

medicine using the terms “fava de puchury” or “pichury” comes to the same insight. Further, Nees von Esenbeck (1836) pointed out that the dried fruits provide ethereal oils with pleasant sweet scent, resembling cloves [*Syzygium aromaticum* (L.) Merr. & L.M. Perry]; Peckolt (1868) reported that the aromatic fruits are an excellent carminative and, externally, in cataplasms, they have good effect against the “debility of stomach” and colics of children; Caminhoá (1877) also indicated that the species produces essential oils, the fruits are carminative, stimulative, and can be used as a substitute for nutmeg; according to Dragendorff (1898; after Peckolt), Peckolt & Peckolt (1899) and Pio Corrêa (1926), the bark is bitter and aromatic, considered to be stomachical and used against colics and diarrhoea etc. Record & Hess (1942) indicated that its “timber is useful for general construction, but that the species’ chief interest is with the fruits which resemble nutmegs in appearance and pungent flavour”. The species is honey-producing (Pio Corrêa, 1926).

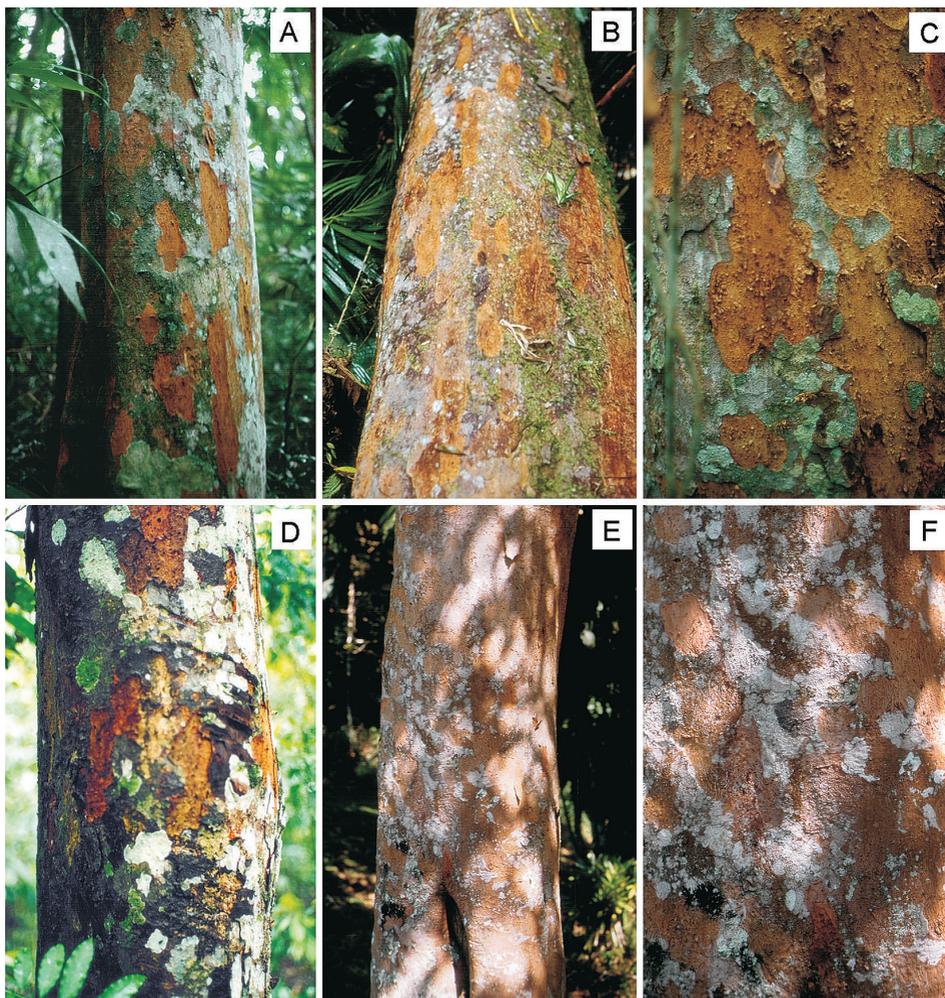
Traditional people from the region of Marliéria and Timóteo, Minas Gerais, Parque Estadual do Rio Doce, still use the fruits as spice (pers. obs.). Rossato (1996) reported that *caíçarás* at Picinguaba, São Paulo, use the tea from its seeds against stomachache, and its crushed leaves mixed with water against aches and colics; its wood has been used to manufacture canoes. This species is rich in alkaloids, styrylpyrones (Cavalheiro, 1995; Cavalheiro & Yoshida, 2000), and flavonoids (Pascoli *et al.*, 1997).

Fruits are widely consumed by primate populations [brown howler monkeys (*Alouatta fusca* (Geoffroy Saint-Hilaire, 1812)), brown capuchins (*Cebus apella* (Linnaeus, 1758)), and woolly spider monkeys or “muriquis” (*Brachyteles arachnoides* (Geoffroy Saint-Hilaire, 1806)), and cracid birds [*Pipile jacutinga* (Spix, 1825) and *Penelope obscura* (Temminck, 1815)] (Kuhlmann, 1975; Moraes, 1992a, b, 1993; Galetti *et al.* 1997; Moraes *et al.*, 2002; pers. obs.). Pizo & Oliveira (2000) also reported the chemical composition of the pulpy diaspores of *C. mandioccana* collected at Parque Estadual Intervales, Saibadela Research Station, Sete Barras, SP and indicated that 8 species of ants were attracted by the diaspores, which were part of their diet. Vieira *et al.* (2003) reported the consumption of fruits of *C. mandioccana* by small rodents of the Parque Estadual Intervales, SP. They found that the fleshy part of the fruit (accrescent tube) was eaten by *Akodon serrensis* (Thomas, 1902), *Nectomys squamipes* (Brants, 1827), *Oligoryzomys nigripes* (Olfers, 1818), and *Oryzomys russatus* (Wagner, 1848), whereas both the fleshy part and the seed were eaten by *Delomys dorsalis* (Hensel, 1872), *Oecomys* aff. *concolor* (Wagner, 1845), and *Trinomys iheringi* (Thomas, 1911). The authors also indicated that *O. russatus* is likely to be a secondary disperser of the seeds (see also Briani *et al.*, 2001).

**Comments** - *Cryptocarya mandioccana* is a well-collected species with a relatively wide distribution. It can be recognised by its leaves that are manifestly pubescent on the lower surface, with conspicuous papillae, midrib impressed to level above, prominent below, inflorescences and flowers densely pubescent, and by its mostly ellipsoid fruits, medium-sized, clearly ribbed, with the fleshy portion usually thin. Its closest relatives seem to be *C. moschata* and *C. riedeliana* as it shares similar floral characters with them; *C. riedeliana* also has, to some extent, similar fruits.

Although *Cryptocarya mandioccana* can be easily distinguished from other congeneric species by its pubescent indument on the lower leaf surface, some collections of *C. citriformis* have been confused with it due to their general vegetative likeness and because both species may share similar foliar indument on the lower surface. Hair orientation, whether ascending to erect or appressed to the leaf surface, appears to be stable within the species, but both extremes are found in the circumscription adopted here. Usually only one type of hair is produced on a surface. Collections of *C. mandioccana* bearing short, straight, appressed hairs on the abaxial side of leaves (which is the pattern found in the type specimen) are mainly found in populations of Bahia, Minas Gerais, Rio de Janeiro, and from Anhembi, Cunha, São Luiz do Paraitinga, and Ubatuba in state of São Paulo. The population of Serra da Cantareira, SP, shows individuals either with the former pattern of foliar indument, or with long, curled, ascending hairs on the abaxial side of leaves. The latter pattern is mainly found in populations from Paraná, Santa Catarina, and from Cubatão, Pariqüera-Açu, São Paulo, São Roque, and São Sebastião in state of São Paulo. Collections from Itajaí, SC, also show both patterns of foliar indument.

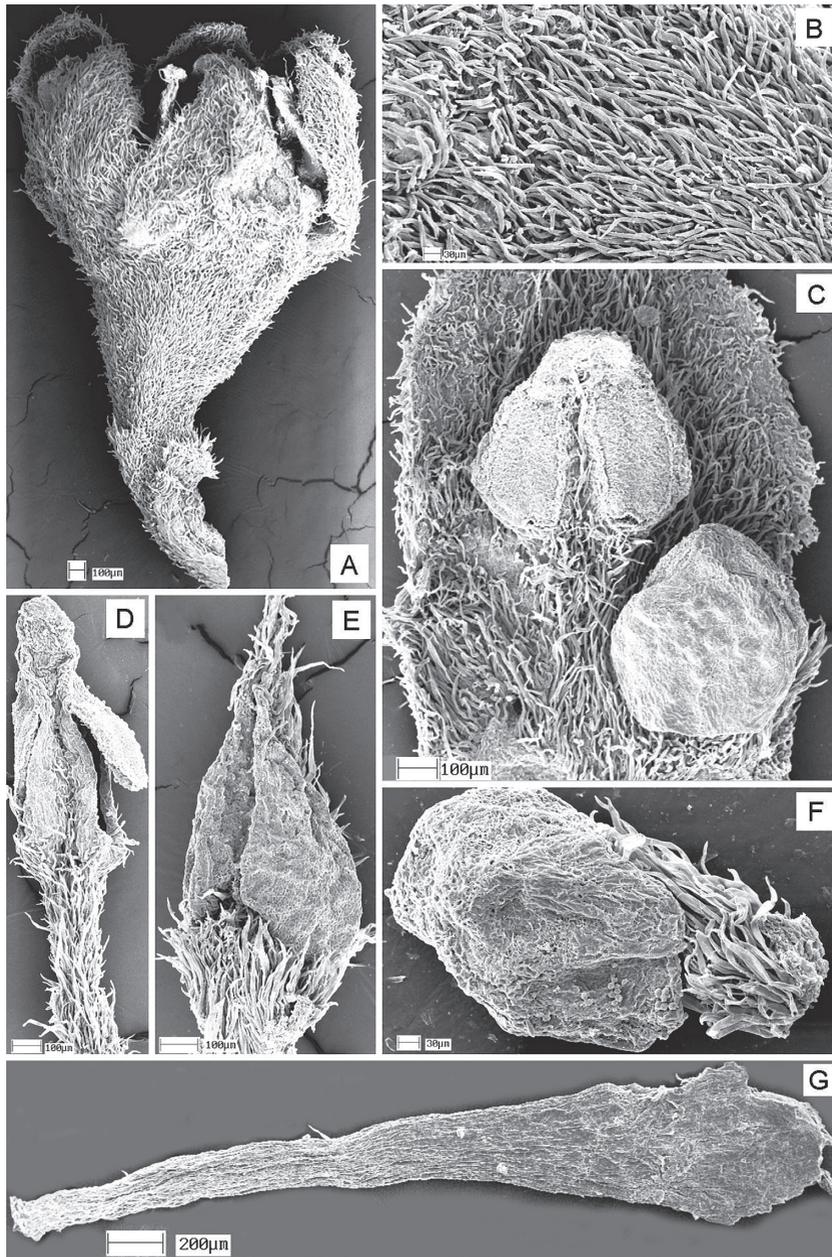
**Specimens examined** - 279 (listed in appendix 13.3).



**Fig. 35.** Barks of *Cryptocarya mandioccana* Meissner. A-C. P.E. Carlos Botelho, São Miguel Arcanjo, SP; D. P.E. Rio Doce, MG; E-F. Serra da Estrela, Petrópolis, RJ. (Photographs by author).



**Fig. 36.** *Cryptocarya mandioccana* Meissner. A-B. Branches collected at P.E. Cantareira, São Paulo; C-D. Branches collected at P.E. Intervales, Núcleo Saibadela, SP; E-F. Detail of leaves. (Photographs by author).



**Fig. 37.** SEM micrographs of flowers of *Cryptocarya mandioccana* Meissner. A. Flower bud; B. External indumenta; C. Adaxial side of stamen of the androecial whorl I, introrse, and gland; D. Abaxial side of stamen of the androecial whorl III, lateral-extrorse; E. Abaxial side of staminode; F. Detail of gland; G. Gynoeceum (from Riedel s.n., L-0036185). (Photomicrographs by author).



**Fig. 38.** *Cryptocarya mandioccana* Meissner: A-B. Mature fruits, Serra da Estrela, Petrópolis, RJ, June 2001; C. Mature fruits, E.E. Juréia-Itatins, SP, May 2001; D. Immature fruits, P.E. Intervales, Nucleus Saibadela, SP, April 2001. (Photographs by author).

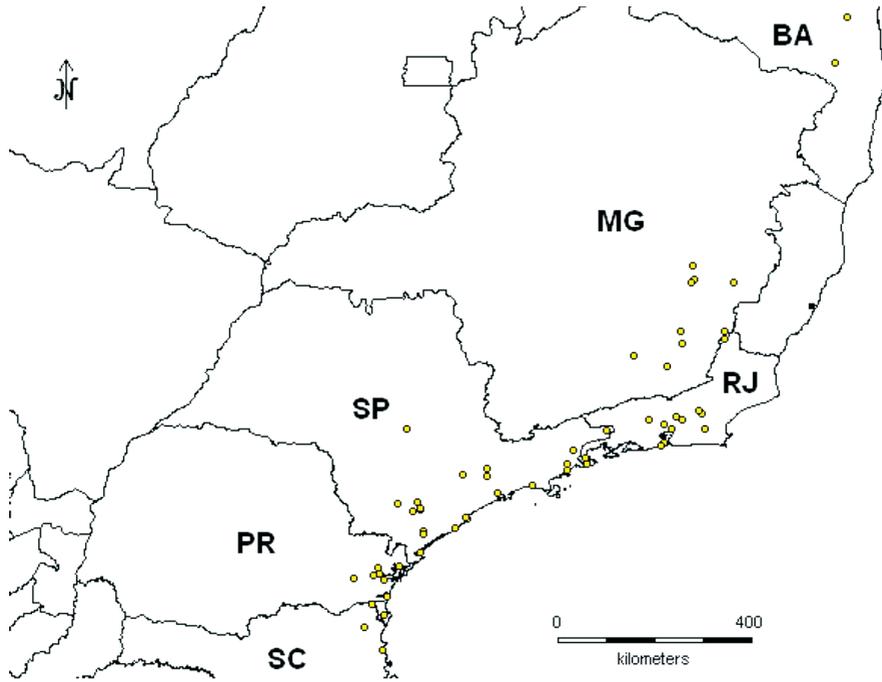


Fig. 39. Distribution of *Cryptocarya mandioccana* Meissner.

## 6. *Cryptocarya micrantha* Meissner

in *Prodr.* (DC.) 15 (1): 75 (1864). – Holotype: Brazil. Rio de Janeiro, “In sylv. umbr. Mand.”, Oct. 1823 (fl., fr.), *L. Riedel s.n.* [LE, photo in UEC!; isotypes: B<sup>†</sup> (F Neg. No. 3845!), GOET! (2 sheets, photos in UEC!), K! (cibachrome in UEC!), L-0033190! (photo in UEC!), L-0036191! (photo in UEC!), LE (photo in UEC!), NY-00355046! (photo in UEC!)]. Plate VII A (cf. Appendix 13.5).

= *Cryptocarya granulata* Vattimo-Gil, *Rodriguésia* 25(37): 222 et 237, f. 71 et 72 (1966b). – Holotype: Brazil. Minas Gerais, Vargem Alegre, Fazenda das Pedras, 25 Jul. 1928 (fr.), *J.G. Kuhlmann* 39 [RB!, photo in UEC!; sheet with label of “Serviço Florestal do Brasil no. 351”, plus label of “Herbário do Jardim Botânico do Rio de Janeiro no. 91292”; isotypes: BO n.v., RB! (3 sheets, photos in UEC!)]. Plate VII B (cf. Appendix 13.5).

= *Cryptocarya schwackeana* Mez, *Arbeiten Königl. Bot. Gart. Breslau* 1: 107 (1892). – Lectotype (designated by Moraes, 2005a): Brazil. Minas Gerais, Rio Novo, s.d. (fl.), *F.P.L. Araújo s.n. in Herb. Schwacke* 6680 [RB-48690!, photo in UEC! (Holotype: B<sup>†</sup>)]. Plate VIII B (cf. Appendix 13.5).

**Illustrations** - Mez (1889, t. III – Fig. 12, fruit), Vattimo-Gil (1957, Fig. 6, habit and fruits), Vattimo-Gil (1966b, Fig. 47-51, flower pieces; 59, fruit), Quinet (2001, Fig. 4 C, habit and flower pieces; 5 C, photograph of fruiting branch) and Quinet & Andreatta (2002, Fig. 3 C, habit and flower pieces), Assis *et al.* (2005, Fig. 3 B, fruit).

**Vernacular names** - Canela-batalha, goiaba-de-mico.

**Description** - *Trees* or small trees, 3-20 m tall, trunk cylindrical, DBH 6.37-35.01 cm ( $\bar{X}$  = 18.24 ± 10.12 cm;  $N$  = 13), bark cinnamon to red-brown, flaky, with lenticels (Fig. 40 A-B). *Branches* terete, slender, brown to gray or reddish, slightly warty, with lenticels. *Branchlets* 5 cm below terminal bud c. 1-1.6 mm in diam., slender, smooth, glabrous, dark to light-brown (dried), initially angular from the beginning; terminal buds ovoid, densely yellowish to rusty-strigose, with short, ± appressed hairs. *Petioles* thin, 5.0-10.0 mm long, 0.8-2.0 mm thick, seldom deeply to slightly canaliculate or flattish above, somewhat roundish below, glabrous, smooth to striate, dark (dried). *Leaves* alternate, elliptical to elliptic-lanceolate, 4.1-12.0 cm long, 1.1-4.5 cm broad, chartaceous to rather stiffly chartaceous (rarely coriaceous) (Fig. 41 A-D), glabrous above, glabrous to glabrescent with very sparse hairs mainly along midrib below, tip acute to obtusely or broadly acuminate, or caudate and rarely retuse, base acute to obtuse, margin flat and hardly recurved, sclerified; above green, somewhat shining in dried material, prominulously and rather reticulate, granulate in some collections; beneath paler, dull, glaucescent in some collections, papillae conspicuous to inconspicuous; midrib prominulous above, prominent below, secondary veins rather patent (7-12 per side), arcuate towards margin, prominulous on both surfaces; tertiary venation prominulous and densely reticulate below; venation pattern camptodromous-brochidodromous. *Inflorescences* axillary and subterminal, thyrsoid-paniculate, few to many-flowered, 0.5-2.4 mm in diam. at the base, 1.2-10.0 cm long, lax, broadly pyramidal, yellowish to rusty-tomentellous; peduncles short, smooth; bracts and bracteoles minute, ovate, acute, densely yellowish tomentellous, sub-persistent. *Flower buds* green to greenish or cream-greenish. *Flowers* greenish-yellow, whitish to greenish-white, densely yellowish-tomentellous (Fig. 42 A), with ± long, ± ascending hairs (Fig. 42 B), 2.6-3.2(-4.3) mm long,

1.2-2.0(-2.2) mm in diam. at apex; tube cylindrical sub-urceolate, glabrous within, 0.89-1.5(-1.6) mm long, 0.8-1.2 mm in diam.; pedicels nil or up to 1.3 mm long; tepals equal, 0.9-2.5 mm long, (0.6-)1.1-1.3 mm broad, concave, erect and slightly incurved at apex, ovate, roundish to acutish, pilose within; stamens included (Fig. 42 C); stamens of whorls I and II introrse, 0.5-1.0 mm long, anthers glabrous, broadly triangular-ovate (Fig. 42 D), c. (0.22-)0.28-0.66 mm long ( $\bar{X} = 0.52 \pm 0.14$  mm;  $N = 11$ ), c. (0.17-)0.33-0.45 mm broad ( $\bar{X} = 0.41 \pm 0.03$  mm;  $N = 12$ ), connectives prolonged beyond the large sporangia, tip obtuse or acutish, filaments rather slender, pilose, as long as or shorter than anthers, adnate to tepals; stamens of whorl III extrorse (Fig. 42 E), c. 0.6-1.4 mm long, anthers glabrous, c. 0.3-0.9 mm long ( $\bar{X} = 0.54 \pm 0.18$  mm;  $N = 13$ ), 0.24-0.37 mm broad ( $\bar{X} = 0.29 \pm 0.04$  mm;  $N = 9$ ), connectives thick, prolonged beyond the large sporangia, tip truncate, filaments rather stout, as long or slightly shorter than anthers, pilose; glands subglobose, 0.37-0.5 mm long, 0.3-0.5 mm broad, often with hollows, adnate to the filaments, short pedicelled to sub-sessile, pedicel pilose; staminodes relatively small (Fig. 42 F), triangular-ovate, three-edged, acute, c. 0.3-0.8 mm long, 0.25-0.3 mm broad, tip and abaxial side long pilose, nearly sessile; gynoecium ellipsoid (Fig. 42 G), 1.0-2.2 mm long, glabrous, ovary ovoid, 0.6-0.8 mm long, c. 0.3-0.5 mm broad, style 0.6-1.4 mm long, cylindrical-conical, stigma small, truncate, obtuse. *Immature fruits* green (Fig. 41 E). *Mature fruits* green-yellowish, green or orange, pear-shaped with a neck at base (Fig. 9 E), or ellipsoid to globose (Fig. 9 G; Plate VII A-B (cf. Appendix 13.5), many-ribbed, 1.45-4.1 cm long ( $N = 150$ ;  $\bar{X} = 3.08 \pm 0.43$  cm), 0.95-3.0 cm broad ( $N = 150$ ;  $\bar{X} = 2.12 \pm 0.34$  cm); flesh portion originated from the accrescent flower tube usually thin.

**Phenology** - Flowering material in January, May, June, August to November. Immature fruits in April to September, November and December; mature fruits in June, July, October, and November.

**Distribution and habitat (Fig. 43)** - Species restricted to the states of Espírito Santo, Minas Gerais, Rio de Janeiro and São Paulo. Mostly in the Ombrophilous Dense Forest, but also collected in Semi-deciduous forests of Minas Gerais, from 10-900 m altitude. Judging from my own collections at Serra da Juréia and Serra da Estrela and from the scarce material deposited in herbaria (52 collections), the species likely occurs only at low frequency and low density in the known populations.

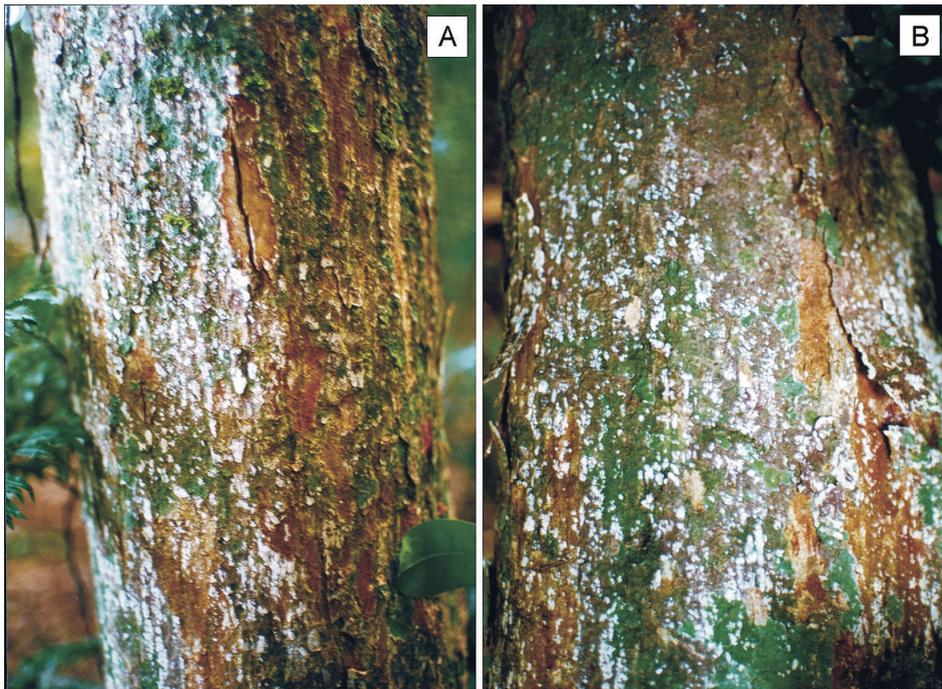
**Comments** - *Cryptocarya micrantha* can be recognised by its branchlets glabrous, leaves elliptical, chartaceous, glabrous above, glabrous to glabrescent below, midrib prominulous above, prominent below, secondary veins prominulous on both surfaces, tertiary venation prominulous and densely reticulate below, petioles almost always slightly canaliculate or flattish above, inflorescences and flowers densely tomentellous, and fruits relatively large, pear-shaped with a neck at base or ellipsoid to globose, many-ribbed. As pointed out previously, the species seems to be related to *C. botelhensis*, and also with *C. moschata*, which can be easily mistaken for this species due to overall vegetative likeness of some collections.

As pointed out by Kostermans (1937), the ring around the style, described by Mez (1892) in *C. schwackeana*, does not occur in all specimens and it seems

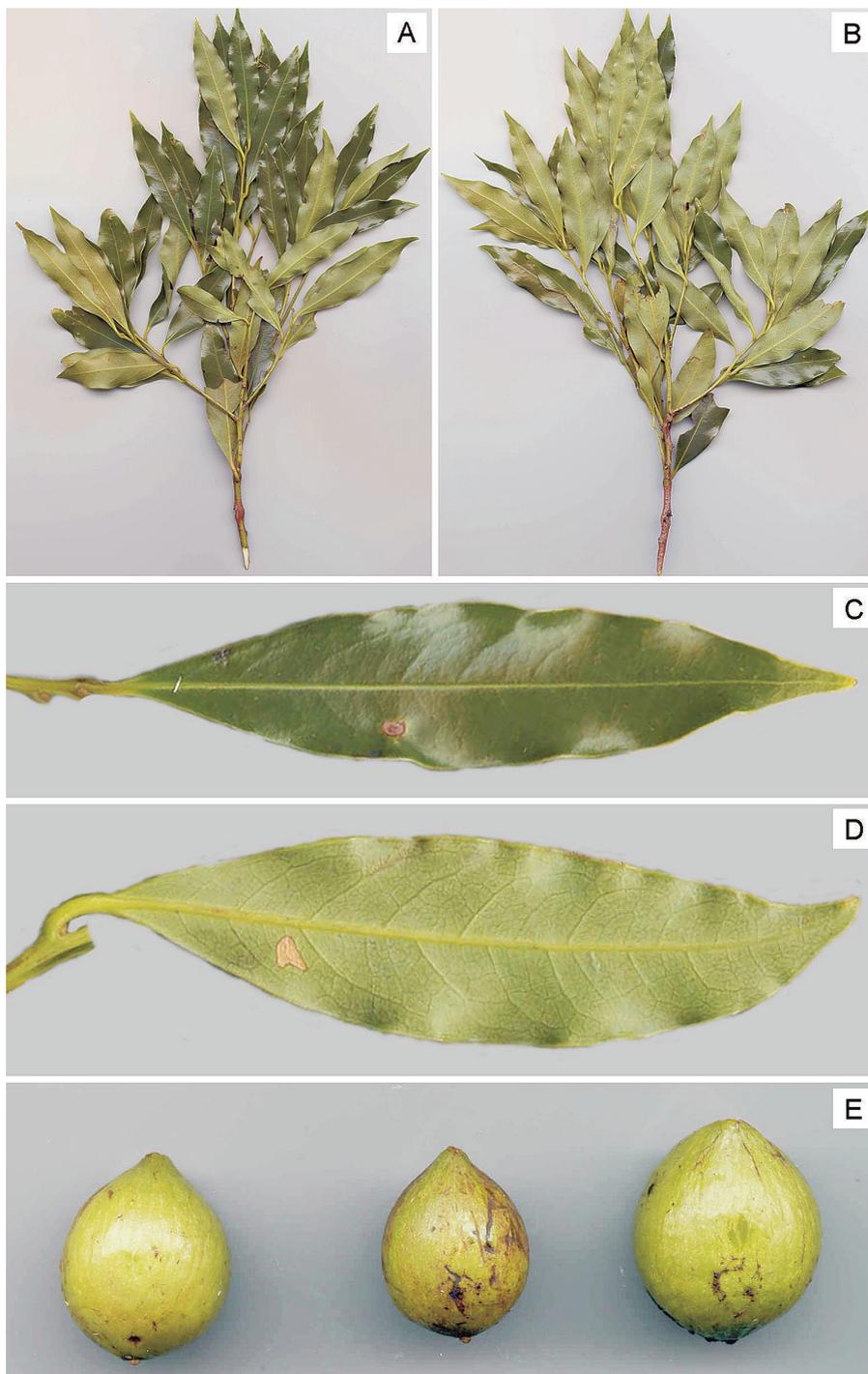
to be the result of compression of the style in the narrow throat of the flower tube. Specimens from Serra da Juréia, SP bear fruits differing from the predominant pear-shaped pattern presented by collections of *C. micrantha* from Rio de Janeiro and Minas Gerais. However, their vegetative and flower characters are alike, except for the tip of leaves being caudate from several samples of the former.

Fresh leaves of *C. micrantha* showed to possess a high concentration of mucilage, which was observed during extractions of total DNA and isozymes for subsequent analyses.

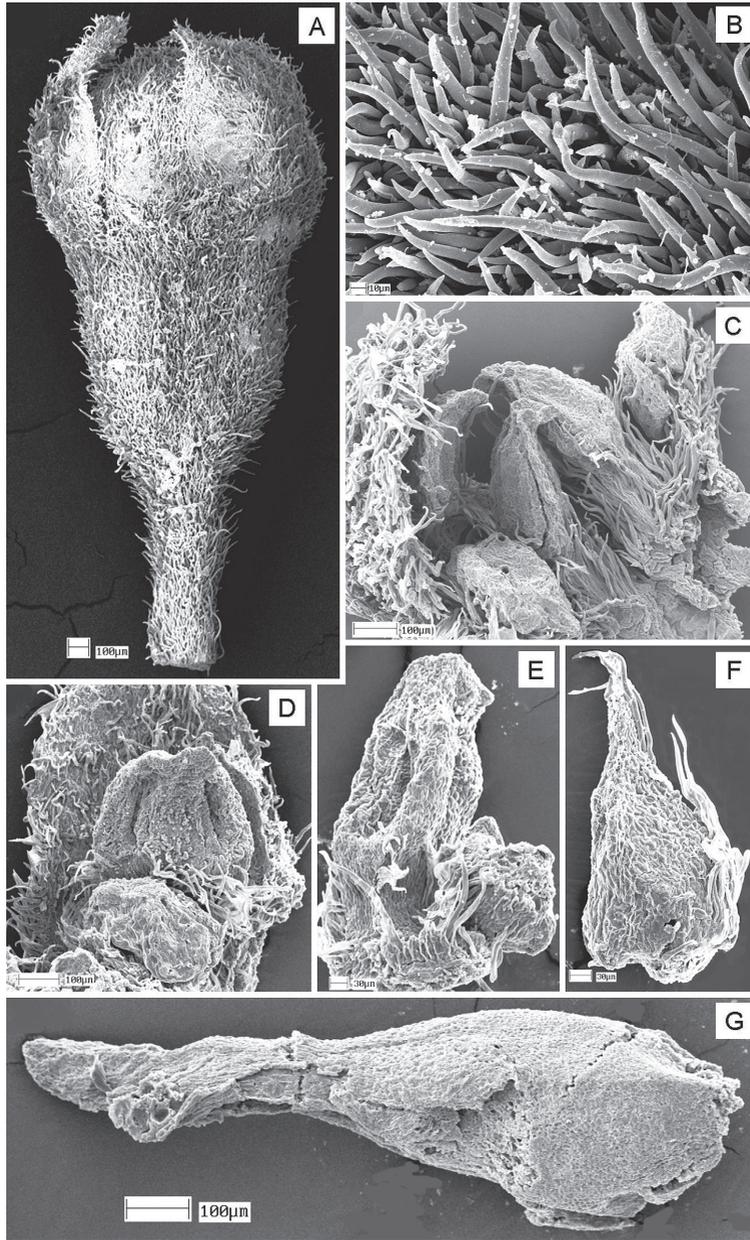
**Specimens examined** - 52 (listed in appendix 13.3).



**Fig. 40.** Appearance of barks of *Cryptocarya micrantha* Meissner at Serra da Estrela, Petrópolis, RJ. (Photographs by author).



**Fig. 41.** *Cryptocarya micrantha* Meissner. A-B. Branches collected at Serra da Estrela, Petrópolis; C-D. Detail of leaves; E. Immature fruits, June 2001. (Photographs by author).



**Fig. 42.** EM micrographs of flowers of *Cryptocarya micrantha* Meissner. A. Flower bud (from *Riedel s.n.*, L-0036191); B. External indument (from *Riedel s.n.*, L-0036191); C. Longitudinal section of fully developed flower (from *Heringer 913*, ESA); D. Adaxial side of stamen of the androecial whorl I, introrse, and gland (from *Riedel s.n.*, L-0036191); E. Abaxial side of stamen of the androecial whorl III, lateral-extrorse, and gland (from *Riedel s.n.*, L-0036191); F. Abaxial side of staminode (from *Riedel s.n.*, L-0036191); G. Gynoecium (from *Riedel s.n.*, L-0036191). (Photomicrographs by author).

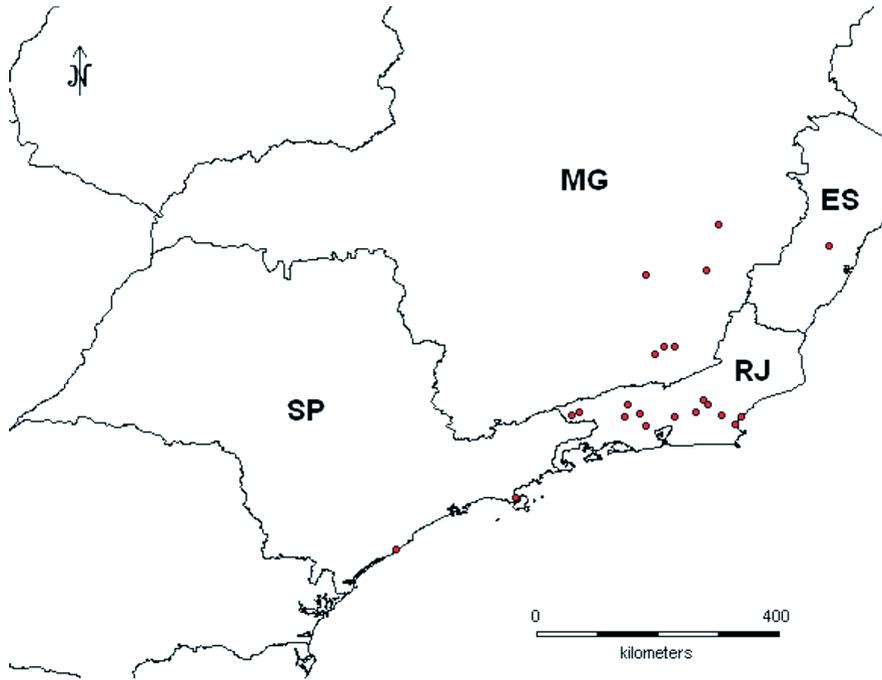


Fig. 43. Distribution of *Cryptocarya micrantha* Meissner.

## 7. *Cryptocarya moschata* Nees & Martius ex Nees

*Linnaea* 8: 37 (1833). – Lectotype (designated by Moraes, 2005a): Brazil. “Brasilia tropica”, s.d. (fl.), *F. Sellow s.n.* (1375 fide Nees, 1836) [LE, photo in UEC!; isolectotypes: B† (F-619557!, fragments, photo in UEC!), CGE (photo in UEC!), E-109558! (photo in UEC!), HAL-101917 (photo in UEC!), K! (cibachrome in UEC!), K! (cibachrome in UEC!), KIEL! (photo in UEC!), L-0246990! (photo in UEC!), L-0246991! (photo in UEC!), US-00811475 (photo in UEC!)] Fig. 49; Plate IX A (cf. Appendix 13.5).

= *Cryptocarya moschata* forma *angustifolia* Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 9 (1889). – Lectotype (designated by Moraes, 2005a): Brazil. Minas Gerais, 1845 (fl.), *J.F. Widgren 394* (BR-837722!, photo in UEC!; isolectotypes: K! (cibachrome in UEC!), LE (photo in UEC!), NY! (fragments, photo in UEC!), OI, R-30946! (photo in UEC!), S (3 sheets, photocopies in UEC!), U-0017916!, UPS (photo in UEC!). Plate IX B (cf. Appendix 13.5).

= *Nectandra robusta* Löfgren & Everett (1905) ex E. Navarro de Andrade & O. Vecchi, in *Les bois indigènes de São Paulo* 43 (1916). – Lectotype (designated here): drawing of branch with fruits and fruits in longitudinal and transversal sections in Navarro de Andrade & Vecchi (1916). Plate X A (cf. Appendix 13.5).

**Illustrations** - Meissner (1866, plate LVI), Coe-Teixeira (1965, Tab. I, Fig. 1, leaf, flower pieces and fruit), Moraes (2003, pr. 3 F-G, flower and stamen of androecial whorl I).

**Vernacular names** - Bataia, bataira, bataeira, batalha, batalheira, cajaty, canela-bastarda, canela-batalha, canela-batalheira, cabelabranca, canela-cega, canela-de-papagaio, canela-preta, farinha-seca, fruto-de-jacu, louro-precioso, pau-santo, tiriveiro.

**Description** - Trees up to 35 m tall, trunk cylindrical, DBH 8.0-199.90 cm ( $\bar{X}$  = 55.37 ± 28.37 cm;  $N$  = 205), bark (Fig. 44) cinnamon to ochre-coloured or tawny, flaky in adult trees, smooth to rugose in the young, with lenticels. *Branches* cylindrical, thick, light to dark brown or grayish to blackish, smooth or with conspicuous longitudinal lenticels. *Branchlets* (Fig. 45 A-B) 5 cm below terminal bud c. 1.2-3.2 mm in diam., light or dark brownish, initially sub-angular or terete from the beginning, smooth to estriate, glabrous to glabrescent, with yellowish or rusty, mostly short, ± appressed hairs, somewhat shining; terminal buds minute, ovoid, pubescent, densely covered by yellowish, short, ± appressed hairs. *Petioles* thin, (3.7-)6.0-17.7 mm long, 0.7-1.8 mm thick, deeply canaliculate to subcanaliculate to flattish above, roundish below, rugose, glabrous. *Leaves* (Fig. 45 A-D) alternate, narrow-elliptical to lanceolate or obovate, (2.2-)3.5-16.0 cm long, (1.0-)1.5-6.5 cm broad, chartaceous to chartaceous-coriaceous (rarely rigid-coriaceous); young leaves sparsely pubescent on both surfaces, whereas adult leaves mostly glabrous on both surfaces, but some collections glabrescent below, with sparse hairs along midrib; tip mostly acute to acuminate to short-cuspidate or obtuse to rounded, base acute to attenuate or rarely obtuse, margin flat, incurved towards the base in some collections, sclerified; above rather shining, prominulous reticulate, rarely inconspicuous; beneath paler, with papillae conspicuous; midrib impressed to level to prominulous above, prominent below, secondary veins patent to erect-patent (5-11 per side), mostly prominulous or rarely poorly reticulate on both surfaces; tertiary venation loosely to mostly

reticulate; venation pattern camptodromous-brochidodromous. *Inflorescences* axillary, paniculate, many-flowered, 0.6-1.1 mm in diam. at base, 1.7-10.0 cm long, sparse yellowish pubescent to rusty-strigose, often glabrescent towards the base, shorter than leaves; bracts and bracteoles minute, densely tomentelous. *Flowers* (Fig. 46) cream, light-cream, green, greenish, green-yellowish, yellow, yellowish or yellow-greenish, sparsely to densely pubescent, seldom glabrescent, with  $\pm$  short,  $\pm$  appressed hairs, c. 2.7-4.0(-5.0) mm long, 1.4-2.84(-4.0) mm in diam. at apex, tube urceolate, 0.98-2.6 mm long, 0.5-1.77 mm in diam.; pedicels mostly tomentose, glabrescent in few collections, 0.3-0.7(-1.0) mm long; tepals subequal, 1.47-2.44(-2.5) mm long ( $\bar{X} = 1.84 \pm 0.29$  mm;  $N = 17$ ), 0.68-1.73 mm broad ( $\bar{X} = 1.04 \pm 0.32$  mm;  $N = 13$ ), concave, ovate, tip acute to obtuse or rounded, pilose within; stamens included; stamens of whorls I and II introrse, incurved, 1.0-1.67 ( $\bar{X} = 1.32 \pm 0.19$  mm;  $N = 13$ ), anthers sparse pilose or ciliate, ovate to ovate-oblong, 0.51-0.99 mm long ( $\bar{X} = 0.72 \pm 0.13$  mm;  $N = 24$ ), 0.3-0.58 mm broad ( $\bar{X} = 0.46 \pm 0.06$  mm;  $N = 22$ ), connectives prolonged beyond the large sporangia, tip acute or obtuse to truncate, filaments rather slender, densely pilose, usually shorter than anthers, adnate to tepals; stamens of whorl III lateral to extrorse-lateral, erect, 1.0-1.73 mm long ( $\bar{X} = 1.29 \pm 0.19$  mm;  $N = 15$ ), anthers narrow-ovate, ciliate, 0.63-0.86 mm long ( $\bar{X} = 0.73 \pm 0.07$  mm;  $N = 19$ ), 0.26-0.37 mm broad ( $\bar{X} = 0.33 \pm 0.04$  mm;  $N = 7$ ), connectives obtuse to truncate, prolonged beyond the large sporangia, filaments rather stout, equal or shorter than anthers, pilose; glands subglobose, sagittate, 0.4-0.66 mm long ( $\bar{X} = 0.52 \pm 0.07$  mm;  $N = 17$ ), 0.31-0.43 mm broad ( $\bar{X} = 0.37 \pm 0.05$  mm;  $N = 7$ ), pedicel long, pilose, rather distant from the filaments; staminodes relatively small, triangular-ovate, flattened, 0.52-0.9 mm long ( $\bar{X} = 0.68 \pm 0.11$  mm;  $N = 20$ ), 0.33-0.48 mm broad ( $\bar{X} = 0.40 \pm 0.05$  mm;  $N = 10$ ), tip and abaxial side pilose, stalks conspicuous, stout, pilose; gynoecium immersed in the tube, glabrous, 2.0-3.21 mm long ( $\bar{X} = 2.39 \pm 0.31$  mm;  $N = 12$ ), ovary ellipsoid, 0.73-1.26 mm long ( $\bar{X} = 0.90 \pm 0.13$  mm;  $N = 16$ ), 0.3-0.8 mm in diam. ( $\bar{X} = 0.47 \pm 0.13$  mm;  $N = 18$ ), gradually merging into the about 1.2-1.88(-2.0) mm long ( $\bar{X} = 1.50 \pm 0.22$  mm;  $N = 12$ ) style with small, truncate, discoid stigma. *Fruits* yellow, light-yellow, yellowish, yellow-whitish, whitish or reddish. *Mature fresh fruits* (with the accrescent flower tube) from 37 trees of 11 populations are ellipsoid to globose (Moraes & Alves, 2002), 1.78-3.47 cm long ( $\bar{X} = 2.50 \pm 0.28$  cm;  $N = 1487$ ), 1.10-3.20 cm broad ( $\bar{X} = 2.37 \pm 0.22$  cm;  $N = 1487$ ) (Fig. 47). The diaspores from the former fruits are 1.38-3.00 cm long ( $\bar{X} = 2.15 \pm 0.24$  cm;  $N = 1283$ ), 1.00-2.16 cm broad ( $\bar{X} = 1.50 \pm 0.15$  cm;  $N = 1283$ ; Moraes & Alves, 2002). Dried fruits from herbarium specimens 1.26-2.52 cm long ( $\bar{X} = 2.21 \pm 0.21$  cm;  $N = 198$ ), 1.02-1.8 cm broad ( $\bar{X} = 1.33 \pm 0.13$  cm;  $N = 198$ ), slightly ribbed to smooth or with vestigial ridges (Fig. 9 J-K); flesh portion originated from the accrescent flower tube usually thick.

**Phenology** - Flowering material in June to October. Immature fruits in February, March, May, and July to December. Mature fruits in January to May, and August. At Fazenda Barreiro Rico, Assumpção (1983) reported that fruit production is massive and fruits are available at least from December to March.

**Distribution and habitat (Fig. 48)** - Species collected in Alagoas, Bahia, Distrito Federal, Goiás, Mato Grosso, Minas Gerais, Paraná, Pernambuco, and

São Paulo. Mainly in Semi-deciduous forests, but also in riparian forests, from c. 20 to 1660 m altitude. According to Kuhlmann & Kühn (1947), it is found in dry and stony soils, being indicative of poor lands for agriculture.

**Uses** - Assumpção (1983) reported that ripening fruits are eaten by the monkeys *Alouatta guariba*, *Brachyteles arachnoides*, *Callicebus personatus* and *Cebus apella*, at Fazenda Barreiro Rico; Galetti *et al.* (1994) observed that in the Santa Genebra Reserve, *A. guariba* and the bat *Artibeus lituratus*, also consume the fruits; further at Bosque dos Jequitibás, Campinas, fruits are eaten by agoutis (*Dasyprocta agouti*) that have been introduced in the area.

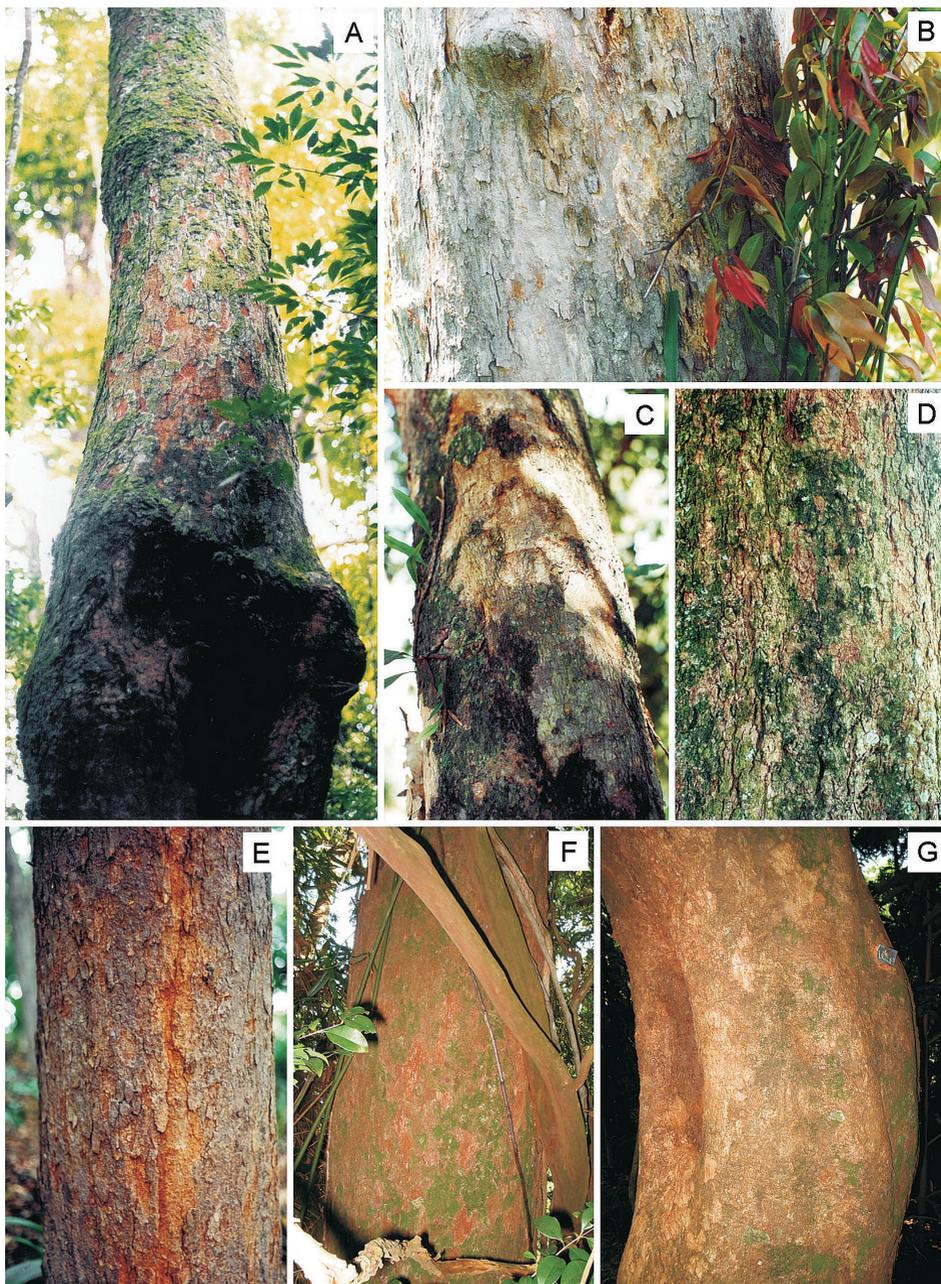
Formariz *et al.* (2002) evaluated the antiproliferative activity of crude extracts from leaves and stems of *Cryptocarya moschata*. The antitumoral activity was evaluated in human tumour cell lines that have phenotypical resistance for multiple drugs viz. melanoma, breast, lung, ovary, prostate, kidney, colon and breast.

The species has also been recommended for mixed plantations in programs of restoration of disturbed areas, degraded environments, gallery forests and recuperation of margins of hydroelectric reservoirs.

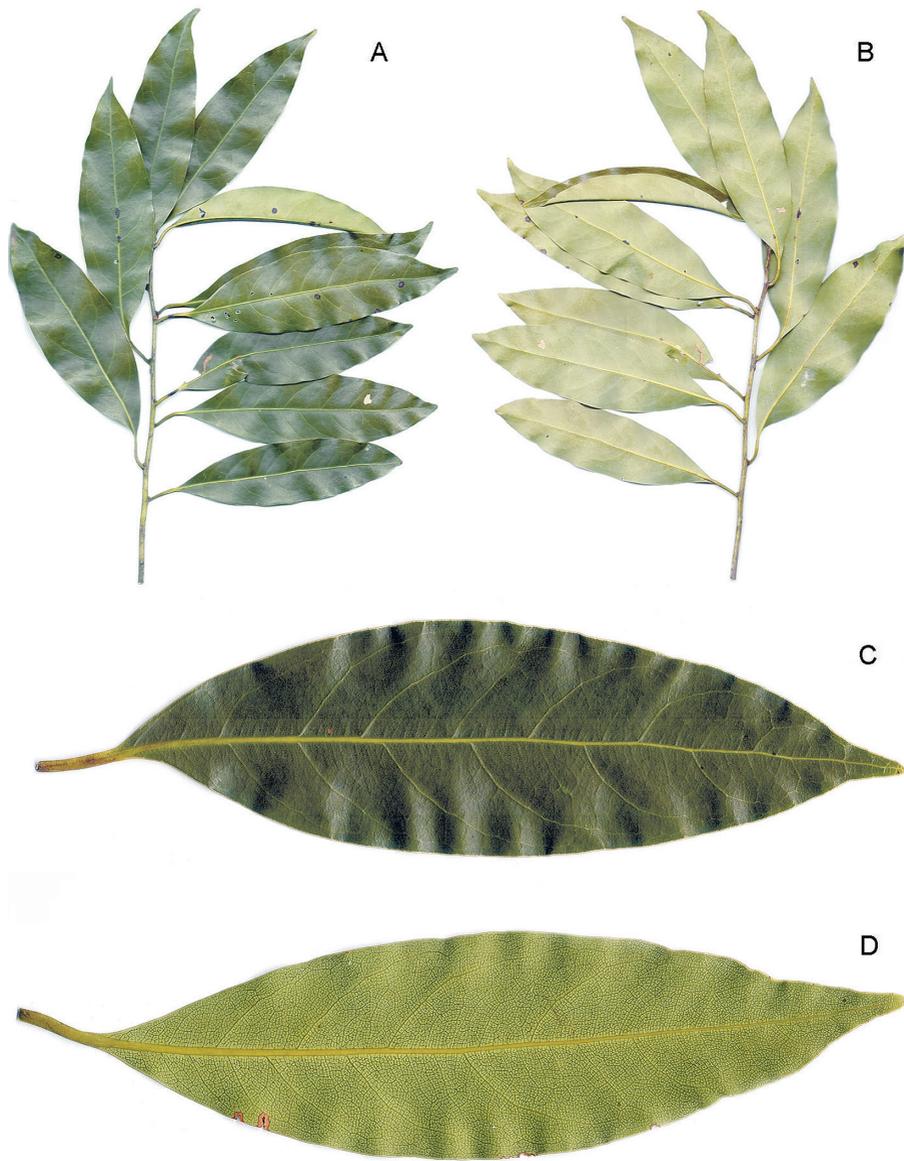
**Comments** - *Cryptocarya moschata* can be recognised by its usually chartaceous to chartaceous-coriaceous leaves, adult leaves mostly glabrous on both surfaces, rather shining above, generally prominulous reticulate, paler and conspicuously papillate beneath, midrib little to prominulous impressed above, prominent below, glands subglobose, sagittate, long-pedicelled, rather distant from the filaments, and mature fruits ellipsoid to globose, with pericarp slightly ribbed to smooth or with vestigial ridges and with the flesh portion developed from the accrescent flower tube usually thick. As mentioned before, it is difficult to separate *C. aschersoniana* from *C. moschata*. The variational range of the latter species includes almost all characteristics of *C. aschersoniana*, but the two can be best distinguished with mature fruit collections and some differences in the field (e.g. outer bark, habit).

Rohwer (1993b), in his revision of neotropical *Nectandra*, included *N. robusta* Löfgren & Everett ex E. Navarro de Andrade & O. Vecchi in the list of doubtful names and excluded the taxon since no type was indicated. Instead, Rohwer (1993b) judged that the drawing represents a *Cryptocarya* sp. Indeed, the common name 'Batalha', its drawing and the general description would support the identification as *C. moschata*. However, the name *Nectandra robusta* can still be found in recent compilations of arboreal species from Brazil, as a valid species (Camargos *et al.*, 1996).

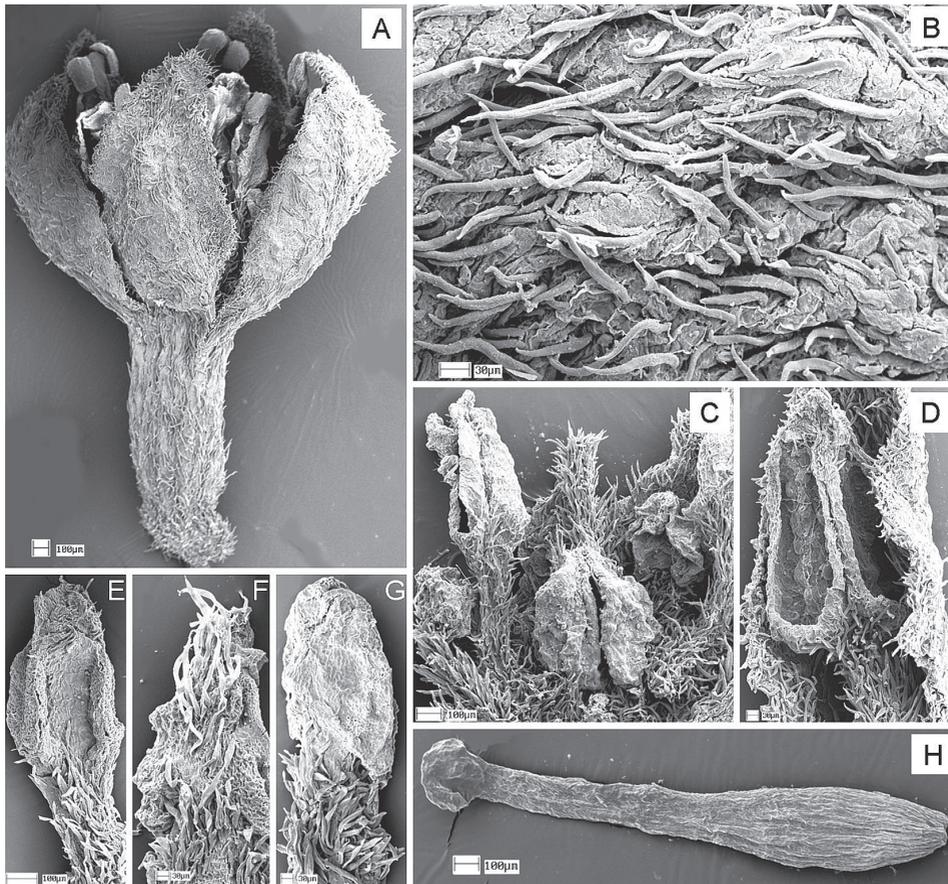
**Specimens examined** - 289 (listed in appendix 13.3).



**Fig. 44.** Barks of *Cryptocarya moschata* Nees & Martius. A. Fazenda Barreiro Rico, Anhembi, SP; B. São Tomás de Aquino, MG, with lateral stems and young red leaves; C. Andradas, MG; D. Fazenda São José, Rio Claro, SP; E. Bosque dos Alemães, Campinas, SP; F. São Pedro, SP; G. Bosque dos Jequitibás, Campinas, SP. (Photographs by author).



**Fig. 45.** *Cryptocarya moschata* Nees & Martius. A-B. Branches collected at São Pedro, SP; C-D. Detail of leaves. (Photographs by author).



**Fig. 46.** SEM micrographs of flowers of *Cryptocarya moschata* Nees & Martius. A. Flower bud (from *Warming 684, C*); B. External indument (from *Sellow s.n., L-0246991*); C. Longitudinal section of flower (from *Sellow s.n., L-0246991*); D. Adaxial side of stamen of the androecial whorl I, introrse (from *Sellow s.n., L-0246991*); E. Abaxial side of stamen of the androecial whorl III (from *Sellow s.n., L-0246991*); F. Adaxial side of staminode (from *Sellow s.n., L-0246991*); G. Detail of gland (from *Sellow s.n., L-0246991*); H. Gynoecium (from *Warming 684, C*). (Photomicrographs by author).



**Fig. 47.** *Cryptocarya moschata* Nees & Martius. A. Ripe fruits still in green colour at São Pedro, SP, in January 2006; B. Fruits collected at Mata do Alemão, Ibaté, SP, January 2001; C. Fruits collected at Mogi Mirim, SP, January 2001; D. Fruits collected at Fazenda Palmital, Santo Antonio de Posse, SP, January 2001. (Photographs by author).