely around their settlements. When passing the village border, their enemies would become forceless and inoffensive. A bath from shame bush leaves and sweet broom (*Scoparia dulcis*) makes a person invulnerable for attacks, as the arms of his enemy will hang down powerless from his body (Grenand et al., 1987).

Apart from the magic, the leaves are also used medicinally. The ash from the burned leaves mixed with coconut oil is rubbed on ordinary swellings and bruises as well. To relieve a bad cough, the leaves are heated briefly over a fire and applied as a warm poultice on the chest. A decoction of the leaves is drunk for high blood pressure.

Economy: The species is used for subsistence only.

Notes: (1) 'Embarrassed plant', after the folding leaves (Bennet, 1994); (2) 'Snake teeth', after the recurved spines; (3) 'Shame bush', a Carib translation of the Creole name.



57. *Montrichardia arborescens* a. flowering branch; b. infructescence.

57. **Montrichardia arborescens** (L.) Schott **ARACEAE** **Mokomoko**

Vernacular names: Mokomoko (Cr), Yurika (Ar), Mukumuku (C), Imuru (Wr).

Botanical description: Terrestrial herb; stem erect, woody, to 3 m tall, to 2 cm in diam., base much thicker, armed with recurved prickles. Leaves alternate, simple, sheathed at the base; stipules absent; sheaths ca. 20 cm long, with an acute, free cusp ca. 1 cm long; petiole ca. 25 cm long, terete; blades leathery, sagittate, ca. 30 x 25 cm, lobes ovate, to 15 cm wide, apex acute. Inflorescence a terminal spadix, cylindrical, ca. 10 x 1 cm, whitish; spathe ca. 13 x 7 cm, greenish outside, cream to white inside, cuspidate; peduncle stout, ca. 4 cm long. Flowers actinomorphic, lacking a perianth, unisexual, plants monoecious. Male flowers in the upper 8 cm of the spadix; stamens 4-7. Female flowers in the basal 2 cm; ovary superior, 1-locular, style inconspicuous, stigma discoid, lobed. Fruiting spadix ca. 12 x 8 cm. Fruit a berry, green, soft, obovoid, ca. 2.5 cm in diam.; seed 1, smooth, brown, obovoid, ca. 2 cm in diam.

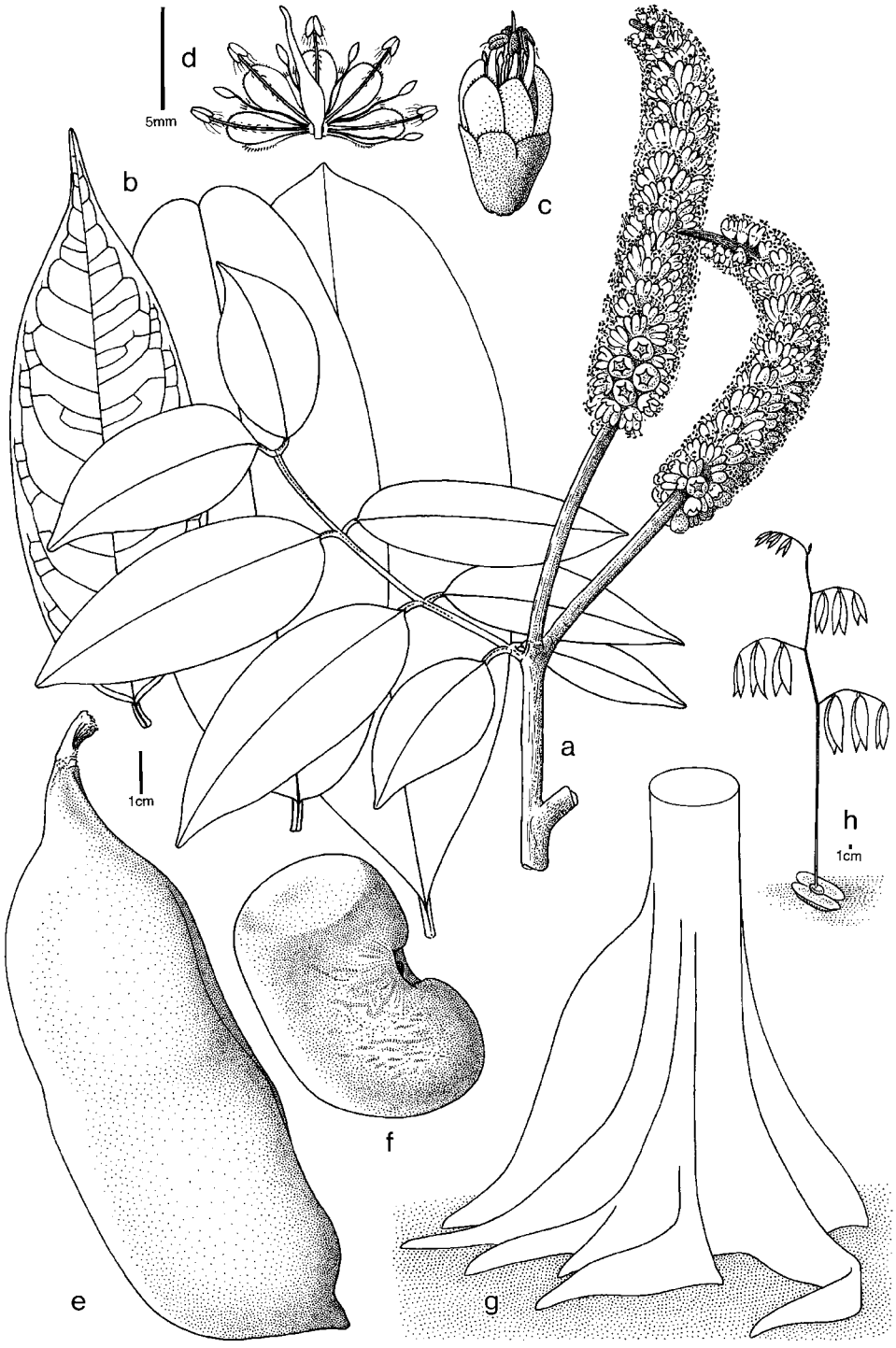
Distribution and ecology: Throughout tropical America, frequent along riverbanks in coastal areas. In northwest Guyana, abundant in brackish and fresh water swamps and coastal savannas, often forming dense stands along rivers. Less common deeper in the interior. Flowering and fruiting through the year. Pollination is probably done by beetles; seeds are dispersed by water and fish.

Use: A tea from a few mokomoko and mango leaves (*Mangifera indica*) is drunk by diabetes patients to keep their blood sugar level low. To treat tuberculosis and heavy chest colds, a concoction is made from one mokomoko leaf, some wild semitoo (*Passiflora foetida*), wild maran (*Pityrogramma calomelanos*), kakarawa bark (*Pradosia schomburgkiana*), and crapeaud pepper (*Physalis pubescens*). The tea is drunk regularly until the symptoms have disappeared. To disinfect and stop the bleeding of cuts, bruises, snakebites, scorpion stings, and stingray punctures, a piece of stem or shoot is heated over a fire for about 5 minutes. The slightly acrid sap is squeezed in the wound. A slice of stem or a poultice from a young shoot is tied to the wound with a piece of cloth. A spoonful of the sap with three drops of kerosene is taken for the relieve of colds and sore throat. Reinders (1993) observed that in Mabaruma, the sap was drunk with some salt for high blood pressure. It was also rubbed on sprained limbs. Lachman-White et al. (1992) reported the internal and external use of the salted sap for sore eyes, tuberculosis, colds, and thrush by infants. A decoction of dried roots and leaves was taken daily for hypertension. The powdered roots are known as a drastic diuretic in Colombia (Schultes and Raffauf, 1990). In French Guiana, the sap is rubbed on the limbs as a protection against attacks of the electric eel (Grenand et al., 1987).

The flowering spadix is cut into pieces and put on a hook as fish bait. To catch large fish like the morocot (*Myletes* sp.), a whole spadix may be used. Warao fishermen have a special way of preparing morocot bait. Since the fish is able to smell humans from a long distance, touching the spadix must be avoided. A knife or muddy hands are used instead. A sharp stick is drilled in the spongy spadix, the whole is wrapped in a dhalebana leaf (*Geonoma baculifera*) and closed tightly with a bush rope. To avoid that the bait contracts the smell of humans, the preparation is done in the forest, away from the village and forest trails. When the package is thrown in the river or put on a hook, morocots are immediately attracted to it. The same type of bait is made with crabwood seeds (*Carapa guianensis*). The young shoot may also be carved into the shape of a fish and used as bait. This is particularly effective to catch lokonani (*Cichla ocellaris*).

In the past, mokomoko spadices were also used to lure manatees (*Trichechus mantus*) by holding the spadix above the water and shooting the animal when it came near (Roth, 1924). Nowadays manatees have become very scarce and are rarely hunted. Pieces of mokomoko trunk serve as cork for gasoline containers. The elastic stem is easily cut into shape and does not let the fuel leak through. Duke and Vásquez (1994) mentioned that roasted mokomoko seeds were edible, but this custom was not observed in Guyana.

Economy: Mokomoko leaves are sold on medicinal herb stalls at the Georgetown market.



58. *Mora excelsa* a. flowering branch; b. leaflets; c. flower; d. dissected flower; e. fruit; f. seed; g. trunk base (4 m high); h. seedling.

58. **Mora excelsa** Benth. **LEGUMINOSAE-CAESALP.** **Mora**

Vernacular names: Mora (Ar), Parakuwa (C), Mo'ra (Wr).

Botanical description: Tree, to 50 m tall; trunk to 2 m in diam., often hollow when old, buttresses to 5 x 4 m, often with smaller secondary branches. Outer bark grey-brown to red-brown, lenticellate, scaly to flaky, inner bark pink to light brown, darkening after exposure, slightly sweet-scented, exudate brown-yellow, clear, somewhat sticky, sapwood light brown, heartwood red-brown. Leaves alternate, 6-8- foliolate, rachis ca. 9 cm long; stipules minute, caducous; petiole ca. 4 cm long, flat above; leaflets opposite, leathery, oblong-elliptic, ca. 14 x 6 cm, glabrous, apex acute, obtuse or emarginate, base rounded to acute. Inflorescence a terminal panicle of few, dense spikes ca. 15 x 1.5 cm long. Flowers white, almost symmetric, sessile; calyx cup-shaped, 4 mm long, shortly 5-lobed, margins ciliate; petals 5, ca. 6 mm long, margins ciliate; stamens 10, free, 5 sterile and 5 fertile, exserted, covered with white, woolly hairs. Pod brown, woody, flattened, to 20 x 7 x 5 cm, glabrous, longitudinally dehiscent, valves coiling up after dehiscence; seeds 1-2, heavy, kidney-shaped, ca. 9 x 5 x 4 cm, wall thin. Seedlings with pink or reddish leaves, apex long-acuminate, the two pink cotyledons spread out on the soil.

Distribution and ecology: Venezuela (Orinoco), Trinidad, Guyana, and Suriname, in moist to wet places, locally abundant to dominant (Mora forest) on clay soils along rivers and creeks, occasional in marsh forest. In northwest Guyana, dominant on the floodplains of large rivers above the influence of the tides, occasional in local depressions in mixed forest and manicole swamp. Flowering mainly from January to May, sometimes in July and August; fruiting mainly in June-July, occasionally in October-November (ter Steege, 1990). In Barama, the species was flowering in July-August and fruiting in December. Mora has a conspicuous leaf flush and an abundant germination under fruiting trees, creating a dense seedling bank, even in dense shade. The flowers are probably pollinated by bees, the floating seeds are dispersed by water (Polak, 1992).

Use: The hard and heavy wood is used for canoes, which may last up to 20 years. When they become old and leaky, they serve some more years as cassava grating trough, known as kumong (C) or adisa (Ar). The wood is sawn into boards with a chainsaw or mechanically in local sawmills. Boards are also used for 'ballahoos' (boats made out of boards). Sometimes only the stern of a boat is made from mora, to have a firm backside to attach the outboard motor. In remote Carib communities, drinking vessels for cassava beer (paiwari, cassiri) are made from a hollowed-out mora trunk. These 'cassiri canoes' are able to contain up to 100 litres of drink. Their ends made into two handles, to carry the vessel when empty. The wooden construction to attach matapis is made from mora as well.

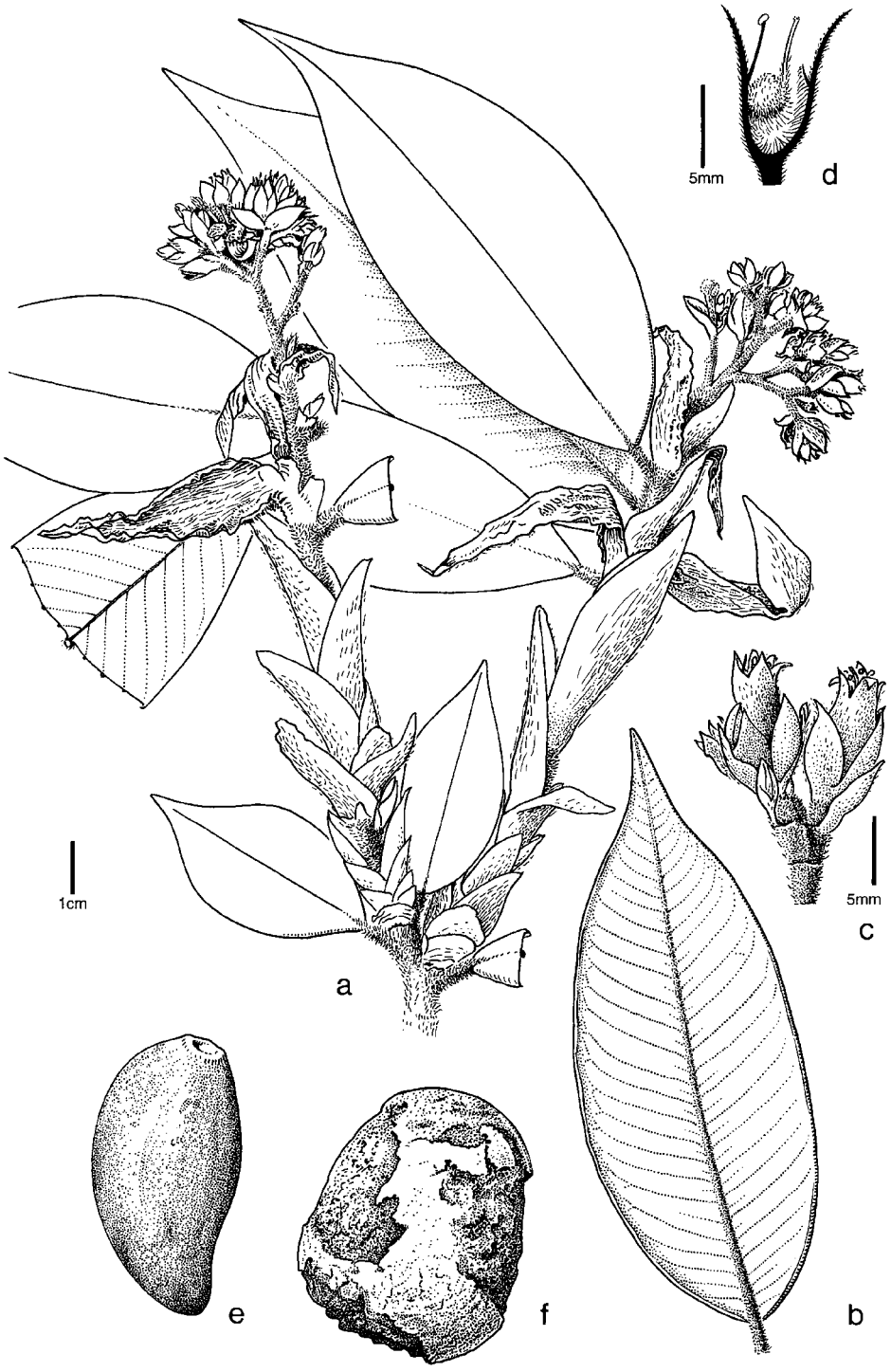
Young mora trunks are preferred for house posts, as they are strong and heavy. In Barama, nearly every house is built on 'mora tacoubas'. Pieces of the heavy wood are carved into mortars to pound coffee beans, maize, or other grains and seeds. Mora branches and split trunks are used to build a fireside ('babracots').

The bark is scraped off with a knife, boiled as tea or soaked in water and strained. Half a cup is drunk to relieve diarrhoea and dysentery. Fanshawe (1948) mentioned a decoction of the fresh bark for uterine infections, intestinal worms, and to cleanse cuts and sores. The bark contains some 8% tannin and produces light-coloured leather, but has no commercial scope, as its quality is inferior to that of mangrove bark (*Rhizophora mangle*). Roth (1924) and Gillin (1936) noted that in times of cassava scarcity, mora seeds were grated, mixed with cassava flour and baked into bread. The hard seeds had to be soaked in water for a week before they could be grated. In Barama, this is still being done every now and then, but not always in times of shortage. People said they liked the bitter taste the seeds give to the cassava bread.

Fresh chips of mora wood and bark thrown in the water appear to have a weak toxic effect on fish. But unlike in other parts of Guyana (Fanshawe, 1948; Lachman-White et al., 1992), mora is not used as fish poison in the North-West District. Local beekeepers said that most of their honey was produced during the flowering of mora and corkwood (*Pterocarpus officinalis*).

Economy: Mora is a commercial timber species (Polak, 1992), used for construction of bridges and shipbuilding. In the interior, Mora canoes are sold for around US$ 55, according to their size.

Notes: (1) Morabukea (*Mora gonggrijpii*) is distinguished from *M. excelsa* by its bifoliate leaves. Morabukea is much more common in central Guyana than in the North-West District.



59. *Parinari rodolphii* a. flowering branch; b. leaf; c. flowers; d. flower, longitudinal section; e. young fruit; f. fruit, mesocarp partly eaten by agouti.

59. **Parinari rodolphii** Huber **CHRYSOBALANACEAE** **Buhurada**

Synonym: *Parinari lucidissima* Standl.

Vernacular names: Counter, Wild potato (Cr), Burada, Buhurada (Ar), Karapa porï[1], Napi[2], Ereyuru, Tapowonureng (C).

Botanical description: Tree, to 40 m tall; trunk to 45 cm in diam., buttresses to 2 m high. Outer bark flaky, lenticellate, light brown, inner bark orange-yellow, wood white. Young branches densely covered with stiff, golden to rusty-brown hairs. Leaves alternate, simple; stipules to 4 cm long, almost clasping the branch, rusty-brown puberulous; petiole ca. 5 mm long, with two medial glands usually obscured by dense pubescence; blades elliptic to oblong to narrowly elliptic, ca. 15 x 4 cm, glabrous above, densely covered with white or golden hairs below, apex acuminate, base acute to obtuse. Inflorescences terminal, densely flowered panicles to 6 cm long, rusty-brown puberulous; bracts and bracteoles enclosing young flowers in small groups. Flowers slightly zygomorphic; hypanthium cup-shaped, brown puberulous on both sides, ca. 3 mm long; calyx 5-lobed, lobes ca. 2 mm long; petals 5, white, shorter than calyx lobes; stamens 7, staminodes 7-8, short, filiform, opposite the stamens; ovary superior, 2-locular, excentrally placed in hypanthium, densely pilose, style 1. Fruit a drupe, ellipsoid, to 6 cm long, epicarp warty, pinkish yellow, glabrous, mesocarp yellow, starchy, sweet-scented, endocarp hard, thick, fibrous.

Distribution and ecology: The Guianas and eastern Amazonian Brazil, in non-flooded or periodically flooded forest (Prance, 1972). In northwest Guyana, common in mixed primary and late secondary forest. In Barama, fruits were seen in August. The seeds are probably dispersed by monkeys, bats, and rodents (van Roosmalen, 1985).

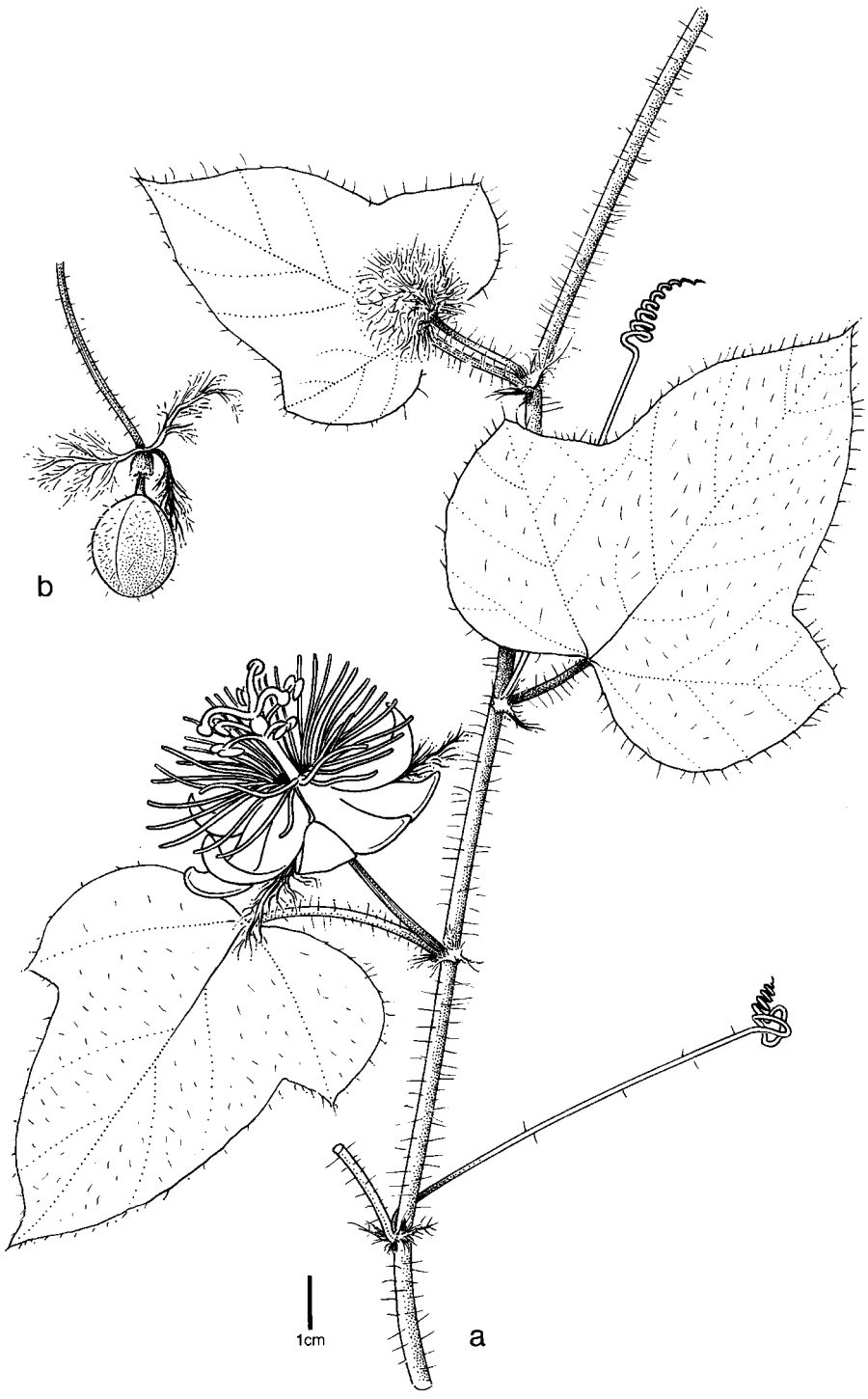
Use: The wood of this species is highly valued as firewood, like most other species of Chrysobalanaceae. The wood splits easily into small sticks, burns good and is quickly lit, even when wet. The wood is preferred for the small fires under the circular iron plates used for baking cassava bread[3]. In the more traditional Amerindian villages, wood is still the only fuel source. In a household survey carried out in the North-West District by Sullivan (1999), all but one household interviewed said they collected firewood. An average of 1.3 hour per day was spent in gathering and preparing firewood. The wood is locally sawn into boards and used for flooring and walling.

The inner bark is scraped and used as a poultice on snakebites. Meanwhile, the patient must suck on some pieces of the slimy bark. It is said to counteract the poison of different species of snakes. A decoction of the outer bark is reputed to have aphrodisiac properties (Fanshawe, 1948).

Van Roosmalen (1985) mentioned that the starchy mesocarp was edible. The fruits are not eaten in northwest Guyana, but the aromatic fruit flesh is occasionally grated, mixed with coconut oil and rubbed on the skin as a perfume.

Economy: The wood of this species is sometimes sold as firewood at regional markets for $ 0.25 per basket. The species is a minor commercial timber (Polak, 1992).

Notes: (1) 'Smells like crabwood' (*Carapa guianensis*), after the scent of the fruits; (2) 'Potato', after the shape of the fruit. The same name is given to the sweet potato (*Ipomoea batatas*); (3) See plate 23.



60. *Passiflora foetida* var. *hispida* a. habit; b. fruit.

60. **Passiflora foetida** L. var. **hispida** (DC.) Killip ex Gleason **PASSIFLORACEAE** **Wild semitoo**

Vernacular names: Wild semitoo, Baby semitoo, Mis mis (Cr), Semetho[1] (Ar), Nuno inyeropo[2] (C), Merehkuyu[3] (Wr).

Botanical description: Delicate vine, climbing with spring-like, axillary tendrils, covered with yellowish brown hairs. Leaves alternate, simple, 3-lobed, giving an unpleasant smell when crushed; stipules semi-circular, deeply cleft into thread-like, gland-tipped segments; petiole ca. 2.5 cm long, glandular-ciliate, without true petiolar glands; blades hastate, ca. 8 x 7 cm, sparsely appressed-hirsute on both sides, margins glandular-ciliate. Flowers solitary, axillary; pedicels ca. 2.5 cm long; bracts ca. 3.5 cm long, tri- or quadripinnatisect, the gland-tipped segments closely interwoven in bud and even at the time of fruiting. Flowers actinomorphic, bisexual; hypanthium prolonged into an androgynophore; calyx tube short, campanulate; sepals and petals 5, alternately inserted at the throat of the tube, white, tinged with blue, oblong, ca. 1.5 cm long; corona filaments in several series of white and purple threads, ca. 1.5 mm long; stamens 5; ovary superior, 1-locular, glabrous, styles 3. Fruit a berry, yellow, globose, ca. 2.5 cm in diam., ribbed, glabrous; seeds numerous, blue-black, narrowly obovoid, ca. 4 mm long, coarsely reticulate, embedded in sweet, grey pulp.

Distribution and ecology: From the West Indies throughout tropical South America to northern Peru and Amazonian Brazil, introduced in tropical Africa and Asia. In northwest Guyana, common in secondary shrubby vegetation and abandoned fields, sometimes spared from weeding around house yards. Flowering and fruiting from July to January. Seeds dispersed by monkeys and birds (van Roosmalen, 1985).

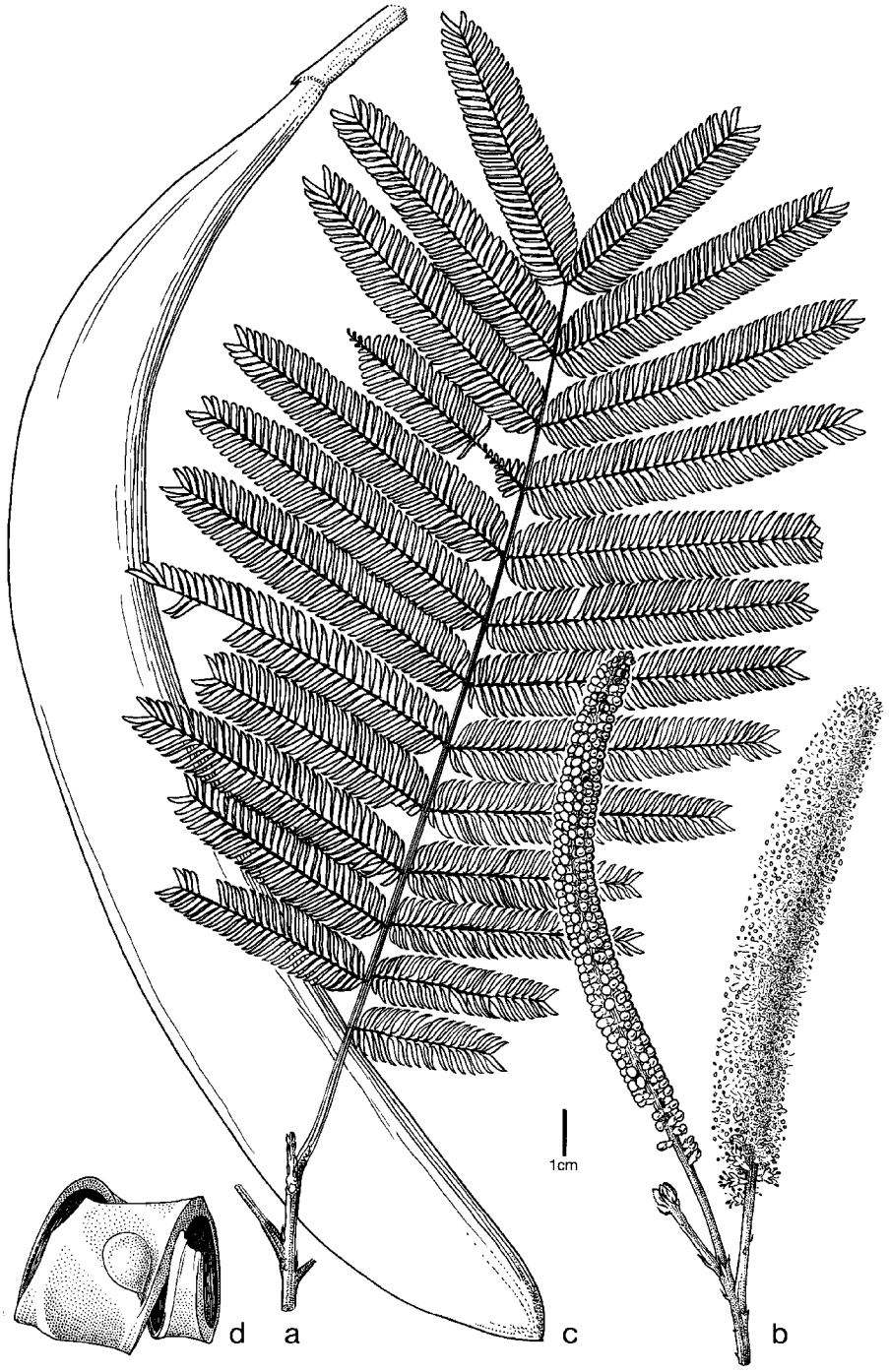
Use: The sweet, grey fruit pulp is eaten. The plants bear just a few ripe fruits at the time, and the amount of pulp is too small to be of commercial interest. More than for its fruits, the species is collected for its medicinal properties. A piece of the vine is boiled into a tea that should be drunk for nine days to combat hookworms and other intestinal worms. The medicine is said to kill the parasites, which are sooner or later passed out with the stool.

To treat tuberculosis and heavy chest colds, a concoction is made from some wild semitoo, wild maran (*Pityrogramma calomelanos*), one leaf of mokomoko (*Montrichardia arborescens*), the bark of the kakarawa tree (*Pradosia schomburgkiana*), and crapeaud pepper (*Physalis pubescens*). The tea is drunk regularly until the symptoms have disappeared. A children's medicine for colds is made by boiling some wild maran with a piece of wild semitoo vine, lime juice, and sugar in a pint of water. The decoction is boiled down into a syrup that is taken as a relief for colds.

Around Mabaruma, a laxative to get rid of intestinal parasites is prepared by boiling six leaves of wild tobacco (*Irlbachia alata*) with a piece of wild semitoo vine in two litres of water, and boiling it down to one litre. Half a glass of the bitter tea must be warmed and taken three times a day to 'clean out' the intestines (Reinders, 1993). In Venezuela, an infusion of the flowers is drunk to reduce fever (Delascio Chitty, 1985). A wide variety of flavonoids have been isolated from *Passiflora foetida* var. *hispida* (Ulubelen et al., 1982). This variety is distinguished from *P. foetida* var. *foetida* by having less hairy leaves.

Economy: The vine is sold at medicinal herb stalls at the Georgetown market as medicine for parasitic worms and thrush.

Notes: (1) Arawak name means 'the sweet one', as 'semehi' is sweetness (Bennet, 1994); (2) The Carib name means 'the moon has left her', in the sense of an infertile woman, since the vine bears only a few fruits at a time. In Suriname, the same name was given to *P. vespertilio*, used by women to postpone their menstruation during long boat trips (Ahlbrink, 1931); (3) Warao name is derived from 'maracuya', the general Spanish name for passion fruits.



61. *Pentaclethra macroloba* a. leaf; b. inflorescences; c. fruit; d. dry valve with seed.

61. **Pentaclethra macroloba** (Willd.) Kuntze **LEGUMINOSAE-MIMOS.** **Trysil**

Vernacular names: Trysil (Cr), Koroballi (Ar), Parawakasi (C), Bihibihidu (Wr).

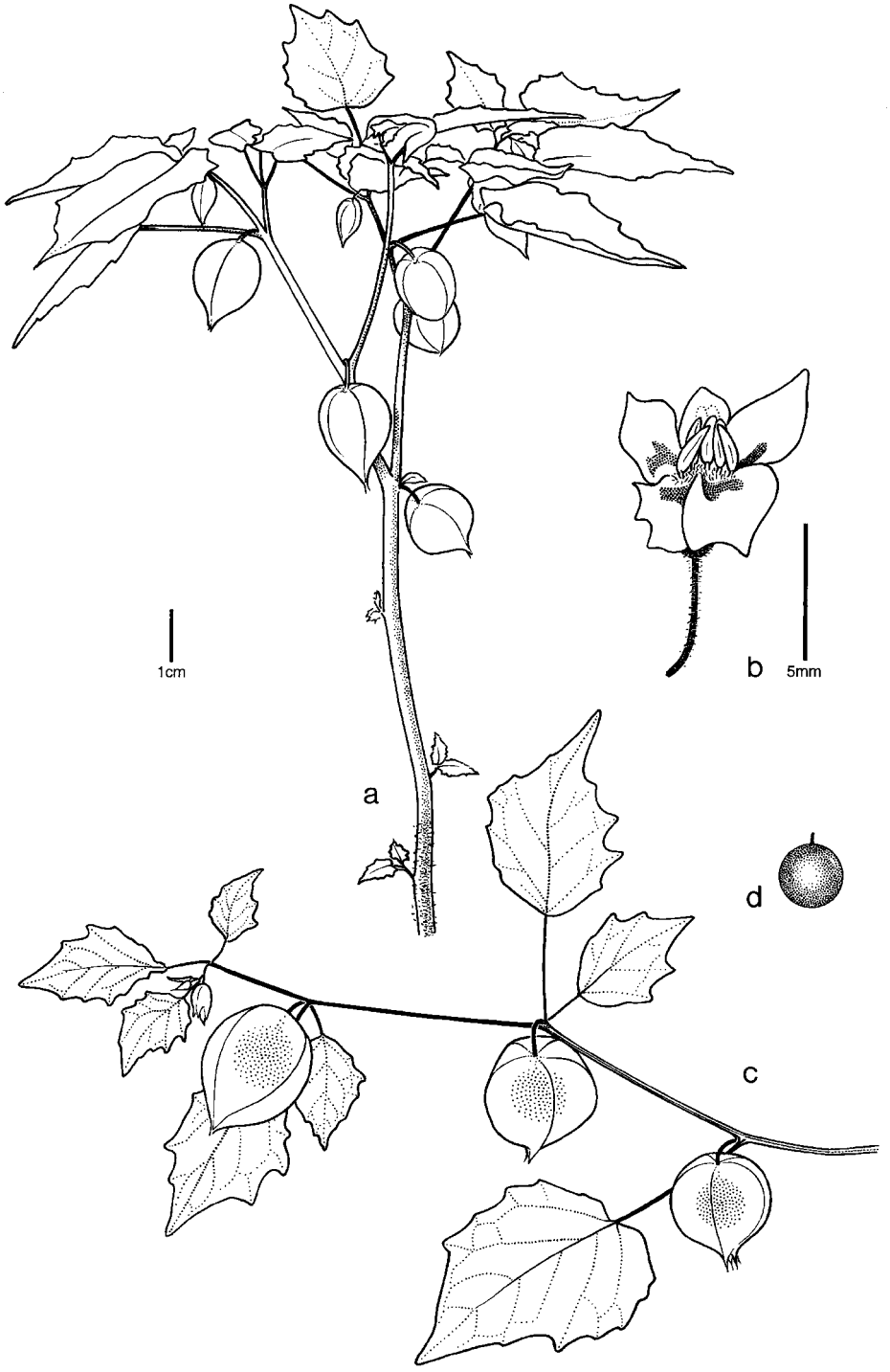
Botanical description: Tree, to 25 m tall; trunk to 40 cm in diam., small buttresses. Outer bark light brown with white patches, rough, inner bark brown, sapwood light brown, heartwood dark red-brown. Branches robust, red-brown, puberulous when young. Leaves alternate, bipinnate, pinnae in 10-20 pairs, rachis ca. 20 cm long, grooved; stipules small, caducous; petiole ca. 4 cm long; leaflets in 30-50 pairs, falcate, linear, ca. 7 x 1.3 mm, glabrous, apex acute, base asymmetric. Inflorescence a cylindrical spike, ca. 20 cm long, often arranged in terminal panicles, rachis rusty tomentose, floral scars evident on rachis after flowers have fallen. Flowers actinomorphic, 5-merous; sepals reddish, 2 mm long; petals yellowish white inside, red outside, ca. 9 mm long; stamens 5, connate into a short tube; staminodes 5, yellow, ca. 25 mm long, opposite to the petals; ovary superior, 1-locular, style and stigma 1. Pod flattened, red-brown to purple-black, falcate, longitudinally veined, ca. 30 x 6 cm, explosively dehiscent, the valves coiling up after dehiscence; seeds ca. 6, light brown, irregularly rhomboid, ca. 4 x 3 x 0.3 cm.

Distribution and ecology: From Nicaragua to northern South America, Trinidad, the Guianas and Brazil. Abundant in Mora forest and species-poor liana forest (Mennega et al., 1988). In northwest Guyana, abundant in manicole swamps, Mora and secondary forest, frequent as large tree in mixed forest. Flowering from April to November; fruiting from February to June (Hellum, 1994).

Use: Trysil bark is widely used as a disinfectant for skin wounds. The inner bark is rasped with a knife and the powdery scrapings are boiled. The bright red, slightly aromatic decoction is used to cleanse cuts, bruises, sores, and abscesses. The bark scrapings are also applied directly to the skin, either fresh or a bit warmed in water. The treatment is said to stop the bleeding and allow for a rapid healing. Furthermore, bark scrapings are put as poultice on sprained limbs and stuffed in cavities or rotten teeth to relieve tooth ache. The decoction of the bark was mentioned as a first aid to cleanse snakebites, especially from the labaria (*Bothrops asper*) and morabana (*Lachesis* sp.) snakes. However, as this remedy alone was not sufficient, patients were recommended to go to a hospital for full treatment. In coastal Guyana, rum, garlic, and gun powder are added to the bark decoction, which is smeared as a poultice on the bite. The powdered bark mixed with salted butter is rubbed on *leishmaniasis* sores (bush yaws). Drinking the bark tea causes vomiting, and this is done on purpose to treat bowel complaints (Lachman-White et al., 1992). Fanshawe (1948) noted an infusion of the inner bark as a remedy for scorpion stings, fever, asthma, bronchitis, and colds. He did not clarify whether the infusion should be taken orally or applied externally.

Children suffering from measles are immersed in a bath with trysil leaves. Fresh leaves are rubbed on children's limbs to cure chicken pox. The leaves are thrown together with the leaves of small leaf bloodwood (*Vismia guianensis*) into chicken pens to get rid of poultry lice (known as 'nimbles' in Guyana). Trysil leaves are scattered around the house when there are many jiggers (sand fleas) in the yard. Trysil twigs and branches are stuffed into the holes in walls and roofs to repel insects eating the thatch. The smell of the leaves is said to chase away the bugs. In French Guiana, the Palikur Indians apply ground trysil seeds as a plaster on scabies (Grenand et al., 1987). To make a fire without matches, a dry trysil branch is rapidly swizzled in a piece of firemother wood (*Tabernaemontana disticha*). When the wood gets very hot, some dry, powdered trysil bark is sprinkled on it, which will quickly catch fire. Matches and lighters are widely available in the interior, but this method of fire making is occasionally practised by hunters when they are far away in the forest, or by children just for fun. It is believed that when somebody beats an acquero palm (*Astrocaryum aculeatum*) full of unripe fruit with a young trysil branch, the ripe fruits will be dropping plentiful the following day. The wood is used for firewood and frames of temporary forest camps. In Moruca, where heavier and high-quality wood species are getting scarce, trysil trunks are used as house posts.

Economy: The wood is a commercial timber in other South American countries (Duke and Vásquez, 1994), but in Guyana the species is used for subsistence only.



62. *Physalis pubescens* a. habit; b. flower; c. fruiting branch; d. fruit.

62. **Physalis pubescens** L. **SOLANACEAE** **Crapeaud pepper**

Vernacular names: Crapeaud pepper, White crapeaud pepper, Pap bush (Cr), Shibero bime[1] (Ar), Pororu wokuru[2] (C), Naniyobo ahuku[3] (Wr).

Botanical description: Erect, annual herb, ca. 50 cm tall, unarmed, densely covered with glandular hairs. Stem hollow, flexuous. Leaves alternate, simple, variable in size, with a strong, unpleasant smell; stipules absent; petiole to 6.5 cm long; blades ovate, subcordate, to 9 x 5 cm, but often much smaller, puberulous on both sides, margin coarsely dentate, apex acuminate, base subcordate, asymmetric. Flowers solitary, axillary; pedicels ca. 4 mm long, puberulous. Flowers actinomorphic, 5-merous; calyx campanulate, green, 5-toothed, enlarging strongly after flowering; corolla campanulate, disc-shaped, 5-lobed, lobes yellow with a dark brown spot, ca. 8 mm long, puberulous inside; stamens 5, inserted at the base of the corolla tube, unequal, filaments lilac, anthers blue; ovary superior, 2-locular, style and stigma 1. Fruiting calyx greenish white, inflated, ovoid, ca. 25 x 16 mm, reticulate, 5-angular, puberulous outside, teeth acuminate. Fruit a yellow berry, enclosed in calyx, ca. 1 cm in diam; seeds numerous, rugose.

Distribution and ecology: Widely distributed in Central America, the West Indies, Venezuela, the Guianas, Brazil, and the Old World tropics. In northwest Guyana, common as weed in cultivated fields and pastures. Apparently flowering and fruiting throughout the year (Benítez de Rojas and Magallanes Nessi, 1998).

Use: The yellow berries are edible and have a soursweet, tomato-like taste. They are mainly eaten by children. Frogs and toads are fond of the berries as well, as can be deduced from the vernacular names of this plant. The sticky, smelling leaves have a variety of medicinal applications. The whole herb is boiled and the bitter tea is taken to get rid of intestinal worms, to treat kidney disorders and Brights' disease, a kidney infection leading to anuria. A small dose of this tea is drunk to relieve swelling of the stomach and skin, which might be a result of kidney malfunction. Reinders (1993) mentioned a steam bath from three crapeaud pepper plants, boiled for half an hour in water with five to ten cowfoot leaves (*Pothomorphe peltata*) as a treatment for swellings of the body. Skin wounds are covered with a poultice of the boiled leaves, while a little of the tea is drunk to prevent infection.

A decoction of several crapeaud pepper plants serves as a hot foot bath to cure ground itch (fungus infection between the toes). The crapeaud pepper is said to 'kill the ground itch'. Foot fungus or 'athlete's feet' is a common ailment in the wet tropics, as people often walk barefoot in the mud or swampy soil for long distances. To treat tuberculosis and heavy chest colds, a concoction is made from crapeaud pepper, wild semitoo (*Passiflora foetida*), wild maran (*Pityrogramma calomelanos*), one leaf of mokomoko (*Montrichardia arborescens*), and the bark of the kakarawa tree (*Pradosia schomburgkiana*). The tea is drunk regularly until the symptoms have disappeared. In French Guiana, the Creoles regard the fruits as a diuretic and effective against intestinal worms. Fruits are crushed and preserved on vinegar as a condiment. An infusion of the leaf is drunk against gall eruptions. When the leaves are fed to chickens, this will stimulate their egg production (Grenand et al., 1987).

The black crapeaud pepper (*Physalis angulata*) is less common in the North-West District, but it is frequently used as medicinal herb in other parts of the Guianas (Lachman-White et al., 1992; Raghoenandan, 1994). The species is distinguished from the white crapeaud pepper by being less hairy and having cuneate leaf bases. The plant is used for quite different ailments.

Economy: The species is used for subsistence purposes only.

Notes: (1) 'Frog pepper', as frogs feed on the fruits; (2) 'Toad drink', as toads eat the fruits as well; (3) 'Smell of the big toad' (*Bufo marinus*) (Charette, 1980).

63. *Pityrogramma calomelanos* var. *calomelanos* a. habit; b. part of fertile frond.

63. **Pityrogramma calomelanos** (L.) Link var. **calomelanos** **PTERIDACEAE** **Wild maran**

Vernacular names: Wild maran, Violin head, Maidenhair fern, Aisegay, Silverback fern (Cr), Arawera upuhpo[1], Amamai (C), Ohisiakaida, Ohisiaka mokumoku (Wr).

Botanical description: Terrestrial fern. Rhizomes short, erect, apex covered by golden-brown, narrowly elliptic scales with long, filamentous apex. Fronds in clusters, to 1 m long; petiole reddish brown to black, shiny, grooved on the upper side, almost as long as lamina. Lamina narrowly triangular, to 100 x 30 cm, bipinnate to bipinnate-bipinnatifid, the ultimate segments narrowly elliptic to elliptic, covered with white, waxy powder below, margins dentate; pinnae with numerous pinnately arranged lobes, ultimate segments shallowly toothed, narrowly elliptic, pinnately many-veined. Young leaves 1-pinnate-pinnatifid, totally covered with silvery-white, waxy powder. Sporangia numerous, without indusium, almost completely covering the lower surface of the pinnules; spores prominently ridged.

Distribution and ecology: From southern Florida to Bolivia and Argentina, widely introduced in the Old World tropics, common in disturbed habitats. In northwest Guyana, common as weed in cultivated fields and in open, recently burned areas.

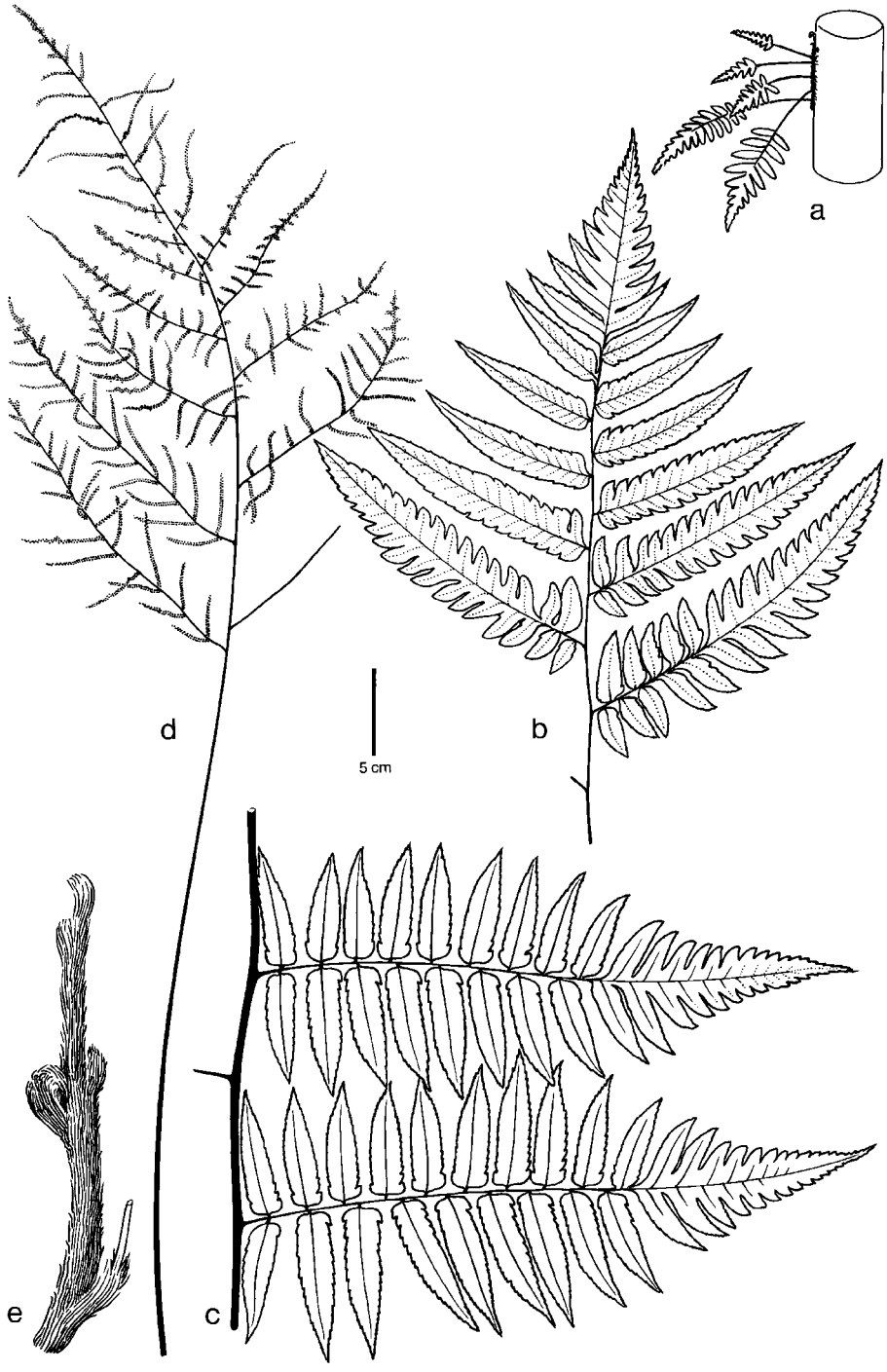
Use: Throughout its range, this fern is used for a variety of medicinal purposes (Duke and Vásquez, 1994). One of the most common applications is the use of the leaves to staunch the bleeding of cuts. Leaves are briefly heated over a fire, rolled and macerated between the hands. The sap is squeezed in a cut, bruise, or open sore. The green sap burns like iodine and is said to have comparable antiseptic properties. The sap from the pounded rhizomes is used similarly. A tea brewed from the leaves is used to cleanse cuts and sores. Medicinal plant vendors in Georgetown defined the properties of this plant as 'antibiotics', and advised to prepare a bitter tea from the leaves. This tea should be drunk to cure internal bleedings, stomach pains, venereal diseases, colds, and influenza. The tea was furthermore recommended as aphrodisiac and to clean out the ovary tubes.

In Barama, a very effective poultice to cure bush yaws (*leishmaniasis*) was made as follows: the leaves of iodine bush (*Solanum leucocarpon*) were briefly heated over a fire, macerated, squeezed into a bowl, and mixed thoroughly with some cooking oil, crushed leaves of carrion crow bush (*Senna alata*), and leaves of wild maran. The poultice was applied to the sores for several days. To treat tuberculosis and heavy chest colds, a concoction is made from some wild maran, wild semitoo (*Passiflora foetida*), one mokomoko leaf (*Montrichardia arborescens*), crapeaud pepper (*Physalis pubescens*), and kakarawa bark (*Pradosia schomburgkiana*). The tea is drunk regularly until the symptoms have disappeared.

The whole fern is boiled with some leaves of cat ears (*Hebeclinium macrophyllum*), and drunk for bronchitis, heavy colds, whooping cough, asthma, pneumonia, tuberculosis, and other respiratory illnesses. A children's medicine for colds is made by boiling some wild maran with a piece of wild semitoo vine (*Passiflora foetida*), some lime juice and sugar in a pint of water. The decoction is boiled down into a syrup and given to children as a relief for colds. Around Mabaruma, the leaves are macerated in water and some of this liquid is dripped into sore eyes. The leaves are boiled with some lemongrass (*Cymbopogon citratus*) and one granadilla leaf (*Passiflora quadrangularis*) and drunk for colds and fever (Reinders, 1993). In French Guiana, an infusion of the rhizomes is used to relieve coughs and other pulmonary infections (Grenand et al., 1987). Several sesquiterpene lactones have been isolated from this fern, of which some have proved antibiotic properties and others exhibited anti-fungal activities (Bardouille and Cox, 1977; Bardouille et al., 1978).

Economy: The fern is sold on medicinal herb stalls at the Georgetown market.

Notes: (1) The Carib name means 'violin head', after the coiled young fronds.



64. *Polybotrya caudata* a. habit on tree trunk; b. sterile frond, 3-pinnate-pinnatifid; c. sterile frond, 2-pinnate-pinnatifid; d. fertile frond; e. rhizome.

64. **Polybotrya caudata** Kunze **DRYOPTERIDACEAE** **Baboon tail**

Vernacular names: Small leaf baboon tail (Cr), Hoa ferobero[1], Ituri hi (Ar), Arawata andïkïrï[2] (C), Wai ahu[2] (Wr).

Botanical description: Hemi-epiphytic fern; rhizomes of adult plants long-creeping, to 2.5 cm in diam., appressed against tree trunks, densely covered with scales; scales linear-triangular, ca. 14 x 1 mm, red-brown. Sterile lamina 2-3-pinnate-pinnatifid, glabrous to pilose; hairs on the axis to 1.5 mm long; pinnae subdeltate, stalked, acuminate, ca. 20-50 x 7-25 cm; pinnules slightly prolonged acroscopically, base truncate or cordate, margins sparsely ciliate with small hairs. Fertile leaves 2-pinnate, with some of the larger pinnules lobed at the base, pinnae long-caudate, ca. 6 x 1 cm, sporangia more or less covering both surfaces including the enlarged margin, the remaining adaxial surface a small, central, narrow green stripe.

Distribution and ecology: From southern Mexico to Bolivia, in wet, shaded forest at low elevations. In northwest Guyana, common in the understorey of mixed and Mora forest.

Use: The rhizome of this creeping fern is covered with long, reddish brown scales, and its top end is often coiled inwards. The colour and shape of the rhizome is associated with the tail of a red howler monkey, known locally as 'baboon' (*Alouatta seniculus*). Two other climbing ferns common in the region, *Cyclodium meniscioides* var. *meniscioides* and *Lomariopsis japurensis*, also have a coiled rhizome with red 'hairs'. They are both called 'broad leaf baboon tail', and are used in a similar way as the species treated here.

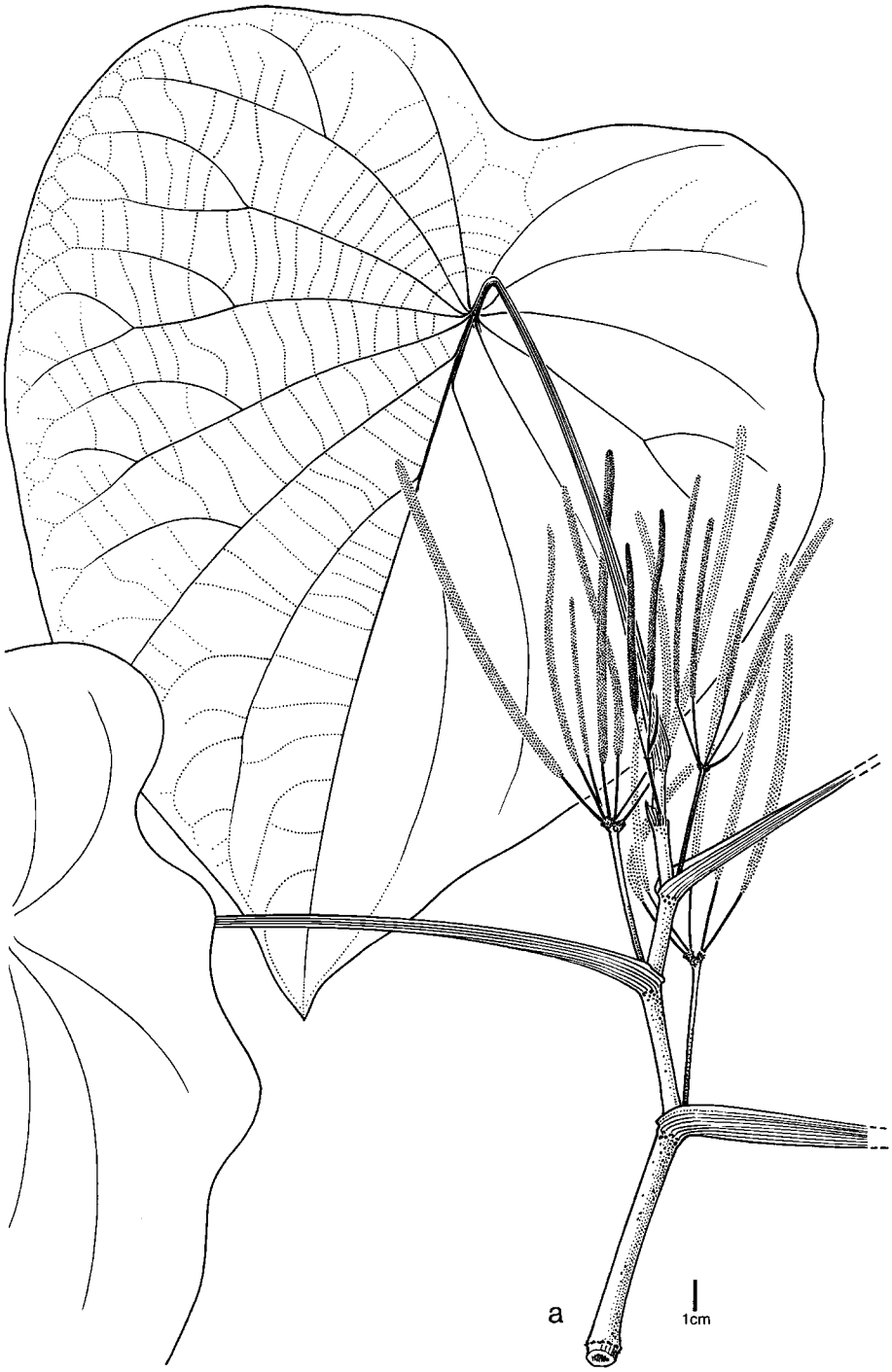
Among indigenous people in Guyana, it is believed that whooping cough is a disease that is related to the baboon, as the sound of the cough resembles the howling of the monkey. To cure children suffering from whooping cough, the rhizome is washed and boiled (with or without the scales) and drunk as tea. The sap squeezed from the rhizome is also drunk. A rhizome decoction is used as a herbal bath for the same illness. Sometimes a section of the scaly rhizome is hung around the neck of the patient as a necklace. This is believed to alleviate the whooping cough as well.

In many traditional Amerindian households, a voice box or 'goggle' from a howler monkey skull is kept in case somebody falls ill with whooping cough. The goggle is used as a cup out of which a sick child must drink until it recovers. In the past, the skin and brains of the baboon were also used against heavy colds and cough. The healing property is explained by the fact that 'the monkeys howls so much and so loudly that he cannot possibly have anything wrong with his throat' (Coles et al., 1971: 18).

To relieve painful swellings or abscesses, the sturdy red hairs of the rhizome are removed, and the white flesh of the rhizome is grated and applied as a poultice. The slime from the grated rhizome is said to bring down the swelling and draw out the inflammation.

Economy: The species is used for subsistence purposes only.

Notes: (1) The Arawak name means 'large kind of ring-tailed monkey' (capuchin monkey, *Cebus* sp.); (2) The Carib and Warao names both stand for 'baboon tail'.



65. *Pothomorphe peltata* a. flowering branch.

65. **Pothomorphe peltata** (L.) Miq. **PIPERACEAE** **Cowfoot leaf**

Vernacular names: Cowfoot leaf (Cr), Dobori banaro[1] (Ar), Popo sakari, Papasaka arï (C), Naba aumu[2], Bebe Joconi, Naniyobo aroko, Naniyobo makuru (Wr).

Botanical description: Shrub, to 2 m tall. Stem glabrous, hollow, green with black spots, swollen at the nodes, with few branches. Leaves alternate, simple, peltate, with a strong anise-pepper scent when crushed; stipules absent; petiole ca. 15 cm long, sheathed up to half of its length; blades broadly ovate, ca. 25 cm in diam., glabrous, green above, greyish green below, with yellow, transparent, glandular dots, apex acute, base rounded to cordate. Inflorescences compound, umbellate, erect, at the end of an axillary stalk, ca. 6 cm long, rachis fleshy, spikes 3-12, greyish white, slender, many-flowered, ca. 7.5 cm long; peduncles slender, ca. 2.5 cm long, glabrous; bracts small, linear, at the base of the spikes, caducous. Flowers actinomorphic, bisexual, sessile, subtended by triangular-peltate bracts, fimbrate at the margins; perianth absent; stamens 2; ovary superior, 1-locular, stigmas 3, sessile. Fruit a drupe, small, 3-angled, ca. 0.5 mm in diam.; seed 1.

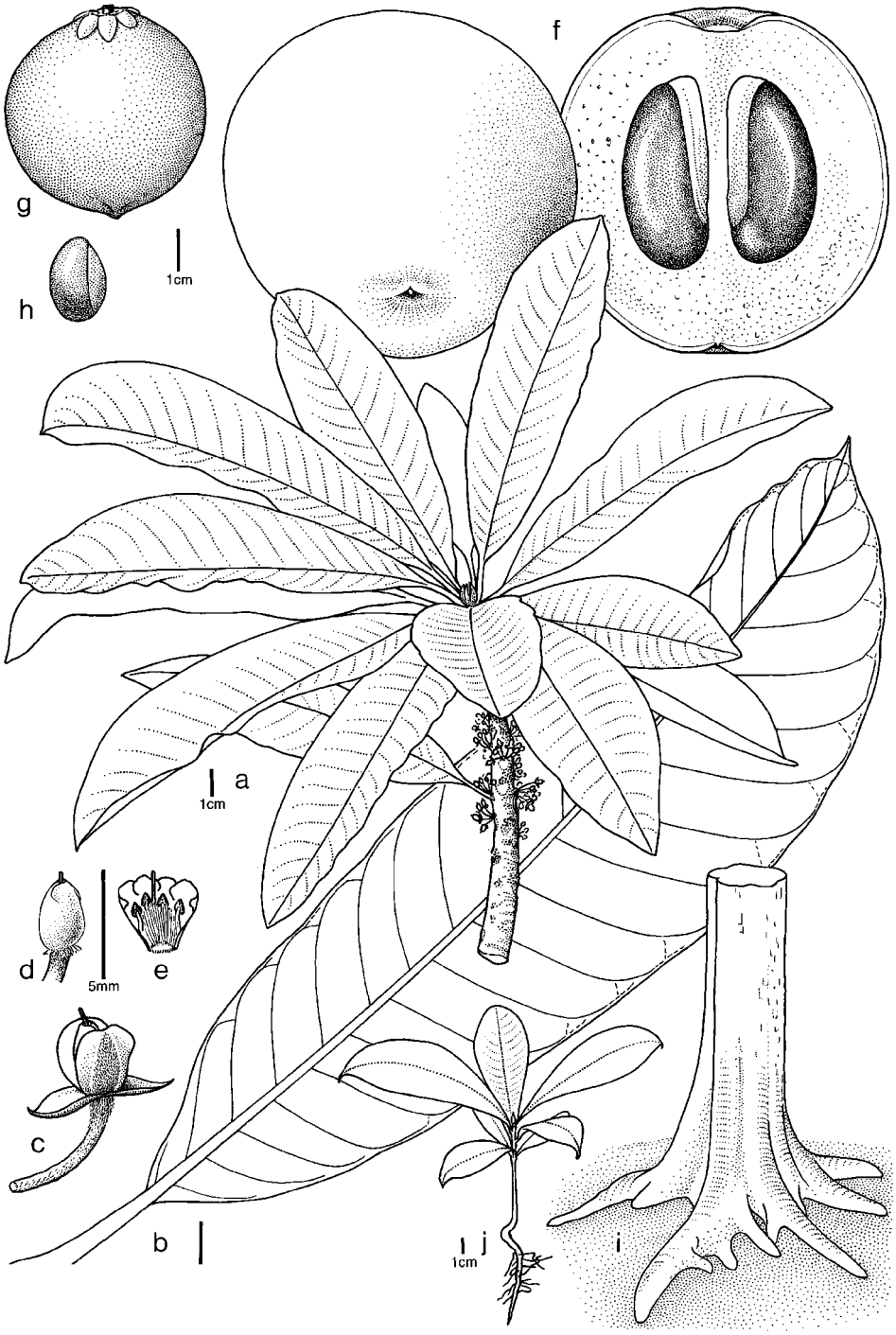
Distribution and ecology: Mexico, the West Indies, Northern South America, Peru, and Brazil. In open, disturbed areas, road sides, and secondary forest (Steyermark, 1984). In northwest Guyana, very common in pastures, growing as weed in cultivated and abandoned fields. Flowering and fruiting throughout the year. Pollination is probably done by bees; seeds are dispersed endozoochorously (Maas and Westra, 1993).

Use: Cowfoot leaves are used for a variety of herbal remedies throughout South America (Milliken and Albert, 1997). For painful and swollen limbs, cuts, sores, abscesses, and arthritis, a leaf is briefly heated over the fire, rubbed in with some coconut or crabwood oil and wrapped around the hurting spot. Leaves are also macerated and applied as poultice. For headache and other facial pains, a leaf is simply stuck to the forehead or face with some coconut oil. The leaves are said to have a cooling effect because of their volatile oils. When a woman is bleeding heavily after childbirth (haemorrhage) and her vagina has ruptured, three cowfoot leaves, some plum bark (*Spondias mombin*) or a few pumpkin leaves (*Cucurbita moschata*), and a little kerosene are boiled in a large cooking pot. The woman must sit over the pot and wash her genitals with the warm decoction. This remedy is said to be very effective, as shortly afterwards the bleeding will stop and the birth channel will close back. In remote areas, where there is no doctor who can put a stitch in the wound, this method is used by local midwives. A tea from cowfoot leaves alone, or with some pumpkin leaves and a piece of ginger (*Zingiber officinale*), is given to a woman in childbed 'to clean out her womb', a purgative for uterine curettage. The tea causes an increased vaginal discharge, after which she will soon recover.

From Baramita, Coles et al. (1971) reported a decoction of cowfoot leaves and fire rope (either a Dilleniaceae liana or *Philodendron fragrantissimum*) in four pints of water, boiled down to three pints. The brew should be drunk the following morning by women unable to produce children. After taking one bottle of the medicine, the woman will experience a heavy menstruation. Shortly after this she will become fertile again. In Baramita, the strong scent and the bitterness of cowfoot leaves were thought to be the reason why a decoction of the leaves was a powerful remedy against venereal diseases. Reinders (1993) described a treatment for swellings of the body with a steam bath from three crapeaud pepper plants (*Physalis pubescens*) and five to ten cowfoot leaves, boiled for half an hour in water. To ease fever, a steam or herbal bath was prepared from cowfoot leaves, munuridan (*Siparuna guianensis*), and a black banana leaf (*Musa* sp.). The Yanomami Indians of Brazil use cowfoot leaf as a remedy for malaria and intestinal pains. Crushed leaves are soaked in hot water. The infusion is drunk in small quantities or used as bath. The macerated leaves may also be rubbed on the body to ease malaria (Milliken and Albert, 1997).

Economy: The species is used for subsistence purposes only.

Notes: (1) 'Stingray leaves', as the peltate leaves are shaped like a stingray (*Potamotrygon* sp.) (Fanshawe, 1949); (2) 'Tapir foot', after the shape of the leaves.



66. *Pouteria guianensis* a. flowering branch; b. leaf, lower side; c. flower; d. flower with calyx and corolla removed; e. flower, opened to show stamens and pistil; f. fresh fruit, complete (l) and in longitudinal section (r); g. dried fruit; h. seed with hilum; i. trunk base; j. seedling.

66. **Pouteria guianensis** Aubl. **SAPOTACEAE** **Asepoko**

Vernacular names: Red tree, Broad leaf asepoko (Cr), Asepoko (Ar, C), Esseboko (Wr).

Botanical description: Tree, to 35 m tall; trunk to 90 cm in diam., base often fluted, with steep, slender buttresses to 1 x 1 m. Outer bark red-brown, fibrous, vertically grooved, scaly; inner bark pink to light brown, with little, white latex, sapwood light brown, heartwood red-brown. Branches reddish brown, covered with short, appressed hairs when young. Leaves simple, alternate, clustered at branch ends, densely covered with rusty brown hairs when young; stipules absent; petiole ca. 3 cm long, angular; blades leathery, narrowly obovate to oblong-elliptic, ca. 20 x 7 cm, more or less glabrous above, brown-silky puberulous to glabrous below, apex rounded to shortly acuminate, base acute. Inflorescences 2-5-flowered fascicles, axillary and below the leaves; pedicels ca. 3 mm long. Flowers actinomorphic, bisexual; sepals 4, green, broadly ovate to elliptic, ca. 7 mm long, persistent; corolla tubular, 4-lobed, pale green, tube ca. 10 mm long, lobes ca. 3 mm long; stamens 4, ca. 5 mm long; ovary superior, 4-locular, style and stigma 1. Fruit a berry, orange-yellow, with little white latex, globose, ca. 5 cm in diam., densely covered with pale brown hairs when young, sweet-tasting; seeds 2-4, ellipsoid, ca. 25 x 15 mm, shiny brown, hilum dull brown, ca. 8 x 20 cm.

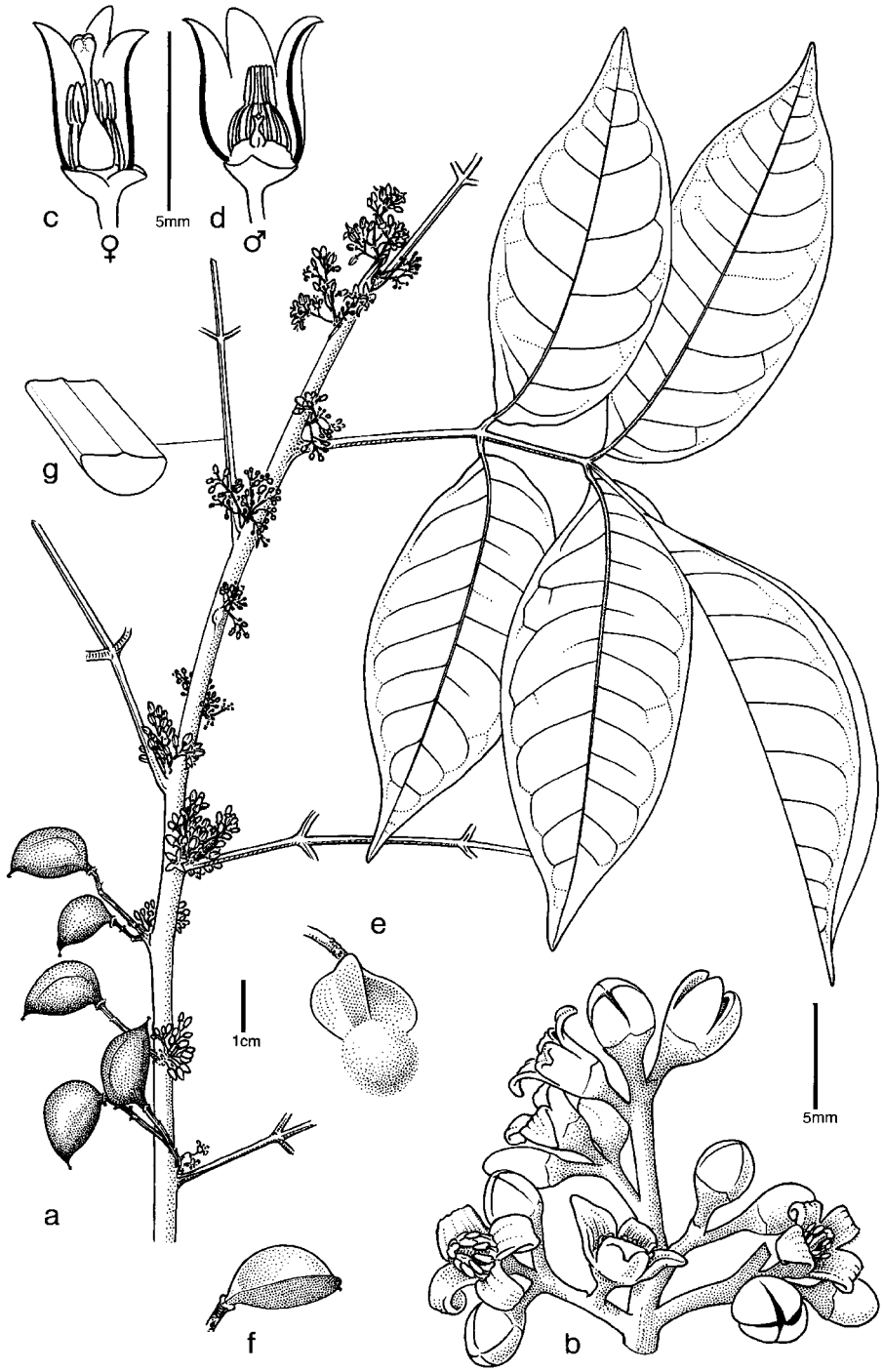
Distribution and ecology: Western Colombia to Venezuela, Trinidad, the Guianas, Brazil, and Peru, in non-flooded, seasonal evergreen forests and montane forest (Pennington, 1990). In northwest Guyana, common in mixed forest, rare in Mora forest and other swamp forests. Flowering mainly in October-December and April-June; fruiting in March and April (Polak, 1992). In northwest Guyana, flowers were seen only once in October. A few fruits were ripe between September and December. Local people claimed the tree was fruiting once every three years, mostly in the dry season (April). Flowers are probably pollinated by small bees (Pennington, 1990). Seeds are dispersed by spider monkeys (van Roosmalen, 1985).

Use: The large, yellow fruits are juicy and sweet. In spite of their sticky latex, asepoko fruits are much appreciated by local people. In the rare moments that asepoko is in season, trees are fruiting heavily. People even cut down the trees to collect baskets full of the fruits. No attempts were observed to cultivate the species.

More than eight species of *Pouteria* with edible fruits were collected in northwest Guyana. In Barama, *P. guianensis* was the most common species, while several other *Pouteria* species were frequent in Moruca. Regardless of their popular fruits, asepoko trees were not deliberately spared when cutting forest for agriculture. In a household survey in three Amerindian villages in northwest Guyana, some 18% of the families listed asepoko among the most important plants they collected from the forest (Sullivan, 1999). Several species of *Pouteria* might be included in this response, as no details on particular species were given.

The wood of this tree is hard and durable and locally used in house construction. Young trunks are used as roundwood rafters and house posts. Parts of the steep buttresses are cut out with a cutlass to make axe handles, a type of wood harvesting which is generally survived by the tree.

Economy: The species yields a commercial timber (Polak, 1992). The fruits of *P. guianensis* are consumed throughout its range, but unlike other wild *Pouteria* species, asepoko is not commercialised or cultivated, neither in Guyana nor in other Amazonian countries (Cavalcante, 1974; Duke and Vásquez, 1994; Sánchez, 1996).



67. *Protium heptaphyllum* subsp. *heptaphyllum* a. branch with flowers and fruits; b. part of inflorescence; c. female flower, longitudinal section; d. male flower, longitudinal section; e. dehiscent fruit, showing pyrene covered with pulp; f. empty fruit; g. petiole.

67. **Protium heptaphyllum** (Aubl.) March. subsp. **heptaphyllum** **BURSERACEAE** **Kurokai**

Vernacular names: Incense tree, Morocot eyeball (Cr), Kurokai, Haiawa, Porokai (Ar), Sipyo, Kasama enuru (C), Sibu (Wr).

Botanical description: Tree, to 20 m tall; trunk to 15 cm in diam. Outer bark light brown, inner bark pink, exudate colourless, turning white after exposure, heavily sweet-scented, wood yellow. Branches slender, greyish. Leaves alternate, compound, 5-7-foliolate, to 25 cm long, rachis flattened; stipules absent; petiole ca. 5 cm long; leaflets opposite; petiolules ca. 4 mm long, swollen; blades oblong-elliptic to elliptic, ca. 9 x 4 cm, glabrous, apex acuminate, base obtuse, asymmetric. Inflorescences axillary clusters, dense, much-branched, sparsely puberulous, ca. 1.5 cm in diam. Flowers actinomorphic, fragrant, unisexual, male and female flowers in one inflorescence; calyx cup-shaped, green, ca. 1 mm long, minutely 4-lobed, lobes shallowly triangular; petals 4, yellowish green to reddish, oblong, reflexed, ca. 4 mm long, papillose at the margins; stamens 6-10, in two whorls; ovary superior, 4-5-locular, glabrous; style 1, stigma 4-lobed. Fruit a drupe, asymmetric, consisting of 1-3 pyrenes, entire to 3-lobed, oblique-ovoid, ca. 3.5 x 1.5 cm, apiculate, dehiscent, pericarp shiny green when immature to bright red when ripe, each pyrene enclosed by fleshy, white, balsamiferous pulp, endocarp woody; seed 1 per pyrene.

Distribution and ecology: Northern South America, occasional in rain and seasonal forest. In northwest Guyana, frequent in mixed and secondary forest, common in shrubby vegetation on white sand in the Moruca region. Flowering and fruiting from October to February. Pollination probably takes place by small, stingless bees (Daly, 1987). Seeds are dispersed by birds (toucans, marudis), spider and howler monkeys, opossums, and kinkajous (van Roosmalen, 1985).

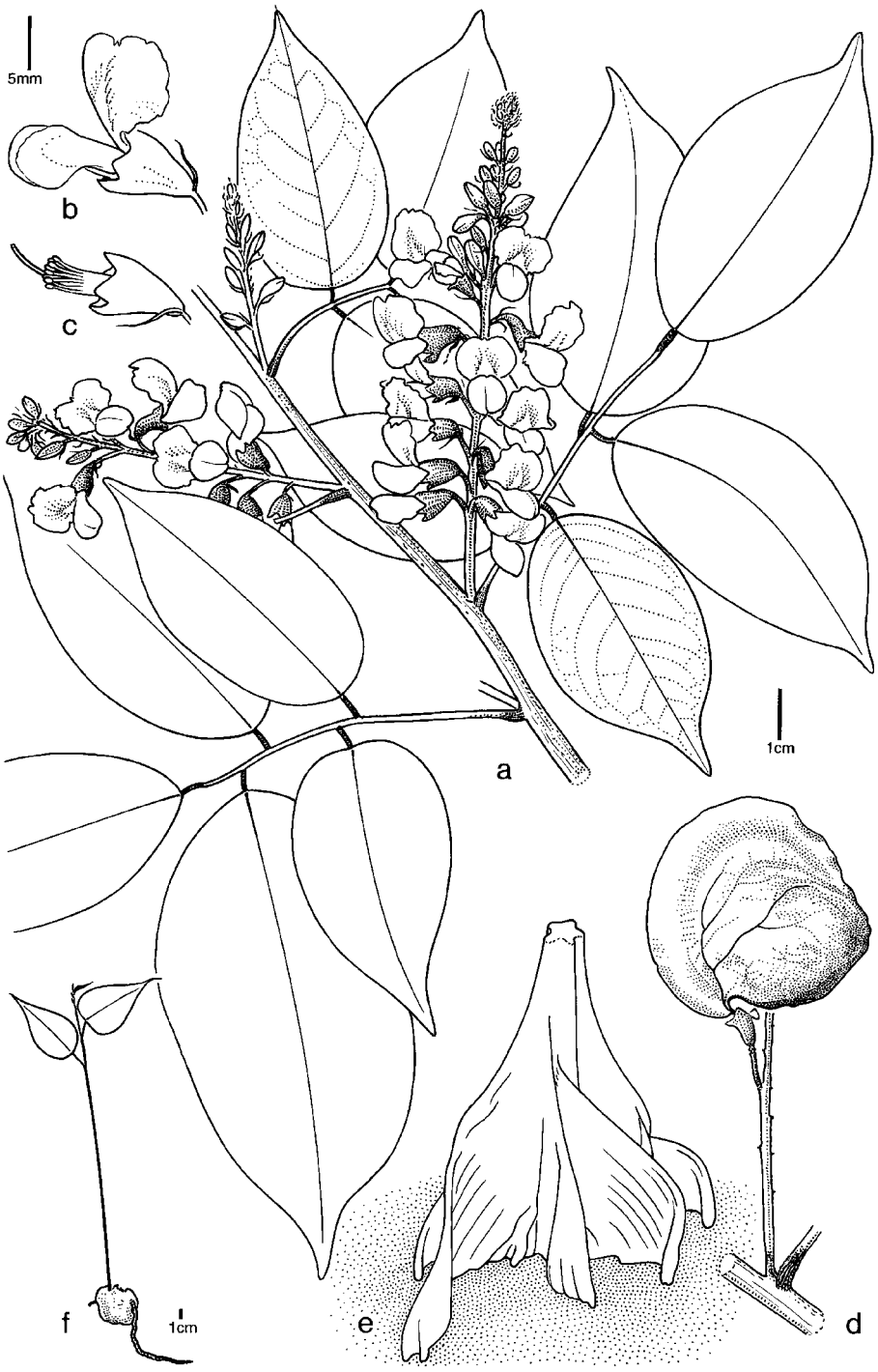
Use: An aromatic, clear resin is secreted from the wounded bark. This resin, which soon becomes solid and whitish, is known as elemi, haiawa, or kurokai gum. Several *Protium* species in the Guianas have such aromatic resin, but they are quite difficult to tell apart in the field. Arawaks made no clear distinction and called all *Protium* species either 'kurokai', 'haiawa', or both, and used them similarly. The Barama Caribs, however, were certain that the resin of sipyo (*P. heptaphyllum*) was of better quality than that of arïwa-u (*P. decandrum*). For this reason, *P. heptaphyllum* is treated here, although *P. decandrum* is more common in northwest Guyana.

The brittle, white resin of *Protium* is used as incense throughout South America. People search for small balls of resin on the trunk, or slash the bark and return the following day to collect the coagulated resin. It burns quite well, but gives a thick smoke and melts very fast. A candle is made by splitting a twig and putting a piece of gum in between. Once lighted, the gum will not go out easily, but the steadily dripping hot gum makes walking with these candles a hazardous exercise. More elaborated candles are made by pouring the melted gum into a bamboo segment with a small thread of homespun cotton as a wig. Before kerosene lamps became popular in the interior, Amerindians made torches by filling a dry crown shaft of manicole (*Euterpe oleracea*) with haiawa gum, strapping it tightly with a bush rope and burn it as a 'flambeau'. Because of their nice smell and ability to chase away mosquitoes, they left the torches burning the whole night. These days, torches are not made anymore, but pieces of gum are still used to light a fire. The incense is believed to invite good spirits and chase away the bad ones. It is even burned in the Catholic church of Santa Rosa Mission, Moruca River.

The melted gum, mixed with coconut oil, is said to be soothing when rubbed on painful or arthritic limbs. The pinkish inner bark is scraped off and dried in the sun. The powder is applied to skin sores, cuts, or fire burns. It dries the wound and allows a fast healing. In coastal Guyana, a decoction of boyari rope (*Aristolochia daemoninoxia*) with some haiawa (unknown if gum or leaves are used) acts as a vomiting agent for drowsiness, listlessness, and as antispasmodic (Lachman-White et al., 1992).

The soursweet pulp is sucked from the seeds, but should be eaten only after the fruit has split open, otherwise the resin in the fruit wall irritates the mouth. Barama Caribs also ate the coagulated resin. The trunk of a large sipyo tree along a 'public bush road' was totally deformed by the repeated slashing of the bark to obtain the resin. The wood is regionally used for house construction and canoes. It is sawn into boards in local sawmills, but was not mentioned as a commercial timber by Polak (1992).

Economy: In the 1940s, some chemical trials were carried out by the Imperial Institute to see whether the gum was suitable for the manufacture of fumigants and printing inks. However, the quality of the resin was too low and the species too scattered to commercialise the product (Fanshawe, 1948).



68. *Pterocarpus officinalis* subsp. *officinalis* a. flowering branch; b. flower, side view; c. flower with petals removed to show staminal tube; d. fruit; e. trunk base; f. seedling.

68. **Pterocarpus officinalis** Jacq. subsp. **officinalis** **LEGUMINOSAE-PAPIL.** **Corkwood**

Vernacular names: Corkwood (Cr), Itiki boro[1] (Ar), Mutusi (C).

Botanical description: Tree, to 30 m tall; trunk to 55 cm in diam., buttresses flat, wide, often sinuous. Outer bark light brown to greyish white, corky, lenticellate, inner bark yellow with little red, sticky exudate, sapwood yellowish white. Leaves alternate, 5-11-foliate, ca. 13 cm long; stipules ca. 3 mm long, caducous; leaflets alternate, ovate-oblong, ca. 13 x 4 cm, shiny, apex shortly acuminate, base asymmetrically rounded. Inflorescence axillary or terminal panicles; bracts ca. 2 mm long, caducous. Flowers zygomorphic; calyx pale green, campanulate, ca. 6 mm long, 5-dentate, glabrous or somewhat puberulous, curved in bud; petals 5, dark yellow, clawed, ca. 15 mm long, glabrous, standard with a red-brown spot, orbiculate, emarginate, wings obliquous-ovate, shorter than standard, keel shorter than wings; stamens 10; ovary superior, long-stipitate, glabrous, style and stigma 1. Pod light green, stipitate, asymmetrically rounded, ca. 4 x 4 x 0.7 cm, glabrous, leathery, with prominent venation, winged at the exterior margin; seed 1, oblong, ca. 2.5 x 3 cm.

Distribution and ecology: Central America, northern South America, the West Indies, the Guianas, and Brazil, common in swamp forest along creeks and riverbanks, in moist to very wet areas (Amshoff, 1939; van Roosmalen, 1985). In northwest Guyana, common in Mora forest, manicole and quackal swamps. Flowering in October, fruiting in November. The winged fruits are dispersed by wind and water (Fanshawe, 1954).

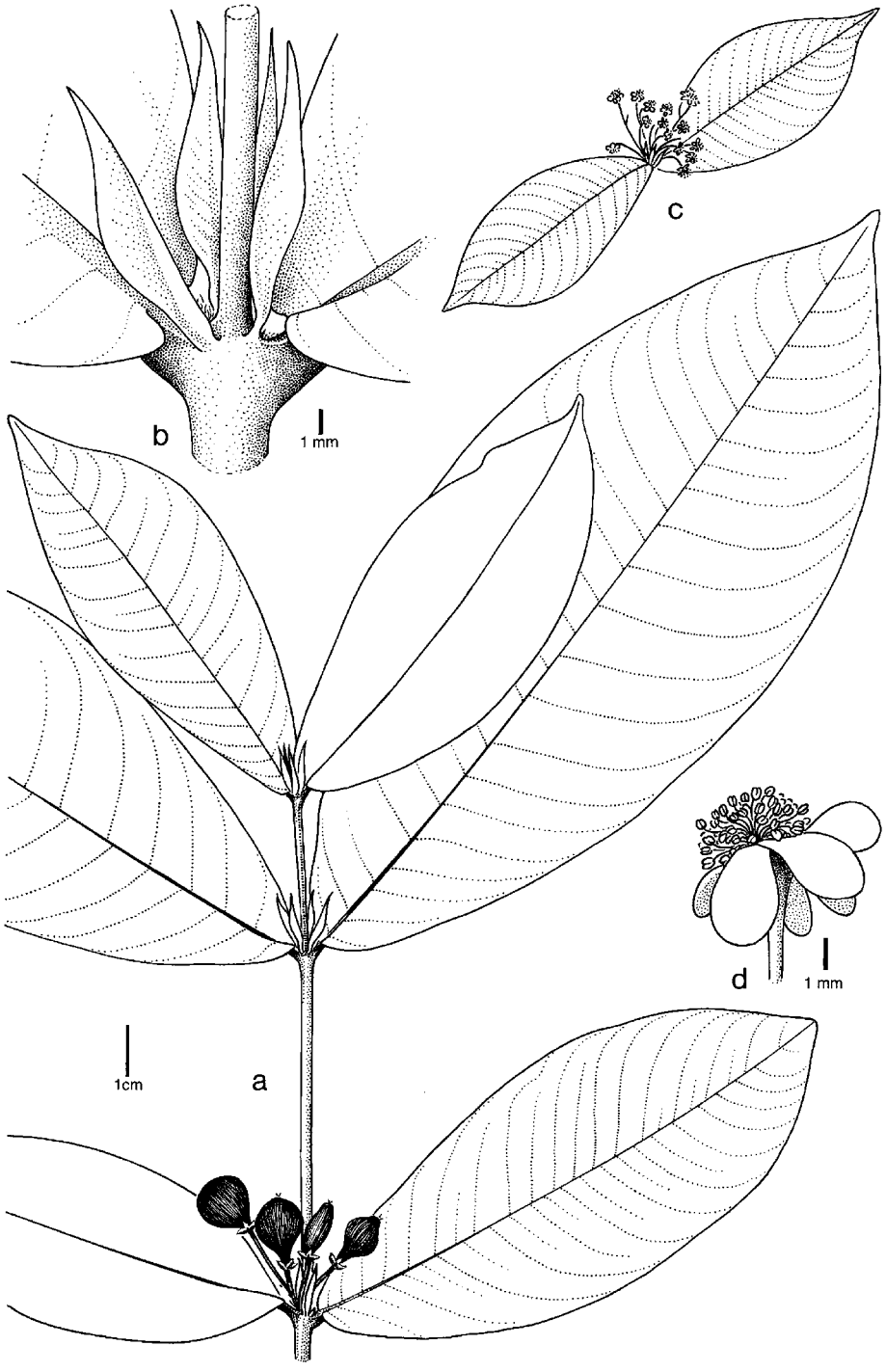
Use: The wood of this tree is soft, very light, and floats on water. Pieces of the broad buttresses are cut off with a cutlass, without felling the tree. The wood is carved with a knife into floaters for fishing nets, bottle corks, or plugs for gasoline containers. When a canoe lacks a seat, a quick bench is shaped out of a corkwood spur during the trip. Children carve the wood into cricket bats, balls, helicopters, aeroplanes, guitars, and toy boats[2]. Occasionally, more sophisticated handicrafts are made from the wood, such as small boats, animal figures, and elaborated balancers[3]. The crafts need to be painted or varnished with mangrove bark (*Rhizophora mangle*), since the soft wood is quickly attacked by weevils.

The bitter, red exudate from the bark is diluted in some water and drunk to stop diarrhoea. A piece of cotton is soaked in the red sap to disinfect mouth sores. The mouth must be rinsed with water afterwards. The sap is also used to cleanse the mouth of babies and small children suffering from thrush, a infection in the mouth caused by the fungus *Candida albicans* (Lachman-White et al., 1992). Thrush is often the result of unhygienic feeding habits, such as dirty nipples, spoons, or drinking bottles. Local people also use the name thrush if a baby reacts sensitive to breast milk after the mother has eaten hot pepper, garlic, or catfish ('skin fish'). Symptoms include a white mouth and tongue, stomach cramps, and rash or sores on the baby's skin.

Fanshawe (1948) reported that an infusion of the bark was used to treat dysentery. The coagulated red sap, known as 'dragon's blood', was also used medicinally, but no further details were given.

Economy: Corkwood handicrafts are sold every now and then in craft shops in Mabaruma and Georgetown, varying in price from US$ 3.50 for a small boat to US$ 20 for a painted balancer.

Notes: (1) According to Bennet (1992), the Arawak name means 'shoot of the kiskadee bird' (*Pitangus* sp.); (2) See plate 24; (3) See plate 25.



69. *Quiina guianensis* a. fruiting branch; b. stipules; c. inflorescence; d. male flower;

69. **Quiina guianensis** Aubl. **QUIINACEAE** **Wokunse**

Vernacular names: Okokonshi (Ar), Wokunse (C), Dau konisi (Wr).

Botanical description: Tree, to 15 m tall; trunk to 13 cm in diam. Outer bark brown, inner bark red, wood light brown. Leaves simple, opposite, subsessile; stipules interpetiolar, leaflike, acute, to 2 cm long; petioles ca. 2 mm long; blades ovate-oblong to obovate, ca. 15 x 5 cm, apex shortly acuminate, base rounded or subcordate. Inflorescences axillary clusters of few-flowered cymes; bracts narrowly elliptic, ca. 1.5 mm long, puberulous, bracteoles minute; pedicels ca. 5 mm long, enlarging in fruit. Male flowers ca. 6 mm in diam.; sepals 4, free, obtuse, ca. 1.5 mm long; petals 6-7, yellowish orange, obovate to orbicular, ca. 3 x 2 mm; stamens ca. 30. Bisexual flowers insufficiently known, sepals 4, ca. 2 cm long, persistent in fruit; ovary superior, 2-locular, styles 2, ca. 1 mm long; fruiting pedicels slender, to 1 cm long. Fruit a fleshy berry, brownish when immature, bright orange when ripe, obovoid, ca. 12 x 6 mm, glabrous, longitudinally striate, apex crowned by 2 styles, base stipitate; seeds 2-4, subglobose, ca. 0.6 cm in diam., densely puberulous.

Distribution and ecology: Venezuelan Guayana, Trinidad, and the Guianas, in riverine and upland rainforests. Dominant in the lower canopy of greenheart forest (Polak, 1992). In northwest Guyana, common in the understorey of mixed and secondary forest. In Barama, flowers and ripe fruits were seen in August. Seeds are dispersed by monkeys (van Roosmalen, 1985).

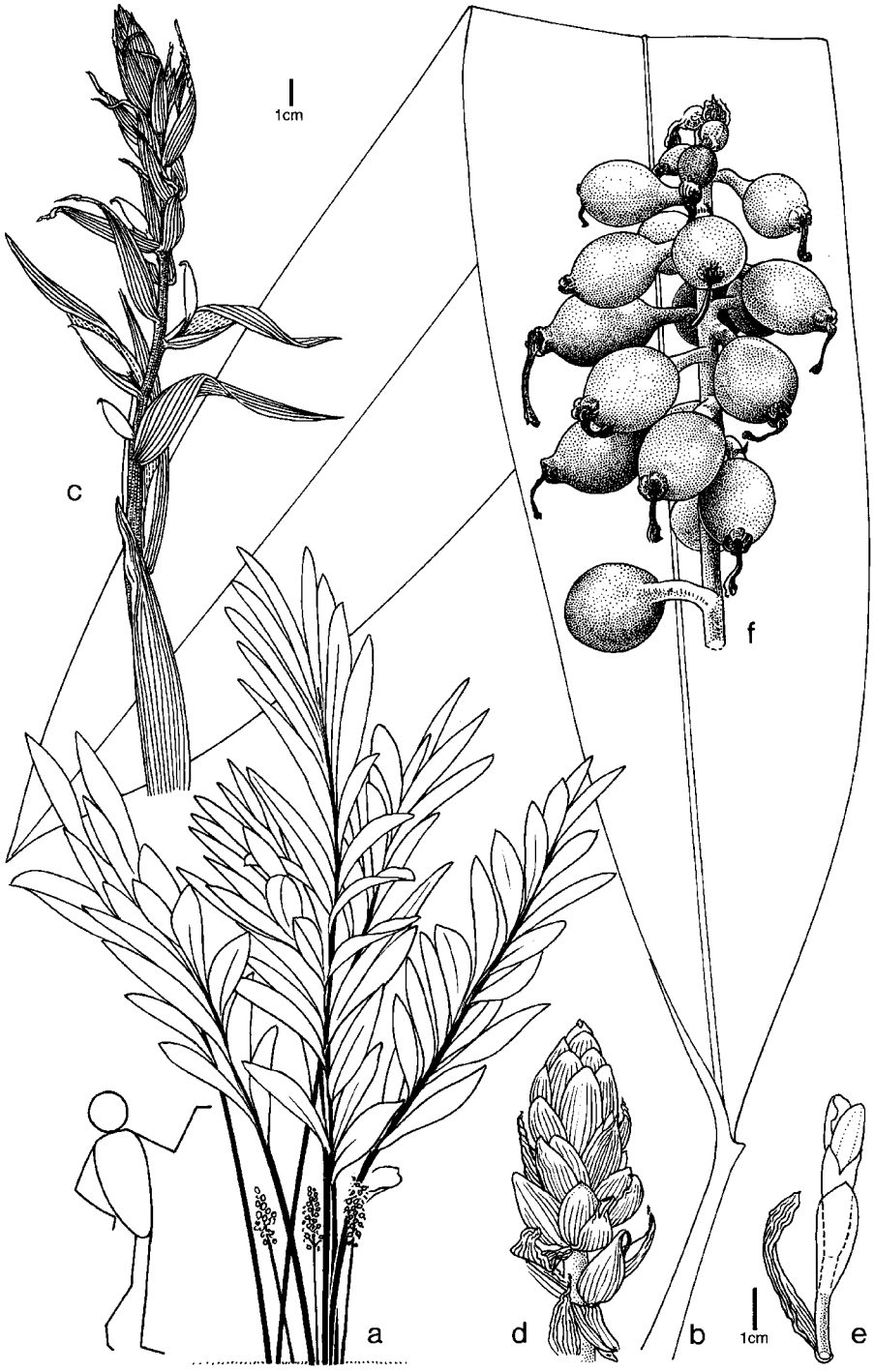
Use: The wood of this species is very hard and the twigs are quite difficult to break. For this property, wokunse is preferred for the manufacture of matapi handles, frames of cassava flour sifters, and warishis, the backpack-like carrying baskets woven from nibi (*Heteropsis flexuosa* or *Thoracocarpus bissectus*)[1]. The wood is also used for spear and arrow sockets, the hardwood pegs in which iron arrow heads are inserted. The peg is forced into a hollow arrow shaft made from a flower stalk of *Gynerium sagittatum* (arrowstick). The construction is tightly fastened with a twine and subsequently covered with melted karaman wax (see *Symphonia globulifera*). A smaller piece of wokunse wood is inserted in the bottom end of the shaft, to form the 'arrow foot' which will rest on the bow string.

Wokunse was frequently used by the Barama Caribs. Even though the species was common in the Moruca forests, local Arawaks did not have a name for it. The name okokonshi was taken from Fanshawe (1949). Instead of wokunse, the Moruca Arawaks used turtle cherry (*Eugenia patrisii*) or wild mangro (*Tovomita obscura*) to make their arrow sockets and warishi frames. These species occurred in Barama as well, but local Caribs definitely favoured wokunse for their household equipment, as did Arawaks and Warao living deeper in the interior. Caribs also used the hard wokunse wood to carve out a composite type of arrow point called 'sarapa', made from four barbed prongs and functional to shoot fish[2].

The fruits of wokunse are edible and have a slightly bitter, soursweet taste. The fruits were only consumed by people from remote, traditional communities (e.g., Kariako, Koriabo, and Warapoka). Arawaks from Moruca did not know that the fruits were edible. Barama Caribs told that the powis, a large black forest bird (*Crax alector*), was fond of the fruits as well, and that 'wokunse' meant 'powis food' in Carib. The use of this species is hardly mentioned in literature.

Economy: Wokunse wood is not sold apart, but arrows, sifters, and warishis are commercialised in Amerindian villages and on regional markets. The fruits are used for subsistence only.

Notes: (1) See front page; (2) See plate 20.



70. *Renealmia alpinia* a. habit; b. leaf; c. inflorescence; d. top of inflorescence; e: flower with bract and bracteole; f. infructescence.

70. **Renealmia alpinia** (Rottb.) Maas **ZINGIBERACEAE** **Ink bush**

Synonym: *Renealmia exaltata* L.f.

Vernacular names Ink bush, Ink berry, Wild ink, Big warakaba food (Cr), Koruati (Ar), Konosa (C), Murushi (Wr).

Botanical description: Perennial, aromatic herb, to 6 m tall; rhizome to 3 cm in diam. Leaves distichous, simple, with an open sheath; ligule ca. 2 mm long; blades narrowly elliptic, to 70 x 13 cm, subglabrous, apex acuminate, base acute. Inflorescence a raceme on a leafless peduncle between the leaf bases, ca. 35 x 5 cm, densely covered with short hairs; bracts pink to red, membranous, soon withering and becoming brown, triangular, ca. 6 cm long; pedicels pink to red, ca. 5 mm long. Flowers zygomorphic; calyx pink to red, membranous, tubular, shortly 3-lobed, ca. 15 mm long; corolla yellowish orange to red, tubular, 3-lobed, tube ca. 15 mm long, lobes ca. 15 mm long; fertile stamen 1, anther dark yellow, staminode forming a 3-lobed, yellow labellum ca. 1 cm in diam.; ovary inferior, 3-locular, red, style and stigma 1. Fruit a capsule, red when immature, purple-black when ripe, ellipsoid to subglobose, ca. 3 x 2 cm, crowned by the persistent base of the calyx, wall fleshy; seeds numerous, ca. 3 mm in diam., aril large, orange, threadlike.

Distribution and ecology: Central America, the Lesser Antilles, and tropical South America, in flooded and secondary forest (Maas, 1977). In northwest Guyana, common in secondary forest, abandoned fields and newly formed banks of meandering rivers. Flowering and fruiting throughout the year. Flowers are pollinated by hummingbirds; seeds are dispersed by ground-dwelling birds.

Use: A purple-black sap is obtained from the ripe fruits by breaking them open, removing the seeds and arils and squeezing the fruit walls. Before ballpoints were introduced around the 1960s, the black sap was commonly used in the interior as a substitute for ink. Schoolchildren were required to supply their own ink for their dip pens, and used the black sap to fill their ink pots, known locally as 'duke-a-pot'. They squeezed a little lime juice in the ink to give it a reddish colour. Nowadays, the sap is used to dye tibisiri fibre (from *Mauritia flexuosa*), toy boats made out of corkwood (*Pterocarpus officinalis*), and other handicrafts. Home-made tattoos are made by piercing the skin with a needle or a thorn and rubbing in the black dye. In coastal Guyana, the sap is used to treat eye infections (Lachman-White et al., 1992). The orange fruit pulp (arils) with the seeds is used as bait in bird traps to catch large, ground-dwelling birds, like the warakaba (*Psophia crepitans*), marudi (*Penelope marail*), maam (*Tinamus major*), and powis (*Crax alector*). The unripe fruits are used as slingshot ammunition. According to an old Amerindian belief, a woman should not hold the fruits too long in her hands, as this will make her look old soon. In Suriname, the oily fruit pulp is an important forest product, traded widely on the national market and even exported to the Netherlands. It is used to flavour and colour the 'masoesa rice', a traditional Surinamese dish. The orange pulp is mixed thoroughly with water, squeezed and sieved. The rice is boiled in the remaining oily, yellow liquid. This practise is unknown in northwest Guyana.

The young leaf shoots are are pounded, macerated and applied as a poultice on snakebites. The shoots are also boiled and the aromatic, ginger-like tea is drunk to relieve stomach ache. The rhizome and shoots are grated, mixed with half a cup of water, warmed a little and drunk for the same illness. The tea induces vomiting and is also used as such (Lachman-White et al., 1992). The rhizome is chopped into pieces, boiled, and drunk as a remedy for heavy back sprain accompanied with blood in the urine. The same tea is drunk by snakebites to ease the pain and prevent the circulation of the poison in the blood. A tea from the dried leaves is drunk against high blood pressure. The aromatic leaves are also used in herbal baths. In Suriname, these baths are said to strengthen the nerves (Heyde, 1987), while people in Guyana wash their hair with it to get rid of dandruff (Lachman-White et al., 1992). When used in combination with munuridan leaves (*Siparuna guianensis*), these herbal baths help to ease fever and pain (Reinders, 1993).

Economy: Except for the use as dye in handicraft production, the species is just used for subsistence.

71. *Rhizophora mangle* a. habit; b. branch with young flowers; c. flower, top view; d. flower, side view; e. flower bud; f. fruit; g. seedlings.

71. **Rhizophora mangle** L. **RHIZOPHORACEAE** **Red mangrove**

Vernacular names: (Red) mangrove, Wild mangro (Cr), Kakutiru[1] (Ar), Konopo, Kunapo (C), Bu (Wr).

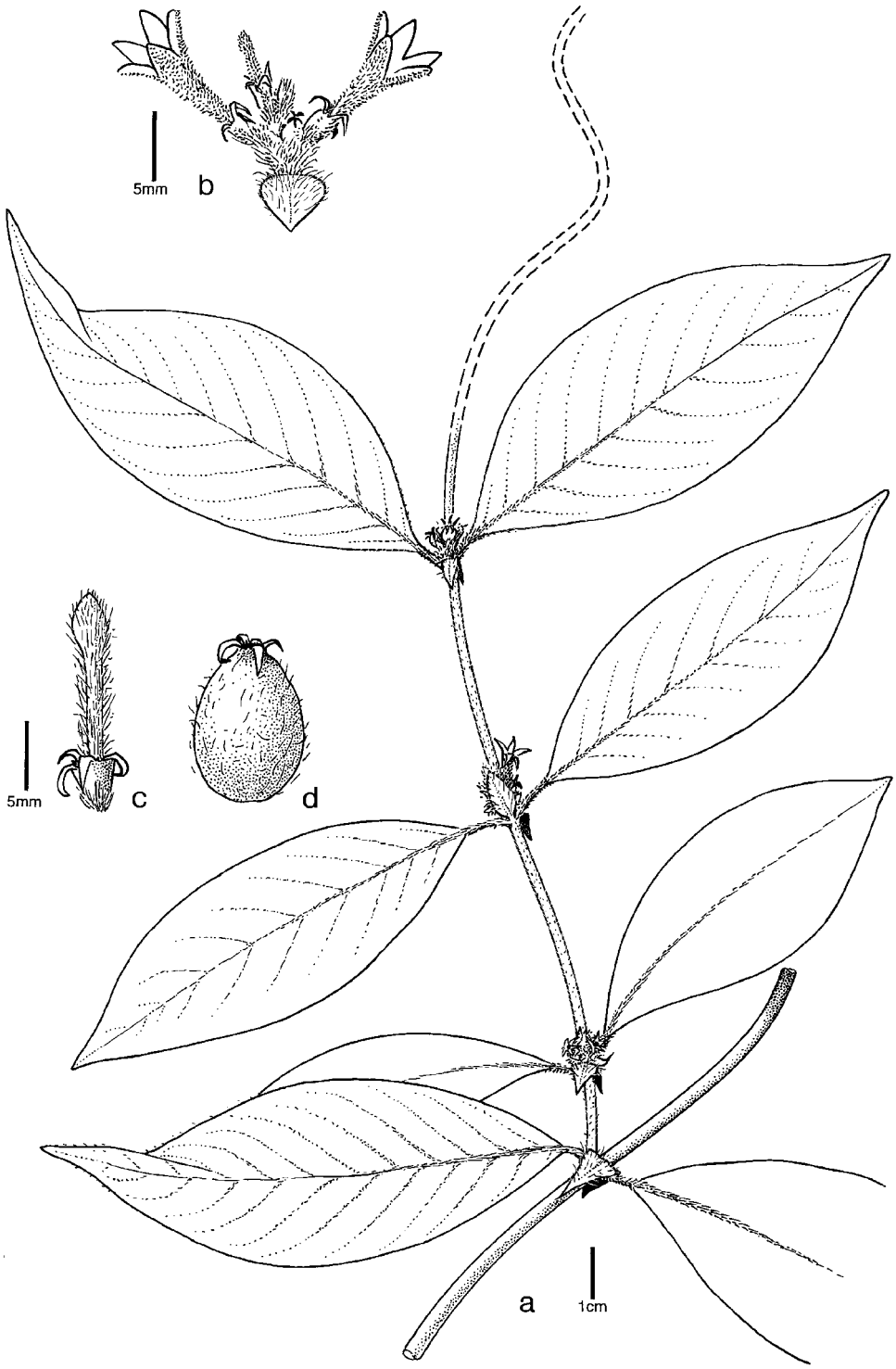
Botanical description: Tree, to 30 m tall, with large stilt roots. Trees more branched and shrubby closer to the seashore. Bark black or reddish brown, flaky. Leaves opposite, simple, clustered at branch ends; stipules narrowly elliptic, caducous, ca. 7 cm long; petiole pale, thick, ca. 2 cm long, extending into the midrib; blades leathery, elliptical to obovate, obtuse, ca. 11 x 5 cm. Inflorescences axillary, cymose, 2- to many-flowered, once or more times forked, to 10 cm long, in the axils of the upper leaves; pedicels ca. 7 mm long. Flower buds yellow, pointed at apex. Flowers actinomorphic, yellowish green, surrounded by two bracteoles, the lower half-connate in the form of a cup; sepals 4, thick, narrowly elliptic, ca. 7 x 3 mm; petals 4, greenish white, narrowly elliptic, ca. 5 x 2 mm, villous inside, margin involute; stamens 8, anthers sessile or on very short, thick filaments, ca. 5 mm long; ovary inferior, ca. 2 mm long, style ca. 4 mm long, 2-lobed. Fruit olive-green, conical, ca. 2 cm long, rough, viviparous, surrounded at the base by persistent bracteoles, crowned by the sepals when young; seed 1, germinating in the fruit. Seedling with a spindle-shaped hypocotyl, pointing downwards and often attaining a length of more than 25 cm before it is set free.

Distribution and ecology: From California and Florida to northern South America and the West Indies, the Pacific islands, and West Africa. Growing on muddy seashores and riverbanks, often forming dense forests (Tomlinson, 1986). In northwest Guyana, all along the Atlantic coastline and riverbanks within the influence of salt water. Flowering and fruiting throughout the year. Flowers are pollinated by the wind; seedlings are dispersed by water (Tomlinson, 1986).

Use: The bark of the red mangrove has a high tannin content, and is employed in the leather production by small tanneries in Georgetown. To obtain the bark, the whole tree is cut, left to wither for a few days and then beaten with a stick until the bark slabs come loose. The bark is cut in pieces of ca. 40 x 10 cm. The pieces, still moist, are ground into a dark red powder and mixed with salts in the tanning baths for the cow hides. Mangrove has a tannin content of 16-25%, much higher than other tree species in Guyana. Leather tanned with this bark has good wearing qualities, although the reddish brown colour compares unfavourably with imported leather (Fanshawe, 1948). The bark sap also yields a reddish brown sap, used locally to varnish handicrafts made from corkwood (*Pterocarpus officinalis*). A whistle can be made from the fruit. The bark scrapings are boiled or soaked in cold water and drunk against dysentery and diarrhoea. The macerated young tip of a mangrove root in a little water was mentioned as an easy measure to fight diarrhoea. Although the medicine causes some constipation, it is said to be practical on long boat trips on the coastal rivers. One handful of chopped bark is boiled in one gallon of water for ten minutes and used as a hot bath for very stubborn or serious skin sores, leprosy, and swellings (Arvigo and Balick, 1993).

Economy: Mangrove bark is commercially harvested along the Waini River mouth and the Mora passage. The bark is stuffed in rice bags of 100 lbs. and sold to middlemen in Mabaruma for US$ 0.04 per lbs. The product is shipped with the fortnightly ferry to the capital, where the actual leather production takes place. Since there is hardly any cattle ranging, no leather tanning takes place in the North-West District. In the 1940s, the bark was exported in small quantities to the West Indian islands (Fanshawe, 1948). In the 1960s, more than 250 tons were harvested annually. Mangrove bark has lost economic importance since the 1970s. Production dropped sharply after the decline in cattle production in the Rupununi and the development of synthetic alternatives (Sizer, 1996). Industrial tanning substitutes have caused to shut down most commercial mangrove operations in the world (Tomlinson, 1986), but some tanners prefer to use mangrove bark. The species occurs in near mono-specific stands along the coast, but felling the trees could be risky, since they protect the seashore against tidal damage. To minimise the negative impact, the Guyana Forestry Commission has advised harvesters not to fell trees that grow directly at the waterfront.

Notes: (1) 'Many-footed', after the stiltroots (Fanshawe, 1949).



72. *Sabicea glabrescens* a. flowering branch; b. inflorescence; c. flower bud; d. fruit.

72. **Sabicea glabrescens** Benth. **RUBIACEAE** **Strong-for-man**

Vernacular names: Strong-for-man, Donkey eye, Wild sorrel, Old lady's neck string[1] (Cr), Nohpoko enamïtyï[1] (C), Tida aidamo aro ahutu (Wr).

Botanical description: Vine with winding shoots. Young branches puberulous, older branches becoming glabrous. Leaves opposite, simple; stipules interpetiolar, broadly ovate to triangular, ca. 4 x 3 mm, persistent; petiole to 1.5 cm long, densely strigose; blades oblong-elliptic, ca. 9 x 4 cm, glabrous or puberulous above, midrib and lateral veins strigose below, apex acuminate. Inflorescences axillary, sessile, capitate, 5-6-flowered; involucral bracts glabrous outside, ca. 5 x 4 mm. Flowers actinomorphic, sessile; calyx tube green, ca. 5 mm long, densely puberulous outside, 5-lobed, lobes narrowly elliptic, ca. 2 mm long, persistent; corolla tube white, ca. 11 mm long, more or less bowl-shaped, puberulous on the outside, throat glabrous, 5-lobed, lobes ciliate, ca. 3 mm long; stamens 4-6, inserted in the corolla tube, filaments very short; ovary inferior, 5-locular, style 1, threadlike, lobed. Fruit a fleshy berry, dark red to purple-black when ripe, sessile, globose or ellipsoid, ca. 1 cm in diam., crowned by calyx lobes; seeds numerous, small, ovoid or angular.

Distribution and ecology: Venezuela, Trinidad, the Guianas and northern Brazil. In northwest Guyana, common in secondary shrubland, along forest trails, riverbanks and on abandoned fields. Fruiting and flowering throughout the year. Seeds are dispersed endozoochorously (van Roosmalen, 1985).

Use: The juicy berries are edible, but they are not highly esteemed and mostly eaten by children. The leaves are smoked by Amerindian pork-knockers as a substitute for tobacco or cigarettes. A few *Sabicea* leaves are dried on a pot over the fire, rolled in a piece of paper or winakakaralli bark (*Lecythis corrugata*), and smoked. Young men familiar with smoking these leaves said that the effect and taste was quite different from tobacco or marijuana. Apparently, smoking *Sabicea* keeps you awake at night and makes it hard to fall asleep.

The whole vine is boiled in water and drunk by women to stop haemorrhage. If taken in large quantities, the tea can even make a woman completely sterile. It was said that women used this medicine when they did not want to become pregnant anymore.

In French Guiana, the Wayãpi Indians frequently use the species as an antispasmodic and as remedy against dysentery and abdominal pains. They eat the unripe fruits and prepare a decoction of stems and leaves and drink this as tea. The plant is apparently rich in saponins and tannins (Grenand et al., 1987).

The plant was well-known in Barama and Barima, but it was recognised by very few people in Moruca. No Arawak name was known for the species. Other species of the genus *Sabicea* are used for various medicinal purposes and magic rituals throughout South America (Grenand et al., 1987; Schultes and Raffauf, 1990; Reinders, 1993).

Economy: The species is used for subsistence purposes only.

Notes: (1) The Creole name 'old lady's neck string' is a translation of the Carib name, since 'nohpoko' means 'old woman' and 'enamïtyï' means 'necklace'. The head-like inflorescences look like beads on a string.

73. *Senna alata* a. leaf; b. detail of rachis (r = 4.5 mm); c. inflorescence; d. flower; e. petal; f. fruit; g. fruit, transversal section.

73. **Senna alata** (L.) Roxb. **LEGUMINOSAE-CAESALP.** **Carrion crow bush**

Synonym: *Cassia alata* L.

Vernacular names: Carrion crow bush, Wild senna (Cr), Anatapari (C).

Botanical description: Fast growing shrub, to 4 m tall. Young branches, petioles, and inflorescences puberulous. Leaves alternate, to 24-foliolate, ca. 40 cm long, unpleasantly scented, rachis slightly depressed above; stipules elliptic-ovate, to 1.5 cm long, subpersistent; petiole ca. 2 cm long, with two minute glands; leaflets opposite, oblong to obovate, ca. 10 x 5 cm, glabrous above, often puberulous below, apex rounded or retuse, base broadly rounded or truncate. Inflorescences elongated racemes in the upper leaf axils; bracts ovate, apiculate or obtuse, ca. 2 cm long, caducous. Flowers zygomorphic; sepals 5, orange-yellow, oblong, ca. 1 cm long; petals 5, bright yellow with brown veins, obovate, clawed, ca. 1.5 cm long, nearly equal; stamens 6, the 2 inferior with much larger anthers; ovary superior, 1-locular, sessile, puberulous, style 1. Pod narrow, brown to black, ca. 15 x 1.5 cm, with stiff longitudinal wings along the middle of the valves, margins thickened, membranous, glabrous, wings notched; seeds ca. 50, brown, ca. 2 x 0.7 mm.

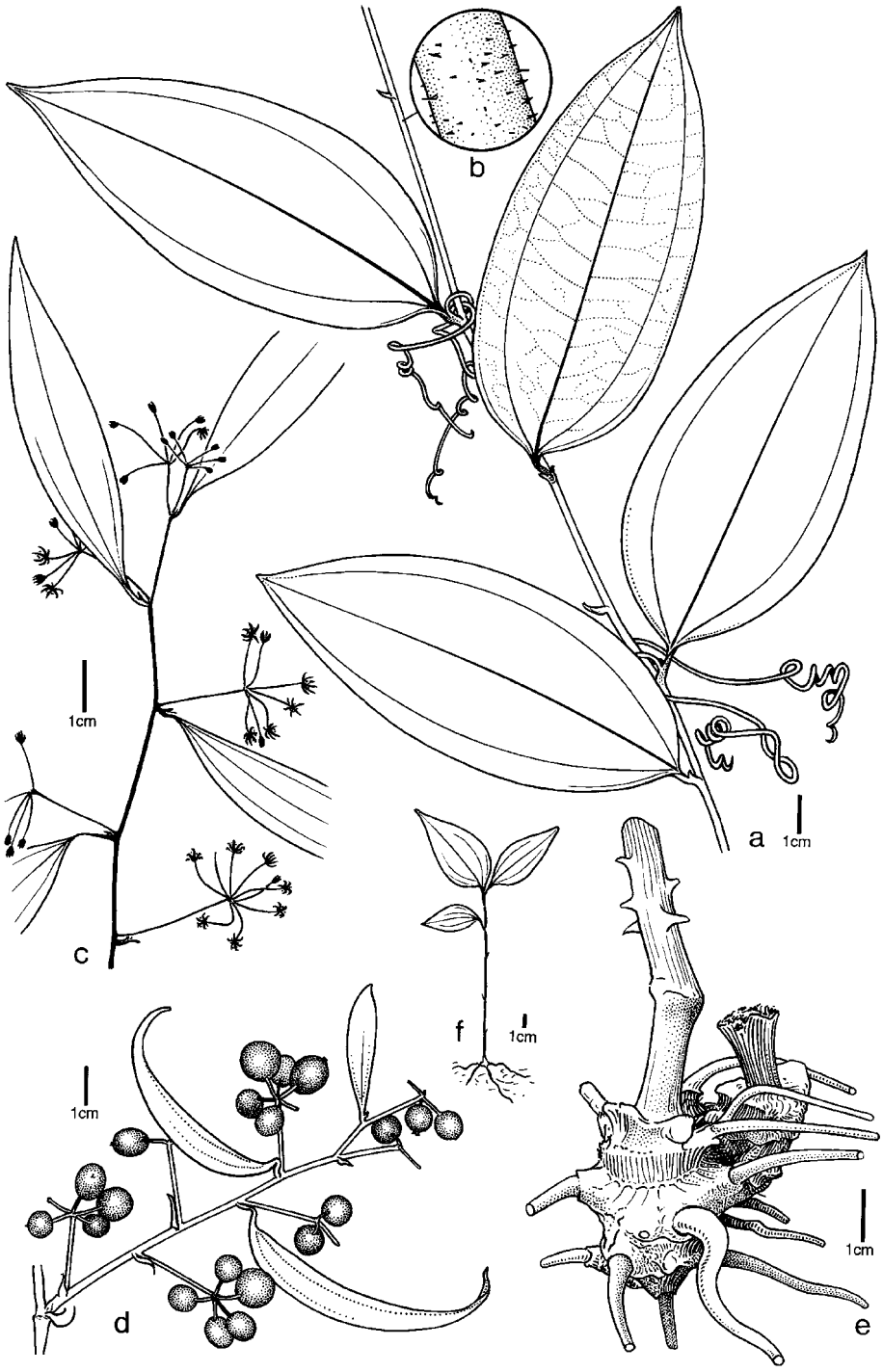
Distribution and ecology: Probably native to the Guianas, now occurring as a shrubby weed in tropical America, Asia, Australia, and Africa (Irwin and Barneby, 1982). In northwest Guyana, frequent and sometimes dominant in secondary shrubland, abandoned farms, pastures, riverbanks, and roadsides. Flowering and fruiting throughout the year. Flowers are probably pollinated by bees (Irwin and Barneby, 1982).

Use: *Senna alata* is used as a medicinal plant all over the tropics, in particular as oral laxative and externally for skin diseases. In northwest Guyana, the foul-smelling leaves are rolled and squeezed between the hands, and the sap is rubbed with a pinch of salt on ringworm, lota, and other skin fungi. The entire leaves are rubbed on the skin to relieve the itches of bête rouge and ringworm. The pounded leaves are applied as a poultice on skin sores. Sulphur may be added to the leaf sap when it is applied externally for ringworm (Lachman-White, 1992). The anti-fungal use of this species was also found in Africa (van Dijk, 1999), India (Jain and DeFilipps, 1991), and Central America (Arvigo and Balick, 1993).

The leaves and flowers are boiled and the tea is drunk against diarrhoea, biliousness, as a laxative to clean out stomach and bowels, and to get rid of intestinal worms. Women drink the tea for menstruation problems, to clean out their uterus, and as abortive. Other uses in Guyana include a decoction of the leaves with zeb grass (*Tripogandra serrulata*) and pear leaves (*Persea americana*), taken orally for biliousness and hypertension. Branches are boiled and mixed with egg white and cassareep and taken orally for pneumonia, heavy colds, and fever (Lachman-White et al., 1992). Children are bathed in a decoction of the leaves for scabies, itch, skin fungus, and eczema (Reinders, 1993).

In Suriname, the root is boiled and drunk for womb problems, malaria, and as aphrodisiac (Heyde, 1985). Leaves are boiled and drunk against high blood pressure, fever, womb cramps, and spleen problems (Raghoenandan, 1994). In Belize, the tea from the flowers is drunk for urinary tract conditions, and the tea from the leaves for liver congestion, liver spots, kidney ailments, and as a purge for the lymph system. The mashed root in an alcohol is taken orally for female infertility (Arvigo and Balick, 1993). The species is employed in Cameroon to cure sexual diseases (van Dijk, 1999), and in India against snakebites, leprosy, inflammations, eczema, rheumatism, bronchitis, asthma, as insect repellent, and abortive (Jain and DeFilipps, 1991). The purgative properties of various *Senna* species are due to their content of anthraquinone glycosides (Schultes and Raffauf, 1990). Antibacterial and anti-inflammatory activity has been proved from alcohol extracts, and several other active phytochemicals have been isolated from the plant (Arvigo and Balick, 1993).

Economy: The dry branches with flowers and leaves are sold at medicinal herb stalls in Georgetown.



74. *Smilax schomburgkiana* a. sterile branch; b. prickles (r = 1.5 mm); c. flowering branch; d. fruiting branch; e. rhizome; f. seedling.

74. **Smilax schomburgkiana** Kunth **SMILACACEAE** **Cockshun**

Vernacular names: Cockshun, Dorokwaro plimpla (Cr), Dorokwaro yuruwan[1] (Ar), Sipyatamu (C), Kaihido[2] (Wr).

Botanical description: Woody climber, with tendrils arising from the petioles. Young branches terete or angular, coarsely rough by minute black prickles, older branches with hooked spines 2 mm long, stem base with straight spines to 1 cm long, reddish with a black tip, grouped in pairs. Leaves alternate, simple, palmately veined; leaf sheaths basally winged, ca. 6 mm long, wings to 2 mm long, bearing 2 tendrils; petiole ca. 10 mm long; blades stiff, papery, on sterile branches narrowly ovate, ca. 18 x 8 cm, on fertile branches narrowly elliptic, ca. 7 x 1.5 cm, apex acute, base obtuse or cordate. Inflorescence axillary, umbellate; peduncle ca. 1.5 cm long, ending in a thickened receptacle ca. 2 mm in diam. Flowers actinomorphic, 6-merous, unisexual, plants dioecious, fertile branches shortened, 5-25 cm long, often arranged in panicles. Male flowers: tepals ca. 2 x 1 cm, nearly equal; stamens 6, ca. 1 mm long. Female flowers: tepals ca. 15 x 7 mm; ovary superior, 3-locular, styles 3. Fruit a berry, orange-red, ca. 8 mm in diam.; seeds 1-2, yellow with a black spot.

Distribution and ecology: Venezuela, the Guianas, and Northern Brazil, in secondary vegetation. In northwest Guyana, frequent in secondary forest, riverbank forest and abandoned fields. Fruits were seen in July, and October-January. Seeds are dispersed by birds and bats (van Roosmalen, 1985).

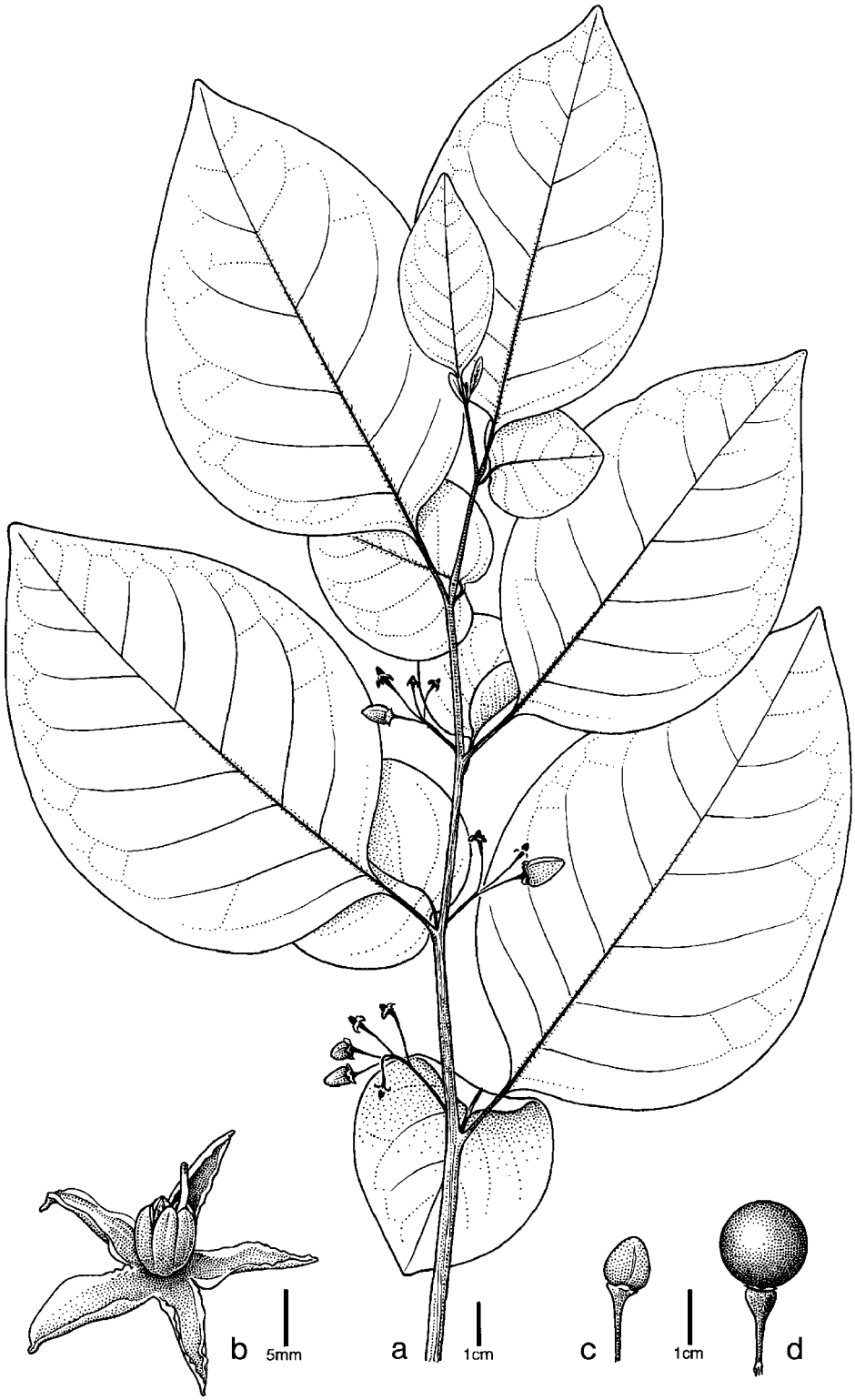
Use: The peculiarly shaped, yellowish brown tuber of this liana can weigh up to half a pound. The tuber is cleaned, the cortex is scraped off, the remaining tissue is chopped into pieces and boiled for an hour. The tea is said to have aphrodisiac properties. Cockshun is mostly used with the following ingredients: monkey ladder wood (*Bauhinia guianensis*), kapadula wood (*Tetracera* spp., *Pinzona* sp. or *Doliocarpus* sp.), granny backbone wood (*Curarea candicans*), sarsparilla tuber (*Dioscorea trichanthera*), kufa root (*Clusia* spp.), and locust bark (*Hymenaea courbaril*). The pieces may also be soaked in alcohol. The tea or tonic is drunk in small quantities or added to milkshakes or porridge. These aphrodisiacs, popular among coastlanders, and (Amerindian) pork-knockers, are said to protect against diseases and enhance sexual activities. Boiling a whole cockshun tuber with a 5 cm long piece of buruburu root (*Solanum stramoniifolium*) makes a remedy for severe back pain. The tea must be drunk during one day; the following day the back pain will be gone.

Fanshawe (1948) described an infusion of the tuber as an antispasmodic to treat diseases of the bladder and urethra. Reinders (1993) reported that in Mabaruma, the leaves of *Smilax officinalis*, known locally as wihiyo (Wr), were heated and tied as a plaster on scorpion stings. Since this species does not occur in Guyana, its use might be ascribed to *S. schomburgkiana*. According to the Barama Caribs, the orange berries were edible, but in Moruca the fruits were thought to be poisonous. The berries are used as bait in bird traps. Van Roosmalen (1985) mentioned that they were used as fish poison, but this practise was unknown in the study area. Schoolchildren in Kariako told that the spiny stem of the liana is gently stroked against small children's heads 'to make them grow big'. The spines are used as a pin to remove jiggers or spines from the feet.

Throughout the Neotropics, indigenous people use *Smilax* tubers in stomach tonics and stimulants. Steroidal glycosides and occasional flavonoids have been found in the genus *Smilax* (Schultes and Raffauf, 1990), some of which may mimic the action of human hormones. Between 1870 and 1920, Brazil exported large quantities of *S. syphilitica* to Europe, where it was used as blood purifier and to treat syphilis (Grenand et al., 1987). Today these tubers are still commercially processed into herbal extracts. Marketed under the name 'sarsaparilla', they are prescribed for a variety of illnesses. *S. schomburgkiana* is not commercially exploited on such a large scale. In Guyana, the name sarsparilla is reserved for *Dioscorea trichanthera*. The Creole word 'cockshun' is likely to stem from 'coction'.

Economy: Cockshun tubers are sold on herb stalls at the Georgetown market for US$ 0.35. Ready-made aphrodisiacs are sold for US$ 3.50 per litre bottle. Some of these stalls are open 24 hours a day.

Notes: (1) The Arawak name is translated as 'thorn of the partridge' (*Odontophorus guianensis*), known in Guyana by its indigenous name 'dorokwaro' (Fanshawe, 1949); (2) The Warao name refers to a spiny plant to trap animals, as 'kai' is an animal trap and 'hi' is a thorn (Charette, 1980).



75. *Solanum leucocarpon* a. flowering branch; b. flower; c. flower bud; d. fruit.

75. **Solanum leucocarpon** Dunal **SOLANACEAE** **Iodine bush**

Synonym: *Solanum surinamense* Steud.

Vernacular names: Iodine bush (Cr), Surakadang (Ar), Ku-uhl kunamide, Kuruliwa, Karuru (C).

Botanical description: Shrub or small tree, to 6 m tall, unarmed; trunk to 6 cm in diam. Outer bark spotted grey-green, lenticellate, inner bark greenish yellow, sapwood light yellow, heartwood pinkish purple. Branches terete, sparsely puberulous when young. Leaves simple, in conspicuously unequal pairs, with a strong poisonous scent and a very bitter taste; stipules absent; petioles of large leaves ca. 1.5 cm long, those of small leaves much shorter; larger leaf blades ovate-oblong, ca. 16 x 7 cm, apex shortly acuminate, base acute, slightly asymmetric, smaller blades broadly ovate to suborbiculate, ca. 6 x 5 cm, apex shortly acuminate, base rounded; both leaf types glabrous above, puberulous below. Inflorescences axillary, opposite the leaves, shortly racemose, to 15-flowered; peduncle ca. 1 cm long. Flowers actinomorphic, sweet-scented; calyx cream, minutely 5-lobed, very shortly crenulate, ca. 2 mm long; corolla white, 5-lobed, lobes narrowly elliptic to ovate, ca. 12 mm long, margin involute; stamens 5, anthers connivent, bright orange; ovary superior, 2-locular, glabrous, style and stigma 1. Fruit a berry, greenish white when ripe, hard, globose, to ca. 1.4 cm in diam.; seeds numerous, small.

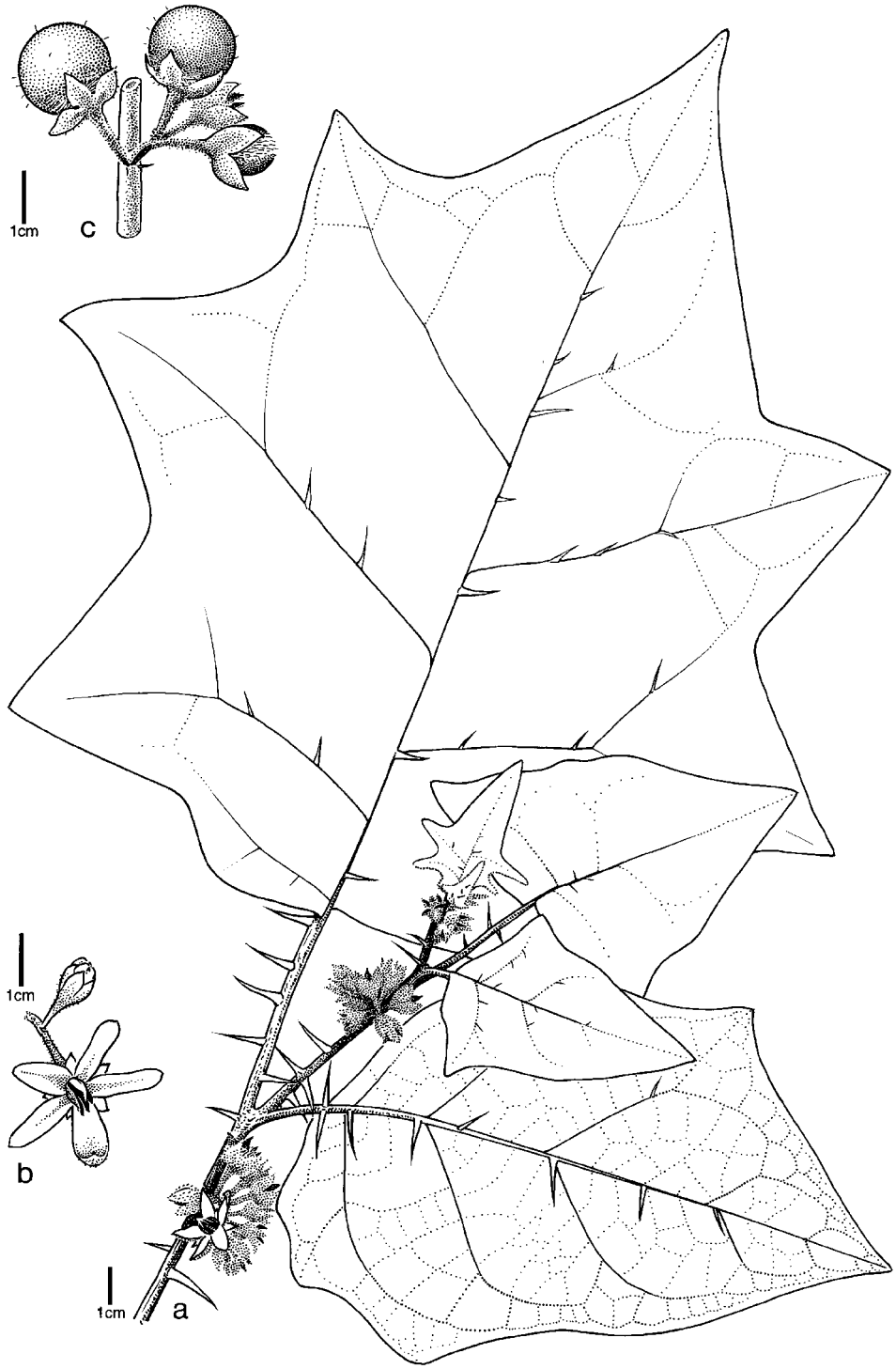
Distribution and ecology: The Guianas, Colombia, and Amazonian Brazil. In northwest Guyana, common along roadsides, in secondary forest and abandoned fields. Flowering and fruiting throughout the year. Seeds are dispersed endozoochorously (van Roosmalen, 1985).

Use: The strong-scented leaves of this shrub are sometimes used as fish poison, together with leaves of the cultivated kunami (*Clibadium surinamense*). A large basket full of leaves and branches of both species is stuffed in a hole in the ground and crushed with a wooden pestle into a pulpy mass. The pulp is then thrown in a creek or small stream, after which the fish starts floating belly upwards. The local Carib name 'ku-uhl kunamide' indicates its connection with poisoning fish. Apart from the Barama Caribs, the use of this species as fish poison was reported once from Suriname, in an unpublished manuscript by Archer (1965). Since the leaves were used only in combination with other poisons, Archer called it a 'doubtful species'. It remains unclear whether the plant itself contains ichthyotoxic ingredients. In Barama, the species was regarded as a very effective medicine to cure bush yaws (*leishmaniasis*). The leaves are briefly heated over a fire, macerated and squeezed into a bowl. The sap is mixed thoroughly with some cooking oil, crushed leaves of the carrion crow bush (*Senna alata*), and leaves of wild maran (*Pityrogramma calomelanos*). The poultice is then applied to the bush yaws sores for several days.

The unripe fruits are used by children as slingshot ammunition. Carib children said they used them often to kill 'cassava birds', little yellow and black birds that live in cassava fields. The birds are roasted and eaten by the children themselves. With a small stick drilled through it, the hard, round berry also serves as top. The species was less abundant in the Moruca area. Even though children used the fruits for their slingshots, the plant did not have a local name and its medicinal use was unknown. In French Guiana, the Creoles prepare a bitter tea from the leaves to cure liver disorders. Fresh leaves are rubbed on a dog's skin to get rid of fleas, and on the human skin to treat scabies. Crushed leaves and bark are also soaked in rum and rubbed on scabies. The Palikur Indians boil a tea from equal proportions of fresh leaves, fallen leaves and young guava leaves (*Psidium guajava*) to combat diarrhoea (Grenand et al., 1987).

Steroid alkaloids and sapogenins have been found in many *Solanum* species (Carle, 1981). *Solanum* alkaloids are generally not regarded as dangerous, as they are poorly absorbed and rapidly detoxified after ingestion (Mahmood and Tankur, 1980). *S. leucocarpon* is particularly rich in Mayer alkaloids (Grenand et al., 1987).

Economy: The species is used for subsistence purposes only.



76. *Solanum stramoniifolium* a. flowering branch; b. flower; c. part of infructescence.

76. **Solanum stramoniifolium** Jacq. **SOLANACEAE** **Buruburu**

Vernacular names: Buruburu plimpla, Bulibuli, Dog plimpla (Cr), Boboro (Ar), Paremuru (C), Buruburu (Wr).

Botanical description: Spiny shrub, to 2 m tall, armed with straight or recurved spines to 12 mm long, young branches purplish, covered with stellate hairs. Leaves simple, alternate; stipules absent; petiole ca. 2.5 cm long, armed; blades broadly ovate, more or less pinnately lobed, ca. 20 x 12 cm, sparsely puberulous above, densely puberulous below, with a few straight spines on midrib and lateral veins, apex bluntly acuminate, base asymmetric. Inflorescences lateral, cymose, to 30-flowered, densely stellate-puberulous; pedicels ca. 6 mm long. Flowers actinomorphic; calyx broadly campanulate, shortly 5-dentate; corolla white, 5-lobed, lobes ovate to narrowly elliptic, ca. 11 mm long, with purple stellate hairs on the outside; stamens 5, anthers more or less connivent, yellow; ovary superior, 2-locular, style and stigma 1. Fruit globose, ca. 2 cm in diam., yellow to orange-red, first densely covered with rusty-brown stellate hairs, becoming glabrous when ripe; seeds numerous, flat, light brown, globose to kidney-shaped, ca. 3 mm in diam.

Distribution and ecology: Northern South America and the Amazon basin, in open vegetation and savanna edges. In northwest Guyana, abundant in secondary shrubland and abandoned fields. Flowering and fruiting throughout the year. Seeds are dispersed by bats, birds, and monkeys (van Roosmalen, 1985).

Use: The red berries have a soursweet, tomato-like taste and are popular with children, who search the shrubby school yards during class breaks and collect the fruits by the dozens. They first rub or blow off the brown hairs before swallowing them. Around mining camps, or other places in Barama where only adults have access to, shrubs always seemed to be full of fruits, while those growing in the village were always stripped bare. Children in Moruca said the fruits were given to toddlers to stimulate them to talk. In coastal Guyana, the fruit juice is rubbed on the skin to relieve ant bites (Lachman-White et al., 1992).

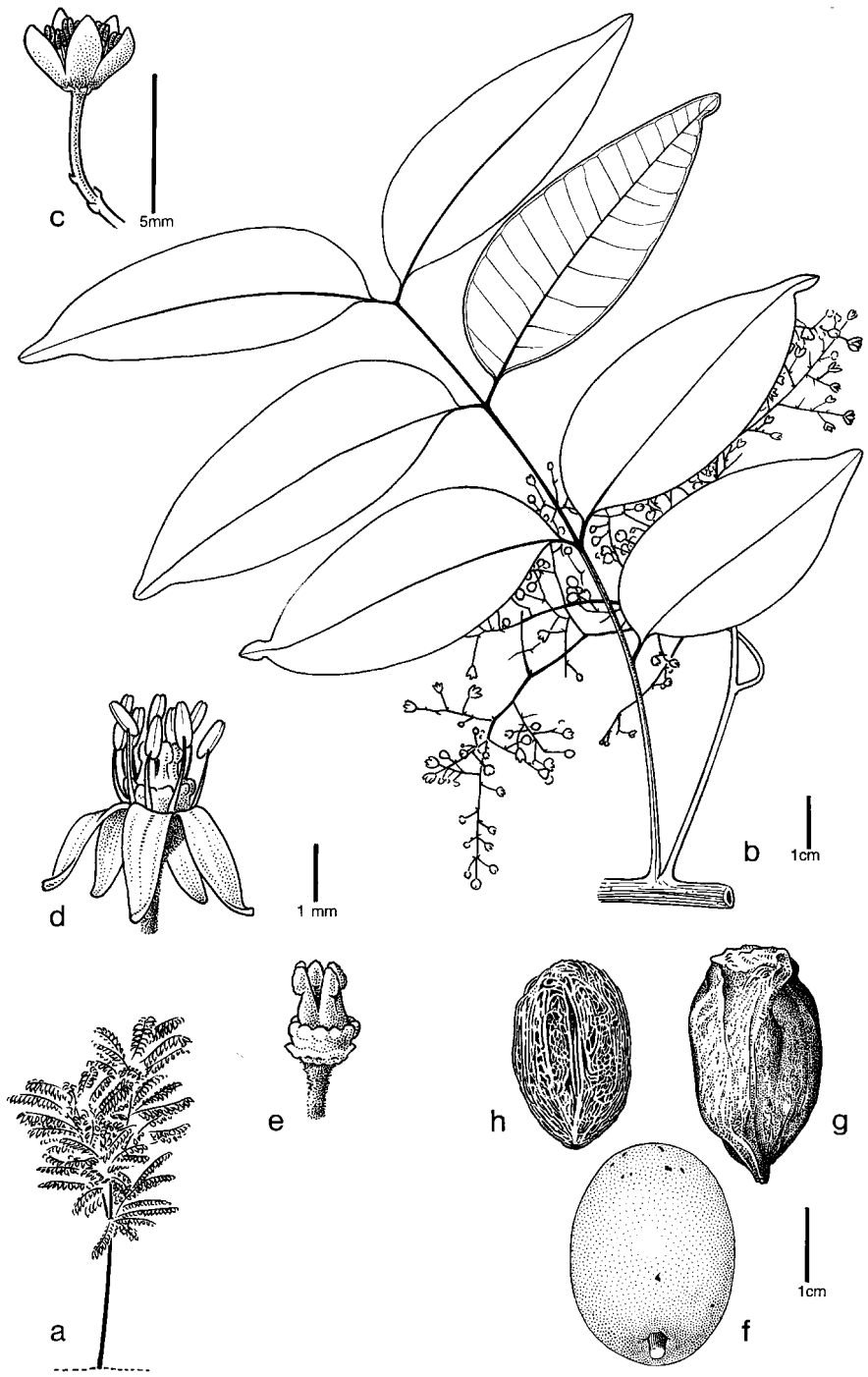
In Peru and Colombia, the species is occasionally cultivated. Probably as a result of selection by man, individuals from the western Amazon region tend to have larger fruits and fewer spines. Therefore, some authors distinguish two taxonomic varieties: the prickly *S. stramoniifolium* var. *stramoniifolium* as described above, and the unarmed *S. stramoniifolium* var. *inerme* from the Andes (Whalen et al., 1981).

The root has a good reputation to combat malaria and fever. An entire root is cut into pieces and boiled. A quarter cup of the bitter tea is drunk three times a day for a week, until the fever stops. The decoction may be enriched with lemon juice or peel, quashi wood (*Quassia amara*), white yarula bark (*Aspidosperma marcgravianum*), and five bamboo leaves (*Bambusa vulgaris*). Some people said this medicine only eased down the fever, but others claimed this was the most effective remedy against malaria they knew. In Georgetown, the malaria therapy included buruburu root, bamboo leaves, and sinkola bark (*Cinchona* sp.), the latter a cultivated tree of Andean origin of which the bark is the natural source of quinine. Sinkola bark is sold on medicinal herb stalls in the capital, but the species is not grown in the interior.

Buruburu root is also used in a treatment for venereal diseases, ('V.D.' or 'the runnings'), which in most cases applies to gonorrhoea. An entire root is boiled with a root of a pawpaw tree (*Carica papaya*), several sweet broom plants (*Scoparia dulcis*), and some lemongrass (*Cymbopogon citratus*). A rum bottle is filled with the concoction, and the patient must drink some each morning, midday, and evening. When the bottle has finished, the runnings should be finished too. Only one elderly Carib man in Koriabo knew the precise way of preparing this drug. Gold miners from the Tassawini mine (Barama River) walked a day through the forest to visit the old man for a bottle of his medicine. The root scrapings are plugged in decayed teeth to relieve toothache. This burns at first, but cools down the pain later.

A remedy for severe back pain is made by boiling a whole cockshun root (*Smilax schomburgkiana*) and a 5 cm long piece of buruburu root. If the tea is drunk in one day; the following day the back pain will be vanished. Roth (1924: 710) mentioned that in Essequibo a decoction of several buruburu roots was drunk to treat snakebites, while some of the tea had to be poured on the bite. He saw 'several cases of recovery by means of this root', but the patients still suffered from trembling and 'aberration of mind', caused by the snake venom. An infusion of the leaves is used to treat thrush, and a syrup from leaves and flowers boiled in sugar water is taken for colds (Lachman-White et al. 1992). In Moruca, the tea is drunk for stomach ache. In Barama, the leaves are used in a herbal bath for fever. In Colombia, the fruit is applied to sore gums to stop bleeding. The sap of the stem is mixed with oil and applied to painful nipples of nursing mothers. The genus is rich in potentially biodynamic principles, particularly in steroid and other alkaloids (Schultes and Raffauf, 1990).

Economy: Buruburu roots are sold at herbal medicine stalls at the Georgetown market.



77. *Spondias mombin* a. young tree; b. flowering branch; c. young flower; d. bisexual flower; e. flower with perianth and stamens removed to show disc and styles; f. fresh fruit; g. dried fruit; h. seed.

77. **Spondias mombin** L. **ANACARDIACEAE** **Plum**

Synonym: *Spondias lutea* L.

Vernacular names: Plum, Hog plum (Cr), Hobo, Hubu (Ar), Mope (C), Usi arau (Wr).

Botanical description: Tree, to 25 m tall, deciduous; trunk ca. 50 cm in diam. Outer bark brown or grey, longitudinally fissured, inner bark pinkish orange, aromatic. Leaves alternate, compound, to 15-foliolate, ca. 30 cm long, clustered at branch ends; stipules absent; petiole ca. 10 cm long, glabrous to puberulous; leaflets (sub)opposite, papery, narrowly elliptic, somewhat falcate, to 15 x 5 cm, apex shortly acuminate, base truncate or obtuse, asymmetric. Inflorescences terminal or axillary panicles, many-flowered, ca. 40 cm long, puberulous, developing when mature leaves are present; peduncle ca. 6 cm long; bracts narrowly elliptic to ovate, ca. 1 mm long. Flowers bisexual; calyx 5-lobed, lobes deltate, ca. 0.5 mm long; petals 5, whitish, narrowly elliptic, ca. 3 mm long, glabrous; stamens 10, disk crenulate; ovary superior, 5-locular, ovoid, glabrous, styles 5. Fruit yellow or orange, fleshy, ellipsoid, ca. 3 x 2 cm, endocarp bony. Seedlings with crenate to serrate leaves.

Distribution and ecology: Native from south Mexico to southeastern Brazil, sporadically cultivated in Africa, Asia, and the West Indies. In semideciduous, gallery and evergreen, non-inundated forest (Mitchell, 1997). In northwest Guyana, common in secondary and Mora forest, occasionally along creeks in mixed forest. Trees are spared from felling around settlements. Flowering from August to April; fruiting from August to May (Mitchell, 1997). In Barama, trees were flowering in June-July and fruiting from August to the end of October. The tree normally sheds its leaves when fruiting (mostly during the dry season). Fruits are eaten by spider and howler monkeys, toucans, marudis, land turtles, and fish. Seeds float and are dispersed by water.

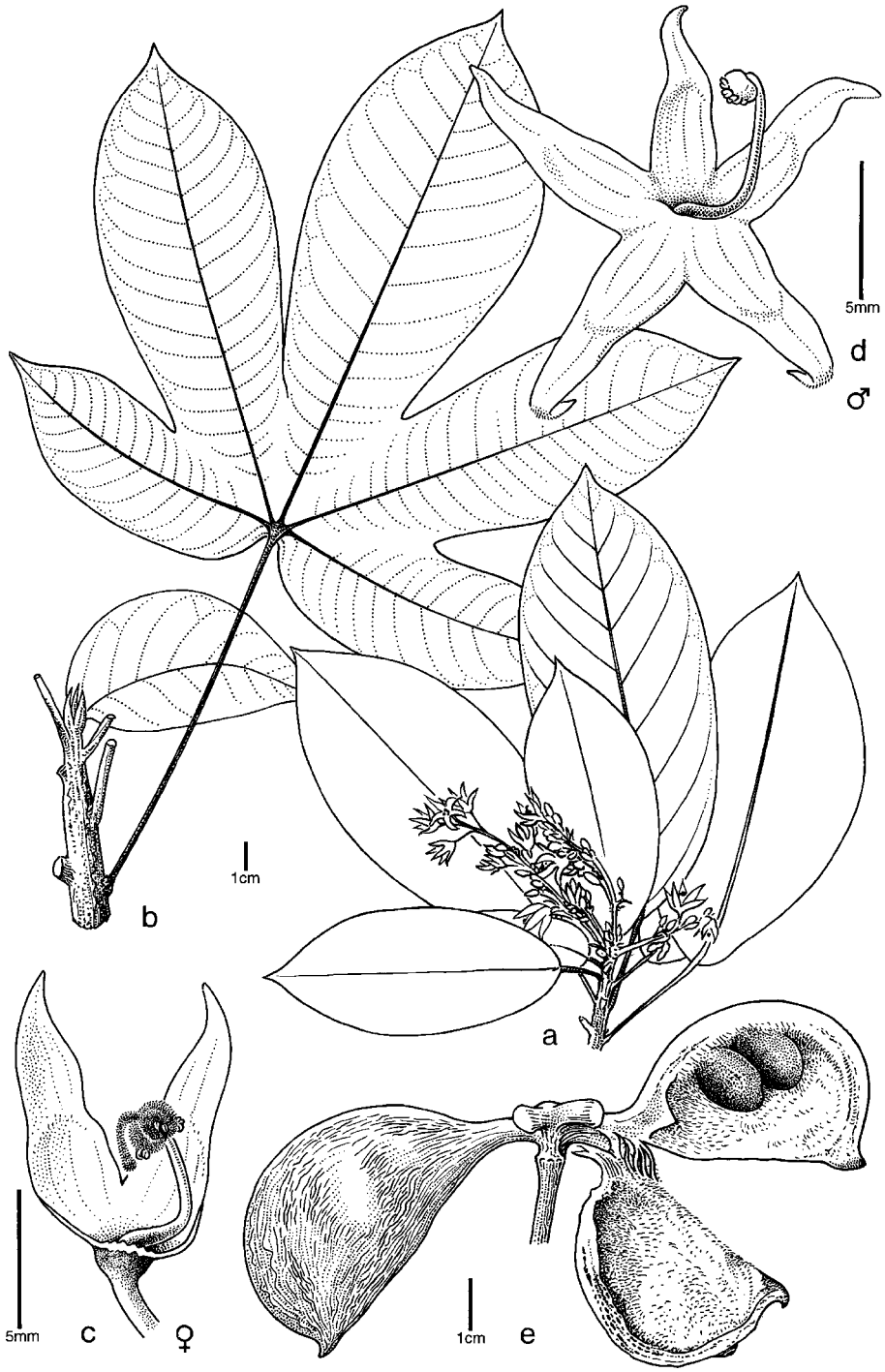
Use: The mildly acid fruits are edible and much appreciated. They are gathered from the forest floor and sand banks along the river, or collected from the water surface by canoe. A strong alcoholic drink is made when the pulp is mixed with sugar and left to ferment for a maximum of seven days. Land turtles are fond of the fruits as well, so people search for the animals under fruiting trees. It is believed that patients recovering from malaria should not eat plum, as this will bring back the fever. People also think that if someone pierces his or her ears in plum season, the hole will get infected and swell up to the size of a plum.

Plum seeds are roasted in the fire and put on a hook as fish bait, in particular to catch morocots (*Myletes* sp.). Seeds are thrown in the water to attract fish, so that they can be shot with bow and arrow. People fish under fruiting trees as well. If seeds are thrown in the fire, they produce a strong smell that chases away (vampire) bats. The soot from roasted plum seeds is rubbed on vampire bat bites to heal the wound. When a woman is bleeding heavily after childbirth (haemorrhage) and her vagina has ruptured, three cowfoot leaves (*Pothomorphe peltata*), some plum bark or a few pumpkin leaves (*Cucurbita moschata*), and a little kerosene are boiled in a large cooking pot. The woman must sit over the pot and wash her genitals with the warm decoction. This remedy is said to be very effective, as stops the bleeding and closes back the birth channel. This method is used by local midwives in remote areas, where there is no doctor or nurse to assist with problematic births. The tea from young plum leaves is also drunk to stop haemorrhage.

Young leaves are heated over the fire and put on skin sores. A decoction of the inner bark and leaves is used to cleanse the sores. The tea from the bark alone is drunk for colds. A remedy from Warapoka to stop diarrhoea includes the young leaves of plum, pear (*Persea americana*), guava (*Psidium guajava*), cashew (*Anacardium occidentale*), and jamoon bark (*Syzygium cumini*). All ingredients are boiled together and the sour tea is drunk with a little sugar. Plum bark, leaves, and fruits are furthermore used in the treatment of cancer (Mitchell, 1997), dysentery, diarrhoea, and constipation (Fanshawe, 1948), excessive bleeding during menstruation, stomach pains, as monthly contraceptive, or to induce permanent sterility (Schultes and Raffauf, 1990).

The various medicinal applications of bark and leaves of *Spondias mombin* are probably due to their tannin content (Stahel, 1944; Siang, 1983).

Economy: In coastal Guyana, the fruits are made into jams, jellies, ice creams and preserves. However, plum is not industrially processed like in other Central and South American countries. Fruits are sold at the regional and national markets, but these are likely to come from cultivated sources. In the North-West District, fruits are mostly harvested from wild trees. The alcoholic plum drink is occasionally sold.



78. *Sterculia pruriens* a. flowering branch; b. young leaf; c. female flower, partly opened to show pistil; d. male flower; e. fruits, closed (l), and opened to show seeds (r).

78. **Sterculia pruriens** (Aubl.) Schum. **STERCULIACEAE** **Maho**

Vernacular names: Small leaf maho, Smooth leaf maho, Bushcow maho[1], Real maho (Cr), Maho (Ar), Omose, Maipyuri omoseri[1] (C).

Botanical description: Tree, to 25 m tall; trunk to 30 cm in diam. Outer bark light brown, stripping off easily in several layers, inner bark pink to orange brown, wood white. Branches and young leaves covered with brown, stellate hairs. Leaves alternate, simple, clustered at branch ends, palmately veined; stipules narrowly elliptic, ca. 5 mm long, densely pilose, caducous; petiole ca. 7 cm long; blades oblong-elliptic to elliptic, ca. 15 x 7 cm, glabrous above, glabrous below, apex shortly acuminate, base rounded to subcordate, young leaves much larger, palmately lobed, appressed hairy above, tomentellous below. Inflorescences axillary, tomentellous panicles to 25 cm long. Flowers zygomorphic, unisexual, both male and female flowers present in one inflorescence; calyx campanulate, ca. 12 mm long, 5-lobed, lobes spreading, green or yellow outside, pinkish red inside; petals absent. Male flowers with an irregular cluster of sessile anthers at the top of the long staminal tube. Female flowers with 5 free carpels on a gynophore, becoming woody afterwards. Fruit a follicle, yellowish green, velvety, wrinkled, ca. 4 x 3.5 x 2.5 cm, apex acuminate, ventrally dehiscent; seeds 2, white, ca. 2 cm in diam., embedded in yellow, prickly hairs.

Distribution and ecology: The Guianas and Brazil, common in rain, marsh, and creek forest (van Roosmalen, 1985). In northwest Guyana, common in mixed and secondary forest. In Suriname, flowering mainly from November to February, fruiting around March (Uittien, 1932). Seeds are dispersed by rodents and monkeys (van Roosmalen, 1985).

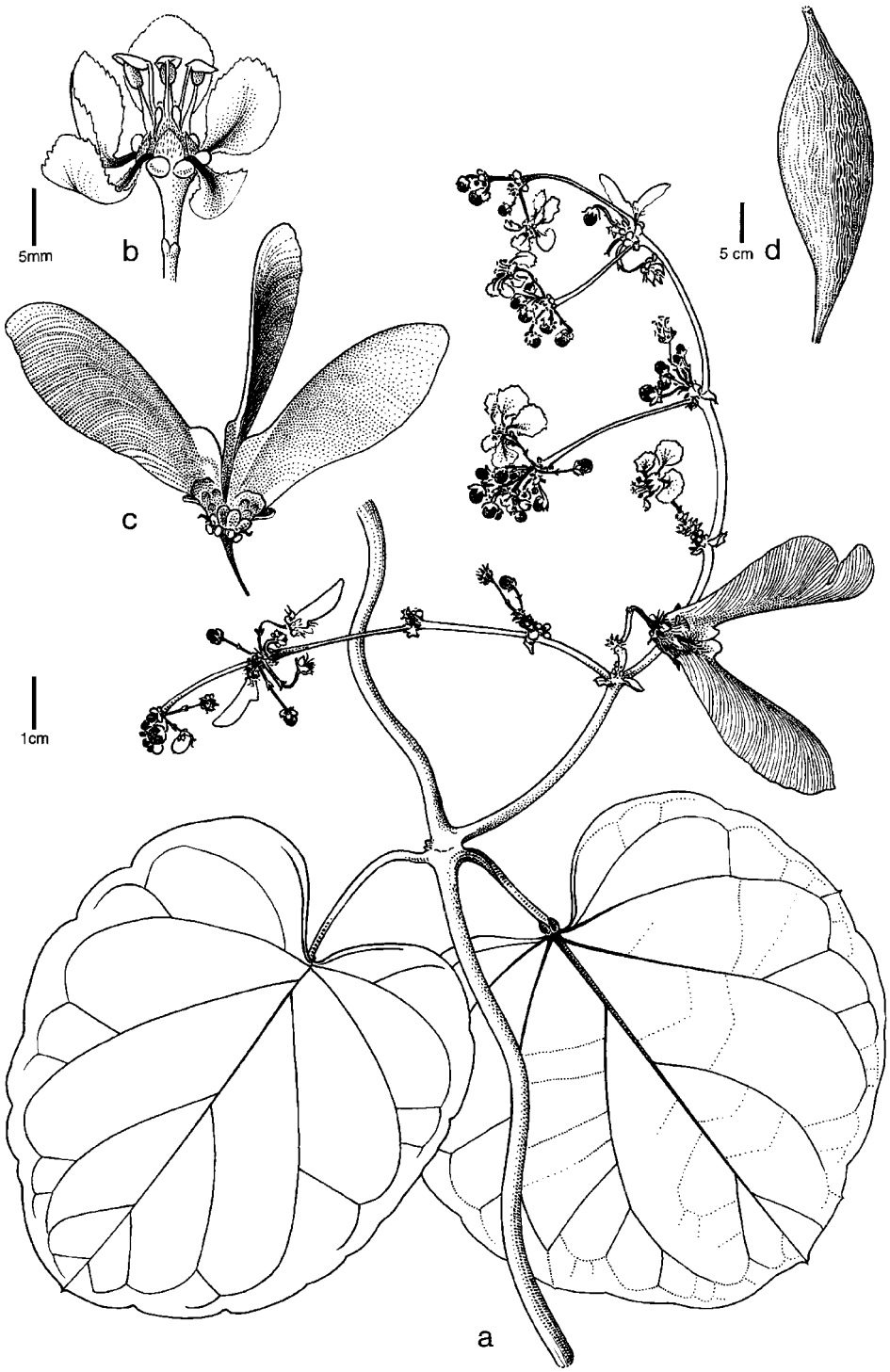
Use: The bark fibres of this species are quite strong and used throughout its range for head and shoulder straps, cordage, strings, and belts. The 'real maho' has a greater strength, durability, and pliability and is therefore preferred above other maho species (e.g., *Anaxagorea dolichocarpa*, *Annona symphyocarpa*, *Rollinia exsucca*, and *Sterculia rugosa*). The latter species, also called 'rough leaf maho', is hardly used, because its bark is rather brittle and slimy.

Barks strips are harvested by slashing the trunk with a cutlass and pulling off the bark in one movement towards the base of the trunk. The bark strip is easily divided in an outer and an inner layer[2]. Only the inner bark layer is used as lashing material. The strips must be used fresh and moist; if dried in the sun they soon become brittle. Trees generally survive the removal of bark strips; in the periphery of Amerindian settlements, most individuals show signs of previous harvesting. Young trees with a diameter less than 10 cm already yield suitable strips.

The strips are used as headband to carry warishis, quakes, or other heavy baskets, as binding material to strap bundles of palm leaves for roof thatch, to close full warishis, and strap living turtles to prevent them from escaping. The fibres are also employed in loose plait work for makeshift hammocks ('bush hammocks'), tied into circular bands to climb trees and used to fasten palm leaves on temporary roofs as a substitute for nibi (*Heteropsis flexuosa* and *Thoracocarpus bissectus*). A traditional 'tondoli' basket is made by bending an aerial root of kufa (*Clusia* spp.) into a circle, binding the two ends together with a strip of maho and weaving a loose wicker of maho between the frame. The basket is used to store cassava bread, and hung with a bark strip on the roof in a way that animals cannot get close to it. Roth (1924) described this basket as typical Arawak, but nowadays tondolis are only made and used by Caribs.

Economy: Warishis and quakes (with or without maho straps) are sold on Amerindian village markets, but the bark alone is not a commercial item.

Notes: (1) 'Bushcow maho', as the lobed leaves resemble the footprint of a bushcow (*Tapirus terrestris*); (2) See plate 26.



79. *Stigmaphyllon sinuatum* a. branch with flowers and fruits; b. flower; c. fruit (schizocarp); d. tuberous rhizome.

79. **Stigmaphyllon sinuatum** (DC.) A. Juss. **MALPIGHIACEAE** **Karia**

Synonym: *Stigmaphyllon fulgens* A. Juss., *Stigmaphyllon hypoleucum* Miq.

Vernacular names: Cassava momma[1], Mother cassava, Kurria, Careeya (Cr), Karia (woman type, man type) (Ar), Aronato (C), Aruarani, Ararau amutu[2], Masi aurere akahu[3] (Wr).

Botanical description: Liana, to 30 m long. Rhizome tuberous, brown, ca. 40 x 12 x 10 cm, inner tissue white. Leaves opposite, variable in size and shape; stipules interpetiolar, ca. 1 cm long; petioles to 13 cm long, with a pair of prominent, sessile glands at the apex; blades triangular to heart-shaped, rounded or kidney-shaped, to 21 x 20 cm, glabrous above, sparsely to densely silver-sericeous below, margin crenate to subentire, apex rounded, mucronate, base acute, truncate, cordate, or deeply auriculate. Inflorescences axillary pseudoracemes, to 35-flowered; peduncle reddish, ca. 6 mm long; bracts triangular, ca. 1.3 x 1 mm; bracteoles ca. 1.2 x 1 mm, with a pair of inconspicuous glands. Flowers actinomorphic; sepals 5, ca. 2 x 2 mm, with two glands on the outer side; petals 5, clawed, yellow and red, ca. 1 cm long, margin denticulate, claw ca. 3 mm long; stamens 7, unequal, 4 sterile and 3 fertile, filaments more or less united; ovary superior, styles 3. Fruit a schizocarp, separating into 3 samaras; wings dark red, dorsal wing ca. 4.5 x 1.4 cm; nut ca. 6 x 3.6 mm, smooth or bearing 1-3 lateral winglets.

Distribution and ecology: Northern South America and the Amazon region, common in lowland, wet primary forest and secondary forest, but also in white sand vegetation (Anderson, 1993). In northwest Guyana, common as weed in cultivated fields, secondary shrubland and abandoned fields. Flowering and fruiting throughout the year. Seeds are dispersed by the wind (van Roosmalen, 1985).

Use: Due to the highly variable leaves of this species, locals distinguish a ‘woman type’, with round or heart-shaped leaves and a ‘man type’ with triangular leaves. The latter is considered to have stronger medicinal properties. For headache, karia leaves are crushed in cold water and the green mass is applied to the head. This same mixture is warmed and used as bath against fever. Some of the infusion is drunk to ease headache and colds. Leaves are boiled with kufa root (*Clusia* spp.) against malaria. A cold bath with karia leaves and grated black potato (*Ipomoea batatas*) eases the fever as well. Another remedy for headache and fever is to heat a leaf over a fire, rub a little oil on the forehead and stick the leaf to it. All three Amerindian tribes in the study area used karia leaves for headache and fever, but recipes varied somewhat among informants.

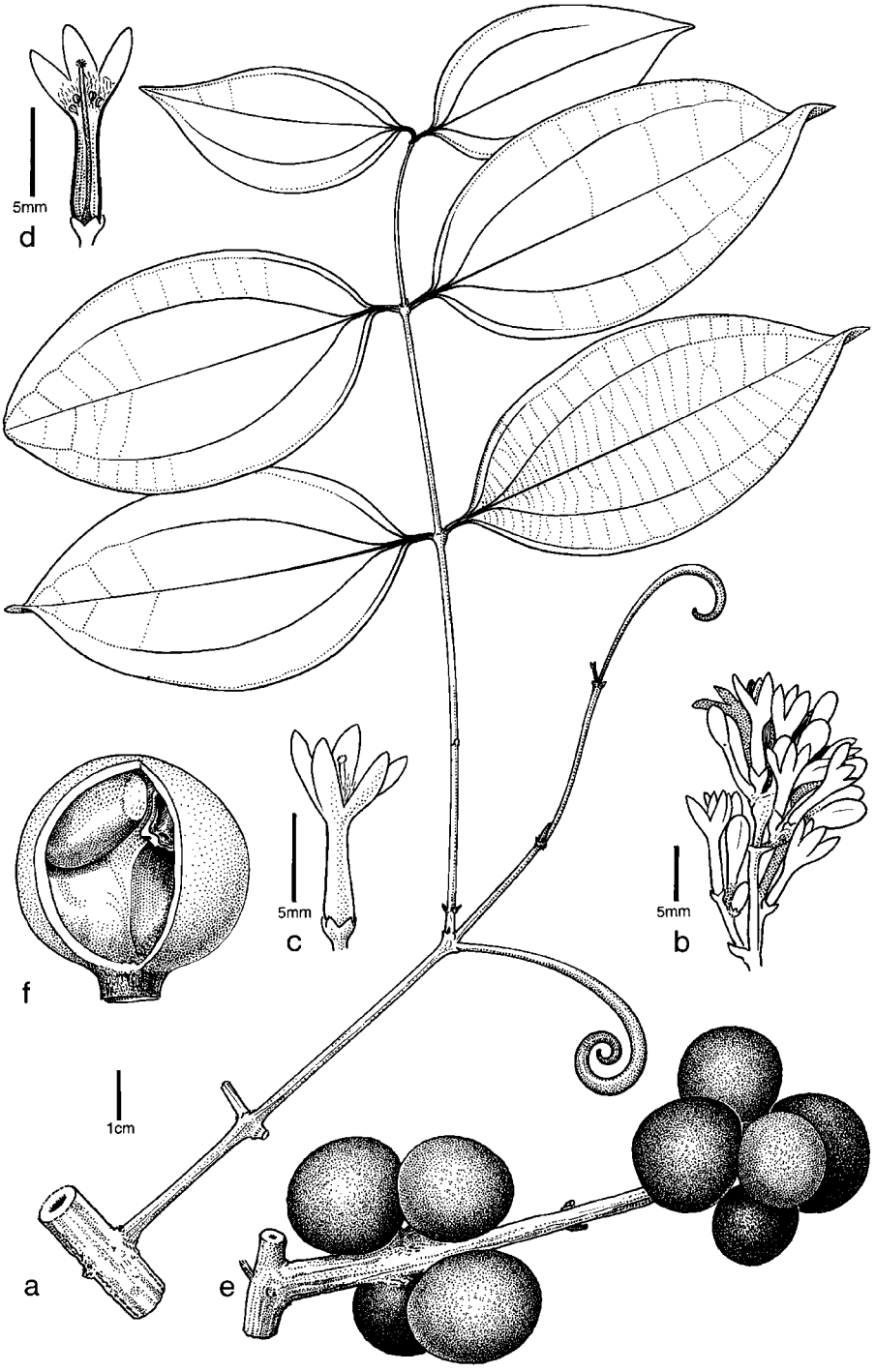
The sap from crushed leaves is rubbed on ringworm (skin fungus). Macerated leaves are applied to skin burns. Women in labour having trouble with delivering the afterbirth are given a tea from the crushed leaves. Drinking the bitter, slimy tea will soon release the afterbirth. If there are problems with delivering the baby itself, the same tea can ease the labour. Drinking the tea in earlier stages of pregnancy can cause an abortion. Patients suffering from a stroke are required to sit in the smoke from three karia leaves, burned with nutmeg, camphor, physic nut leaves (*Jathropa curcas*), and a piece of a termite nest. The leaves are stripped from the vine and the stem is used as a ‘bush rope’. During class breaks, children tear the vine from the shrubby schoolyard and use it as a skipping cord. Young girls rub the sap from crushed karia leaves on their eyelids as a bluish green eye shadow.

For irregular heart beating and other heart problems, the large tuber (‘root’) of the karia is cleaned, peeled, and a slice of ca. 5 cm is boiled and drunk as tea. A handful of scraped root tissue is tied with a leaf to swollen limbs. The root is cut into pieces and boiled, the starch is left to settle, and the decoction used to cleanse swellings. Farmers grate a karia root and scatter the pieces over their cassava field to ensure a good crop. Karia fulfils here the same role as the cultivated magic plant *Asarina erubescens*, also named ‘cassava mother’. Stems and leaves are crushed for washing the hair, and seeds are swallowed as a contraceptive (Lachman-White et al., 1992). Leaves of male and female variety boiled together are drunk to clean out the uterus after giving birth and to treat ‘lining cold’ (puerperal fever). A root decoction is drunk against womb cramps.

When man grass roots (*Eleusine indica*) and calabash leaves (*Crescentia cujete*) are added, the decoction is used to cleanse skin sores. The boiled root is applied to the sores as well (Reinders, 1993).

Economy: Decoctions of karia root were sold by a traditional healer in Moruca for US$ 3.50-7, although he was often accused of charging his clients too much for his services. The plant is not sold at the Georgetown herbal market.

Notes: (1) The large root of the karia vine strongly resembles a cassava root; the reason why the plant is sometimes called 'cassava mother'. The root is not edible; (2) 'Wrap around cassava sticks', as the species is a common weed in cultivated fields; (3) 'Sweet potato root of the deer' (Charette, 1980).



80. *Strychnos mitscherlichii* var. *mitscherlichii* a. leafy branch; b. part of inflorescence; c. flower; d. flower, longitudinal section; e. infructescence; f. fruit, partly opened to show seeds.

80. **Strychnos mitscherlichii** M.R. Schomb. var. **mitscherlichii** **LOGANIACEAE** **Devildoer**

Vernacular names: Devildoer, Big devildoer (Cr), Kwabanaro (Ar), Aritya wokuru (C).

Botanical description: Liana, stem to 10 cm in diam. Branches glabrous to minutely puberulous, with strongly curved, hook-like tendrils opposite the leaves. Leaves opposite, simple, at the base united by a stipular line; petiole glabrous, ca. 8 mm long; blades broadly ovate to oblong, to 20 x 9 cm, shiny, leathery, with 3 prominent veins, apex rounded to bluntly acuminate, base obtuse to acute. Inflorescences terminal or axillary, narrowly thyrsoid, with opposite cymes to 4 cm long, rachis black, glabrous. Flowers zygomorphic, tubular, fragrant; calyx yellow, 5-lobed, lobes ovate, to 1.3 x 1 mm, conspicuously ciliate; corolla cream, tube narrowly cylindrical, ca. 6 mm long, papillose outside, 5-lobed, lobes narrow, ca. 3 mm long, with white, woolly fimbriae at the throat; stamens subsessile, included, inserted below the wool at the throat of the corolla; ovary superior, mostly 2-locular, style and stigma 1. Fruit a berry, dark gray to yellowish green when immature, orange-grey when ripe, lenticellate, globose, ca. 4.5 cm in diam., fruit flesh orange to grey, sweet; seeds several, ca. 2.5 x 1.5 x 1.8 cm.

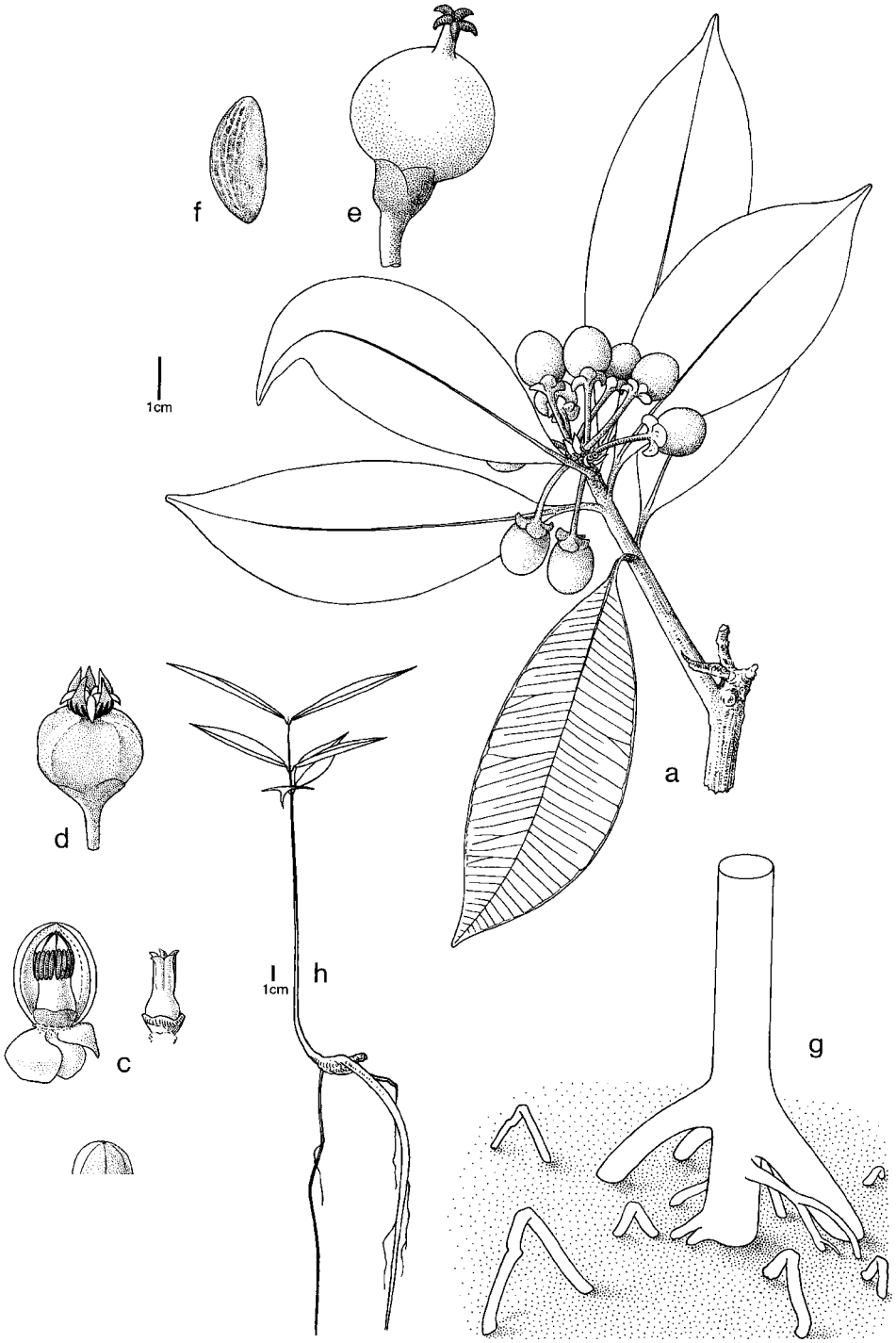
Distribution and ecology: Venezuela, the Guianas, and Amazonian Brazil. In northwest Guyana, frequent in riverbank Mora forest, occasional in mixed and secondary forest. According to Robert Schomburgk (1848), who collected the type specimen close to Kariako (Barama), the species was flowering in September-October. In the same area, fruits were observed in August and from October to January. Seeds are dispersed by spider monkeys (van Roosmalen, 1985).

Use: The orange-grey pulp around the seeds is edible. The tough fruit shell is broken op and the pulp is sucked out. Just a few persons in Kariako mentioned the fruit as edible. People usually do not fancy them, as they are often infested with worms. This also explained by its Carib name, which means 'worm drink'. A tea brewed from the chipped stem and bark is drunk as aphrodisiac, to cure a 'weak back' (impotence). People warned that the liana had quite strong effects ('devil-doer') and therefore only small stems should be utilised. A police officer in Moruca fell seriously ill after taking an overdose of devildoer tea. He had to be transported by air to the Georgetown hospital. A too strong concoction was said to cause permanent impotence. *S. mitscherlichii* is the most common species of *Strychnos* in northwest Guyana, but the less frequent *S. erichsonii* is used for the same purposes.

In other parts of the country, different *Strychnos* species may be used as aphrodisiac. The stem is mostly used in combination with one or more of the following ingredients: monkey ladder wood (*Bauhinia guianensis*), cockshun root (*Smilax schomburgkiana*), kapadula wood (*Tetracera* spp., *Pinzona* sp., *Doliocarpus* sp.), sarsparilla root (*Dioscorea trichanthera*), kufa root (*Clusia* spp.), locust bark (*Hymenaea courbaril*), and granny backbone wood (*Curarea candicans*). The pieces are either soaked in alcohol or boiled in water for about an hour. These 'builders' are added to milkshakes, porridge, tea, stew, or other dishes, and are said to protect against diseases and enhance sexual activities. Aphrodisiacs are popular among coastlanders and (Amerindian) pork-knockers.

The bark and roots of more than 12 different species of *Strychnos* are involved in the preparation of curare. A variety of alkaloids have been found in the genus (Marini-Bettolo and Bisset, 1972), of which strychnine is the most famous, nowadays used in modern medicine as a muscle relaxant. *S. toxifera*, *S. erichsonii*, and *S. guianensis* were commonly used in curare by Macushi and Wai-wai Indians in Southern Guyana (Krukoff and Smith, 1939; Fanshawe, 1948). Although rather common, *S. mitscherlichii* is used only occasionally as a curare ingredient (Schultes and Raffauf, 1990). This is probably because of its variable alkaloid content, a phenomenon often found in polymorphic species with an extensive range (Krukoff, 1965). It is assumed that blowguns and curare never formed part of the traditional hunting methods of the northwestern tribes (Lewin, 1923). Informants said they had never heard of the use of *Strychnos* bark in arrow poisons, but they knew the seeds were poisonous.

Economy: Ready-made aphrodisiacs are sold in litre bottles for US$ 3.50 in medicinal herb stalls at the Georgetown market. Some of these stalls are open 24 hours a day. Pieces of *Strychnos* wood are sold for US$ 0.35, but they are likely to be harvested from several different species.



81. *Symphonia globulifera* a. fruiting branch; b. flower bud; c. flower bud, partly opened to show staminal tube (l) and pistil (r); d. flower; e. fruit; f. seed; g. trunk base with pneumatophores; h. seedling.

81. **Symphonia globulifera** L.f. **GUTTIFERAE** **Manni**

Vernacular names: Karaman wax tree, Buck wax tree, Black manni, White manni (Cr), Manni, Manniballi (Ar), Ananiyu, Wesekapo epïtyï[1] (C), Ohoru (Wr).

Botanical description: Tree, to 25 m tall; trunk to 60 cm in diam., base with root spurs and stilt roots to 1 m high, in swamp forest with pneumatophores. Outer bark dark brown to yellow-brown, lenticellate, cracked, scaly, inner bark yellowish white to light brown, with plentiful light yellow, sticky latex, sapwood and heartwood light brown. Branches horizontally spreading, angular, glabrous. Leaves simple, opposite; petiole ca. 7 mm long, grooved above; blades leathery, narrowly ovate, ca. 9 x 3 cm, glabrous on both sides, shiny above, dull below, apex acuminate with blunt tip, base narrowed, acute. Inflorescence axillary or terminal, more or less umbelliform cymes; pedicels to 25 mm long in fruit, reddish. Flowers actinomorphic, bisexual; sepals 5, reddish, overlapping, ca. 5 mm long, persistent; petals 5, red, twisted, ca. 13 mm long, only slightly spreading during flowering; stamens united into a 5-lobed tube, split to halfway from the top; ovary superior, 5-locular, style 1, stigmas 5. Fruit a berry, brown to purple, with yellow latex, globose, ca. 3 cm in diam., glabrous, crowned by the persistent stigmas; seeds 1-3, with marbled surface, ellipsoid, ca. 2 x 1 cm.

Distribution and ecology: From Central America to northern South America, the West Indies, and tropical West Africa, dominant to common in swamp and marsh forest, less frequent in mixed forest, mainly near creeks. In northwest Guyana, abundant in swamp forests on pegasse, less common in Mora forest. Flowering mainly from July to October; fruiting from February to April (Polak, 1992). Flowers are pollinated by hummingbirds and bees; seeds are dispersed by bats (Bittrich and Amaral, 1996). Bees often visit the trunk to carry pieces of latex to their nest.

In mixed forest on less swampy soil, the species has smaller leaves and flowers, while pneumatophores are lacking (Polak, 1992). In Moruca, locals distinguished a rare black manni, which had harder wood and more flaky bark than the more common white manni. Both types were beyond doubt *Symphonia globulifera*, but it was not clear whether the variation between the types was caused by differences in habitat. There was no difference in use between the black and the white manni.

Use: The thick, yellow latex of manni is known as karaman wax, used to fasten arrow points on their shafts, and thus an important forest product in areas where hunting is still done with bow and arrow. The fresh latex is boiled in some water with soot scraped from kerosene lamps or cooking pots. Some beeswax or powdered ashes from burnt leaves of sandpaper (*Pourouma guianensis*) or troolie (*Manicaria saccifera*) may be added as well. Fanshawe (1948) also reported the addition of powdered charcoal, tallow, or kufa latex (*Clusia* spp.). The wax, which has turned black now, has obtained a great tenacity and a low melting point. The hot, liquid wax is poured into a bamboo segment to store it for future use. It can also be kneaded into a compact lump after cooling down.

Iron arrow heads are filed from a piece of an old cutlass and inserted into a hardwood peg from *Quiina guianensis*, *Eugenia patrisii*, or *Tovomita obscura*. The point is fastened tightly in its socket with a twine, made from homespun krawa fibre (*Ananas comosus*) or synthetic polyethylene cord. The thread construction needs to be 'blackened' with karaman wax to obtain extra strength. A burning piece of wood is held against a lump of wax and the melting, tar-like substance is rubbed on the tread[2]. In this way, the strap will not loosen easily. The thread may also be covered with the black gum before it is wrapped around the socket. The gum burns like a candle, but is not used as such. The Warao use the pitch-like substance to caulk the creases in boats and canoes. Roth (1924) further mentioned the waxing of fishing lines, nets, and cordage.

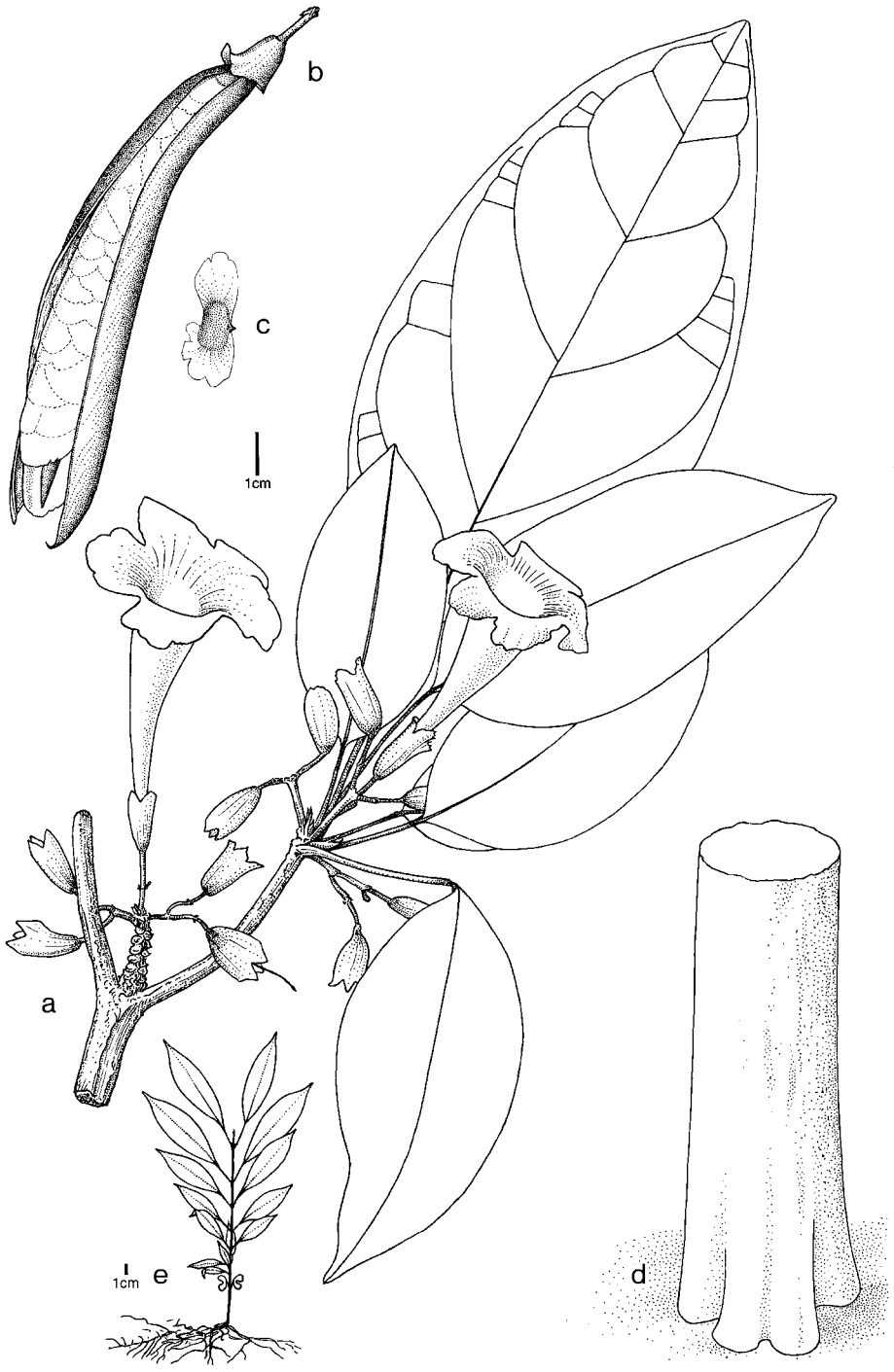
The latex has various medicinal properties as well. It is applied to swellings and abscesses to break them open and release the pus. When people suffer heavily from diarrhoea, some manni bark is scraped, boiled, strained and put in a syringe. The liquid is injected in the anus of the patient. This is a last option to administer a medicine to patients who are too sick too hold any fluids or oral medicine. The bark is also scraped, diluted in water and given in small quantities to babies suffering from thrush. According to Reinders (1993), the latex is also applied as disinfectant plaster on cuts and

rubbed on sore lips and mouth. In French Guiana, pieces of cloth are drenched in the latex and tied on diverse skin diseases (Grenand et al., 1987). In Colombia, the ashes of burnt bark are rubbed on wounds and recalcitrant ulcers to 'dry the infection' (Schultes and Raffauf, 1990). The poisonous seeds are grated, mixed with coconut oil and rubbed on the skin to cure ringworm. The stilt roots of the tree are a nuisance when passing through a swampy forest, often causing the walker to stumble. Stepping barefoot on a cut root stump may result in a serious infection that takes long to heal.

Manni trunks are sporadically made into canoes, mostly when no other suitable wood is available. The wood is also sawn into boards in local sawmills.

Economy: In the early days, the sale in karaman wax was much more important in the region than it is today. Alexander von Humboldt saw 'masses of several hundredweight of this most celebrated resin' lying for sale at an upper Orinoco village market (von Humboldt, 1889: 357). Nowadays, arrows are sold in indigenous communities in Guyana, but karaman wax as such is not really a commercial item. Arrows in Georgetown tourist shops are seldom made with the wax. The wood is a commercial timber (Polak, 1992).

Notes: (1) 'Medicine for abdominal pain' (Coles et al, 1971); (2) See plate 27 and 28.



82. *Tabebuia insignis* var. *monophylla* a. flowering branch; b. dehiscing fruit; c. seed; d. trunk base; e. seedling.

82. **Tabebuia insignis** (Miq.) Sandw. var. **monophylla** Sandw. **BIGNONIACEAE** **White cedar**

Vernacular names: White cedar (Cr), Warokuri (Ar), Pokata, Panda (C), Haheru (Wr).

Botanical description: Tree, to 30 m tall; trunk to 50 cm in diam., base swollen or buttressed. Outer bark grey-brown, lenticellate, with longitudinal creases, inner bark light brown to pinkish brown, turning orange after exposure, strong-scented, sapwood and heartwood light grey-brown. Branches ribbed, grey, with u-shaped leaf scars, covered with brown scales when young. Leaves simple, opposite, clustered at branch ends; stipules absent; petiole ca. 7 cm long; blades leathery, elliptic, ca. 21 x 9 cm, glabrous above, covered with very small scales below, apex acute to long-acuminate, base acute. Inflorescence a terminal, few-flowered, compound cyme ca. 15 cm long; peduncle ca. 2 cm long; pedicels ca. 5 mm long. Flowers actinomorphic; calyx cup-shaped, irregularly 2-3-lobed, ca. 2 cm long, persistent, covered with very small scales; corolla white, tubular, ca. 7 cm long, 5-lobed, hairy inside at the throat; ovary superior, 2-locular, style 1. Fruit a more or less woody capsule, linear, ca. 15 x 1.2 cm, apiculate, densely covered with scales; seeds numerous, oblong, flat, winged, ca. 6 x 9 x 1 mm, wings papery, ca. 12 mm long.

Distribution and ecology: Venezuela, Colombia, the Guianas, Brazil, and Peru, mostly in swamp forests. In northwest Guyana, occasional as large tree in Mora forest, abundant to dominant in swamp forests on pegasse, frequent in as small tree in mokomoko (*Montrichardia arborescens*) riverbank vegetation. Quickly regenerating after burning in (seasonally flooded) savannas,. Flowering throughout the year, with a peak from February to May; fruiting from December to April. The seeds are dispersed by the wind and germinate within two months (Polak, 1992).

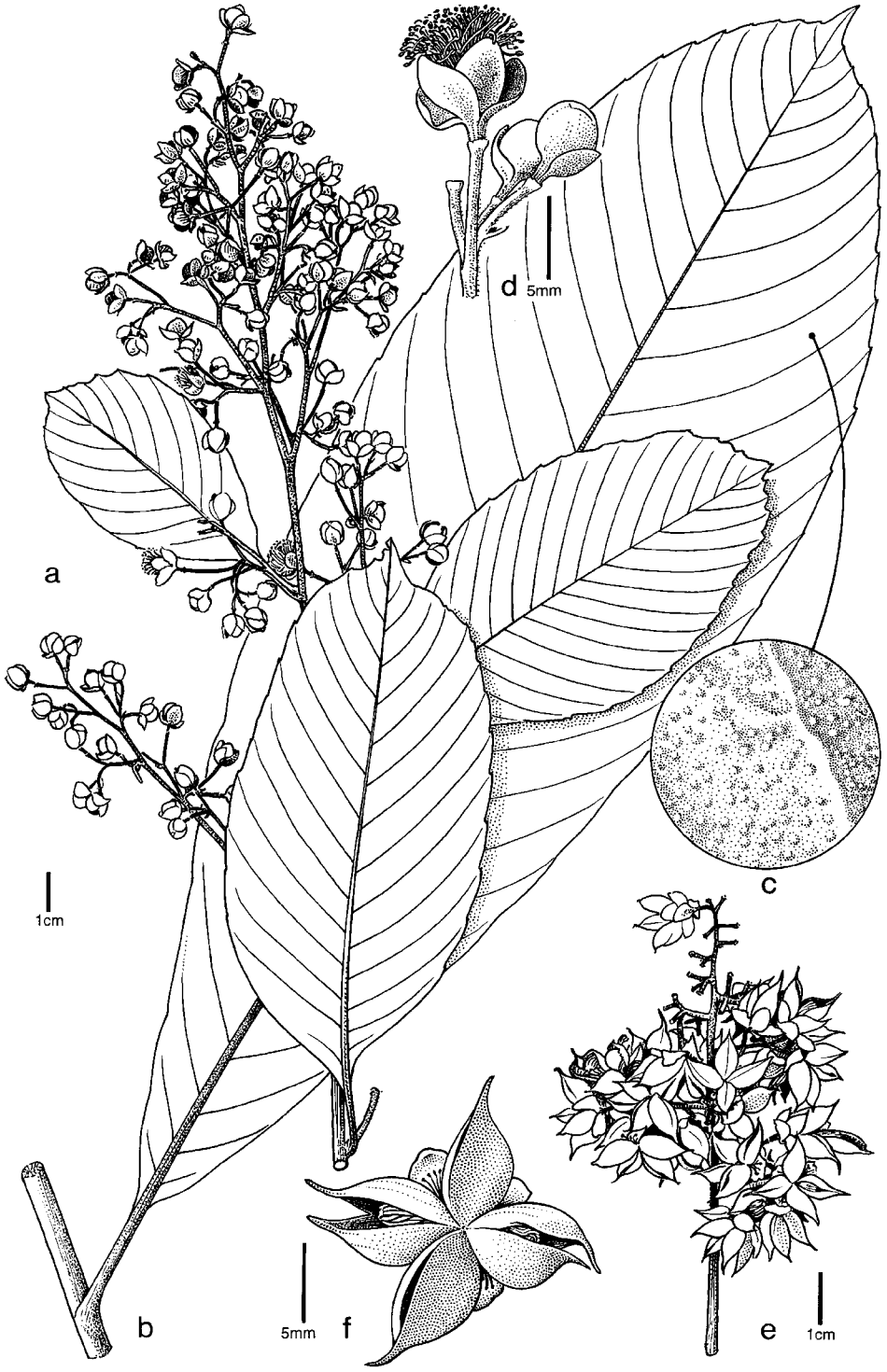
Use: The bark of the white cedar is a well-known remedy to treat and prevent malaria. A handful of the inner bark scrapings are boiled in about three litres of water. The bitter, dark red liquid is boiled down to a pint and drunk in small quantities for malaria. A few tablespoons a day of this tonic are also drunk just to ‘bitter the blood’. This allegedly helps to build up resistance to sores and mosquito bites, and prevents the malaria parasite from attacking the body. The bark decoction is also drunk to treat diarrhoea and venereal diseases. An infusion or a cold decoction of three bark strips is drunk to treat skin ailments, syphilis, and other venereal diseases (Fanshawe, 1948; Greene-Roesel, 1995).

White cedars growing in the flooded savanna are frequently cut down, so that their trunk can serve as bridge over the swampy soil. Individuals with three or more forked branches are suitable as pole in the savanna. The trunk is felled and turned upside down, in a way that the stumps of the branches fasten in the boggy soil. These poles serve to tie boats and canoes.

The wood is locally sawn into boards which are used to build ‘ballahoos’ (boats made out of boards). Arawaks and Warao prefer to make their paddles from white cedar wood, because it splits easily. Caribs that live deeper in the interior, where the species is less common, carve their paddles from the buttresses of yarula (*Aspidosperma* spp.), parakasana (*Swartzia schomburgkii*), or crabwood (*Carapa guianensis*).

Caribs used to make their large sambura drums from the wood of white cedar. This traditional music instrument was played during Carib dances and festivities, but it is hardly made anymore. Today people use white cedar to make the small guitars that are played during Christian church ceremonies.

Economy: The wood is a commercial timber (Polak, 1992).



83. *Tetracera volubilis* subsp. *volubilis* a. flowering branch; b. young leaf; c. lower leaf surface (r = 0.9 mm); d. flower; e. infructescence; f. fruit, composed of 4 follicles.

83. **Tetracera volubilis** L. subsp. **volubilis** **DILLENIACEAE** **Kapadula**

Vernacular names: Kapadula, Fire rope[1], White kapadula, Red kapadula, Female kapadula, Male kapadula (Cr), Kabuduli (Ar) Tameyu-u, Ereyunde (C), Ero karara[2], Ero simuida, Ero buabua, Ero kaukau (Wr).

Botanical description: Woody climber; stem to 18 cm in diam., with concentric circular growth rings in cross section. Outer bark flaky, reddish brown, wood reddish or light brown, with clear watery sap. Leaves alternate, simple; stipules absent; petiole ca. 1.5 cm long; blades obovate to elliptic, ca. 11 x 6 cm, rough on both sides, with stellate hairs below, margin serrulate, apex acuminate, base acute. Sapling leaves to 30 x 10 cm, margins deeply serrate. Inflorescence a many-flowered, terminal panicle; bracts narrowly elliptic, ca. 2 mm long. Flowers actinomorphic, bisexual, fragrant; sepals 5, imbricate, orbicular, ca. 3 mm long, persistent, enlarged in fruit, margins ciliate; petals 5, dark red, free, obovate, ca. 5 mm long; stamens numerous; carpels 1-5, free, style 1, very short, stigma 1, peltate. Follicles 4-5, purplish brown, 3-angled, ovoid, ca. 1.7 x 0.8 x 0.6 cm, leathery, shiny, spreading at maturity, dehiscent; seeds 2-3 per follicle, black, ca. 1 x 0.4 x 0.4 cm, aril red, with lacerate lobes.

Distribution and ecology: Central America, the West Indies, northern South America, Peru, and Amazonian Brazil, in deciduous to evergreen lowland forest (Aymard, 1998). In northwest Guyana, frequent as large canopy liana in mixed forest, smaller individuals in secondary and Mora forest. Phenology unknown. Seeds are dispersed endozoochorously (Maas and Westra, 1993).

Use: Kapadula wood has the reputation to be a powerful aphrodisiac. A piece of stem is chopped off and dried in the sun. To serve four persons, a piece of ca. 5 x 5 x 2 cm is split and boiled into a blood-red tea. When drunk hot with sugar and milk, it tastes like Ovomaltine. Kapadula is said to work as a 'builder', stimulating sexual activities and curing impotence. Kapadula often occurs as large woody climber, its leaves invisible from the forest floor. Informants all agreed that there existed a white and a red kapadula, and that the white type aroused sexual feelings by women, while the red type worked exclusively on men. The different types were recognised by their wood colour instead of by their leaves or fertile organs. However, this colour varies a lot in the field and is not quite indicative for the species.

Six species of Dilleniaceae were collected under the name kapadula: *Davilla kunthii*, *Doliocarpus* cf. *dentatus*, *Pinzona* sp. TVA2509, *Tetracera asperula*, *T. tigarea*, and *T. volubilis* subsp. *volubilis*. Little agreement existed among informants on local names and types. It thus seems that species are confused and used similarly, without noticeable differences in their effect. *T. volubilis* subsp. *volubilis* it is treated here, since it was by far the commonest 'kapadula species' in northwest Guyana.

Kapadula wood is the main ingredient in aphrodisiacs made with the following ingredients: locust bark (*Hymenaea courbaril*), cockshun root (*Smilax schomburgkiana*), kufa root (*Clusia* spp.), sarsparilla root (*Dioscorea trichanthera*), monkey ladder wood (*Bauhinia* spp.), granny backbone wood (*Curarea candicans*), and devildoer wood (*Strychnos* spp.). The components are soaked in alcohol to make a tonic or boiled in water for an hour. The 'kapadula wine' is added to milkshakes, porridge, or other dishes. It is said to be 'good for the nature', strengthen the body and protect against diseases. Amerindians often call these aphrodisiacs 'pork-knocker medicine' or 'black man's tea', implying that they are not familiar with them. Yet many of them know exactly how to prepare these beverages. Coastlanders often ask Amerindians to collect the ingredients from the forest, as they cannot identify the species themselves. Cooks in mining camps prepare the drinks for the labourers. Amerindian pork-knockers admitted they tried out these drinks and told wild stories about the effects.

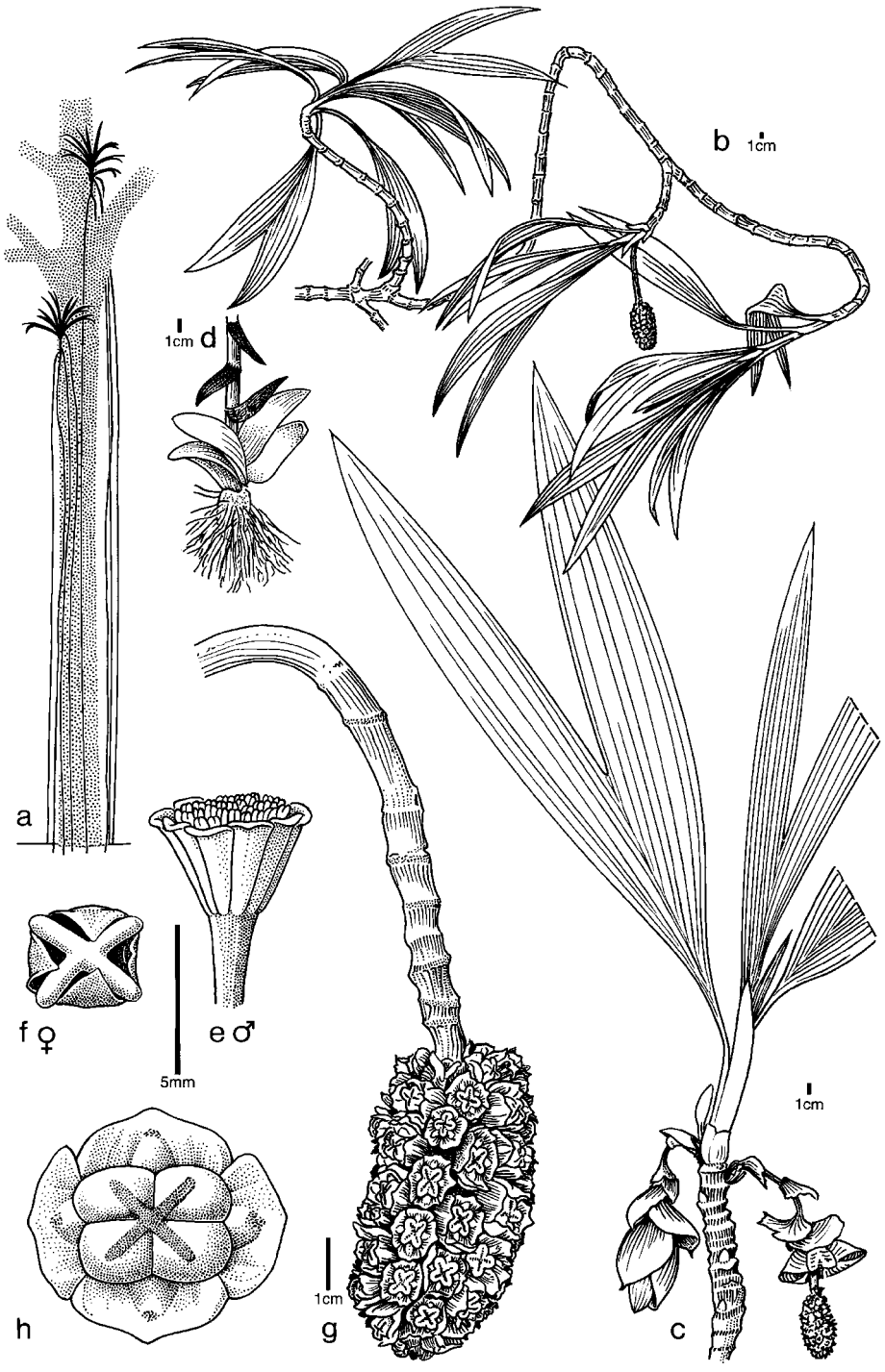
When a large piece of stem is cut and held upside down, clear water starts flowing from the wood, which can be drunk when thirsty in the forest. Snakebite victims are advised to drink only kapadula water, as rain or river water would worsen their condition. Bottles full of kapadula water are collected for the patients until they recover.

The sap is also used to disinfect sore eyes, and drunk instead of normal water to relieve the symptoms of diabetes. To collect kapadula water for a sick child, a young liana is cut and tied together so the water cannot flow out. The vine is taken home and the water dripped in the child's eyes. The sap is also drunk as a remedy for cough and colds. Pregnant women are warned not to drink kapadula water, since it can cause abortion. Even cutting the liana with a cutlass during pregnancy is believed to provoke a miscarriage. The sap is sometimes deliberately drunk for this purpose.

In remote areas, where women deliver their babies at home instead of in a hospital, kapadula leaves are used to disinfect the navel strings of new-borns. The leaves are parched on a metal pot or burned in the fire and ground to powder with a bottle. After cutting the umbilical cord with a razorblade, the grey ash is rubbed on the navel remnants. This treatment quickly dries the navel and causes the remainder to drop off. A decoction of scraped kapadula bark is used daily as an antiseptic wash to clean the navel. Apart from kapadula, the ashes of burnt widi leaves (*Astrocaryum gynacanthum*) or shells of the krekete snail (*Ampullaria* sp.) may be rubbed on the navel for the same purpose. In areas closer to hospitals, this custom has died out.

Economy: Kapadula wood is sold at the Georgetown herbal market for US$ 0.35 per piece, mostly from *Pinzona* sp. TVA2509 and *Doliocarpus dentatus*. Ready-made aphrodisiacs are sold for US$ 3.50 per litre. Amerindian men from Moruca occasionally carry a bag full of kapadula with them when travelling to the capital, but there is no regular trade in medicinal plants from the North-West District. The majority of ingredients for aphrodisiacs are brought from the Essequibo and Demerara forests. Several small businesses (e.g., Family D'lite and Caledonia Canning Co.) have taken initiatives to process kapadula wine into tins.

Notes: (1) The species is called 'fire rope', because its rough leaves scratch the skin of the passer-by; (2) This is also reflected in the Warao name, as 'ero' signifies liana and 'karara' means razor grass.



84. *Thoracocarpus bissectus* a. habit; b. fruiting branch; c. branch with young flowering spadix (l) and fruiting spadix (r); d. flowering spadix, showing bracts and staminodes; e. male flower; f. female flower; g. fruiting spadix; h. fruit.

84. **Thoracocarpus bissectus** (Vell.) Harling **CYCLANTHACEAE** **Scraping nibi**

Synonym: *Carludovica sarmentosa* Sagot ex Drude

Vernacular names: Scraping nibi, Bastard nibi (Cr), Mamuri (Ar), Akawari[1], Shai Shai[2] (C), Ini[1] (Wr).

Botanical description: Hemi-epiphyte; stem woody, branched, with evenly spaced, circular scars; aerial roots either short and climbing, or long and rope-like, reddish brown, grooved, freely pendent from the branches and upper parts of the stem. Leaves alternate, spirally arranged at branch ends, entire when young, bifid when older; stipules absent; petiole ca. 15 cm long, sheathing around stem; blades split halfway, ca. 35 cm long, apex acute, base acute. Inflorescence terminal, spadix thick, pendent, cylindric, ca. 4 x 2 x 2 cm in flower; spathes ca. 9, scattered along peduncle, white to straw-coloured, ca. 2.5 x 1.5 cm, entirely clasping, caducous; peduncle ca. 8 cm long, with conspicuous spathe scars. Flowers unisexual, actinomorphic, plants monoecious. Male flowers surrounding the female flowers, funnel-shaped, ca. 6 mm long; tepals 10-15, ca. 4 mm long; stamens numerous. Female flowers: tepals 4, triangular to rhomboid, to 1 cm wide; staminodes yellowish white, threadlike, ca. 5 cm long, caducous; ovary inferior, 1-locular, style lacking, stigmas 4, sessile. Fruiting spadix to 10 x 3.5 cm, shiny, olive-green to brown, rough from persistent tepals; seeds numerous, ca. 2 x 1 mm.

Distribution and ecology: Northern and central South America, in lowland forests, common along rivers and in swamps (Harling, 1958). In northwest Guyana, common but patchily distributed in mixed forest, less frequent in swamp forests. Flowering and fruiting probably throughout the year. Flowers are pollinated by beetles; seeds are dispersed autochorously or zoochorously by birds, bats, or monkeys (Maas and Westra, 1993).

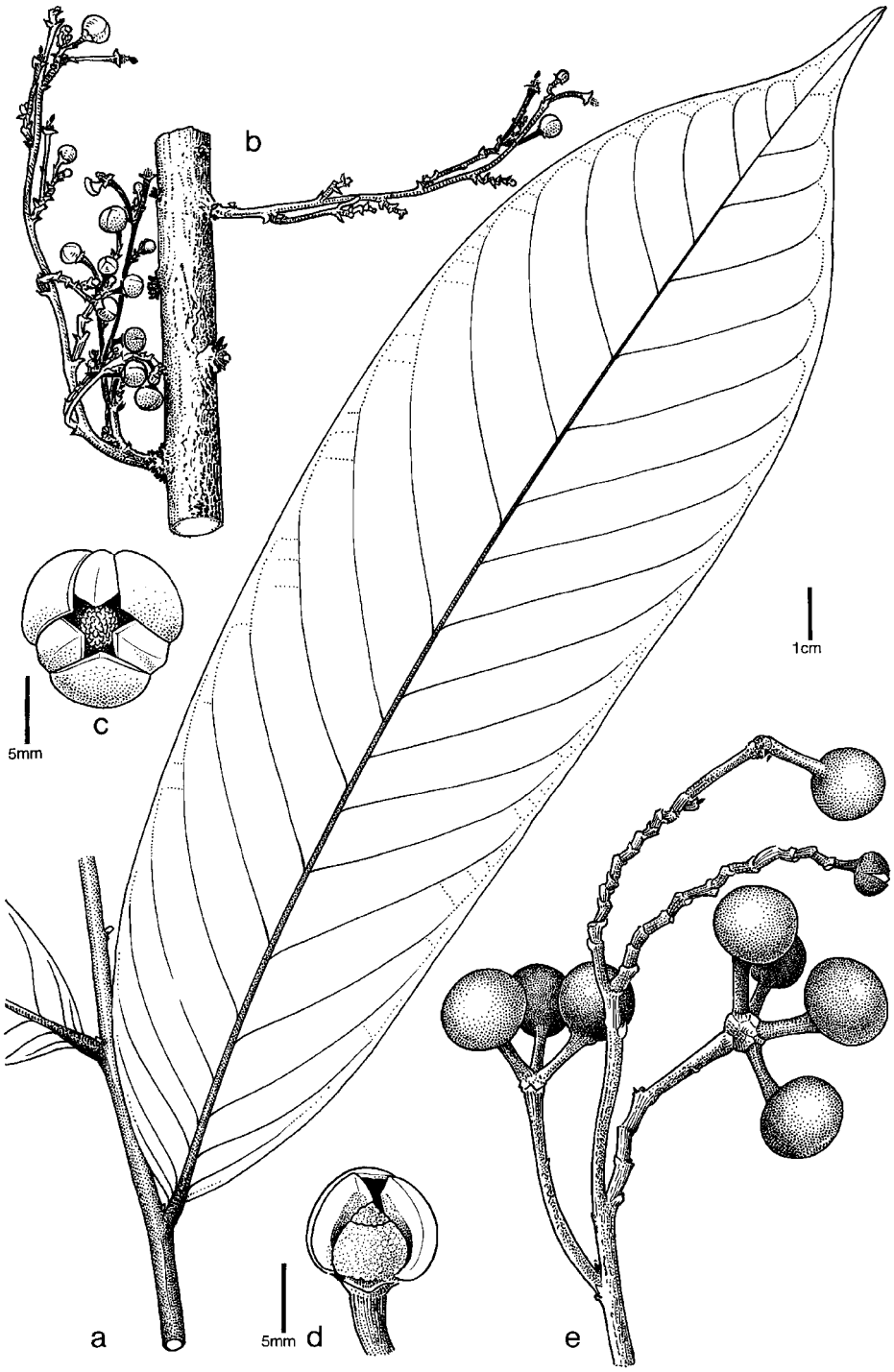
Use: The aerial roots of this epiphyte provide a major source of binding and plaiting material. Roots of scraping nibi are stronger than those of peeling nibi (*Heteropsis flexuosa*), but are less easy to work with. First the reddish cortex has to be scraped off with a knife, a labour that often causes irritation of the skin. Only after this 'dust' is removed, the roots can be split into long strips. These are used to tie house frames, walls, floors, and roofs together. The strips are woven into baskets, quakes, and warishis[3]. The hard cores of the roots are tied in a bundle to serve as broom. Peeling nibi is easier to split and somewhat finer, lighter coloured and more pliable, and thus preferred for the commercial furniture industry.

Harvesting aerial roots does not kill the epiphyte itself. Only straight roots are harvested; the majority of the roots are left behind, because they are twisted or wrapped around the trunk. It is not known at what speed aerial roots grow back after harvesting. Since the epiphytes are mostly settled high in the canopy, local people are not always familiar with their features. The maam nibi (*Evodianthus funifer*) is often confused with *T. bissectus*, since its leaves, seedlings, and inflorescences are rather similar. However, the aerial roots of maam nibi are quite weak and never become woody.

When a valuable fruit tree is shedding its unripe fruits, people believe that tying a strip of nibi around the trunk will cease the dropping until the fruits are fully ripe. A band of nibi tied around the waist or wrist is thought to offer protection against malicious water spirits.

Economy: Scraping nibi does not have the commercial importance of peeling nibi, but warishis and quakes made out of this species are sold in interior communities and at local and regional markets. Scraping nibi might one day become an appropriate alternative for peeling nibi, if the latter becomes scarce due to overharvesting or the logging of host trees.

Notes: (1) These names are general names for nibi and also include *Heteropsis flexuosa*; (2) This name refers to the rasping noise made when scraping off the root cortex; (3) See front page.



85. *Unonopsis glaucopetala* a. leafy branch; b. inflorescences; c. flower, top view; d. flower, partly opened to show stamens and carpels; e. infructescence.

85. **Unonopsis glaucopetala** R.E. Fr. **ANNONACEAE** **Black yariyari**

Vernacular names: Black yariyari (Cr), Arara (Ar), Tapïseipyo (C), Dau horo ana[1] (Wr).

Botanical description: Tree, to 25 m tall; trunk to 25 cm in diam. Outer bark dark brown to black, vertically fissured, inner bark dark yellow to orange, sweet-scented, wood yellow. Young branches covered with rusty brown hairs. Leaves alternate, simple, in two distichous rows along the branches; stipules absent; petiole thickened, ca. 5 mm long, puberulous; blades stiff, papery, elliptic, ca. 25 x 8 cm, apex acuminate, base obtuse to acute. Inflorescence axillary or produced from the main trunk, to 15 cm long, strongly branched, many-flowered; pedicels ca. 12 mm long. Flowers actinomorphic, greenish yellow; sepals 3, triangular, ca. 1.5 mm long, connate for two third; outer petals 3, concave, broadly ovate, ca. 5 mm long, thin, inner petals 3, slightly smaller, thick; stamens numerous, ca. 1 mm long, spirally disposed on a receptacle. Fruit consisting of 3-15 free monocarps, receptacle ellipsoid, monocarps green, becoming black at maturity, globose, ca. 12 mm in diam.; seed 1 per monocarp, dark reddish brown, broadly ellipsoid, ca. 11 cm in diam.

Distribution and ecology: Southern Venezuela (Bolívar) and the Guianas, common in rainforests, especially along creeks. In northwest Guyana, common in mixed and secondary forest. Flowers and fruits were observed from August to October. Flowers are pollinated by small insects. Seeds are dispersed by monkeys and cotingoid birds (van Roosmalen, 1985).

Use: Throughout northwest Guyana, the bark of the black yariyari is considered as the most effective herbal cure for snakebites, in particular the bite of the labaria snake (*Bothrops asper*). When a person is bitten by this deadly snake, the skin is sliced open on the place of the bite, some inner bark of black yariyari is scraped and applied to the bite and tied with a piece of cloth to the skin. Meanwhile, the patient puts some of the scraped bark in his mouth and sucks out the sap. In another recipe, the inner bark is squeezed and the sap is mixed with the patients urine and drunk. Fibres from the squeezed bark ('couscous') may also be mixed with some water or urine and put as a poultice on the bite. The labaria or fer-de-lance is fairly abundant in Guyana and much feared by the local population. Its bite can be fatal within hours, and deaths or severe injuries caused by labarias are rather common. Direct action is required in case of an attack. If no black yariyari can be found in close proximity, the patient is treated with the bark of black aromatta (*Clathrotropis brachypetala*) or white yariyari (*Duguetia* spp.). The leaves of the spotted hanaquablar (*Philodendron scandens*), broad leaf kunami (*Clibadium surinamense*), or warakaba bush (*Piper* spp.) are also used as treatment, but black yariyari is generally considered as the most successful remedy.

Another notorious treatment for labaria bites is to kill the snake immediately after the attack, crush its eyes and brains and rub these on the bite. Supposedly, the snake's own antidote works for the patient as well. Synthetic serum for labaria bites is not available outside the major hospitals in Guyana, since refrigerators are required to keep such medicines in good condition. Few people possess a snakebite kit with a suction pump. Shops in the interior often sell bottles of a Brazilian antidote named 'específico'. This drug can be stored outside the fridge, but it has a questionable reputation. Thus, for the majority of the labaria attacks, which often occur when one is walking barefoot in the forest, people have to rely on herbal medicine. Black yariyari wood is hard, but rather elastic and very durable. It is commonly used for house frames (runners and beams), preferred above small leaf bloodwood (*Vismia cayennensis*), but it is much less abundant. In Moruca, it is sawn into boards. In Barama, it is used to carve the 'urape', a traditional Carib spoon with a decorative handle, used for stirring cassava beer. Paddles are occasionally made from black yariyari. The stems are not suitable for making fishing rods. The outer bark does not strip off easily, but is occasionally used for lashing material to substitute maho bark (*Sterculia pruriens*, *Anaxagorea dolichocarpa*, or *Rollinia exsucca*) or kakaralli bark (*Eschweilera* spp.).

Economy: The species is used for subsistence purposes only.

Notes: (1) The Warao name means 'black skin tree'.