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SERIES OF REVISIONS OF APOCYNACEAE XXI.

NOTES ON TABERNAEMONTANEAE

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SERIES OF REVISIONS OF APOCYNACEAE XXI-XXIII

by A. J. M. Leeuwenberg

PHYTOCHEMISTRY AND USES

by N. G. Bisset

INTRODUCTION

The present publication is a precursor to a monograph on *Tabernaemontana* and, at the same time, a supplement with much new information to a previously published account of the taxonomy and chemistry of the genus (VAN BEEK et al., 1984). The aim of this paper is to help to stabilize the nomenclature to be used in a forthcoming review of the chemical literature on the genus by VAN BEEK, and the notes given here are mainly concerned with the species to be mentioned in that publication.

In the author's view, the *Tabernaemontaneae* comprise the following 10 genera:

1. *Calocrater*,
2. *Callichilia*,
3. *Carvalhoa*,
4. *Crioceras*,
5. *Schizozygia*,
6. *Stemmadenia*,
7. *Tabernaemontana*,
8. *Tabernanthe*,
9. *Voacanga*,
10. *Woytkowskia*.

Comments on *Carvalhoa* and *Tabernanthe* are to be found under *Tabernaemontana inconspicua*, while notes on *Tabernaemontana* are placed under the names of the species concerned, these being arranged in alphabetical order.

NOTES ON GENERA AND SPECIES

Tabernanthe elliptica (Stapf)Leeuwenberg,**comb. nov.**

Basionym: *Daturicarpa elliptica* Stapf, Kew Bull. 1921: 170, fig. 2. 1921; Hürlimann, Ber. Schw. Bot. Ges. 67: 487-505. 1957.

Type: Zaire: Orientale: between Lubutu and Kirundu, Bequaert 6843 (BR, lectotype, here designated).

Heterotypic synonyms: *D. lanceolata* Stapf, l.c. and fig. 1, **syn. nov.** Type: Zaire: Orientale: Kisangani, Tshopo R. bank, Bequaert 7058 (BR, holotype).

D. firmula Stapf, l.c., **syn. nov.** Type: Zaire: Equateur: Moma, Jespersen Oct. 1910 (BR, holotype).

Notes with *Tabernaemontata inconspicua.*

Tabernaemontana africana Hook. in W. Gray & Dochard, Travels in W. Afr. 389, t. B. 1825 and Voy. Afr. Occ. 381, t. B. 1826, as second name for *T. grandiflora* Hook., l.c., non Jacq. (1760); De Candolle, Prod. 8: 367. 1844; Bentham in Hooker, Niger Fl. 447. 1849.

Type: Icon. cit. (no specimen preserved).

PHOT. 1. *Tabernaemontana africana* (phot. Leeuwenberg; Ivory Coast, W of Niapidou, Leeuwenberg 2781 (WAG)).

Heterotypic synonyms: *T. longiflora* Benth. l.c.; H. Huber in Fl. W. Trop. Afr. 66. 1963, **syn. nov.** Type: Senegambia: sin. loc., Heudelot 726 (K, holotype; isotype: P). Homotypic synonym: *Conopharyngia longiflora* (Benth.) Stapf in Fl. Trop. Afr. 4. 1: 142. 1902.

Conopharyngia chippii Stapf, Kew Bull. 1913: 77. 1913. Type: Ghana: Western Prov., Jemma, Chipp 353 (K, holotype; isotype: BM). Homotypic synonym: *T. chippii* (Stapf) Pichon, Not. Syst. ed. Humbert 13: 251. 1948; H. Huber, l.c., **syn. nov.**

Notes. The corolla tube is less twisted than is figured on the type plate of the species. However, in the other characters (leaves, calyx, pistil, position of the corolla inflation around the stamens, corolla limb, and immature fruit) it is easily recognizable as the species known as *T. longiflora* or *T. chippii*. HOOKER (1825) proposed *T. africana* as an alternative name for *T. grandiflora* Hook. in the same paper. The first was adopted by DE CANDOLLE (1844), who observed that the name *T. grandiflora* was already used for another species by LINNAEUS (in fact, JACQUIN, 1760). Since DE CANDOLLE's use of the name *T. africana*, it has not been mentioned in more recent publications. BENTHAM (1849) stated that no specimen was preserved as a basis for this species. No later specimen has been traced and so the plate is designated type here.

T. africana is closely allied to *T. crassa* in almost all characters. The two species can be distinguished as follows:

Sepals 2.5-8 mm long; stamens inserted 8-14(17) mm from the corolla base; tube slender, at inflation around stamens 5-10 mm and above (3)4-6 mm wide; fruit pale green or glaucous; flowers open from 5 p.m. to 10 a.m. . . .**T. crassa**

Sepals 6-18 mm long; stamens inserted 25-45 mm from the corolla base; tube wider, at inflation 7-15 and above 4-12(15) mm; fruit yellow or orange; flowers open at day . . . . . .**T. africana**

T. aurantiaca Gaud., Frey. Voy. Uran. Bot. 50, 55. 1826; Leeuwenberg, Adansonia ser. 2. 16: 390. 1976.

Type: Indonesia: Moluccas, Bawak Island, Gaudichaud 123 (P, holotype; isotype: G).

Homotypic synonym: *Rejoua aurantiaca* (Gaud.)Gaud., tom. cit. 451, pl. 61.

Heterotypic synonyms: *T. pentastica* Scheff., Flora 52: 309. 1969; Natuurk. Tijdschr. Nederl. Ind. 31: 22. 1870; Greshoff, Meded. s'Lands Plantent. 25: 131. 1898 (as *entarctica*). Type: Indonesia: cult. Hort. Bot. Bogor IV A 57, from Aroë Island (BO, holo- or neotype; no date on label).

T. novo-guineensis Scheff., Ann. Jard. Buitenz. 1: 36 1876, **syn. nov.** Type: Indonesia: Irian Jaya, Humboldtsbay, Teijsmann s.n. (BO, holotype). Homotypic synonym: *Rejoua novo-guineensis* (Scheff.) Mgf., Notizbl. Bot. Gart. Berlin 12: 546. 1935.

T. longipedunculata K. Schum. in K. Schumann & Hollrung, Fl. Kais. Wilh. Land 113. 1889 (as *longecaudata*). Type Papua New Guinea: Malu, Augusta R., Hollrung 723 (holotype not seen, destroyed in B; lectotype: BO).

T. anguinea Hemsl., Kew Bull. 1895: 136. 1895; in Hooker, Icon. 24: t. 2397. 1895. Type: Solomon Islands: San Cristobal, R.B. Comins 83 (K, holotype).

Notes. The specimens examined are remarkably uniform in all characters, except the shape of the fruit. The latter may be subglobose, obliquely pear-shaped, curled pod-like, or an intermediate shape. As these different forms occur side by side throughout almost the whole area of the species, the author has reduced several names to synonyms. The specimens with curled fruits may be called: **T. aurantiaca** forma **anguinea** (Hemsl.) Leeuwenberg, **comb. nov.**

Tabernaemontana bovina Lour., Fl. Cochinch. 118. 1790; Pitard in Fl. Indo-Chine 3: 1159. 1933; Merrill, Trans. An. Phil. Soc. Philadelphia ser. 2. 24: 312. 1935.

Type: Vietnam: Tourane (=Da Nang), Clemens 4056 (P, neotype; isoneotypes: A, BM, C, G, K, MICH, MO, NY, UC, W, Z, here designated).

Homotypic synonyms: *Ervatamia bovina* (Lour.) Mgf., Notizbl. Bot. Gart. Berlin 12: 547. 1935. *T. tonkinensis* Pierre ex Pitard, tom. cit. 1154. The neotype of *T. bovina* is here designated the lectotype of this name.

Notes. MERRILL (1935) was of the opinion that *T. bovina* is conspecific with *T. tonkinensis*. He cited some collections, including Clemens 4056, one of the syntypes of *T. tonkinensis*. This specimen is probably a topotype of *T. bovina* and in the view of both MERRILL and the present author it fits LOUREIRO's description. As this specimen is well preserved and there are many duplicates, it

is here designated the neotype of *T. bovina* and the lectotype of *T. tonkinensis*. No original Loureiro specimen has been traced.

Tabernaemontana bufalina Lour., Fl. Cochin. 117. 1790; ed. Willd. 145. 1793 (partly, exl. Rumphius (4(cap. 73: 133, t. 6f. 1743)); Merrill, Trans. Am. Phil. Soc. Philadelphia ser. 2. 24: 312. 1935.

Neotype: Vietnam: Annam, Quang-tri Prov., An-long, Pirey 95bis in Chevelier 41172 (P, neotype; iso-neotypes NY, WAG, here designated).

Homotypic synonyms: *Ervatamia bufalina* (Lour.) Pichon, Mem. Mus. Hist. Nat. Paris ser. 2. 27: 220. 1949 ('1948'). *T. jasminiflora* Pitard in Fl. Indo-Chine 3: 1145. 1933. The lectotype of this name, here designated, is the neotype of the first. *E. laxiflora* Pichon, l.c. *E. jasminoides* Tsiang, Acta Phytotax. Sinica 8: 250. 1963 (not *E. jasminiflora* Ridley).

Heterotypic synonyms: *T. luensis* Pierre ex Pitard, tom, cit. 1147, **syn. nov.** Type: Vietnam: Annam, near Nha-trang, Robinson 1453 (P, lectotype; isotypes: K, NY). Homotypic synonym: *E. luensis* (Pierre ex Pitard) Kerr in Craib, Fl. Siam. Enum. 2: 445. 1939.

T. microphylla Pitard, tom. cit. 1150, **syn. nov.** Type: Cambodia: Siem-reap, Lecomte & Finet 1821 (P, lectotype). Homotypic synomym: *E. microphylla* (Pitard) Kerr, tom. cit. 446.

T. sralensis Pierre ex Pitard, tom. cit. 1156, **syn. nov.** Type: Cambodia: Samrong-tong Prov., Mt. Sral, Pierre 4391, June 1870 (P, lectotype; isotypes: A, NY). Homotypic synonym: *E. sralensis* (Pierre ex Pitard) Kerr, tom. cit. 447.

E. ceratocarpa Kerr, Kew Bull. 1937: 88. 1937, **syn. nov.** Type Thailand: Krat, Khao Kuap, Kerr 17692 (K, holotype; isotypes: BM, E, P). Homotypic synonym: *T. ceratocarpa* (Kerr) P.T. Li, Guihaia 6: 173. 1986.

E. hainanensis Tsiang, tom. cit. 246, pl. 31.2; Tsiang & P.T.Li, Fl. Rep. Pop. Sinica 63: 104, pl. 35. 1977, **syn. nov.** Type: China: Hainan, Wanning, F.C. How 71447 (IBSC, holotype). Homotypic synonym: *T. hainanensis* (Tsiang) P.T.Li, Guihaia 6: 169. 1986.

E. chengkiangensis Tsiang, tom. cit. 247, pl. 32. 1; Tsiang & P.T.Li, tom. cit. 106, **syn. nov.** Type: China: Yunnan, Chengkiang, H.T.Chang 1237 (IBSC, holotype). Homotypic synonym: *T. chengkiangensis* (Tsiang) P.T.Li, l.c.

Notes. After comparative studies of all the *Tabernaemontana* species represented in Vietnam the above one was found to agree best with LOUREIRO's description. Occasionally, the inflorescence may be reduced to a single flower and then its peduncle is very long. Moreover, it may have elongate, torulose mericarps, a condition known from specimens usually named as *T. luensis* or *T. sralensis*. The flowers and leaves of the specimens examined are very similar, while the fruits may vary greatly in length, a point that the present author was able to observe in the field in Hainan. They contain mostly 1-2 rows of seeds, e.g. in a single branch in China, Hainan, Nga Ping Mt., Tsang Wai-Tak 913 in L.U. 16412 (UC).

Tabernaemontana chocoensis (A. Gentry) Leeuwenberg, **comb. nov.**

Basionym: *Bonafousia chocoensis* A. Gentry, Ann. Miss. Bot. Gard. 68. 116. 1981; Allorge, Mem. Mus. Natn. Hist. Nat. ser. 2B. 30: 109, pl. 48. 1985.

Tabernaemontana ciliata Pichon, Not. Syst. ed. Humbert 13: 246. 1948.

Type: Madagascar: near Vatomandry, Perrier de la Bâthie 14137 (P, holotype).

Homotypic synonym: *Pandaca ciliata* (Pichon)Mgf., Adansonia ser. 2. 10: 33. 1970; Fl. Madag. 169: 210. 1976.

Heterotypic synonym: *Pandacastrum saccharatum* Pichon, tom. cit. 210; Markgraf, tom. cit. 178, pl. 27, **syn. nov.**: Type: Madagascar: near Mananjary, Perrier de la Bâthie 8914 (P, holotype).

Notes. *Pandacastrum saccharatum* is typified by a poor specimen in bud. It resembles the type of *T. ciliata*, which bears open flowers like several other specimens that help to fix the identity of this specimen. After comparing these specimens and other collections not seen by PICHON, especially in the herbaria of Antananarivo (TAN and TEF), the author concludes that they are synonyms. These specimens which will be cited in the forthcoming revision of the genus, enabled more of the variation within the species to be seen and it was also possible to study it in the field in the Ananalalava Forest near Foulpointe (Leeuwenberg 13766 (MO, TAN, WAG)).

Tabernaemontana colombiensis (Allorge) Leeuwenberg, **comb. nov.**

Basionym: *Bonafousia colombiensis* Allorge, Ann. Miss. Bot. Gard. 68: 679, fig. 2. 1981; Mém. Mus. Natn. Hist. Nat. ser. 2B. 30: 11, pl. 49. 1985.

Tabernaemontana corymbosa Roxb. ex Wall., Bot. Reg. 15: sub t. 1273. 1829; Roxburgh, Fl. Ind. 2: 25. 1832.

Type: Malaysia: Penang, Wallich 1572 (K-WALL, holotype; isotypes: BM, CGE, E, K, SING).

Homotypic synonyms: *Ervatamia corymbosa* (Roxb. ex Wall.) King & Gamble, Journ. As. Soc. Beng. 74. 2: 448. 1908. *Pagiantha corymbosa* (Roxb. ex Wall.) Mgf., Notizbl. Bot. Gart. Berlin 12: 546. 1935.

Heterotypic synonyms: *Pseudixora sumatrana* Miq., Fl. Ind. Bat. 2: 209. 1857. Type Indonesia: Sumatra, Upper Angkola, Junghuhn s.n. (L-908. 220-1303, holotype). Homotypic synonym: *Randia sumatrana* (Miq.) Miq., Ann. Mus. Lugd.-Bat. 4: 235. 1869.

T. hirta Hook.f., Fl. Brit. Ind. 3: 646. 1882, **syn. nov.** Type: Malaysia: Malacca, Maingay 2441 in Kew distrib. 1059 (K, holotype). Homotypic synonym: *E. hirta* (Hook.f.) King & Gamble, tom. cit. 449.

E. corymbosa var. *pubescens* King & Gamble, Journ. As. Beng. 74.2: 449. 1908; Ridley, Fl. Malay Peninsula 2: 342. 1923, **syn. nov.**. Type: Malaysia: Perak, Larut, Gopeng, King's collector 4830 (BM, lectotype; isotypes: K, SING).

E. pauciflora Ridley, Journ. As. Soc. Straits 86: 299. 1922; Fl. Malay Peninsula 2: 342. 1923 (non *T. pauciflora* Bl., 1826), **syn. nov.**. Type: Malaysia: Selangor, Ginting Sempah, Ridley et al. March 1917 (SING, holotype; isotype: K).

E. pauciflora var. *minor* Ridley, tom. cit. 300 et tom. cit. 343, **syn. nov.**. Type: Malaysia: Negri Sembilan, Bukit Tangga, Ridley 13033 (SING, holotype; isotype: K).

T. chinensis Merr., Philipp. Journ. Sc. 21: 507. 1922, **syn. nov.** Type: China: Kwangtung, Tung Sing, K.K. Tsoong 1977 (holotype not seen, destroyed in PNH, phot. seen: GH; isotype: IBSC). Homotypic synonym: *E. chinensis* (Merr.) Tsiang, Acta Phytotax. Sinica 8: 244, pl. 31.1. 1963; Tsiang & P.T.Li, Fl. Rep. Pop. Sinicae 63: 108. 1977.

E. jasminiflora Ridley, Fl. Malay Peninsula 2: 342. 1923 (not *T. jasminiflora* Pitard, 1933), **syn. nov.**. Type: Malaysia: Pahang, Kwantan, Baloh Res., C.F.Field 836 (SING, holotype; isotype: K).

T. laotica Pitard in Fl. Indo-Chine 3: 1148. 1933, **syn. nov.** Type: Laos: Samneua Province, Na-ham, Poilane 1870 (P, holotype). Homotypic synonym: *E. laotica* (Pitard) Pichon, Mém. Mus. Hist. Nat. Paris ser. 2. 27: 219. 1949 ('1948').

T. baviensis Pitard, tom. cit. 1156, **syn. nov.** Type: Vietnam: Tonkin, Lankok Valley at Mt. Bavi, Balansa 2099 (P, lectotype; isotype: K). Homotypic synonym: *E. baviensis* (Pitard) Pichon, l.c.

T. sumatra Merr., Contrib. Arn. Arb. 8: 139. 1934, **syn. nov.** Type: Indonesia: Sumatra, along the Takigeum-Bieuen Road, km 96, Bangham 813 (A, holotype; isotypes: K, NY, SING, SYS, W).

Pagiantha peninsularis Kerr, Kew Bull. 1937: 43. 1937, **syn. nov.** Type: Thailand: Ranawng, Kao Pawta Luang Keo, Kerr 16991 (K, holotype; isotypes: BM, E, L).

P. peninsularis var. *brevituba* Kerr in Craib, Fl. Siam. Enum. 2: 442. 1939, **syn. nov.** Type: Thailand: Surat, Kao Nan Sao, Langsuan, Kerr 12026 (K, holotype: isotypes: BM, E, P).

T. inaequifolia Lütjeh. & v. Ooststr., Blumea 3: 103, f. 2. k-p. 1938, **syn. nov.** Type: Indonesia: Sumatra, Bengkulu Distr. near Bua-Bua, Enggano, Lütjeharms 4461 (L, holotype; isotypes: A, BO, K). Homotypic synonym: *E. inaequifolia* (Lütjeh. & v. Ooststr.) Pichon, Mém. Mus. Nat. Hist. Nat. ser. 2. 27: 220. 1949.

T. carinata Lütjeh. & v. Ooststr. tom. cit. 104, f. 2. a-h, **syn. nov.** Type: Indonesia: Sumatra, Berhala Islands, E coast of Sumatra, Lörzing 6994 (L, holotype; isotype: BO).

T. pubituba Merr., Papers Mich. Acad. Sc. 24: 87. 1939, **syn. nov.** Type: Indonesia: Sumatra, Si Mandi Angin, near Kanan R., Rahmat Si Toroes 4133 (MICH, holotype; isotypes: A, K, L, NY, S).

E. kweichowensis Tsiang, Acta Phytotax Sinica 8: 237, pl. 28. 1. 1963; Tsiang & P.T.Li, Fl. Rep. Pop Sinicae 63: 111. 1977, **syn. nov.** Type: China: Kweichow, Lo-Fou, Cavalerie Aug. 1909 (E, holotype; isotype: IBSC). Homotypic synonym: *T. kweichowensis* (Tsiang) P.T.Li, Guihaia 6: 171. 1986.

E. kwangsiensis Tsiang, tom. cit. 238, pl. 28.2; Tsiang & P.T.Li, tom. cit. 111, **syn. nov.** Type: China: Kwangsi, Bako Mt., W Poseh, R.C. Ching 7556 (IBSC, holotype; isotype: W). Homotypic synonym: *T. kwangsiensis* (Tsiang) P.T.Li, l.c.

E. officinalis Tsiang, tom. cit. 239, pl. 29.1; Tsiang & P.T.Li, tom. cit. 112, pl. 37, **syn. nov.** Type: China: Hainan, Loktung, S.K.Lau 27206 (IBSC, holotype; isotype: A). Homotypic synonym: *T. officinalis* (Tsiang) P.T.Li, tom. cit. 172.

E. yunnanensis Tsiang, tom. cit. 241, var. *yuannensis*, tom. cit. 242, pl. 20.1; Tsiang & P.T.Li, tom. cit. 110, **syn. nov.** Type: China: Yunnan, Szemao, E. Mts., Henry 12026 (IBSC, holotype; isotypes: K, MO, US). Homotypic synonym: *T. yunnanensis* (Tsiang) P.T.Li, tom. cit. 171.

E. yunnanensis var. *heterosepala* Tsiang, tom. cit. 242; Tsiang & P.T.Li, tom. cit. 111, **syn. nov.** Type: China: Yunnan, Nan-Chiao, C.W. Wang 75054 (IBSC, holotype; isotype: A). Homotypic synonym: *T. yunnanensis* var. *heterosepala* (Tsiang) P.T.Li, tom. cit. 171.

E. continentalis Tsiang var. *continentalis*, tom. cit 243, pl. 30.2; Tsiang & P.T.Li, tom. cit 107, **syn. nov.** Type: China: Kwangsi, Na-Leung and vicinity, Fang-Cheng, W.T. Tsang 26547 (IBSC, holotype; isotypes: C, E, K, P, SYS). Homotypic synonym: *T. continentalis* (Tsiang) P.T.Li, tom. cit. 170.

E. continentalis var. *pubituba* Tsiang, tom. cit. 244; Tsiang & P.T.Li, tom. cit. 108, **syn. nov.** Type: China: Kwangtung-Kwangsi, Sheh-Man Ta Mts. S.C.Chun 5112 (IBSC, holotype). Homotypic synonym: *T. continentalis* var. *pubituba* (Tsiang) P.T.Li, tom. cit. 170.

Notes. *T. corymbosa* is one of the most widespread Asian species. Since being described from Penang in 1822, it has been discovered in many other localities in Malaysia and also in a number of other countries. It has therefore acquired an extensive synonymy. The most recent synonyms have come from TSIANG (1963) who had no access to herbaria outside China. The far from clear descriptions in the literature obviously made identification of the collections he studied a matter of difficulty. He therefore resorted to describing as new to science all the species that appeared to him to be new, and because of the limited number of collections available this led him to describe certain taxa several times over. The present author has had the opportunity to see considerably more material from the area of the species involved, among which has been above-cited type specimens. This has led to the very long list of synonyms set out above.

The species varies in the following characters: in size of the leaves, the indumentum on the outside of the calyx and corolla, the number of colleters in the calyx, and the shape of the fruit. The calyx is usually glabrous, but may be pubescent outside, while the corolla is mostly pubescent on the lobes, but may also be glabrous. The sepals and corolla lobes, however, are always ciliate. The number of colleters on each sepal varies from 0 to 8. The variation in these three characters extends more or less throughout the area of distribution. The fruits may be more or less stipitate as is shown mainly in the specimens collected in China and Vietnam; but this feature is also known from Sumatra.

T. corymbosa is closely allied to *T. divaricata* through the leaves (usually larger than in the latter), flowers, and fruits. They difffer mainly as follows:

Corolla outside pubescent or glabrous, inside pubescent or puberulous on the base of the lobes; lobes ciliate; stamens 1-4 mm included; sepals ciliate . . . . . **T. corymbosa**

PHOT. 2. *Tabernaemontana divaricata*. fruits. (phot. L. J. G. van der Maesen; India, W Bengal, Jainti Forest, Jalpaiguri Distr., v.d. Maesen 4891 (K, WAG)).

Corolla glabrous outside, with a 3-4 mm wide pilose belt below the anthers inside; lobes mostly not ciliate; stamens (2)7.5-15 mm included; sepals ciliate or not **T. divaricata**

Tabernaemontana divaricata (L.) R.Br. ex Roem. & Schult., Syst. 4: 427. 1819; G. Don, Gen. Syst. 4: 91. 1837; Merrill, Contrib. Arn. Arb. 8: 141. 1934; Leeuwenberg, J. Ethnopharmacology 10: 11. 1984.

Basionym: *Nerium divaricatum* L., Sp. Pl. 209. 1753.

Type: Cult. in Sri Lanka, sin. loc., 'Apocynum zeylanicum arborescens', with 2 buds of double flowers, herb. Hermann Vol. 1: 7(BM, lectotype, designated by LEEUWENBERG in 1984, after consultation with C. JARVIS).

Homotypic synonym: *Ervatamia divaricata* (L.) Burkill, Rec. Bot. Surv. India 10: 320. 1925.

Heterotypic synonyms: *T. alternifolia* L., Sp. Pl. 211. 1753; Roxburgh, Fl. Ind. 2: 24. 1832 (excl. of description). Type Van Rheede tot Drakestein, Hortus Malabaricus 1: t. 46. 1678, with simple flowers and fruits (lectotype, designated by LEEUWENBERG, 1984).

Nandi ervatam major Van Rheede tot Drakestein, tom. cit. t.54 (double flowers).

Nandi ervatam minor Van Rheede tot Drakestein, tom. cit. t. 55 (single flowers).

Velutta Amel-Pedi Van Rheede tot Drakestein, op. cit. 6: t. 48.(single flowers). Cited as synonym of *Reichardia grandiflora* Dennst., Schluess. Malab. 32. 1818, nomen.

Nyctanthes acuminata N.L. Burman, Fl. Indica 5. 1768. Type: Cult., Sri lanka, sin. loc., with double flowrs, Pieter de Hertog s.n. (G, holotype).

Nerium coronarium Jacq., Icon. Pl. 1. pl. 52. 1787(?); Coll. 1: 138. 1787. Type: cult. Hort. Schoenbrunn, with double flowers, herb. Jacquin s.n. (W, holotype). Homotypic synonyms: *T. coronaria* (Jacq.) Willd., Enum. Hort. Berol. 275. 1809; Paxton, Mag. Bot. 16: t. 354. 1848 (with plate erroneously as *coronata*, with text correctly spelled). *Ervatamia coronaria* (Jacq.) Stapf in Fl. Trop. Afr. 4. 1: 127. 1902.

T. gratissima Lindl., Bot. Reg. 13: t. 1084. 1827; Trans. Hort. Soc. London 7. 1: 55. 1830. Type: Cult. Royal Hort. Soc. Garden, Gr. Britain s.n. (CGE, holotype).

T. recurva Roxb. ex Lindl., Bot. Reg. 13: sub t. 1084. 1827. Type: Cult. Hort. Bot. Calcutta, India, sent from Cittagong, Burma by Buchanan, s.n. (CGE, holotype; Wallich 1569 (K-WALL) probable isotype). Roxburgh, Icon. 1543, reproduced in Wight, Icon. 2: 476. 1840-1843 (K, probably based on same specimen). Homotypic synonyms: *Ervatamia recurva* (Roxb. ex Lindl.) Lace, List of Trees, Shrubs, Climbers Burma 91.1913. *Testudipes recurva* (Roxb. ex Lindl.) Mgf., Notizbl. Bot. Gart. Berlin 12: 547. 1935 (the last two references omit Lindley).

T. siamensis Warb. ex Pitard in Fl. Indo-Chine 3: 1158. 1933. Type: Cult., Thailand, Bangkok, with double flowers, Zimmermann 65 (P, holotype; isotypes: BM, BO, BR, K, L, M, U, US, W, WU). Homotypic synonym: *Ervatamia siamensis* (Warb. ex Pitard) Kerr in Craib, Fl. Siam. Enum. 2: 447. 1939.

Ervatamia flabelliformis Tsiang, Acta Phytotax. Sinica 8: 248, pl. 32. 2. 1963; Tsiang & P.T.Li, Fl. Rep. Pop. Sinicae 63: 106. 1977, **syn. nov.** Type: China: Yunnan, Chenkang Hsien, C.W. Wang 72751 (IBSC, holotype; isotype: A). Homotypic synonym: *T. flabelliformis* (Tsiang) P.T.Li, Guihaia 6: 170. 1986.

Notes. *Tabernaemontana divaricata* is closely allied to *T. pandacaqui*. Both have been in cultivation for many years. However, only *T. divaricata* has double-flowered forms. These were already known to VAN RHEEDE TOT DRAKESTEIN (1678), who figured both single- and double-flowered specimens. The non fruiting double-flowered forms are very popular and are grown in many tropical countries.

Both species are variable in many characters. As the most reliable character is the indumentum in the corolla tube, a rather complicated key is made to distinguish them without having to dissect a flower:

1. Flowers double, with more or less curled corolla lobes or less often with two superposed corollas. Cult . . . . . **T. divaricata**
   – Flowers single 2
2. Stamens inserted 0.25-0.33 of the length from the base of the corolla tube, at 3-8 mm, 7.5-15 mm included; corolla tube not or sometimes just below the anthers 0.1 turn twisted, inside with a pilose belt below the insertion of

the stamens; sepals usually ciliate, glabrous outside, rounded or less often obtuse; bracts present; tertiary leaf venation not very conspicuous. N. India, Nepal, Bangla Desh, Bhutan, Burma, China (Yunnan), N. Thailand . . . . . **T. divaricata**

– Stamens inserted (0.5)0.55-0.8 of the length from the base of the corolla tube, at 8-14 mm, 1-5.5(9) mm included; corolla tube just below the anthers 0.25-0.5 turn twisted (at least when sepals rounded), inside glabrous or not; sepals not ciliate, glabrous or sometimes pubescent outside; bracts absent or present; tertiary leaf venation conspicuous or not 3

3. Corolla tube usually not twisted, inside with a pilose belt (sometimes reduced to a few hairs) below the insertion of the stamens; sepals about 3 × as long as wide, acute or acuminate glabrous; bracts present; tertiary leaf venation not very conspicuous; peduncle usually robust; plant glabrous . **T.divaricata**

– Corolla tube 0.25-0.5 turn or sometimes not twisted below the anthers, glabrous inside; sepals mostly 1-2 × as long as wide and rounded or obtuse, glabrous or pubescent; bracts usually absent; tertiary leaf venation mostly conspicuous, reticulate; peduncle usually slender; plant glabrous or pubescent. S. Thailand to Tuamotu . . . . . **T. pandacaqui**

T. divaricata is rather constant in the leaf venation, the robust peduncle and pedicels, the indumentum in the corolla tube, and the fruits. The sepals show much variation, being 1-3 × as long as wide and rounded to acuminate. Their range of variation is continuous from suborbicular with a rounded apex to narrowly ovate with an acuminate apex. The former sepals are shown by the types of *T. divaricata* and *T. coronaria* and the latter by those of *T. recurva* and *T. gratissima*. In this respect, the types of *Nyctanthus acuminata*, *T. siamensis* and *Ervatamia flabelliformis* are intermediate.

Most specimens collected in the wild have broad sepals and stamens inserted low down in the corolla tube (see no. 2 of key). Narrow sepals ar known from a few specimens collected in the wild, which are perfectly matched in the type of *T. recurva* taken from a cultivated plant. Their stamens are inserted in the upper half of the corolla tube. Sepals of intermediate shape are found in specimens with stamens inserted low down or less often near the middle or in the upper half of the corola tube. Although the author tried to maintain *T. recurva* as a distinct species with narrow sepals and stamens inserted in the upper half of the corolla tube, the series of intermediates prevents this. Cultivated plants, especially the double-flowered ones, show the whole range in variation in sepals. Part of this variation can even be seen in a single specimen.

The typification of *Nyctanthus acuminata* is due D.O. WIJNANDS, who kindly made the information available to the author.

Tabernaemontana flavicans Willd. ex Roem. & Schult., Syst. 4: 797. 1819.

Type: Brazil: sin. loc., Hoffmannsegg in herb. Willdenow (B-WILLD 5195, holotype; isotype: FI-W).

Homotypic synonym: *Anartia flavicans* (Willd. ex Roem. & Schult.) Miers,

Apoc. S. Am. 82. 1878; Allorge, Mém, Mus. natn. Hist. Nat. ser. 2B. 30: 66, pl. 27. 1985.

Heterotypic synonyms: *T. oblongifolia* A.DC., Prod. 8: 368. 1844, partly, exl. Martin s.n. from French Guiana. Type: Brazil: Bahia, Blanchet 2358 (G-DC, lectotype, designated by LEEUWENBERG in 1984; isotypes: BM, BP, BR, G, K, LD, NY, P, W; phot. G-DC sheet in MO). Homotypic synonyms: *Bonafousia oblongifolia* (A.DC.) Miers, tom. cit. 50. *Anartia oblongifolia* (A.DC) Mgf., Notizbl. Bot. Gart. Berlin 14: 165. 1938; Allorge, tom. cit. 65, pl. 26.

T. olivacea Muell. Arg. in Martius, Fl. Bras. 6. 1: 75. 1860, partly, excl. Kappler 314, **syn. nov.** Type: Brazil: near S. Carlos, near Rio Negro, Spruce 3114 (W, lectotype; isotypes: BM, BP, BR, C, G, GH, GOET, K, LD, NY). Homotypic synonyms: *Bonafousia olivacea* (Muell. Arg.) Miers, tom. cit 52. *Anartia olivacea* (Muell. Arg.) Mgf., l.c.; Allorge, tom. cit. 60, pl. 24.

Bonafousia latifolia Miers, tom. cit. 50. Type: Brazil: Amazonas, near Santarem, Spruce 236 (BM, holotype; isotypes: K, M, W).

Taberna disparifolia Miers, tom, cit. 63. Type: Peru: near Tarapoto, Spruce 4611 (BM, holotype; isotypes: BP, C, CGE, E, G, GH, GOET, K, LD, MPU, NY, W).

Anartia glabrata Miers, tom. cit. 81. Type: Brazil: Barra do Facão, Rio de Janeiro, Martius anno 1827 (BM, holotype; isotype: K).

Notes. In her beautifully illustrated 'Monographie des Tabernaemontanoïdées américaines' Mme ALLORGE (1985) maintained a segregate of *Tabernaemontana* named *Anartia* and distinguished six species in it. This segregate is not maintained here. She annotated specimens as belonging to species, although in fact they do not fit the descriptions she gave for these species. The following remarks elucidate the point. Froes & Black 27666 (MO, NY) and Monteira da Costa 11932 (MO), annotated as *A. flavicans*, and Blanchet 2358, the type of *A. oblongifolia*, have corolla lobes that are much shorter than the corolla tube. The petioles of the leaves of the type of *A. oblongifolia* are not all 10 mm long, but they vary in length from 5 to 10 mm. The corolla lobes of Klug 2709 (BM, G, MO, NY, S) and Killip & Smith 29053 (MO, NY), named *A. olivacea*, are more than half as long as the tube, as they should be according to her description. After having studied more than 100 specimens, among which many annotated by her as *A. flavicans*, *A. oblongifolia*, and *A. olivacea*, and also the type specimens of these names and of the synonyms assigned to them by Mme. ALLORGE, the author concludes that they all belong to a single species. The leaves show a continuous variation in shape and size. The relation between the corolla tube and lobes also varies continuously, the tube being 0.9-2.7 × as long as the lobes; but the shape of the corolla tube and the distance between the anther tips and the corolla mouth are remarkably constant in the whole lot. The species is here named *Tabernaemontana flavicans*.

The W sheet of Spruce 3114, which may have been seen by MUELLER ARG., bears a complete flower and is therefore proposed as lectotpe of *T. olivacea*. The G sheet, erroneously cited by ALLORGE as the holotype for this name, only has a calyx.

Tabernaemontana holothuria (Mgf.) Leeuwenberg, **comb. nov.**
Basionym: *Stenosolen holothuria* Mgf., Ann. Miss. Bot. Gard. 61: 899. 1974.

Tabernaemontana inconspicua Stapf, Kew Bull. 1894: 120. 1894.
Type: Gabon: Mt. John, Kongui R., Mann 1803 (K, holotype).
Homotypic synonym: *Pterotaberna inconspicua* (Stapf) Stapf in Fl. Trop. Afr. 4.1: 126. 1902.

Notes. Four closely allied taxa are known in the African *Tabernaemontaneae* under the names *Carvalhoa campanulata*, *Daturicarpa elliptica*, *Pterotaberna inconspicua* and *Tabernanthe iboga*. The first of these is the only species of a distinctive genus (LEEUWENBERG, 1985a, 1985b). The last one is the basis of a genus that should also be maintained. However, the third of them is reduced to a synonym of *Tabernaemontana* on the following grounds:

STAPF (1902) founded the genus *Pterotaberna* on a single species which he had previous described as *Tabernaemontana inconspicua*. He indicated that it was closely allied to some Indian (in fact, W. Malaysian) species, e.g. *T. peduncularis* and *T. malaccensis* (= *T. pauciflora*), but that it is different in the stigma (= pistil head) being remote from the anthers, capitate, and exapiculate, and in the winged, apparently indehiscent, fruit.

Indeed, it is closely allied to these and several more Asian species, e.g. *T. bufalina*, *T. pandacaqui*, and *T. cylindrocarpa*, by the shape of the anthers and of the pistil head. STAPF analysed material which lacked the bilobed stigmoid apex characteristic of many *Apocynaceae*. The latter is confirmed by the present author analysing herb. Bos 4192. However, a very short bilobed stigmoid apex is observed in Bos 5326, Evrard 2254, Goosens 2965, and J. Louis 2872. Almost all specimens were in bud and therefore the stigmoid apex may develop later or may be overtopped and finally enclosed in the stigmatic basal part rendering the pistil head capitate. Moreover, the basal part often has 5 longitudinal grooves, as, for example, in J. Louis 2872. Therefore, it cannot be separated on these grounds at generic level from the above-mentioned Asian species. The last flower character still kept up for maintaining *Pterotaberna* as a distinct genus was, that the pistil head did not reach the anthers as is usual in the tribe *Tabernaemontaneae*. However, the present author recently observed, that the pistil head of the flowers of *Tabernaemontana heyneana* from southern India may or may not be remote from the anthers. Finally, the fruits of several *Tabernaemontana* species may be more or less winged, as in *T. eglandulosa* and *T. elegans*, both from Africa, and in *T. pandacaqui* from Asia. In some species e.g. *T. crassa* an *T. stapfiana*, the fruits dehisce late or not at all.

There is thus no character left to distinguish *Pterotaberna* from *Tabernaemontana*, and the former is therefore reduced to a synonym of the latter.

Finally, the second *Daturicarpa* is the only taxon of the tribe occurring in Africa that has prickles on the fruit, a character known from several American *Tabernaemontana* species, e.g. *T. catharinensis*, *T. heterophylla*, and *T. muricata*, and also from the Vietnamese *T. granulosa*. The corolla tube, anthers, and pistil head of *Daturicarpa* are very similar to those of many *Tabernaemontana* species.

However, two characters remain to keep it seperate: the in bud non-inflexed corolla lobes and the disk. *Tabernanthe* shares the two with *Daturicarpa* and in addition has a corolla tube similar to that of the latter. However, the carpels are completely fused and the fruits are not prickly. On the other hand, a hybrid had been produced in the Botanic Garden at Kisantu (Breyne 4421 (BR)) bearing a fruit with a base like that of the fruit of *Tabernanthe iboga* (the smooth form) and with an upper part like that of *Daturicarpa elliptica*. In fact, it is composed of two prickly mericarps, such as are shown by *Daturicarpa elliptica*, fused into smooth base like that of the fruits of the smooth-fruited form of *Tabernanthe iboga*. As the flowers of the two species involved resemble each other so strikingly, it is no wonder that they are frequently confused. Moreover, since a fertile hybrid has been made, the author prefers to reduce *Daturicarpa* to a synonym of *Tabernanthe*.

The four taxa discussed above can be distinguished as follows:

1. Corolla tube almost cylindrical, 9-15 mm long, lobes forming an ovoid head wider than the tube and inflexed in bud; disk absent; petiole bases forming a clear ocrea; tertairy venation invisible in dry leaves. Central Africa . . . . . **Tabernaemontana inconspicua**
   Corolla tube not cylindrical; lobes not inflexed in bud; disk present; petiole bases without or with a small ocrea (*Carvalhoa*); tertiary venation visible in dry leaves 2
2. Corolla tube campanulate, not contracted at the mouth, 8-10 mm long, lobes in bud not forming a head; carpels free; fruit of 2 pod-like smooth mericarps. East Africa . . . . . **Carvalhoa**
   Corolla tube almost ovoid, widest just above the base and there often wider than the ovoid apical head when in bud, 5-8 mm long. Central Africa . . . 3
3. Carpels fused; fruit smooth or bumpy; corolla tube usually (?) with purple or violet dots in 5 groups in the throat; 7-20 pairs of secondary leaf veins, some sepals slightly spreading in dried flowers . . . . . **Tabernanthe iboga**
   Carpels almost free, only connected by the disk and the style; fruit of 2 seperate mericarps bearing blunt soft prickles; 4-7 pairs of secondary leaf veins; sepals closely clasping the corolla base in dried flowers. . . . . **Tabernanthe elliptica**

Tabernanthe elliptica (Stapf) Leeuwenberg, see p. 1.

The present author is unable to distinguish more than one entity. After having seen the types and the other specimens of the three species described by STAPF (1921) in *Daturicarpa*. There is no correlation between the weak distinctive characters used by *Stapf*, who did not have enough material at his disposal to determine which characters were reliable enough to distinguish species. The author came to the above conclusions before reading HÜRLIMANN's interesting publication. A revision of *Tabernanthe* is being prepared and will appear soon.

Tabernaemontana linkii A.DC., Prod. 8: 364. 1844.

Basionym: *T. multiflora* Roem. & Schult., Syst. 431. 1819 (non Sm. ex Rees, 1817).

Type: Brazil: sin. loc., herb. Link (not seen, destroyed in B). Brazil: sin. loc., Selber in Hoffmannsegg s.n. (B-W 5190, 2 sheets, one of which on phot. in GH and NY, neotype).

Homotypic synonyms: *Peschiera linkii* (A.DC) Miers, Apoc. S. Am. 47. 1878; Allorge, Mém. Mus. Natn. Hist. Nat. ser. 2B. 30: 149, pl. 66. 1985 (partly, excl. syns. *T. muricata* Link ex Roem. & Schult. and *Peschiera muricata* (Link ex Roem. & Schult.) A.DC.). *T. muricata* Willd. ex Roem. & Schult., tom. cit. 797 (not 431); Mueller Arg. in Martius, Fl. Bras. 6. 1: 80. 1860. The holotype of this name is now the neotype of *T. linkii*.

Heterotypic synonym: Peschiera ochracea Miers, tom. cit. 42. Type: Brazil: Amazonas, Santarem, Spruce 234 (BM, holotype; isotypes: CGE, W).

Notes. Mme ALLORGE erroneously supposed that Sieber in Hoffmannsegg s.n. (B-W 5190) was lost. In fact, the author has been able to examine it in the Berlin herbarium where it is still preserved. In agreement with her, it is here considered to be conspecific with the type of *Peschiera ochracea*. There are, however, a number of points in Mme ALLORGE's paper that require discussion. Part of her synonymy is erroneous. The confusion is quite understandable, as it is a continuation of that started by ROEMER & SCHULTES. These two authors described *T. muricata* on p. 431 on the basis of a collection from the herb. Link. Later, on p. 797 of the same book they described a second specimen, Sieber in Hoffmannsegg s.n. (B-W 5190), and put it under the same name. Willdenow provided the latter specimen with his manuscript name *T. muricata* before ROEMER & SCHULTES saw it. It is known that they tended to publish quickly and it is therefore understandable that they did not observe that the two specimens (Link on p. 431 and B-W 5190 on p. 797) belonged to two different species. MUELLER continued the confusion by following the interpretation given on p. 797. Without realizing it, in the same paper he described *T. muricata* (sensu p. 431) as *T. macrophylla*, with Spruce 1470 as type. Before publishing his *T. muricata* (it was in 1858) MUELLER annotated B-W 5190 as *T. ochracea*. The latter name he mentioned as a synonym of his *T. muricata*, thus causing it to be invalidly published. Markgraf saw both the collections involved, Link (destroyed in Berlin) and B-W 5190 (still there and annotated by him as *Peschiera linkii*), and he realized that the type of *T. linkii* and B-W 5190 belonged to one species and the type of *T. muricata* Link ex Roem. & Schult. (p. 431) to another.

Fortunately, the descriptions of ROEMER & SCHULTES on p. 431 give just enough information to enable the present author to determine what species they intended. This required comparison with most of the American species. Markgraf's notes on the identification label with B-W 5190 were also of great value in reaching a satisfactory understanding of the species concerned.

Tabernaemontana luciliae Leeuwenberg, **nom. nov.**

Basionym: *T. brachyantha* Woods., Ann. Miss. Bot. Gard. 47: 76. 1960 (non Stapf, 1894). Homotypic synonym: *Bonafousia brachyantha* (Woods.) Boiteau & Allorge, Bull. Soc. Bot. France 130, Lettres Bot. 4-5: 340. 1983; Mém.Mus. Natn. Hist. Nat. ser. 2B. 30: 81, pl. 32.1985.

Notes. This species is named after Mme. Lucille Allorge, author of several large publications on *Apocynaceae*.

T. luciliae is closely allied to *T. prancei* by the leaves, inflorescences and flowers. They can be distinguished as follows:

Corolla tube 9-10 mm long: fruit smooth. Peru . . . . . **T. luciliae**
Corolla tube 16-19 mm long; fruit bluntly muricate. W. Brazil . . . . **T. prancei**

Tabernaemontana muricata Link ex Roem. & Schult., Syst. 4: 431. 1819 (non p. 797). Types: Brazil: sin. loc., herb. Link (not seen, destroyed in B). Brazil: Barra do Rio Negro, Spruce 1470 (BM, neotype; iso-neotypes: BR, CGE, G, GH, GOET, K, NY, OXF, W; phot. of lost B sheet in GH and MO).

Homotypic synonyms: *Peschiera muricata* (Link ex Roem. & Schult.) A.DC., Prod. 8: 361. 1844. *Bonafousia muricara* (Link ex Roem. & Schult.) Mgf., Notizbl. Bot. Gart. Berlin 14: 166. 1938; Allorge, Mém. Mus. Natn. Hist. Nat. ser. 2B. 30: 85, pl. 35. 1985 (partly, excl. Roem. & Schult., tom. cit. 797). *T. macrophylla* Muell. Arg. in Martius, Fl. Bras. 6. 1: 75. 1860 with *T. muricata* Spruce ex Muell. Arg. in syn. (non Poir. 1817). The lost B sheet of Spruce 1470 was the holotype of this name. *Phrissocarpus rigidus* Miers, Apoc. S. Am. 72, pl. 9. 1878. The holotype of this name is now the neotype of *T. muricata*. *Anacampta rigida* (Miers) Mgf., Notizbl. Bot. Gart. Berlin 14: 163. 1938. *T. rigida* (Miers) Leeuwenberg, Journ. Ethnopharmacology 10: 16. 1984.

Note. *T. muricata* was validly published by ROEMER & SCHULTES on p. 431, but confused with *T. linkii* on p. 797, a confusion continued by MUELLER ARG. (1860) and by ALLORGE (1985). See further the notes under *T. linkii*.

Tabernaemontana pandacaqui Poir. in Lamarck, Enc. 7: 529. 1806; Merrill, Enum. Phillipp. Fl. Pl. 3: 325. 1923.

Type: Philippines: sin. loc., Sonnerat s.n. (P-LA, holotype).

Homotypic synonyms: *Pagiantha pandacaqui* (Poir.) Mgf., Notizbl. Bot. Gart. Berlin 12: 546. 1935. *Ervatamia pandacaqui* (Poir.) Pichon, Mém. Mus. Hist. Nat. Paris ser. 2. 27: 220. 1949 ('1948').

Heterotypic synonyms: *T. citrifolia* Forst.f., Prod. 20. 1786 (not L., 1753). Type: Tonga: Nomuka Island (Forster 42 (K, holotype)).

T. orientalis R.Br., Prod. 468. 1810; Leeuwenberg, Journ. Ethnopharmacology 10: 14. 1984 (not G. Don, 1837), **syn. nov.** Type: Australia: sin. loc., Robert Brown 2858 (BM, holotype; isotype: K). Homotypic synonym: *Ervatamia orientalis* (R.Br.) Domin in Fedde, Repert. 12: 96. 1913; Turrill, Journ. Linn. Soc. Bot. 43: 32. 1915 (superfluous combination).

T. pubescens R.Br., l.c. Type: Australia: North Coast, Good's Island, Prince of Wales Islands, Robert Brown 2859 (BM, holotype; isotype: K). Homotypic synonym: *E. pubescens* (R.Br.) Domin, l.c.; Markgraf in Engler, Bot. Jahrb. 61: 199. 1927 (superfluous combination).

T. ebracteata R.Br., l.c. Type: Australia: Prince of Wales Islands, Robert Brown 2860 (BM, holotype).

T. multiflora Sm. in Rees, Cycl. 35. n. 11. 1817 (not Link ex Roem. & Schult.,

1819). Type: Indonesia, Banda Island, C. Smith s.n. (not yet traced).

T. semperflorens Perr., Mém. Soc. Linn. Paris 3: 147. 1824. Type not yet traced.

T. floribunda Bl., Bijdr. 1028. 1826. Type: Indonesia: Java, sin. loc., Blume s.n. (L 925.250-252, lectotype). Homotypic synonym: *E. floribunda* (Bl.) Pichon, Mém. Mus. Natn. Hist. Nat. Paris ser. 2. 27: 220. 1949 ('1948'); Bakhuizen v.d. Brink f. in Backer, Bekn. Fl. Java Afl. 7. Fam. 172: 21. 1948.

T. parviflora Dcne., Herb. Timor Descr. 51. 1834 in Nouv. Ann. Mus. Paris 3: 379. 1834 (not Poir., 1817, nor Roxb., 1832, nor Bojer, 1837). Type: Indonesia: Timor, sin. loc., herb. Decaisne s.n. (P, holotype; isotypes: C, CGE, E, G, K, MEL, NY). Homotypic synonyms: *T. decaisnei* A.DC., Prod 8: 369. 1844. *E. decaisnei* (A.DC.)Mgf. in Engler, Bot. Jahrb. 61: 200. 1927. *E. parviflora* (Dcne.) Meyer Drees, Comm. For. Res. Inst. Indones. 33, 36. 1951.

T. laurifolia Blanco, Fl. Filip. ed. 1: 114. 1837 (not L., 1753, nor Ker Gawler 1823). Type: Philippines: Luzon, Bulacan Prov., Angat, Merrill sp. Blancoanae 266 (L, neotype; iso-neotypes: A, BO, F, K, MO, NY, P, W).

T. mollis Hook. & Arn., Bot. Beech. Voy. 199. 1837, **syn. nov.** Type: China: Guangdong, Macao or adjacent island, Lay & Collie April 1827 (W, isotype).

T. decaisnei var. *petiolata* A.DC., l.c. Type: Indonesia: Timor, sin. loc., herb. Decaisne s.n. (G-DC, seen on microfiche in WAG).

T. cumingiana A.DC., Prod. 8: 373. 1844. Type: Philippines: Luzon, Laguna Prov., Calawang, Cuming 604 (G-DC, holotype, seen on microfiche in WAG; isotypes: A, BM, CGE, E, FI-W, G, GOET, K, L, M, MEL, MO, NY, OXF, P, UPS, W). Homotypic synonym: *E. cumingiana* (A.DC.)Mgf., Notizbl. Bot. Gart. Berlin 12: 547. 1935.

T. polygama Blanco, Fl. Filip. ed. 2: 82. 1845, **syn. nov.** Type: Philippines: Luzon, Rizal Prov., near Mandaloyon, Merrill Sp. Blancoanae 243 (K, neotype; iso-neotypes: A, BO, F, GH, L, MO, NY, P, W). Homotypic synonym: *E. polygama* (Blanco)Mgf., Notizbl. Bot. Gart. Berlin 12: 548. 1935.

T. laxiflora Teijsm. & Binn., Tijdschr. Nederl. Ind. 25: 403. 1863, **syn. nov.** Type: Indonesia: Bali, Beliling, Dansa, Teijsmann 2778 (BO, holotype; isotype: K).

T. pacifica Seem., Fl. Vit. 160. 1866, **syn. nov.** Type: Fiji Islands: Taveuni Island, Seemann 314 (BM, holotype; isotype: GH). Homotypic synonym: *Rejoua pacifica* (Seem.)Mgf., Notizbl. Bot. Gart. Berlin 12: 546. 1935.

T. riedeliana Miq., Ann. Mus. Bot. Lugd. Bat. 4: 139. 1869, **syn. nov.** Type Indonesia: N. Sulawesi, Manado, Riedel 5827 (U, holotype; isotype: L).

T. orientalis var. *angustifolia* Benth., Fl. Austr. 4: 311. 1869. Type: Australia: Moreton Bay, Fraser 42 (BM, lectotype, here designated). Homotypic synonym: *E. benthamiana* Domin in Fedde, Repert. 12: 97. 1913.

T. orientalis var. *angustisepala* Benth., l.c. Type: Australia: N.S. Wales, Richmond R., Stranger s.n. (K, lectotype, here designated). Homotypic synonym: *E. angustisepala Domin* in Fedde, Repert 12: 98. 1913.

Anartia recurva Miers, Apoc. S. Am. 80. 1878. Type: Cult., French Guiana, Karouany, Sagot 388 (BM, holotype; isotypes: BR, K, MPU, P, S).

T. punctulata Warb. in Engler, Bot. Jahrb. 13: 405. 1891. Type: Indonesia: Key Islands: sin. loc., Warburg 21327 (holotype not seen, destroyed in B; lectotype: A, designated here; isotype: E). Homotypic synonym: *E. punctulata* (Warb.)Mgf., Nova Guinea 14: 285. 1927.

T. diclinis Laut. & K.Schum., Fl. Deutsch. Südsee 503. 1901. Type: Papua New Guinea: Stephansort, Lewandowski 11 (holotype not seen, destroyed in B; lectotype: SING, here designated).

T. orientalis var. *grandifolia* Val., Bull. Dépt. Agr. Ind. néerl. 10: 48. 1907. Type: Indonesia: Irian Jaya, Merauke Koch, 503b (BO, holotype).

T. caudata Merr., Philipp. Journ. Sc. 4: 316. 1909, **syn. nov.** Type: Phillippines: Luzon, Ilocos Sur Prov., Mt. Bulangao, Merritt & Darling FB 14025 (holotype not seen, destroyed in PNH; lectotype: US). Homotypic synonym: *E. merrilliana* Mgf., tom. cit. 548.

T. linearifolia Merr., tom. cit. 317, **syn. nov.** Type: Philippines: Luzon, Lepanto Distr., Mancayan, Curran FB 10945 (holotype not seen, destroyed in PNH; lectotype: K; isotype: US). Homotypic synonym: *E. linearifolia* (Merr.) Mgf., l.c.

T. mucronata Merr., tom. cit. 318, **syn. nov.** Type: Phillippines: Guimaras Island, Nagaba, Gammill FB 304 (holotype not seen, destroyed in PNH; lectotype: NY; isotype: US, phot. of US sheet in WAG). Homotypic synonym: *E. mucronata* (Merr.) Mgf., l.c.

T. puberula Merrill, tom. cit. 319. Type: Philippines: Luzon, Rizal Prov., Malapadnabato, Merrill 2746 (US, lectotype).

T. biflora Elmer, Leafl. Philipp. Bot 4: 1463. 1912 (18 March), **syn. nov.** Type Philippines: Mindanao, Davao Del Sur Prov., Todaya, Mt. Apo, Elmer 10657 (holotype not seen, destroyed in PNH; lectotype: G; isotypes: A, BO, BP, E, F, HBG, K, L, MO, NY, US, W, Z). Homotypic synonym: *Ervatamia biflora* (Elmer) Pichon, l.c.

T. congestiflora Elmer, tom. cit. 1464. Type Philippines: Capiz Prov., Sibuyan Island, Magallanes, Mt. Giting-Giting, Elmer 12564 (holotype not seen, destroyed in PNH; lectotype F; isotypes; A, BO, BP, E, G, HBG, K, L, NY, P, US, W, Z).

T. subglobosa Merr., Philipp. Journ. Sc. Bot. 7: 242. 1912 (30 Sept.), **syn. nov.** Type: Philippines: Luzon, Bataan Prov., Lamao R., Mt. Mariveles, Merrill 2511 (holotype not seen, destroyed in PNH; lectotype: NY; isotypes: GH, MO, SING, US; phot. of US sheet in WAG). Homotypic synonyms: *Pagiantha subglobosa* (Merr.) Mgf., tom. cit. 547. *Ervatamia subglobosa* (Merr.)Pichon, l.c.

Ervatamia pubescens var. *superba* Domin in Fedde, Repert. 12: 97. 1913. Type: Australia: Queensland, Cape York, MacGillivray 496 (K, lectotype).

E. daemeliana Domin, l.c. Type: Australia: Queensland, Cape York, E. Daemel s.n. (holotype not seen, destroyed in B; lectotype: BM; isotypes: GH, K, MO).

T. hexagona Merr., Philipp. Journ. Sc. Bot. 10: 66. 1915, **syn. nov.** Type: Philippines: Panay, Capiz, Escritor BS 21241 (holotype not seen, destroyed in PNH; lectotype: K; isotype: US). Homotypic synonym: *Ervatamia hexagona* (Merr.) Pichon, l.c.

T. mindanaensis Merr., tom. cit. 67, **syn. nov.** Type: Philippines: Mindanao, Cotabato Prov., Craan, Tarrosa & Almagro FB 14930 (holotype not seen, destroyed in PNH). Lectotype: Philippines: Mindanao, Cotabato Prov., Reina Regente, Robinson BS 11653 (E, lectotype (was paratype); isotypes: BO, F).

T. oligantha Merr., tom. cit. 68, **syn. nov.** Type: Philippines: Samar, Cauayan Valley, Ramos 1621 (holotype not seen, destroyed in PNH; lectotype: L; isotypes: BO, G, GH, MO, NY, P). Homotypic synonyms: *Pagiantha oligantha* (Merr.)Mgf., tom. cit. 546. *Ervatamia oligantha* (Merr.)Pichon, l.c.

T. capsicoides Merr., Interpr. Rumph. Herb. Amboin. 428. 1917, **syn. nov.** Type: Indonesia: Ambon, Robinson 76 (holotype not seen, destroyed in PNH; lectotype: GH; isotypes: BM, BO, K, NY, P).

T. ecarinata Merr., Philipp. Journ. Sci. 14: 450. 1919, **syn. nov.** Type: Philippines: Luzon, Ilocos Norte Prov., between Bangui and Claveria, Ramos BS 33022 (holotype not seen, destroyed in PNH; lectotype: K; isotypes: P, US).

T. mindorensis Merr., Philipp. Journ. Sc. 20: 434. 1922, **syn. nov.** Type: Philippines: Mindoro Occidental Prov., Paluan, Ramos BS 39577 (holotype not seen, destroyed in PNH; lectotype: NY; isotypes: A, BO, IBSC, K, SYS). Homotypic synonym: *E. mindorensis* (Merr.)Mgf., tom. cit. 548.

E. montensis S. Moore, Journ. Bot. 1923. 61. Suppl. 32. Type: Papua New Guinea: Sogere Region, Forbes 478 (BM, lectotype; isotypes: A, E, K, L, US).

T. brachybotrys Merr., Philipp. Journ. Sc. 29: 483. 1926, **syn. nov.** Type: Philippines: Bohol, Ramos BS 43257 (holotype not seen, destroyed in PNH; lectotype: K; isotypes: A, BO, G, HBG, P, UC, US). Homotypic synonym: *E. brachybotrys* (Merr.)Pichon, l.c.

E. punctulata var. *barbatocalyx* Mgf., Nova Guinea 14: 286. 1927. Type: Indonesia: Irian Jaya, Merauke, Koch Aug. 1904 (L, lectotype; isotype: BO). Homotypic synonym: *E. pubescens* var. *barbatocalyx* (Mgf.)Mgf. in Engler, Bot. Jahrb. 61: 199. 1927.

E. eriophora Mgf., Nova Guinea 14: 286. 1927. Types: Papua New Guinea: Sepik Region, Ledermann 8745 (holotype not seen, destroyed in B); Kaiserin Augusta R., Gjellerup 324 (L, lectotype, here designated, was paratype; isotypes: BO, K).

E. punctulata var. *typica* subvar. *lancifolia* Mgf., Nova Guinea 14: 286. 1927. Type Indonesia: Irian Jaya, near Okaba, Branderhorst 115 (L, lectotype; isotypes: BO, K).

E. obtusiuscula Mgf. Notizbl. Bot. Gart. Berlin 12: 547, 551. 1935; Bull. Bishop Mus. Honolulu 141: 128, f. 65 e-g. 1936. Type: Western Samoa: Sawaii, Safune, Vaupel 265 (M, holotype; isotypes: B, HBG, K, MO, NY, US).

E. rotensis Kanehira, Bot. Mag. Tokyo 50: 600, fig. 57. 1936, **syn. nov.** Type: Mariana Islands: Rota Island, Kanehira 3666 (A, isotype). Homotypic synonym: *T. rotensis* (Kanehira) Fosberg ex Stone, Micronesia 2(1): 48. 1965; P.T.Li, Guihaia 6: 172. 1986 (superfluous combination).

E. calcicola Kerr, Kew Bull. 1937: 87. 1937, **syn. nov.** Type: Thailand: Loi, Wang Saphung, Kerr 862OB (K, holotype; isotypes: BM, E, P). Homotypic synonym: *T. thailandensis* P.T.Li, Guihaia 6: 172. 1986.

E. floribunda var. *villosiuscula* Bakhuizen v.d. Brink f. in Backer, Bekn. Fl. Java Afl. 7. Fam. 172: 21. 1948 (Dutch descr. only); Fl. Java 2: 229. 1965 (English descr. only). Type: Indonesia: Bali, Beliling, Kali Bubuk, Teijsmann 2729 (L, holotype; isotype: BO).

E. pubescens var. *glaberrima* Bakhuizen v.d. Brink l.c. (Dutch descr. only) and l.c. (English descr. only). Type: Cult., Bogor sub no. IV E 28, Hallier 89 (L, holotype and isotype).

E. puberula Tsiang & P.T.Li, Acta Phytotax. Sinica 11: 371, pl. 46. 1973; Fl. Rep. Pop. Sinicae 63: 101, pl. 34. 1977, **syn. nov.** Type: sin. loc., Bot. Inst. Kwangtung 17890 (IBSC, holotype). Homotypic synonym: *T. guangdongensis* P.T.Li, Guihaia 6: 169. 1986.

E. lifuana Boiteau & Allorge, Journ. Nat. Products 43: 518, pl. 4. 1980 (French descr. only); in Fl. Nouv. Caled. 10: 240, pl. 43. 1981 (with Latin descr.). Type: Loyaute Islands: Lifou, Sevenet 461 (P, holotype).

Notes. Tabernaemontana pandacaqui is a variable species in shape and size of the leaves, inflorescences, and fruits, but is less so in floral characters.

The type specimens of *T. pandacaqui*, *T. oligantha*, *T. biflora*, *T. brachybotrys*, *T. congestiflora* and *T. subglobosa* have relatively large leaves. Among the specimens with smaller leaves are the types of *T. cumingiana*, *T. linearifolia*, *T. mindanaensis*, *T. mindorensis* and *T. mucronata*. The type of *T. caudata* bears the smallest leaves observed in the species, measuring 15-35 × 4-16 mm. However, no discontinuity in shape and size or innervation could be traced.The inflorescences are rather congested to lax and few- to rather many-flowered. They may even be reduced to a single flower, as in the types of *T. biflora* and *T. linearifolia*, for example. They are two-flowered in the type of *T. caudata* and in Vanoverbergh 433 (distributed as *T. linearifolia*). Those of the type of *T. oligantha* bear 2-7 flowers and those of the types of *T. brachybotrys*, *T. congestiflora*, *T. cumingiana* and *T. mucronata* 2-10 flowers. Congested inflorescences are present in the types of *T. brachybotrys* and *T. congestiflora* and rather congested ones in those of *T. cumingiana* and *T. laurifolia* Blanco. The largest flowers are observed in relatively large-leaved specimens, e.g. the types of *T. pandacaqui* and *T. subglobosa*. The calyx varies from 1 to 3.5 mm in length. The smallests flowers usually have the smallest calyces, e.g. in the types of *T. caudata* (1 mm long) and *T. mucronata* (1.2 mm long).Slightly larger calyces than the latter are found in the types of *T. cumingiana* and *T. linearifolia*. The first of these (1.5-2 mm long) specimens has much larger corollas than the types of the two names just mentioned. The fruits are subglobose, rounded, and not riddged, e.g. in several paratypes of *T. subglobosa*; broadly ellipsoid, ridged, and acuminate in the types of *T. ecarinata*; broadly ovoid and even winged in the type of *T. cumingiana* and Borden FB 1790; narrowly ellipsoid and winged in the type of *T. hexagona*. Narrowly ellipsoid fruits also occur in this species and these are ridged or winged.Many additioned examples of the variations observed in the specimens studied could be given, e.g. small flowers with large calyces, etc. But the above notes ar sufficient to show why the present author has reduced so many names to synonyms. The different forms are frequently collected side by side. *T. panda*

caqui is sometimes cultivated under the synonym *T. cumingiana*.

Before embarking on the study of the *T. pandacaqui* collections from the Philippines and Taiwan and from cultivation, the author had studied similar specimens from easten Indonesia, Papua New Guinea, Australia, and the Pacific and had named them all *T. orientalis*. These collections were quite distinct from those of the few other *Tabernaemontana* species known from the region; and the extensive material (more than 500 collections) allowed an adequate understanding of the variability and enabled a satisfactory description to be drawn up. In fact, the study of this material was the starting point for the author's revision of the Asian species of *Tabernaemontana*. After revising most of the Asian species, a renewed comparison of material named *T. orientalis* and *T. pandacaqui* was carried out. In surveying their characters in order to prepare a key, it became clear that there was no way of distinguishing the two taxa. Pubescent specimens from the Philippines, and known as *T. polygama*, along with those collected in Thailand, and known there as *T. calcicola*, were placed under the name *T. mollis* which was based on material gathered in southern China. Collections from this last area bear a striking resemblance to pubescent specimens of *T. orientalis*, which include the type of *T. pubescens*.

The foregoing observations explain why *T. pandacaqui*, which has already acquired a long list of synonyms based on collections from the Philippines, is now being burdened with the additional synonymy of *T. orientalis* and its many synonyms (some of which were listed in LEEUWENBERG, 1984). Although unhappy about the reduction of such a large number of names, the author considers that this is the most appropriate course to take. As a result, *T. pandacaqui* now becomes the most widely distributed species of the genus, ranging from Thailand east to Tuamotu, and it has the longest list of synonyms. Even although the area of distribution is indeed vast, the species exhibits relatively little variation. It is known to occur on limestone in many localities, e.g. in Thailand, Palawan, the Moluccas, and Guam.

Tabernaemontana pauciflora Bl., Bijdr. 1028. 1826 (not Wight 1840, nor Spruce ex Muell. Arg., nor *Ervatamia pauciflora* Ridley 1922).

Type: Indonesia: Java, near Rompien, Blume 73 (L-908.335-738, lectotype, here designated).

Homotypic synonym: *Ervatamia blumeana* Mgf., Notizbl. Bot. Gart. Berlin 12: 547. 1935.

Heterotypic synonyms: *T. rhynchophylla* Miq., Fl. Ind. Bat. 2: 422, 1957, **syn. nov.** Type: Indonesia: Bangka, Horsfield s.n. (U, holotype).

T. malaccensis Hook.f., Fl. Brit. Ind. 3: 649. 1882, **syn. nov.** Type: Malaysia: Malacca, Maingay 1843A in Kew Distr. 1061 (K, lectotype, here designated; isotypes: GH, L). Homotypic synonym: *Ervatamia malaccensis* (Hook.f.) King & Gamble, Journ. As. Soc. Beng. 74. 452. 1908; Stapf, Bot. Tidsskr. 32: 337. 1916.

E. curtisii King & Gamble, tom. cit. 453. **syn. nov.** Type: Malaysia: Penang, Curtis 1775 (K, lectotype).

T. annamensis Eberhardt & Dubard, Ann. Sci. Agron. 2: 135. 1913 (ex Pitard); Cayala, Journ. Agric. Trop. 13: 383. 1913; Pitard in Fl. Indo-Chine 3: 1158. 1933, **syn. nov.** Type: Vietnam: Annam, near Hue, Eberhardt 2 (P, lectotype, here designated). Homotypic synonym: *Ervatamia annamensis* (Eberhardt & Dubard) Pichon, Mém. Mus. Hist. Nat. Paris ser. 2. 27: 220. 1949.

T. polysperma Merrill, Philip. Journ. Sc. 21:531. 1922, **syn. nov.** Type: Malaysia: Sabah: Sumawang watershed, Labuk, Castillo 667 (K, lectotype, here designated; isotypes: A, P). Homotypic synonym: *Ervatamia polysperma* (Merrill) Pichon. l.c.; Markgraf, Mitt. Bot. Staatssamml. München 1: 29. 1950 (superflous combination).

T. dinhensis Pitard in Fl. Indo-Chine 3: 1151. 1933, **syn. nov.** Type: Vietnam: Dinh Mts., near Baria, Pierre 4388 (P, lectotype, here designated; isotypes: A, NY).

T. harmandiana Pierre ex Pitard, tom. cit. 1152, **syn. nov.** Type: Vietnam: Condor Island, Harmand 780 (P, holotype; isotype: NY). Homotypic synonym: *E. harmandiana* (Pierre ex Pitard) Kerr. in Craib., Fl. Siam. Enum. 445. 1939.

E. blumeana var. *macropetala* Bakh.f., Bekn. Flora Java 7. 172: 20. 1948 (invalid, Dutch descr. only); Fl. Java 2: 228. 1965 (invalid, English descr. only). Type: Java: Pekalongan Prov., Subah, Koorders 27301b (L, holotype; isotype: BO).

Notes. *T. pauciflora* is not very variable. It is characterized by rather thin leaves, lax slender inflorescences, mostly subulate sepals, and slender corolla. Hence, there were few problems in putting together the above synonymy. The species resembles *T. bufalina*, but the latter has usually shorter sepals and corollas and torulose not ridged fruits.

Tabernaemontana persicariifolia Jacq., Coll 4: 139. 1790 (as *persicariaefolia*).

Type: apparently not preserved. Neotype: Mauritius, Sieber II-84 (G-DC, neotype; iso-neotypes: BP, BR, E, G, GOET, HAL, K, L, LD, M, MO, NY, P, W, WU, here designated).

Homotypic synonyms: *Conopharyngia persicariaefolia* (Jacq.) R.E. Vaughan, Maurit. Inst. Bull. 1.1: 59. 1937. *Pagiantha persicariaefolia* (Jacq.)Mgf., Mitt. Bot Staatssamml. 1: 29. 1950. *Pandaca persicariaefolia* (Jacq.)Mgf. & Boiteau, Adansonia ser. 2. 13: 244. 1973.

Heterotypic synonyms: *T. mauritiana* Poir., Encycl. 7: 530. 1806, **syn. nov.** Type Mauritius: Commerson s.n. (P-LA, lectotype; isotypes: C, G, MPU, P, P-JU 7164). Homotypic synonyms: *Conopharyngia mauritiana* (Poir) R.E. Vaughan, l.c. *Pagiantha mauritiana* (Poir.) Mgf., l.c. *Pandaca mauritiana* (Poir.)Mgf. & Boiteau, Adansonia ser. 2. 13: 244. 1973. partly (excl. syns. *T. obtusa* Sm. and *T. squamosa* Sm.).

T. nervosa Desf. ex Poir., Encycl. Suppl. 5: 275. 1817 (not Glaziou, 1910). Type: Cult. Hort. Paris, Desfontaines s.n. (FI-W, holotype).

T. parviflora Boj., Hort. Maur. 209. 1837 (not Poir., 1817, nor Heyne ex Wall, 1824, nor Roxb., 1832, nor Dcne., 1834). Type: Mauritius, Bojer anno 1835 (G-DC, holotype; isotypes: K, M, MAU, W). Homotypic synonym: *T. micrantha* A.DC., Prod. 8: 370. 1844 (not Voigt, 1845).

T. telfairiana Wall., Bot. Reg. 15: sub t. 1273. 1829. Type: Mauritius: Telfair 23 June 1823 in herb. Wallich 1574 (K-WALL, holotype, isotype: K). Homotypic synonym: *Oistanthera telfairiana* (Wall.)Mgf., Notizbl. Bot. Gart. Berlin 12: 547, 550. 1935.

T. borbonica Lam, ex De Cordemoy, Fl. Réunion 482. 1895. 'Type': Reunion: Richard 290 (P, lectotype; isotype: LD). No specimen annotated as *T. borbonica* in MARS. This collection bears the name on the P sheet.

Notes. The conclusion about the delimitation of this species is given in the forthcoming issue of the Flore de Mascareignes containing the contribution on the *Apocynaceae*.

T. persicariifolia (*T. mauritiana*) does not occur on Aldabra. The specimens in the Kew Herbarium colected there belong to *T. coffeoides* Boj. ex A.DC. (error in Flora to be corrected).

T. prancei (Allorge) Leeuwenberg, **comb. nov.**

Basionym: *Bonafousia prancei* Allorge, Bull. Soc. Bot. France 130, Lettres 4-5: 342, fig. 2. 1983; Mém. Mus. Natn. Hist. Nat. ser. 2B. 30: 79, pl. 31. 1985.

Type: Brazil Rondonia, basin of Rio Madeira, near Jaciparana, Prance et al. 5171 (NY, holotype).

Heterotypic synonym: *Anacampta pendula* Mgf., Brittonia 23: 438, fig. 2. 1971, **syn. nov.** (not *T. pendula* Woodsds., 1960). Type Brazil: Amazonas, Rio Urubu, between Cachoeira Iracema and Manau-Itacoatiara Road, Prance et al. 5076 (Z, holotype; isotype: NY). Homotypic synonym: *Bonafousia pendula* (Mgf.) Boiteau & Allorge, Bull. Soc. Bot. France 130, Lettres Bot. 4-5: 340. 1983; Allorge, Mém. Mus. Natn. Hist. Nat. ser. 2B. 30: 81, pl. 33. 1985.

Notes. *Anacampta pendula* is not specifically different from *T. prancei* as is supposed by Mme. ALLORGE (1985). The indumentum on the outside of the sepals and corolla varies as could be observed by comparing the specimens known.

Sepals glabrous or more or less puberulous outside, ciliate or not. Corolla outside glabrous or puberulous on the base of the lobes and often also on the apex of the tube, ciliate at the lobes or not, inside with a recurved-pubescent belt around the anthers also on filament ridged (part among anthers tails).

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LIST of recognized Tabernaemontana and Tabernanthe species and their synonyms encountered in the chemical and ethnobotanical literature, and/or in this publication.

Anacampta angulata (Mart. ex Muell. Arg.) Miers: see *T. angulata*
Anacampta disticha (A.DC.) Mgf.: see *T. disticha*
Anacampta macrocalyx (Muell. Arg.) Mgf.: see *T. macrocalyx*
Anacampta pendula Mgf.: see *T. prancei*
Anartia flavicans (Willd. ex Roem. & Schult.) Miers: see *T. flavicans*
Anartia glabrata Miers: see *T. flavicans*
Anartia meyeri (G. Don) Miers: see *T. attenuata*
Anartia oblongifolia (A.DC.) Mgf.: see *T. flavicans*
Anartia olivacea (Muell. Arg.) Mgf.: see *T. flavicans*
Anartia recurva Miers: see *T. pandacaqui*
Bonafousia brachyantha (Woodson) Allorge: see *T. luciliae*
Bonafousia chocoensis A. Gentry: see *T. chocoensis*
Bonafousia colombiensis Allorge: see *T. colombiensis*
Bonafousia latifolia Miers: see *T. flavicans*
Bonafousia longituba Mgf.: see *T. markgrafiana*
Bonafousia muricata (Link ex Roem. & Schult.) Mgf.: see *T. muricata*
Bonafousia obliqua Miers: see *T. obliqua*
Bonafousia oblongifolia (A.DC.) Miers: see *T. flavicans*
Bonafousia olivacea (Muell.Arg.) Miers: see *T. flavicans*
Bonafousia panamensis Mgf., Boiteau & Allorge: see *T. panamensis*
Bonafousia pendula (Mgf.) Boiteau & Allorge: see *T. prancei*
Bonafousia prancei Allorge: see *T. prancei*
Bonafousia speciosa (Poir.) Boiteau: see *T. siphilitica*
Bonafousia tetrastachya (H.B.K.) Mgf.: see *T. siphilitica*
Bonafousia undulata (Vahl) A.D.C.: see *T. undulata*
Camerunia bouquetii Boiteau: see *T. bouquetii*
Capuronetta elegans Mgf.: see *T. capuronii*
Conopharyngia angolensis (Stapf) Stapf: see *T. pachysiphon*
Conopharyngia brachyantha Stapf) Stapf: see *T. brachyantha* Stapf
Conopharyngia chippii Stapf: see *T. africana*
Conopharyngia crassa (Benth.) Stapf: see *T. crassa*
Conopharyngia cumminsii Stapf: see *T. pachysiphon*
Conopharyngia durissima (Stapf) Stapf: see *T. crassa*
Conopharyngia elegans (Stapf) Stapf: see *T. elegans*
Conopharyngia gentillii De Wild.: see *T. crassa*
Conopharyngia holstii (K. Schum.) Stapf: see *T. pachysiphon*
Conopharyngia johnstonii Stapf: see *T. stapfiana*
Conopharyngia longiflora (Benth.) Stapf: see *T. africana*
Conopharyngia mauritiana (Poir.) R. E. Vaughan: see *T. persicariifolia*
Conopharyngia odoratissima auct. non: see *T. odoratissima*
Conopharyngia pachysiphon (Stapf) Stapf: see *T. pachysiphon*
Conopharyngia penduliflora (K. Schum.) Stapf: see *T. penduliflora*
Conopharyngia persicariifolia (Jacq.) R. E. Vaughan: see *T. persicariifolia*
Conopharyngia retusa (Lam.) G. Don: see *T. retusa*
Conopharyngia stenosiphon (Stapf) Stapf: see *T. stenosiphon*
Conopharyngia thonneri (Th. Dur. & De Wild. ex Stapf) Stapf: see *T. crassa*
Conopharyngia thouarsii auct. non: *Voacanga thouarsii* Roem & Schult.
Conopharyngia usambarensis (K. Schum. ex Engl.) Stapfl see *T. ventricosa*
Conopharyngia ventricosa (Hochst. ex A.DC.) Stapf: see *T. ventricosa*
Daturicarpa elliptica Stapf: see *Tabernanthe elliptica*

Daturicarpa firmula Stapf: see *Tabernanthe elliptica*
Daturicarpa lanceolata Stapf: see *Tabernanthe elliptica*
Ervatamia angustisepala (Benth.)Domin: see *Tabernaemontana pandacaqui*
Ervatamia annanemsis (Eberhardt & Dubard) Pichon: see T. pauciflora
Ervatamia aurantiaca auct. non: see *T. aurantiaca*
Ervatamia baviensis (Pitard) Pichon: see *T. corymbosa*
Ervatamia benthamiana Domin: see *T. pandacaqui*
Ervatamia biflora (Elmer) Pichon: see *T. pandacaqui*
Ervatamia blumeana Mgf.: see *T. pauciflora*
Ervatamia blumeana var. *macropetala* Bakh.f.: see *T. pauciflora*
Ervatamia bovina (Lour.) Mgf.: see *T. bovina*
Ervatamia brachybotrys (Merr.) Pichon: see *T. pandacaqui*
Ervatamia bufalina (Lour.) Pichon: see *T. bufalina*
Ervatamia calcicola Kerr: see *T. pandacaqui*
Ervatamia capsicoides Merr.: see *T. pandacaqui*
Ervatamia ceratocarpa Kerr: see *T. bufalina*
Ervatamia chengkiangensis Tsiang: see *T. bufalina*
Ervatamia chinensis (Merr.) Tsiang: see *T. corymbosa*
Ervatamia continentalis Tsiang: see *T. corymbosa*
Ervatamia continentalis var. *pubituba* Tsiang: see *T. corymbosa*
Ervatamia coronaria (Jacq.) Stapf: see *T. divaricata*
Ervatamia corymbosa (Roxb. ex Wall.) King & Gamble: see *T. corymbosa*
Ervatamia corymbosa var. *pubescens* King & Gamble: see *T. corymbosa*
Ervatamia corymbosa var. *pubescens* King & Gamble: see *T. corymbosa*
Ervatamia cumingiana (A.DC.) Mgf.: see *T. pandacaqui*
Ervatamia curtisii King & Gamble: see *T. pauciflora*
Ervatamia cylindrocarpa King & Gamble: see *T. crispa*
Ervatamia daemeliana Domin: see *T. pandacaqui*
Ervatamia decaisnei (A.DC.) Mgf.: see *T. pandacaqui*
Ervatamia dichotoma (Roxb. ex Wall.) Burkill: see *T. dichotoma*
Ervatamia dinhesis (Pitard) Pichon: see *T. pauciflora*
Ervatamia divaricata (L.) Burkill: see *T. divaricata*
Ervatamia ecarinata (Merr.) Pichon: see *T. pandacaqui*
Ervatamia eriophora Mgf.: see *T. pandacaqui*
Ervatamia flabelliformis Tsiang: see *T. divaricata*
Ervatamia floribunda (Bl.) Pichon: see *T. pandacaqui*
Ervatamia floribunda var. *villosiuscula* Bakh. f.: see *T. pandacaqui*
Ervatamia hainanensis Tsiang: see *T. bufalina*
Ervatamia harmandiana (Pierre ex Pitard) Kerr: see *T. pauciflora*
Ervatamia hexagona (Merr.) Pichon: see *T. pandacaqui*
Ervatamia heyneana (Wall.) Cooke: see *T. heyneana*
Ervatamia hirta (Hook.f.) King & Gamble: see *T. corymbosa*
Ervatamia inaequalifolia (Lütjeh. & v. Ooststr.) Pichon see *T. corymbosa*
Ervatamia jasminiflora Ridley: see *T. corymbosa*
Ervatamia jasminoides Tsiang: see *T. bufalina*
Ervatamia kwangsiensis Tsiang: see *T. corymbosa*
Ervatamia kweichowensis Tsiang: see *T. corymbosa*
Ervatamia laotica (Pitard) Pichon: see *T. corymbosa*
Ervatamia laxiflora Pichon: see *T. bufalina*
Ervatamia lifuana Boiteau & Allorge: see *T. pandacaqui*
Ervatamia linearifolia (Merr.) Mgf.: see *T. pandacaqui*
Ervatamia luensis (Pierre ex Pitard) Pichon: see *T. bufalina*
Ervatamia macrocarpa (Jack) Merr.: see *T. macrocarpa*
Ervatamia malaccensis (Hook. f.) King & Gamble: see *T. pauciflora*
Ervatamia merrilliana Mgf.: see *T. pandacaqui*

Ervatamia microphylla (Pitard) Kerr: see *T. bufalina*
Ervatamia mindorensis (Merr.) Mgf.: see *T. pandacaqui*
Ervatamia montensis S. Moore: see *T. panadacaqui*
Ervatamia mucronata (Merr.) Mgf.: see *T. pandacaqui*
Ervatamia obtusiuscula Mgf.: see *T. pandacaqui*
Ervatamia officinalis Tsiang: see *T. corymbosa*
Ervatamia oligantha (Merr.) Pichon: see *T. pandacaqui*
Ervatamia orientalis (R. Br.) Domin: see *T. pandacaqui*
Ervatamia pandacaqui (Poir.) Pichon: see *T. pandacaqui*
Ervatamia parviflora (Dcne.) Meyer Drees: see *T. pandacaqui*
Ervatamia pauciflora Ridley: see *T. corymbosa*
Ervatamia pauciflora var. *minor* Ridley: see *T. corymbosa*
Ervatamia peduncularis (Wall.) King & Gamble: see *T. penducularis*
Ervatamia polygama (Blanco) Mgf.: see *T. pandacaqui*
Ervatamia polysperma (Merr.) Pichon: see *T. pauciflora*
Ervatamia puberula Tsiang & P. T. Li: see *T. pandacaqui*
Ervatamia pubescens (R.Br.) Mgf.: see *T. pandacaqui*
Ervatamia pubescens var. *barbatocalyx* (Mgf.) Mgf.: see *T. pandacaqui*
Ervatamia pubescens var. *glaberrima* Bakh. f.: see *T. pandacaqui*
Ervatamia pubescens var. *superba* Domin: see *T. pandacaqui*
Ervatamia punctulata (Warb.) Mgf.: see *T. pandacaqui*
Ervatamia punctulata var *barbatocalyx* Mgf.: see *T. pandacaqui*
Ervatamia punctulata var. *typica* subvar. *lancifolia*: see *T. pandacaqui*
Ervatamia recurva (Roxb. ex Lindl.) Lace: see *T. divaricata*
Ervatamia rotensis Kanehira: see *T. pandacaqui*
Ervatamia siamensis (Warb. ex Pitard) Kerr: see *T. divaricata*
Ervatamia shpaerocarpa (Bl.) Burkill: see *T. sphaerocarpa*
Ervatamia sralensis (Pierre ex Pitard) Kerr: see *T. bufalina*
Ervatamia subglobosa (Merr.) Pichon: see *T. pandacaqui*
Ervatamia tonkinensis (Pierre ex Pitard) Mgf.: see *T. bovina*
Ervatamia yunnanensis Tsiang: see *T. corymbosa*
Ervatamia yunnanensis var. *heterosepala* Tsiang: see *T. corymbosa*
Gabunia brachypoda (K. Schum) Stapf: see *T. eglandulosa*
Gabunia crispiflora (K. Schum.) Stapf: see *T. eglandulosa*
Gabunia dorotheae Wernh.: see *T. crassa*
Gabunia eglandulosa (Stapf) Stapf: see *T. eglandulosa*
Gabunia gentilii De Wild.: see *T. crassa*
Gabunia glandulosa Stapf: see *T. glandulosa*
Gabnunia hallei Boiteau: see *T. hallei*
Gabunia latifolia Stapf: see *T. eglandulosa*
Gabunia macrocarpa Boiteau: see *T. eglandulosa*
Gabunia odoratissima Stapf: see *T. odoratissima*
Hazunta coffeoides (Boj. ex A.DC.) Pichon: see *T. coffeoides*
Hazunta costata Mgf.: see *T. coffeoides*
Hazunta membranacea (A.DC.) Pichon: see *T. coffeoides*
Hazunta membranacea forma *pilifera* (A.DC.) Pichon: see *T. coffeoides*
Hazunta modesta (Bak.) Pichon: see *T. coffeoides*
Hazunta modesta var. *methuenii* Mgf. subvar. *methuenii*: see *T. coffeoides*
Hazunta modesta var. *methuenii* subvar. *velutina* (Pichon) Mgf.: see *T. coffeoides*
Hazunta modesta var. *modesta* subvar. *brevituba* Mgf.: see *T. coffeoides*
Hazunta modesta var. *modesta* subvar. *divaricata* Mgf.: see *T. coffeoides*
Hazunta modesta var. *modesta* subvar. *modesta*: see *T. coffeoides*
Hazunta modesta var. *modesta* subvar. *montana* Mgf.: see *T. coffeoides*
Hazunta silicola Pichon: see *T. coffeoides*
Muntafara sessilifolia (Bak.) Pichon: see *T. sessilifolia*

Oistanthera telfairiana (Wall.) Mgf.: see *T. persicariifolia*
Pagiantha cerifera (Panch. & Séb.) Mgf.: see *T. cerifera*
Pagiantha corymbosa (Roxb. ex Wall.) Mgf.: see *T. corymbosa*
Pagiantha dichotoma (Roxb. ex Wall.) Mgf.: see *T. dichotoma*
Pagiantha macrocarpa (Jack) Mgf.: see *T. marcocarpa*
Pagiantha mauritania (Poir.) Mgf.: see *T. persicariifolia*
Pagiantha oligantha (Merr.) Mgf.: see *T. pandacaqui*
Pagiantha pandacaqui (Poir.) Mgf.: see *T. pandacaqui*
Pagiantha peninsularis Kerr: see *T. corymbosa*
Pagiantha peninsularis var. *brevituba* Kerr: see *T. corymbosa*
Pagiantha persicariifolia (Jacq.) Mgf.: see *T. persicariifolia*
Pagiantha sphaerocarpa (Bl.) Mgf.: see *T. sphaerocarpa*
Pagiantha subglobosa (Merr.) Mgf.: see *T. pandacaqui*
Pandaca boiteaui (Mgf.: see *T. mocquerysii*, except for herbarium specimen Boiteau 2121 which is *T. callosa*
Pandaca caduciflolia Mgf.: see *T. calcarea*
Pandaca calcarea (Pichon) Mgf.: see *T. calcarea*
Pandaca callosa (Pichon) Mgf.: see *T. callosa*
Pandaca ciliata (Pichon) Mgf.: see *T. ciliata*
Pandaca debrayi Mgf.: see *T. debrayi*
Pandaca eusepala (Aug.DC.) Mgf.: see *T. eusepala*
Pandaca eusepaloides Mgf.: see *T. eusepaloides*
Pandaca mauritiana (Poir.) Mgf.: see *T. persicariifolia*
Pandaca minutiflora (Pichon) Mgf.: see *T. minutiflora*
Pandaca mocquersii (Aug. DC.) Mgf.: see *T. mocquersii*
Pandaca ochrascens (Pichon) Mgf.: see *T. humblotii*
Pandaca persicariifolia (Jacq.) Mgf. & Boiteau: see *T. persicariifolia*
Pandaca retusa (Lam.) Mgf.: see *T. retusa*
Pandaca speciosa Mgf.: see *T. humblotii*
Pandacastrum saccharatum Pichon: see *T. ciliata*
Peschiera affinis (Muell. Arg.) Miers: see *T. affinis*
Peschiera hystrix (Steud.) A.DC.: see *T. hystrix*
Peschiera laeta (Mart.) Miers: see *T. laeta*
Peschiera linkii (A.DC.) Miers: see *T. linkii*
Peschiera lundii (A.DC.) Miers: see *T. laeta*
Peschiera muricata (Link ex Roem. & Schult.) A.DC.: see *T. muricata*
Peschiera ochracea Miers: see *T. linkii*
Peschiera psychotriifolia (H.B.K.) Miers: see *T. cymosa*
Pseudixora sumatrana Miq.: see *T. corymbosa*
Pterotaberna inconspicua (Stapf) Stapf: see *T. inconspicua*
Randia sumatrana (Miq.) Miq.: see *T. corymbosa*
Reichardia grandiflora Dennst.: see *T. divaricata*
Rejoua anguinea auct. non: see *T. aurantiaca*
Rejoua aurantiaca (Gaud.) Gaud.: see *T. aurantiaca*
Rejouva novo-guineensis (Scheff.) Mgf.: see *T. aurantiaca*
Rejoua pacifica (Seem.) Mgf.: see *T. padacaqui*
Stenosolen heterophyllus (Vahl) Mgf.: see *T. heterophylla*
Stenosolen holothuria Mgf.: see *T. holothuria*
Taberna disparifolia Miers: see *T. flavicans*
Tabernaemontana acapulcensis Miers: see *T. amygdalifolia*
Tabernaemontana accedens Muell. Arg.: see *T. solanifolia*
Tabernaemontana affinis Muell. Arg.
Tabernaemontana africana Hook.
Tabernaemontana alba Mill.: *T. alba* if collected on the mainland of tropical America, but *T. citrifolia* (q.v.) if collected in the Antilles or Cuba

Tabernaemontana albiflora (Miq.) Pulle
Tabernaemontana alterniflolia L.: see *T. divaricata*
Tabernaemontana amblyocarpa Urb.
Tabernaemontana amygdalifolia Jacq.
Tabernaemontana angolensis Stapf: see *T. pachysiphon*
Tabernaemontana anguinea Hemsl: see *T. aurantiaca*
Tabernaemontana angulata Mart. ex Muell. Arg.
Tabernaemontana angustifolia Ait.: *Amsonia angustifolia* Mich.
Tabernaemontana annamensis Eberhardt & Dubard: see *T. pauciflora*
Tabernaemontana apoda Wr. ex Sauv.
Tabernaemontana arborea J. N. Rose ex Donn. Sm.
Tabernaemontana arcuata Ruiz & Pav.
Tabernaemontana armeniaca Areces ex R. Iglesias et L. Diatta: see *T. apoda*
Tabernaemontana attenuata (Miers) Urb.
Tabernaemontana aubletii Pulle: *Macoubea guianensis* Aubl.
Tabernaemontana aurantiaca Gaud.
Tabernaemontana aurantiaca forma *anguinea* (Hemsl.) Leeuwenberg
Tabernaemontana australis Muell. Arg.
Tabernaemontana baviensis Pitard: see *T. corymbosa*
Tabernaemontana biflora Elmer: see *T. pandacaqui*
Tabernaemontana borbonica Lam. ex. De Cordemoy: see *T. persicariifolia*
Tabernaemontana bouquetii (Boiteau) Leeuwenberg
Tabernaemontana bovina Lour.
Tabernaemontana brachyantha Stapf
Tabernaemontana brachyantha Woods.: see *T. luciliae* Leeuwenberg
Tabernaemontana brachybotrys Merr. see *T. pandacaqui*
Tabernaemontana brachypoda K. Schum.: see *T. eglandulosa*
Tabernaemontana bracteolaris Mart. ex Muell. Arg.: see *T. affinis*
Tabernaemontana bufalina Lour.
Tabernaemontana calcarea Pichon
Tabernaemontana callosa Pichon
Tabernaemontana capsiocoides Merr.: see *T. pandacaqui*
Tabernaemontana capuronii Leeuwenberg
Tabernaemontana carinata Lütjeh. & v. Ooststr.: see *T. corymbosa*
Tabernaemontana catharinensis A.DC.
Tabernaemontana caudata Merr.: see *T. pandacaqui*
Tabernaemontana ceratocarpa (Kerr) P.T. Li: see *T. bufalina*
Tabernaemontana cerifera Panch. & Séb.
Tabernaemontana chartacea Pichon: see *T. eglandulosa*
Tabernaemontana chengkiangensis (Tsiang) P. T. Li: see *T. bufalina*
Tabernaemontana chinensis Merr.: see *T. corymbosa*
Tabernaemontana chippii (Stapf) Pichon: see *T. africana*
Tabernaemontana chocoensis (A. Gentry) Leeuwenberg
Tabernaemontana ciliata Pichon
Tabernaemontana citrifolia Forst.: see *T. pandacaqui*
Tabernaemontana citrifolia L.: *T. citrifolia* if collected in the Antilles or Cuba, but *T. alba* (q.v.) if collected in Central America
Tabernaemontana coffeaefolia Boj. ex Bak.: see *T. coffeoides*
Tabernaemontana coffeoides Boj. ex A.DC.
Tabernaemontana colombiensis (Allorge) Leeuwenberg
Tabernaemontana congestiflora Elmer: see *T. pandacaqui*
Tabernaemontana continentalis (Tsiang) P. T. Li: see *T. corymbosa*
Tabernaemontana continentalis var.*pubituba* (Tsiang) P. T. Li: see *T. corymbosa*
Tabernaemontana contorta Stapf
Tabernaemontana coriacea Link ex Roem. & Schult.

Tabernaemontana coronaria (Jacq.) Willd.: see *T. divaricata*
Tabernaemontana corymbosa Roxb. ex Wall.
Tabernaemontana crassa Benth.
Tabernaemontana crassifolia Pichon
Tabernaemontana crispa Roxb. ex Wall.
Tabernaemontana crispiflora K. Schum.: see *T. eglandulosa*
Tabernaemontana cumingiana A.DC.: see *T. pandacaqui*
Tabernaemontana cumminsii auct. non: see *T. pachysiphon*
Tabernaemontana cylindracea Wall. Cat.: *Rauvolfia verticillata* (Lour.) Baill.?
Tabernaemontana cylindrocarpa (King & Gamble) Merr: see *T. crispa*
Tabernaemontana cymosa Jacq.
Tabernaemontana dammar oetan auct. non: *T. sp.*
Tabernaemontana debrayi (Mgf.) Leeuwenberg
Tabernaemontana decaisnei A.DC.: see *T. pandacaqui*
Tabernaemontana decaisnei var. *petiolata* A.DC. see *T. pandacaqui*
Tabernaemontana dichotoma Roxb. ex Wall.
Tabernaemontana diclinis Lauterb. & K. Schum.: see *T. pandacaqui*
Tabernaemontana dinhensis Pitard: see *T. pauciflora*
Tabernaemontana disticha A.DC.
Tabernaemontana divaricata (L.) R.Br. ex. Roem & Schult.
Tabernaemontana donnell-smithii Rose: *Stemmadenia donnell-smithii* (J. N. Rose ex Donn.Sm.) Woods.
Tabernaemontana ebracteata R.Br.: see *T. pandacaqui*
Tabernaemontana ecarinata Merr.: see *T. pandacaqui*
Tabernaemontana echinata Vell. *non Aubl.: see T. hystrix*
Tabernaemontana eglandulosa Stapf
Tabernaemontana elastica Spreng.: *Urceola elastica* Roxb.
Tabernaemontana elegans Stapf
Tabernaemontana entarctica Scheff.: see *T. aurantiaca*
Tabernaemontana eusepala Aug. DC.
Tabernaemontana eusepaloides (Mgf.) Leeuwenberg
Tabernaemontana flabelliformis (Tsiang) P. T. Li: see *T. divaricata*
Tabernaemontana flavicans Willd. ex. Roem. & Schult.
Tabernaemontana floribunda Bl.: see *T. pandacaqui*
Tabernaemontana fuchsiifolia A.DC.: see *T. hystrix*
Tabernaemontana glandulosa (Stapf) Richon
Tabernaemontana globosa Blanco: *Voacanga globosa* (Blanco) Merr.
Tabernaemontana grandiflora Hook.: see *T. africana*
Tabernaemontana grandiflora Jacq.: *Stemmadenia grandiflora* (Jacq.) Miers
Tabernaemontana gratissima Lindl.: see *T. divaricata*
Tabernaemontana guangdongensis P. T. Li: see *T. pandacaqui*
Tabernaemontana haematosticta auct. non.: *T. sp.?*
Tabernaemontana hainanensis (Tsiang) P. T. Li: see *T. bufalina*
Tabernaemontana hallei (Boiteau) Leeuwenberg
Tabernaemontana harmandiana Pierre ex Pitard: see *T. pauciflora*
Tabernaemontana heterophylla Vahl
Tabernaemontana hexagona Merr.: see *T. pandacaqui*
Tabernaemontana heyneana Wall.
Tabernaemontana hilariana Muell. Arg.
Tabernaemontana hirta Hook.f.: see *T. corymbosa*
Tabernaemontana holothuria (Mgf.) Leeuwenberg
Tabernaemontana holstii K. Schum.: see *T. pachysiphon*
Tabernaemontana humblotii (Baill.) Pichon
Tabernaemontana hystrix Steud.
Tabernaemontana inaequalifolia Lütjeh. & v. Ooststr.: see *T. corymbosa*

Tabernaemontana inconspicua Stapf
Tabernaemontana jasminiflora Pitard: see *T. bufalina*
Tabernaemontana javanica Miq.: see *T. sphaerocaroa*
Tabernaemontana johnstonii (Stapf) Pichon: see *T. stapfiana*
Tabernaemontana jollyana Pierre ex Stapf: see *T. crassa*
Tabernaemontana killipii Woods.: see *T. siphilitica*
Tabernaemontana kwangsiensis (Tsiang) P. T. Li: see *T. corymbosa*
Tabernaemontana kweichowensis (Tsiang) P. T. Li: see *T. corymbosa*
Tabernaemontana laeta Mart.
Tabernaemontana laevis Vell.: *Geissospermum laeve (Vell.) Miers*
Tabernaemontana laotica Pitard: see *T. corymbosa*
Tabernaemontana latifolia (Stapf) Pichon: see *T. eglandulosa*
Tabernaemontana laurifolia Blanco *non* L.: see *T. pandacaqui*
Tabernaemontana laxiflora Teijsm. & Binnend.: see *T. pandacaqui*
Tabernaemontana linearifolia Merr.: see *T. pandacaqui*
Tabernaemontana linkii A.DC.
Tabernaemontana longiflora Benth.: see *T. africana*
Tabernaemontana longifolia Benth.: see *T. siphilitica*
Tabernaemontana longipedunculata K. Schum.: see *T. aurantiaca*
Tabernaemontana longipes Donn.Sm.
Tabernaemontana luciliae Leeuwenberg
Tabernaemontana luensis Pierre ex Pitard: see *T. bufalina*
Tabernaemontana lundii A.DC.: see *T. laeta*
Tabernaemontana macrocalyx Muell. Arg.
Tabernaemontana macrocarpa Jack.
Tabernaemontana macrophylla Muell. Arg.: see *T. muricata*
Tabernaemontana macrophylla Poir.: *Macoubea guianensis* Aubl.
Tabernaemontana malaccensis Hook.f.: see *T. pauciflora*
Tabernaemontana markgrafiana Macbr.
Tabernaemontana martensii Peyr.: see *T. alba*
Tabernaemontana mauritiana Poir.: see *T. persicariifolia*
Tabernaemontana membranacea A.DC.: see *T. coffeoides*
Tabernaemontana micrantha A.DC.: see *T. persicariifolia*
Tabernaemontana microphylla Pitard: see *T. bufalina*
Tabernaemontana mindanaensis Merr.: see *T. pandacaqui*
Tabernaemontana mindorensis Merr.: see *T. pandacaqui*
Tabernaemontana minutiflora Pichon
Tabernaemontana mocquerysii Aug.DC.
Tabernaemontana modesta Bak.: *T. coffeoides*
Tabernaemontana mollis Hook. & Arn.: see *T. pandacaqui*
Tabernaemontana mucronata Merr.: see *T. pandacaqui*
Tabernaemontana multiflora Link. ex Roem. & Schult.: see *T. linkii*
Tabernaemontana multiflora Sm.: see *T. pandacaqui*
Tabernaemontana muricata Link ex Roem. & Schult.
Tabernaemontana nereifolia Vahl: see *T. amygdalifolia*
Tabernaemontana nervosa Desf. ex Poir.: see *T. persicariifolia*
Tabernaemontana noronhiana Boj. ex A.DC.: see *T. retusa*
Tabernaemontana novo-guineensis Scheff.: see *T. aurantiaca*
Tabernaemontana obliqua (Miers) Leeuwenberg
Tabernaemontana oblongifolia A.DC.: see *T. flavicans*
Tabernaemontana ochrascens Pichon: see *T. humblotii*
Tabernaemontana odoratissima (Stapf) Leeuwenberg
Tabernaemontana officinalis (Tsiang) P. T. Li: see *T. corymbosa*
Tabernaemontana oliginatha Merr.: see *T. pandacaqui*
Tabernaemontana olivacea Muell. Arg.: see *T. flavicans*

Tabernaemontana oppositifolia (Spreng.) Urb.: see *T. citrifolia*
Tabernaemontana orientalis R.Br.: see *T. pandacaqui*
Tabernaemontana orientalis var. *angustifolia* Benth.: see *T. pandacaqui*
Tabernaemontana orientalis var. *angustisepala* Benth.: see *T. pandacaqui*
Tabernaemontana orientalis var. *grandifolia* Val.: see *T. pandacaqui*
Tabernaemontana ovalis Miq.: *Kibatalia arborea* (Bl.) G. Don
Tabernaemontana pachysiphon Stapf
Tabernaemontana pacifica Seem.: see *T. pandacaqui*
Tabernaemontana palsavelensis Loes.: see *T. alba*
Tabernaemontana panamensis (Mgf., Boiteau & Allorge) Leeuwenberg
Tabernaemontana pandacaqui Poir.
Tabernaemontana parviflora Boj.: see *T. persicariifolia*
Tabernaemontana parviflora Dcne: see *T. pandacaqui*
Tabernaemontana parviflora Heyne ex Wall.: *Hunteria zeylanica* (Retz.) Gardn. ex Thw.
Tabernaemontana pauciflora Bl.
Tabernaemontana peduncularis Wall.
Tabernaemontana penduliflora K. Schum.
Tabernaemontana pentasticta Scheff.: see *T. aurantiaca*
Tabernaemontana persicariifolia Jacq.
Tabernaemontana poeppigii Muell. Arg.: see *T. sananho*
Tabernaemontana polygama Blanco: see *T. pandacaqui*
Tabernaemontana polysperma Merr.: see *T. pauciflora*
Tabernaemontana prancei (Allorge) Leeuwenberg
Tabernaemontana psorocarpa (Pierre ex Stapf) Pichon
Tabernaemontana psychotriifolia H.B.K.: see *T. cymosa*
Tabernaemontana puberula Merr.: see *T. pandacaqui*
Tabernaemontana pubescens R.Br.: see *T. pandacaqui*
Tabernaemontana pubescens Teijsm. & Binnend.: see *T. pandacaqui*
Tabernaemontana pubituba Merr.: see *T. corymbosa*
Tabernaemontana punctulata Warb.: see *T. pandacaqui*
Tabernaemontana quadrangularis auct. non: *Rhigospira quadrangularis* (Muell. Arg.) Miers (?)
Tabernaemontana recurva Roxb. ex Lindl.: see *T. divaricata*
Tabernaemontana retusa (Lam.) Palacky
Tabernaemontana rhynchophylla Miq.: see *T. pauciflora*
Tabernaemontana riedeliana Miq.: see *T. pandacaqui*
Tabernaemontana riedelii Muell. Arg.: see *T. submollis*
Tabernaemontana rigida (Miers) Leeuwenberg: see *T. muricata*
Tabernaemontana rimulosa Woods.
Tabernaemontana rotensis (Kanehira) Fosberg ex Stone: see *T. pandacaqui*
Tabernaemontana rubro-striolata Mart. ex Muell. Arg.: see *T. coriacea*
Tabernaemontana rupicola Benth.
Tabernaemontana salicifolia Wall.: *Hunteria zeylanica* (Retz.) Gardn. ex Thw.
Tabernaemontana salzmannii A.DC.
Tabernaemontana sananho Ruiz & Pav.
Tabernaemontana semperflorens Perr.: see *T. pandacaqui*
Tabernaemontana sessilifolia Bak.
Tabernaemontana siamensis Warb. ex Pitard: see *T. divaricata*
Tabernaemontana siphilitica (L.f.) Leeuwenberg
Tabernaemontana solanifolia A.DC.
Tabernaemontana speciosa Poir.: see *T. siphilitica*
Tabernaemontana sphaerocarpa Bl.
Tabernaemontana squamosa Sm. ex Spreng.: *Landolphia gummifera* (Lam.) K. Schum.
Tabernaemontana sralensis Pierre ex Pitard: see *T. bufalina*
Tabernaemontana stapfiana Britten
Tabernaemontana stellata Pichon

Tabernaemontana stenosiphon Stapf
Tabernaemontana subglobosa Merr.: see *T. pandacaqui*
Tabernaemontana submollis Mart. ex Muell. Arg.
Tabernaemontana sumatrana Merr.: see *T. corymbosa*
Tabernaemontana telfairiana Wall.: see *T. persicariifolia*
Tabernaemontana tetrastachya H.B.K. see *T. siphilitica*
Tabernaemontana thailandensis P.T. Li: see *T. pandacaqui*
Tabernaemontana thonneri Th. Dur. & De Wild. ex Stapf: see *T. crassa*
Tabernaemontana tonkinensis Pierre ex Pitard: see *T. bovina*
Tabernaemontana undulata Vahl
Tabernaemontana usambarensis K. Schum.: see *T. ventricosa*
Tabernaemontana utilis Arn.: *Lacmella* utilis (Arn.) Mgf.
Tabernaemontana ventricosa Hochst. ex. A.DC.
Tabernaemontana wallichiana Steud.: *Rauvolfia verticillata* (Lour.) Baill.; samples probably taken from *T. pandacaqui*
Tabernaemontana yunnanensis (Tsiang) P. T. Li: see *T. corymbosa*
Tabernaemontana yunnanensis var. *heterosepala* (Tsiang) P. T. Li: see *T. corymbosa*
Tabernanthe elliptica (Stapf) Leeuwenberg
Tabernanthe iboga Baill.

PART XXII

THE AFRICAN SPECIES OF WRIGHTIA R.BR.

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INTRODUCTION

After the revision of the genus *Wrightia* made by NGAN (1965) only one species has got a new name. *W. tomentosa* was rebaptized *W. arborea* by MABBERLEY (1977). The present author who used NGAN's publication to name specimens was happy to confirm his species concept. Two species, *W. demartiniana* and *W. natalensis* are indigenous in Africa and the Asian *W. arborea* is cultivated in Senegal and Kenya.

GEOGRAPHICAL DISTRIBUTION

The two species occurring in Africa are geographically separate. *W. demartiniana* is restricted to Ethiopia, southern Somalia and northern Kenya. It resembles *Commiphora* in habit and shares the same habitat. *W. natalensis* is known from eastern Zimbabwe, adjacent Mozambique and northern South Africa.

RELATIONSHIP TO OTHER GENERA

Wrightia belongs to the *Nerieae* of the *Apocynoideae*, as is mentioned by PICHON (1950) and confirmed by VAN DER PLOEG (1985). It is allied to *Pleioceras* by the corona and seeds. Furthermore it resembles *Vallaris* by the corolla.

Wrightia R.Br. in Mem. Wern. Soc. 1: 73. 1811; Pichon, Not. Syst. 14: 77. 1951; Ngan, Ann. Miss. Bot. Gard. 52: 133. 1965; Leeuwenberg in Fl Zambes. 7.2: 480. 1985, not of Solander & Naudin (1852).

Type species: *W. pubescens* R.Br.

Balfouria R.Br., tom. cit. 70. Type species: *B. saligna* R.Br. ex A.DC. (= *W. saligna* (R.Br. ex A.DC.) F. Muell.).

Anasser Blanco, Fl. Filipp. ed. 1: 112. 1837, not of Jussieu (1789). Type species: *A. laniti* Blanco (= *W. pubescens* R.Br.).

Piaggiaea Chiov., Fl. Somala 2: 290. 1932. Type species: *P. demartiniana* (Chiov.) Chiov. (= *W. demartiniana* Chiov.).

Wallida Pichon, tom. cit. 87. Type species: *W. antidysenterica* (L.) Pichon (= *Wrightia antidysenterica* (L.)R.Br.).

Scleranthera Pichon, tom. cit. 88. Type species: *S. cambodiensis* (Pierre) Pichon (= *W. dubia* (Sims) Spreng.).

Shrubs or trees, occassionally climbers. Leaves opposite, with colleters in the axils, petiolate; blade eglandular. Inflorescence terminal aggregate, dichasial or monochasial, few- to many-flowered. Flowers except for the subequal sepals actinomorphic. Sepals almost free, imbricate, with 1–2 alternate colleters or

squamellae. Corolla subrotate to subinfundibuliform, occasionally infundibuldiform or salver-shaped; tube cylindrical to campanulate, constricted at or near the mouth or not; lobes overlapping to the left; corona variously shaped, only absent in the Asian *W. religiosa*. Stamens exserted or (not in Africa) included; anthers narrow, partly fertile, introrse. Pistil: ovary composed of 2 carpels free or slightly connate at the base, united at the apex by the style; style often split at the base and widened at the apex; pistil head coherent with the anthers, subcapitate or subcylindrical, provided with a basal collar; stigmoid apex biapiculate, minute. Disk none. Fruit composed of two follicles; follicles completely connate or only at the extreme base and sometimes (not in Africa) also the apex, terete to laterally compressed, dehiscent throughout by an adaxial slit. Seeds numerous, naarowly fusiform, not beaked, with an apical coma directed towards the base of the fruit.

An Old World genus of 23 species, two of which are indigenous in Africa.

Key to the species represented in Africa

1. Leaves densely pubescent at least beneath 2
   Leaves glabrous on both sides or with minute scattered hairs above and/or pubescent on the base of the costa beneath. Southeastern Africa . . . . . 2. **W. natalensis**
2. Leaves rounded or obtuse at the apex, up to 5 cm long; follicles apocarpous. Ethiopia, Somalia, Kenya . . . . . 1. **W. demartiniana.**
   Leaves acuminate, 7–18 cm long; follicles syncarpous. Cult. . 3. **W. arborea.**

1. **W. demartiniana** Chiov., Ann. Bot. Roma 13: 405. 1915; Ngan, Ann. Miss. Bot. Gard. 52: 163. 1965.

Type: Somalia: Giuba (= Jubba) R., near Matagassile, Paoli 839 (FI, lectotype, designated by Ngan).

Homotypic synonym: *Piaggiaea demartiniana* (Chiov.) Chiov., Fl. Somala 2: 291. 1932.

Heterotypic synonym: *P. boranensis* Chiov., Miss. Biol. Borana, Racc. Bot. Angiosp.-Gymnosp. 159. 1939. Type: Ethiopia: Borana, Malca Guba sul Daua Parma, Cufodontis 86 (FI, holotype; isotype: W). Homotypic synonym: *W. boranensis* (Chiov.) Cufod., Bull. Jard. Bot. Brux. 30. Suppl. 692. 1960.

Shrub or small tree 1.50–5 m high, sometimes straggling, with white latex. Bark black; branches pale brown or grey, with finely and longitudinally fissured bark, only apically with a few lenticels; branchlets pubescent. Stipules very short, almost reduced to lines. *Leaves* opposite, those of a pair equal, shortly petiolate; petiole pubescent, 0.5–2 mm long; blade thinly papery when dried, elliptic, narrowly elliptic or occasionally obovate, 2–5 × as long as wide, 12–55 × 3–20 mm, rounded or obtuse at the apex, cuneate at the base or decurrent into the petiole, entire, pubescent on both sides, with obscure reticulate venation when mature. *Inflorescence* terminal on short lateral shoots, few-flowered, 15–25 × 15–25 mm. Peduncle pubescent, 1–3 mm long; pedicels pubescent, 4–6 mm long.

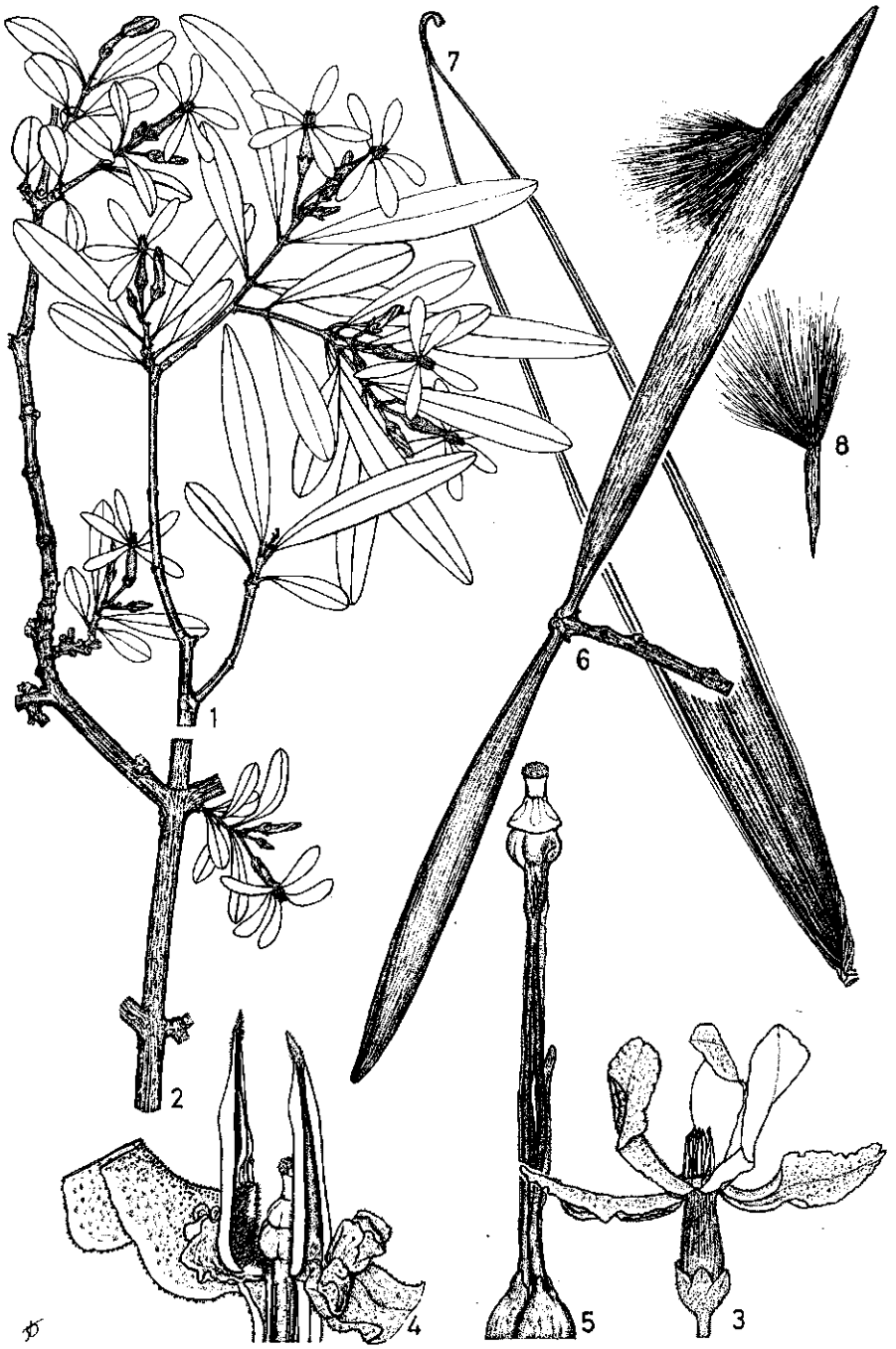


FIG. 1. *Wrightia demartiniana*: 1–2. flowering branches, × 2/3; 3. flower, × 2; 4. opened flower apex, × 8; 5. pistil, × 8; 6. fruit, × 2/3; 7. open follicle, × 2/3; 8. seed, × 2/3. 1 from Cufodontis 86; 2–5 from Gillett 12530; 5 from Paoli 680; 7 from Paoli 896; 8 from Paoli 680.

Bracts sepal-like, about half as long as the sepals. Flowers sweet-scented. *Sepals* connate at the base for 0.3–0.5 mm, erect, slightly spreading in dried flowers, ovate or broadly ovate, 1–2 × as long as wide, 1.5–2.8 × 1–1.8 mm, imbricate in bud, obtuse, entire, pubescent outside, not or rather obscurely ciliate, glabrous and with one large squamella inside; squamellae 5 in the whole calyx, about the same size as the sepals. *Corolla* white or creamy, in the mature bud forming a narrowly ellipsoid head usually slightly longer than the tube, pubescent outside, except for the glabrous base, inside pubescent on the lobes and with stiff recurved hairs on the filament-ridges among the anther tails; corona 1–1.5 mm high, shortly lobed, undulate, seemingly entire, glabrous or pubescent outside; tube 2.4–3.7 × as long as the calyx, 0.46–0.7 × as long as the lobes, 5–7 mm long, almost cylindrical, mostly slightly inflated just above the base and there 1.5–3.5 mm wide, gradually narrowed towards the throat and there 1–2.5 mm wide, not twisted; lobes overlapping to the left, oblong, 1.4–2.2 × as long as the tube, 2.6–3.5 × as long as wide, 10–14 × 3–5 mm rounded, spreading. *Stamens* exserted, inserted at the corolla mouth; anthers sessile, only at the base surrounded by the corona, narrowly ovate or oblong, 4–7 × as long as wide, 3.5–4 × 0.5–1 mm, acuminate at the for 0.5 mm sterile apex, shortly sagittate at the base, pubescent outside at the apex. *Pistil* glabrous, 4.5–6.5 mm long; ovary subglobose, 1–1.5 × 1–1.5 mm, of two separate carpels; style rather thick, persistent when the corolla is shed, 2–5 mm long; pistil head shed with the corolla, composed of a subglobose basal part 1 mm in diameter, with a ring in the middle and a 2-lobed apical part 0.5 × 0.5 mm. About 30 ovules in each carpels. *Fruit* of 2 follicles united at the extreme base; follicles narrowly fusiform, 12–31 cm long and about 8 mm in diameter, pubescent outside, not lenticellate, acuminate at the apex, narrowed towards the base. *Seed* pale brown, 19–25 × 2 × 1 mm, longitudinally ribbed, with a 3.5–4 cm long coma of dirty white unbranced smooth hairs; testa thin, smooth, glabrous; endosperm absent; embryo white, filling the seed; cotyledons rolled up; rootlet conical 6 × 1.5 mm.

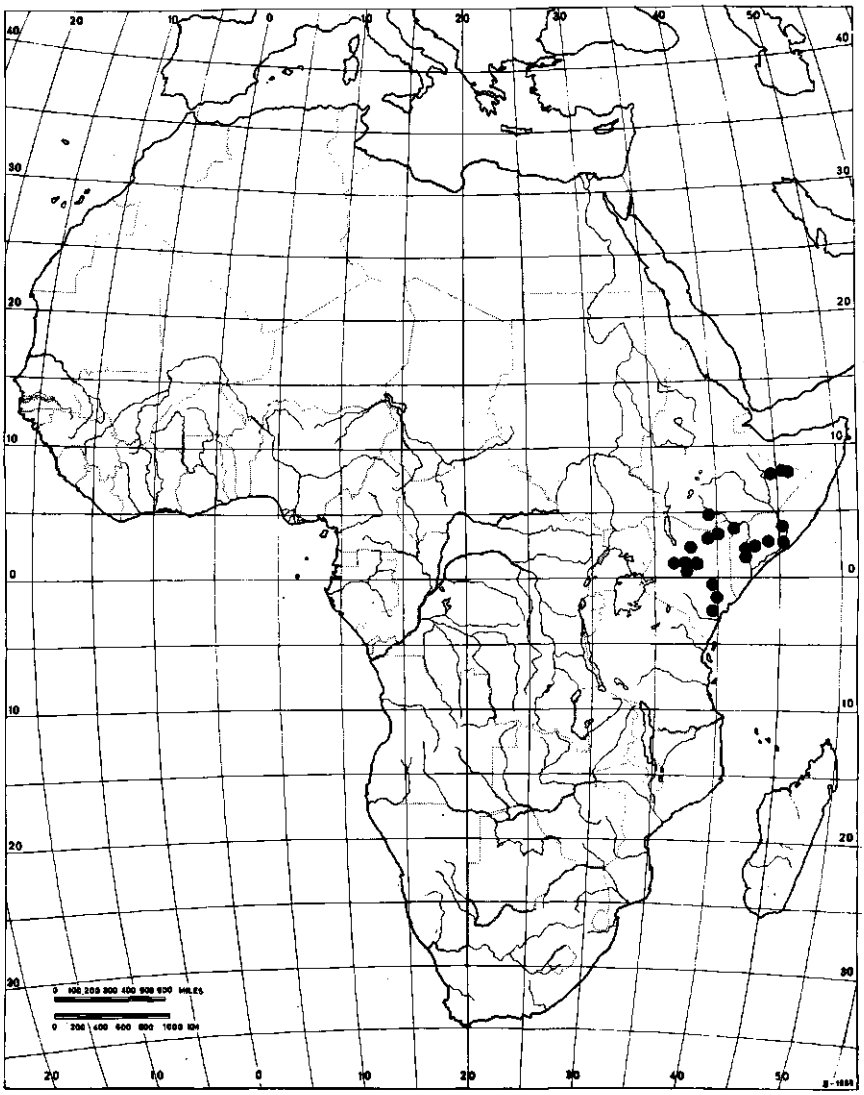
Distribution: Kenya, Ethiopia, Somalia.
Ecoloy: Acacia and Commiphora bushland, Alt. 100–1000 m.

Vernacular names:

ETHIOPIA: Haiyo, Hiyho (near Wardere), Dambi, Habrota, Maiyu, Takadaua (Boran), Magara, Rabban (Boran for the flower), Muka (Boran for the stem).
SOMALIA: Maiyo (Somali).
KENYA: lailé (Samburu).

Speciments examined:

ETHIOPIA: HARRAR PROV.: Ogaden, sin. loc., Simmons 2 (EA); Wardere Area (fl. Oct.) Ellis 108 (K); Wardere (fl. Oct.) Hemming 372 (EA, FI, K); Barnes 11960 (EA, FI, K), (fl. Apr.) Simmons 8 (EA, K; with Ngan err. 58); 6 km N of Wardere (fr. June) Hemming 1478 (EA, K); 85 km E of Wardere (fr. July) Hemming 1515 (EA, K). SIDAMO: Borana, 10 km W of Melka Guba (fl. Oct.) Mooney 9761 (WAG); Malca Guba sul Daua Parma (fl. Mar.) Cufodontis 86 (FI, W. type of *W. boranensis*).



MAP 1. *Wrightia demartiniana*

SOMALIA: 10 km N of Bulo Burto, Roffy 3 Dec. 1960 (EA); Vilabruzzi, N of Mogadishu (fl., fr. Oct.) J. G. le Roux 54 (EA); 20 km W of Bur Hacaba (bud Sept.) Bond & Peckaree 2 (EA); Dinsor (fl. July) Bally 9334 (EA); near Matagoi (imm. fr. July) Paoli 680 (FI, paratype); Jubba R., near Matagasile (fl. Sept.) Paoli 839 (FI, lectotype); Jubba R., near Biobahal (fl., fr. Sept.) Paoli 851 (FI, paratype) between Dorianle and Oneiatta (fl., fr. Oct.) Paoli 896 (FI, paratype); Salagle (fl. Oct.) Tozzi 264 (FI).

KENYA: K1: Kiliwa Heri, Mandera (fl. Sept.) Adamson 77 (EA, K); Dandu (fl., fr. July) Gillett 12530 (B, BM, FI, G, K, S, W), near Mt. Korondil, on Lensayu Rock (fl. Mar.) Bally 12588 (FI,

K); Mt. Nyiru, Samburu Distr. (fl. Nov.) Hepper & Jaeger 6809 (K); ibid. (fl. Dec.) Newbould 3260 (FI, K, S); between Samburu Lodge and Archers' Post (fl. Apr.) Gillett 20192 (K); 2 km NW of Samburu Game Lodge (fl. Oct.) Verdcourt 3794 (K); Ngurnett, Maralal Distr. (fl., fr. Sept.) Herlocker 157 (K); Mathew Range, Lannaiken (imm. fr. June) Sally 3694 (K); 16 km N of Archers' Post (fl. March) Dale K 776 (EA, FI, K); km 41 Isiolo-Marsabit Road (imm. fr. July) Verdcourt & Dale 2212 (EA, K, UPS). K4: Shaptiga, 54 km NE of Isiolo, Meru Distr. (fr. Mar.) Bally & Carter 16596 (K); Galane Ranch, Dakadima Hill (fl., fr. May) Bally 16697 (EA, K), K7: Kora Game Res., Kamunyu Hill, Tana R. Distr. (fl. May) Mungai et al. 364/83 (K); 21 km W of Garissa (fl. Oct.) Bally 9378 (K, UC); 20 km N of Hola, Tana R. Distr. (fl. Oct.) Robertson 1771 (K, MO); W of Galole (fl., fr.) Makin March 1964 (EA).

2. **Wrightia natalensis** Stapf, Kew Bull. 1907: 51. 1907; Codd in Fl. Southern Afr. 26: 296. 1963; Ngan, Ann. Miss. Bot. Gard. 52: 161. 1965; Leeuwenberg in Fl. Zambes. 7.2: 480, tab. 113. 1985. Type: South Africa: Natal, Umzinyati, J. W. Wood 7891 (K, holotype; isotype: BOL). **Map 2**

Tree 2–15 m high. Trunk fluted (teste T. Müller 669), repeatedly dichotomously branched. Bark pale grey-brown, inner bark white or brownish, with white latex. Branches pale grey-brown, lenticellate, with shallowly longitudinally fissured bark; branchlets glabrous or only when very young sparesely pubescent, terete, often sulcate when dried. *Leaves* opposite, shortly petiolate, those of a pair equal; petioles glabrous or sparsely pubescent, 3–5 mm long, channeled above, with colleters in the axils; blade membranaceous when dried, narrowly ovate or narrowly elliptic, 3–6.5 × as long as wide (in some lower leaves sometimes 2.5 ×), 3.5–10 × 1–2.7 cm, long-acuminate at the apex, cuneate or rounded at the base and there often unequal-sided, entire, glabrous or sometimes with minute scattered hairs above, pubescent at the base of the costa or sometimes entirely glabrous beneath; costa often impressed above; secondary veins 8–15 at each side, rather inconspicuous. *Inflorescence* solitary, terminal or in the forks, erect, 2–5 × 2–5 cm, 2× branched. Peduncle 3–5 mm, slender, and pubescent as the branches and the 3–5 mm long pedicels. Bracts linear, about as long as the sepals, pubescent outside, deciduous, leaving conspicuous leaf scars. *Flowers* with a pleasant odour (teste Pooley 71). *Sepals* pale green, with a membranaceous margin, persistent even under the fruit, almost free, narrowly ovate or elliptic, 2–2.4 × as long as wide, 5–6 × 2.2–2.5 mm, obtuse, imbricate in bud, with often recurved apices (when dried), entire, outside sparsely pubescent, especially at the base, ciliate, inside with 5 large colleters alternating with them; colleters 1 × 0.8 mm, flat, entire or 3-lobed. *Corolla* creamy; tube almost cylindrical, slightly constricted at the insertion of the stamens, slightly shorter than the sepals, 4–5 × 1.7–2.8 mm, glabrous on both sides; lobes elliptic, 2–3.3 × as long as wide, 7–9 × 2.7–3.5 mm, obtuse, puberulous on both sides, spreading, in bud overlapping to the left. Corona composed of 2 rings inserted at the mouth; outer ring consisting of 5 basally united emarginate lobes, almost half as long as the anthers, 2–2.5 × 1.5–2 mm, each with triangular tips 1 × 1 mm, and inside it a series of 10 shorter filiform appendages 1.5–2 × 0.3 mm, near the edges of the anthers. *Stamens* exserted, inserted 0.5–1 mm below the corolla mouth; filaments very short, glabrous, 0.3–0.5 mm long; anthers narrowly trian-

gular, 4.5–5.5 × 1–1.4 mm, acuminate at the for 0.3–0.5 mm sterile apex, auriculate at the base, introrse, dehiscent throughout by a longitudinal slit even into the auricles, glabrous outside or at the apex with a few stiff hairs, inside on lower half of connective with a penicillate line of hairs directed downwards just below the level where it is coherent with the clavuncula. *Pistil* glabrous, 6.8–7.7 mm long; ovary broadly ovoid, 1.5–1.7 × 1.5–2 × 1.5–2 mm, composed of 2 free carpels; style often split at the base, 3.5–4.5 mm long, cylindrical; pistil head 1.4–1.5 × 1–1.2 mm., whit a minute stigmoid apex 0.2 × 0.1 mm. Style and pistil head shed with the corolla as the latter is coherent with the anthers. In each cell about 100 ovules. *Fruit* composed of 2 slender follicles united at the extreme base only; follicles cylindrical, 20–40 × 0.8–1 cm, acuminate at the apex and there joined, cuneate at the base, with many pale lenticels, dehiscent throughout by an adaxial longitudinal slit, and becoming flat and 15–17 mm wide. *Seed* pale brown, fusiform, 15–19 × 2 mm, longitudinally striate, not beaked, with an apical coma, 3–5 cm long, directed towards the base of the fruit.

Distribution: Mozambique, Zimbabwe, Swaziland, South Africa (Transvaal, Natal).

Ecology: Woodland, light forest, or bush. Alt. 0–1000 m.

Vernacular names:

MOZAMBIQUE: mtatsala (Shizonga).

SOUTH AFRICA: Transvaal: Mohlare-ose-nkoxo-ine (Bakore Luto).

NATAL: Mpengende (Zulu), Umkhotompugane (Tonga).

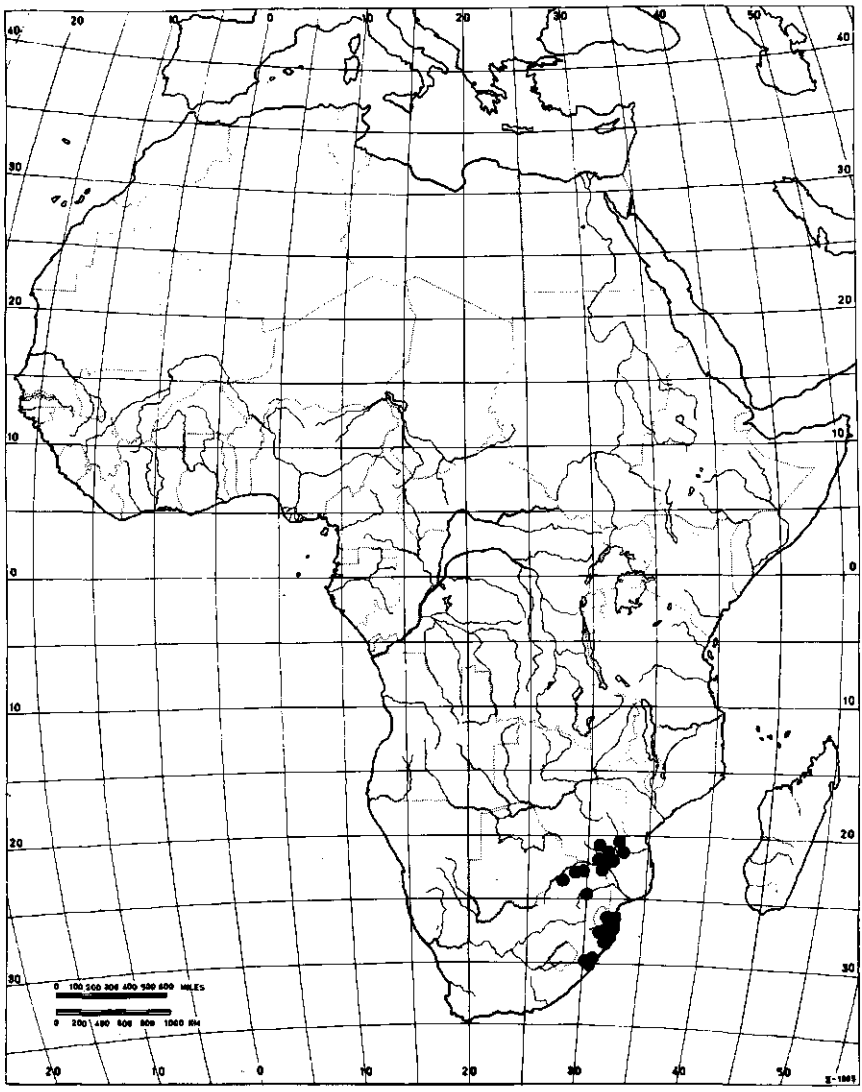
Specimens examined:

ZIMBABWE: E. PROV.: E escarmpment of Sabi R., near the Mwangazi Gap, Pope et al. 1430 (K, MO, PRE, SRGH); Musagwe R., Chisumbanje, Sabi Valley, Chipinga Distr. (fl. Oct.) Plowers 2724 (K, SRGH). S. PROV.: Nyoni Mts., Chibi Distr., Müller & Gordon 1308 (SRGH); S of Shirugwe Hill, 27 km N of Bubye-Limpopo Rs. confluence (fr. May) Loveridge SRGH 85932 (COI, MO, SRGH); Gubulware, Nuanetsi (= Mwenezi) Distr. (fr. July) Carter 28/53 (MO, SRGH); Gona re Zhou Nat. Park (fl. Oct.) Drummond 10403 (B, K, M, MO, PRE, SRGH); ibid. (fr. Sept.) Müller 669 (SRGH); ibid. (fr. Aug.) Sherry 381/71 (SRGH); ibid., Chefu R. (fl. Oct.) Sherry 456/71 (SRGH).

MOZAMBIQUE: GAZA: near Nassangena, Limpopo (fr. July) Correira & Marques 3032 (WAG). SUL DO SAVE: 'Picadilly Circus', Sherry 13/69 (LISC, SRGH). MAPUTO: between Bela Vista (= Matutuine) and Porto Henrique (fr. Feb.) Balsinhas 2379 (WAG); Santaca (fl., dry fr. Aug.) Gomes e Sousa 3791 (COI, K, PRE, S); Catuana (fr. Mar.) Hornby 2625 (K, PRE, SRGH).

SWAZILAND: Chilobe Forest, Stegi Distri., Compton 30068 (NBG); Murray's Farm, Umbombo Mts. (fr. June) Miller 5/55 (FHO).

SOUTH AFRICA: TRANSVAAL: Blaauwberg, (fr. May) v.d. Schijff 7485 (PRU); Vendaland, Trip, S of Mutamba R., van Wijk 2758 (PRU); 32 km N of Louis Trichardt (fl. Nov.) van Vuuren 1626 (K, M); Masekaspoort, Louis Trichardt (fl. Oct.) v.d. Schijff 5187 (PRU); Wyllies Poort, Soutpansberg Distr. (fr. Mar.) Godd & Dyer 3925 (MO); ibid. (fr. Dec.) Dyer 4326 (K, MO); ibid. (fr. June) Pole Evans 3421 (K, MO), (fl., fr. Oct.) 3524 (K, MO, S, SING); ibid. (imm. fr. May) Van Graan & Hardy 508 (K); ibid (fr. May) de Winter 7746 (K); Sekoekoeniland, Lydenburg Distr., Barnard & Mogg 893 (K); Erasmus Pass, Lydenburg Distr. (fr. Feb.) Strey 3607 (BM, FHO, K, M); Mogol Nat. Res. (imm. fr. Feb.) Fourie 2692 (K); Kruger Nat. Park, Wambia (imm. fr. Dec.) v.d. Schijff 3347 (K), 4107 (K, UPS). NATAL: Mahemane Bush (Tinely), Ndumu Game Res. (fl. Nov.) Moll



MAP 2. *Wrightia natalensis*

4292 (K); 3 km SE of Ndumu (fr. May) Stephen 712 (K); Ndumu (fl. Sept.) Pooley 71 (E); Ndumu Game Res. (imm. fr. Jan.) Tinley 411 (E, FHO, K, M); Ubombo Distr., km 27 Jozini-Mbazwana Road (fl. Oct.) de Winter & Vahrmeijer 8464 (K); ibid., Vahrmeijer & Tölken 207 (K); False Bay, Hlabisa Distr. (bud Oct.) Bayer 20 (K), (imm. fr. Jan.) 1464 (E); ibid. (imm. fr. Jan.) Strey 7343 (K, M, S); ibid. (fr. Apr.) Ward 1136 (MO), (fl. Oct.) 1633 (E, K, UPS); Umgeni Valley, near Nagle Dam, Cheadle 627 (K, M); Umgeni Valley, Dyill Line Road, Camperdown Distr. (imm. fr. Feb.) Edwards 2703 (K); Shangmeni Dam, Camperdown Distr., Morris 603 (K); Umzinyati (fl. Sept., Oct., fr. Mar.) Wood 7891 (BOL, K, type), 11530 (B, MO, SAM, STE, Z), 12253 (K).

3. **W. aborea** (Dennst.) Mabberley

SENEGAL: Dakar, Hann (fr. Jan.) Adam 326 (MO), (fl. July) Adam 11049 (MO), (fl. July) Berhaut 955 (Z).

KENYA: sin. loc. (fl. March) Greensmith H 91/63 (EA).

EXCLUDED SPECIES

Wrightia afzelii K. Schum. in Engler, Bot. Jahrb. 23: 231. 1896 = *Pleioceras afzelii* (K. Schum.) Stapf

W. madagascariensis Boj. ex A.DC., Prod. 8: 408. 1844. = *Asclepiadacea.*

W. parviflora Stapf, Kew Bull. 1894: 121. 1894. = *Pleioceras barteri* Baill.

W. stuhlmannii K. Schum. in Engler, Pflanzenw. Ost-Afr. C: 319. 1895 and in Engler & Prantl, Nat. Pflanzenf. 4.2: 183. 1895 = *Alafia lucida* Stapf.

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PICHON, M., 1950. Classification des Apocynacées: XXV. Échitoïdées et supplément aux Pluméroïdées. – Mém. Mus. Nat. Hist. Nat. Paris ser. 2B. **1**: 1–173.

PLOEG, J. VAN DER, 1985. Revision of the genera Cyclocotyla Stapf, Dewevrella De Wild. and of the African species of the genus Malouetia A.DC. (Apocynaceae). – Agric. Univ. Wageningen Papers 85-2: 57–83.

INDEX OF SCIENTIFIC NAMES

PART XXIII

THE AFRICAN SPECIES OF OCHROSIA JUSS.

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INTRODUCTION

The genus *Ochrosia* is widespread in coastal areas in tropical Asia and in Oceania. The western most localities are in Africa, where only two species occur. *O. borbonica* is known from the Mascarene Islands and *O. oppositifolia* from the Seychelles. It is not clear if *O. borbonica* is restricted to these islands. *O. oppositifolia,* however, is widely distributed on the islands in the Indian and Pacific Oceans and on the coasts of tropical Asia.

The delimitation of the genus was often disputed. Several segregates existed, the last of which was *Neisosperma*. FOSBERG who was in great favour of maintaining the latter segregate, discovered characters of which he assigned some to *Neissosperma* and others to *Ochrosia* together in a single species (personal communication).

Ochrosia belongs to the tribe *Rauvolfieae* of the subfamily *Plumerioideae*. The tribe is characterized mainly by possession of a drupe, and by the anthers being not coherent with the pistil head.

Ochrosia Juss., Gen. Pl. 144. 1789; Schumann in Engler & Prantl, Nat. Pflanzenf. 4.2: 155. 1895; Pichon, Mém. Mus. Nat. Hist. Nat. Paris sér. 2. 27: 169. 1949; Boiteau, Allorge & Sevenet, Adansonia sér. 2. 14: 485. 1974; Fosberg, Boiteau & Sachet, Adansonia sér. 2.17: 23–33. 1977; Markgraf, Blumea 25: 233. 1979; Boiteau & Allorge, Fl. Nouv. Caled. 10. Apoc. 47. 1981.

Type species: *O. borbonica* J. F. Gmel.

Heterotypic synonyms: *Caplpicarpum* G. Don, Gen. Syst. 4: 100. 1837, partly, exclusive of *C. roxburghii* G. Don (= *Kopsia fruticosa* (Ker)A.DC.); Boiteau, Adansonia sér. 2. 14: 495. 1974. Lectoype species: *C. opositifolium* (Lam.) Boiteau (= *C. lamarkii* G. Don = *Ochrosia oppositifolia* (Lam.) K. Schum., designated by Boiteau).

Neisosperma Rafinesque, Sylva Tellur. 162. 1838; Fosberg & Sachet, Micronesia 8: 48. 1972; Adansonia sér. 2. 17: 19–22. 1977; Boiteau & Allorge, Fl. Nouv. Caled. 10. Apoc. 64. 1981. Lectotype species: *N. muricatum* Rafinesque (= *N. oppositifolium* (Lam.) Fosberg & Sachet (as *oppositifolia*) = *O. oppositifolia* (Lam.) K. Schum., designated by Boiteau & Allorge).

Lactaria Rumphius, Herb. Abmoin. 2: 255. 1741, nomen illeg., also ex Rafinesque, l.c. Type species: *L. salubris* Rumph. ex Rafinesque (= *O. oppositifolia* (Lam.) K. Schum.).

Pseudochrosia Bl., Mus. Lugduno-Bat. 1: 158. 1850; Schumann, tom. cit. 156. Type species: *P. glomerata* Bl. (= *O. glomerata* (Bl.) Val.).

Bleekeria Hassk., Retzia 1: 38. 1855. Type species: *B. kalocarpa* Hassk. (= *O. calocarpa* (Hassk.) Miq. = *O. elliptica* Labill.).

Excavatia Mgf. in Engler, Bot. Jahrb. 61: 194. 1927. Lectotype species: *E. littoralis* (Merr.) Mgf.: = *o. ackeringae* (Teijsm. & Binnend.) Miq., here designated.

Trees or shrubs with white latex. Leaves in whorls of 3–5 or opposite (the latter not present in African species). Inflorescences terminal, with the branchlets at each ramification and therefore seemingly axillary, cymose. Sepals broadly ovate or nearly so, obtuse, without colleters inside. Corolla salver-shaped, white or whitish; lobes oblong, overlapping to the right. Stamens included; anthers oblong. Fruit apocarpous, rarely (not here) hemisyncarpous or syncarpous, drupaceous; mesocarp fibrous, attached to the endocarp. Seeds 1–3 in each carpel, flat, suborbicular or elliptic.

About 30 species from the Mascarenes and Seychelles in the West throughout the Pacific (also Indonesia, N. Australia, Malay Peninsula).

Key to the species occurring in Africa

Leaves 1.5–5 × as long as wide, 1.5–5 cm wide; sepals 2.5–3 mm long, minutely ciliate; mericarps with lateral ridges, 37–46 mm long. Mascarene Islands . . . . . 1. **O. borbonica**

Leaves 1.5–2.6 × as long as wide, 3–14.5 cm wide; sepals 1–2 mm long, not ciliate; mericarps smooth, 50–80 mm long. Seychelles . . . 2. **O. oppositifolia**

1. **Ochrosia bornica** J. F. Gmel., Syst. 2: 1791; A De Candolle, Prodr. 8:356. 1844; Baker, Fl. Maurit. & Seych. 223. 1877; De Cordemoy, Fl. Réun. 481. 1895; Verdcourt, Kew Bull. 37: 68. 1982. Type: Réunion: Commerson July 1771 (P, holotype; isotype: BM, FI, G, MPU, P).

Homotypic synonyms: *Cerbera borbonica* (J. F. Gmel.) Spreng., Syst. 1: 642. 1825. *Ophioxylon ochrosia* Pers. Syn. 1: 266. 1805.

Heterotypic synonyms: *O. maculata* Jacq., Collect. 4: 218. 1791 and Icon. 10: t. 321. 1797 (illigitimate; cites Jussieu, Gen. Pl. 144. 1789 and *Cerbera parviflora* Forst., Flor. Insul. Austr. Prodr. 19. 1786 which is *O. oppositifolia* (Lam.) K. Schum.); Pichon, Mém. Inst. Sci. Madag. sér. B. 2: 40. 1949. Homotypic synonyms: *Cerbera maculata* (Jacq.) Willd., Sp. Pl. 1: 1223. 1797. *Tanghinia maculata* (Jacq.) G. Don in Sweet, Hort. Brit. ed. 3: 461. 1839. *Lactaria maculata* (Jacq.) O. Kuntze, Rev. 415. 1891.

Cerbera undulata Andr., Bot. Rep. London 2: pl. 130. 1801. Type: icon. cit. Homotypic synonym: *O. undulata* (Andr.) Boj., Hort. Maur. 206. 1837.

Rauvolfia striata Poir. in Lamarck, Encycl. 6: 83. 1804 and Suppl. 4: 656. 1816. Type: Mauritius: Commerson s.n. (P-JU 7170, lectotype; isotype: P; paratype: P-LA).

Tabernaemontana obtusa Sm. in Rees, Cyclop. 35. Tabernaemontana no. 8. 1819. Type: Réunion: Commerson s.n. (BM, lectotype).

Chassalia clusiifolia DC., Prodr. 4: 532. 1830. Type: Mauritius, Sieber II-89 (G-DC, holotype; isotypes: BR, HAL, K, M, P).

Candelabrum-shaped tree 3–15 m high, entirely glabrous, except for the minutely ciliate sepals. Trunk 7–40 cm in diam.; bark dark grey, longitudinally and horizontally fissured. Branches lenticellate, with ring-shaped leaf scars; branchlets terete, sulcate when dry, glabrous. *Leaves* quaternate, rather long-petiolate;

FIG. 2. *Ochrosia borbonica*: 1. flowering branch, × 2/3; 2. corolla, × 2; 3. opened corolla, × 2; 4. pistil, × 6; 5. dried fruit, × 2/3; 6. longitudinal section of dried fruit, × 2/3. 1 from Susplugas 2037; 2–4 from Friedmann 2830; 5 from Lorence 2644; 6 from Bouton s.n. (K).

petiole 5–35 mm long, widened into an intrapetiolar stipule at the base, with a dense row of colleters in the axils; blade obovate, elliptic, or narrowly so, 1.5–5 × as long as wide, 3–25 × 1.5–5 cm, rounded, retuse, acute, or less often acuminate, decurrent into the petiole; with numerous straight secondary veins forming an almost right angle with the midrib, being more or less reticulate-ramified. *Inflorescences* terminal (with the branchlets at each ramification), many-flowered, long-pedunculate, about as long as the leaves. Peduncle 2–12 cm long. Bracts scale-like. *Flowers* fragrant, shortly pedicellate or sessile. *Calyx* subtended by a sepal-like bracteole; sepals green, free, equal or subequal, ovate, 1.3–2 × as long as wide, 2.5–3 × 1.5–2 mm, erect, thick, rounded, entire, minutely ciliate, glabrous on both sides, without colleters. *Corolla* white, pink or red in the throat, in the mature bud 10–17 mm long of which the lobes 1/3–1/2 or 4–9 mm, forming an ellipsoid head with a blunt apex slightly wider than the tube, glabrous outside; tube 2.5–3.3 × as long as the calyx, 0.8–1.3 × as long as the lobes, 7.5–10 mm long, almost cylindrical, slightly widened around the stamens and there 2–2.7 mm wide; lobes not or only slightly twisted, elliptic, 1.3–2 × as long as wide, 6–13 × 3–7 mm, rounded, auriculate at the left side of the base, entire, spreading. *Stamens* included, inserted 5–7 mm (being 1/3–2/3 of the length of the tube) from the base; filaments short, about half as long as the anthers, filiform, glabrous; anthers narrowly ovate, 1.5–1.7 × 0.5–0.6 mm, introrse, completely fertile, acute or subacuminate at the apex, sagittate at the base. *Pistil* glabrous, reaching the middle of the anthers, 5–6.7 mm long; ovary subglobose, 0.7–1.2 × 0.7–1 × 0.7–1 mm, retuse at the apex, of 2 carpels; carpels connected at the base by an entire disk-like 0.1 mm high ring (usually not increassate); style split at the base, 2.5–4 mm long, not thickened, inserted just below the apices of the carpels; pistil head nearly conical, 0.8–1.3 × 0.5–0.6 mm. In each carpel 4 ovules. *Fruit* composed of 2 separate mericarps of which sometimes only one developing; mericarps ellipsoid, laterally compressed, 37–46 × 22–28 × 16–23 mm, with 2 lateral ridges; mesocarp fibrous, united with the stone.

Distribution: Mascarene Islands.

Ecology: Forest. Alt. 300–1250 m. Flowering found almost the whole year, but mainly in January and February; fruiting observed in January, February, May, November and December.

Vernacular name: Bois jaune (Réunion, Mauritius).

Specimens examined:

MAURITIUS: Aublet s.n. (BM); Bijoux 6 (MAU); Blackburn s.n. (GH, K); Bojer s.n. (K, MPU, type of *O. undulata*); Bouton anno 1829 (P), anno 1830 (G, K, MAU, MPU, P); Carmichael anno 1813 (K); Commerson s.n. (FI-W, P, P-JU, type of *Rauvolfia striata*), s.n. (C); Hardwick s.n. (BM, G); Martin s.n. (G); Néraud s.n. (G); Pacupi MAU 1061 (MAU); Roxburgh anno 1813 (BM); Sieber II 89 (BR, E, HAL, K, M, P, type of *Chassalia clusiifolia*); Wallich 1815 (BM); Gaulettes Serrées, Lorence 2644 (K, MO, P, US).

RÉUNION: Aublet s.n. (BM); Balfour presented (E); Boivin 1221 (FI-W, G, P, UPS), 1222 (P); Bory anno 1844 (TCD); Commerson July 1771 (BM, FI, G, MPU, P, type); 283 (L, P); De Lessert anno 1836 (P); Herb. Du Petit Thouars s.n. (P); Gaudichaud July 1837 (G, P); Richard 289 (G, K, L, P), 451 (FI-W, P); Dos d'Ane, Susplugas 2037 (P); Plaine des Palmistes, M.G. de l'Isle 406 (K, P, US); ibid., Susplugas 2034 (P); between Behour and Plaine des Palmistes, Bernardi 15168 (BM, C, G, K, MO, P); Brulé de St. Denis, M.G. de l'Isle Feb. 1874 (P); ibid., Lorence 2486 (K, MO, P); Hauts de Riv. St. Denis, Friedmann 1679 (P); Mts. of St. Denis, Junot Sept. 1956 (P); ibid., La Grande Chaloupe, Bernardi 14569 (G, K, P); ibid., Friedmann 2830 (P), 3032 (P); between Brulé du Baril and St. Philippe, Cadet 3485 (P), 4867 (P); Mare Longue, St. Philippe, Barclay 682 (K, MAU); ibid., Bosser 20650 (P); ibid., Cadet 5073 (K, P); ibid., Capuron SF 28186 (P); ibid., Friedmann 1046 (P, WAG), 3229b (P); ibid., Maillot 8 (P); ibid., Susplugas 2033 (P), 2038 (P).

2. **Ochrosia oppositifolia** (Lam). K. Schum. in Engler & Prantl, Nat. Pflanzenf. 4. 2: 156. 1895; Backer & Bakhuizen v.d. Brink, Fl. Java 2: 232. 1965.

Basionym: *Cerbera oppositifolia* Lam., Encycl. 1: 62. 1783.

Type: Rumphius, Herb. Amboin. 2: 255, t. 84. 1742.

Homotypic synonyms: *Calpicarpum lamarkii* G. Don, Gen. Syst. 4: 100. 1837. *Lactaria salubris* Rumph. ex Rafinesque, Sylva Tellur. 162. 1838. *Ochrosia salubris* Bl., Mus. Bot. Lugd.-Bat. 1: 158. 1850. *Bleekeria salubris* Hassk., Nat. Tijdschr. N. 1. 10: 41. 1856. *Lactaria oppositifolia* (Lam.) O. Kuntze, Rev. 415. 1891. *Neisosperma oppositifilium* (Lam.) Fosb & Sach., Micronesia 8: 48. 1972 (as *oppositifolia*); Markgraf, Blumea 25: 243. 1979. *Calpicarpum oppositifolium* (G. Don) Boiteau, Adansonia sér. 2. 14: 495. 1974.

Heterotypic synonyms: *Cerbera muricata* Lam., l.c. Type: Rumphius, Herb. Amboin. 2. Append. 185, t.60. 1742 (on which many errors! Leaves alternate, and old dry fruit having spent some time on the beach drawn on branch).
Homotypic synonyms: *Neisosperma muricatum* (Lam.) Rafinesque, l.c. (as *muricata*).

Tree 4–25 m high, entirely glabrous, except for the corolla tube inside, with white latex. Trunk 10–50 cm in diameter; bark pale grey, rough, inner bark pale brown; wood hard, yellowish-white. Branches not lenticellate, with conspicuous whorled leaf scars; branchlets terete, often sulcate when dry. *Leaves* quaternate, fairly long-petiolate, petiole 1–6.5 cm long, not widened into intrapetiolar stipules, with 2–3 dense rows of colleters in the axils; blade obovate or elliptic, less often narrowly so, 1.5–2.6 × as long as wide, (4.5) 8–34 × (1.5) 3–14.5 cm, rounded, retuse, obtuse, or less often apiculate at the apex, decurrent into the petiole; with numerous straight secondary veins forming an almost right angle with the midrib; tertiary venation rather inconspicuous, reticulate. *Inflorescences* terminal, accompaigning the branchlets at each ramification of lateral branches, many-flowered, often long-pedunculate, about as long as the leaves. Peduncle (0.5) 2–13.5 cm long. Lower bracts leafy, other scale- or sepal-like. *Flowers* fragrant shortly pedicellate or sessile. *Sepals* green, connate at the base, equal or subequal, ovate, 1–1.3 × as long as wide, 1–2 × 1–1.5 mm, erect, thick, rounded, entire, not ciliate, glabrous on both sides, without colleters. *Corolla* white (or creamy), in the mature bud 10–15 mm long of which the lobes forming an oblong head with a blunt apex being about 1.5–2 × as long as and slightly wider than the tube, glabrous outside, with a pilose belt below the inser-

tion of the stamens down to half the tube length or slightly more; tube 2–6.7 × as long as the calyx, 0.5–1.2 × as long as the lobes, 4–10 mm long, almost cylindrical, at the base 1–1.5 mm wide, sligthly widened around the stamens and there 1.8–2 mm wide; lobes slightly twisted, elliptic, 0.8–2 × as long as the tube, 2.7–4 × as long as wide, 5–9 × 2–3 mm, rounded, auriculate at the left side of the base, entire, spreading. *Stamens* included, inserted about 2 mm below the mouth; anthers sessile, narrowly ovate, 1.2–1.5 × 0.5 mm, introrse, completely fertile, acuminate at the apex; cells parallel, dehiscent throughout by a longitudinal slit. *Pistil* glabrous, 2–5.5 mm long; ovary broadly ovoid, 0.5–0.8 × 0.5–0.8 × 0.5–0.8 mm, acutish at the apex, of 2 separate carpels; disk entire, 0.2 × 0.1 mm; style not split at the base, 1–4.3 mm long, not thickened; pistil head ovoid, about 0.5 × 0.3 mm, with as basal ring and a bilobed apex. *Fruit* composed of 2 separate mericarps; mericarps yellow when ripe, ellipsoid or sometimes sausage-shaped, 5–8 × 3–5.5 cm, apiculate or rounded at the apex, without ridges, smooth, indehiscent; mesocarp fibrous, united with the stone. *Seed* elliptic, about 25 × 20 mm, thin, winged.

Distribution: (seen from): Seychelles- Pacific (Seychelles, Chacos Archipelago, Malaysia (Malay Peninsula and Sarawak), Guam, Philippines, Indonesia (Java, Sulawesi, Kangean Archipelago, Ceram) Papual New Guinea, Solomon Islands, Caroline Islands, Marshall Islands).

Ecology: Coastal forest, bush or open places, less often inland, often on lime stone. Alt. 0–100 m. Fruits floating by fibrous mesocarp.

Specimens collected in Africa and examined:

SEYCHELLES: Kirk anno 1863 (K); P. Wright s.n. (K). Silhouette: La Passe, Jeffrey 833 (K); La Reserve, J. Stanley Gardiner anno 1908 (K). Curieuse Island: Vesey-Fitzgerald 5434 (K). Cousin Island: N side, Fosberg 52067 K, L, MO, US). Mahé: Boivin s.n. (P); Thomasset 180 (K). Mahé and Praslin: J. Horne 390 (K), 534 (K). Long Island: J. Stanley Gardiner 6 (K). Amirantes Group: Desroches, Stoddart & Poore 1401 (K); D'Arros, Stoddart 7193 (MO, US). Remire, Gwynne & Wood 893 (K, LISC); ibid., Stoddart & Poore 1472 (K). Cerf Island: Pervillé 35 (P). Farquhar Atoll: Stoddart & Poore 1385 (K).

Note: Description based on specimens collected throughout the area of the species.

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INDEX OF SCIENTIFIC NAMES

Synonyms are in *italics*. Page number of principal entries are in **bold face,** those of figures in *italics*.

PHYTOCHEMISTRY AND USES OF WRIGHTIA DEMARTINIANA AND W. NATALENSIS

Screening tests on the seeds of *Wrightia natalensis* have indicated the possible presence of iridoids with an unstable aglycone (plumieride type). Sugars also appear to be present, while tests for alkaloids have given weak responses of doubtful significance (ABISCH and REICHSTEIN, 1960; cf. HEGNAUER, 1964).

No local uses for either of the two *Wrightia* species have been noted.

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PHYTOCHEMISTRY OF BEAUMONTIA

The essential phytochemical characteristic of the genus *Beaumontia* is the presence of highly toxic cardiac glycosides. Those found in the seeds of *B. grandiflora*, the most widely occurring species and the one most commonly cultivated, comprise mainly digitoxigenin α-L-oleandroside (beaumontoside) and α-L-cymaroside (wallichoside) and somewhat smaller amounts of the corresponding oleandrigenin derivatives (oleandrin and beauwalloside). The formation of digitoxigenin and oleandrigenin derivatives is also characteristic of *Nerium* species.

[Structure 1]

According to SAYED et al. (1975), the cardiac-glycoside content of *B. grandiflora* decreases in the order: flowers, leaves, buds, wood, and bark; the maximum and minimum amounts in the leaves are found at the beginning and end of the flowering season, respectively. Cardiac glycosides also occur in the seeds and bark of *B. jerdoniana, B. khasiana, B. multiflora* and *B. murtonii* (BISSET, 1957); their presence in this last species explains its use as an arrow-poison ingredient (RUDJIMAN, 1987). No doubt they are also to be found in the leaves of *B. brevituba*, as these are reported to contain a poisonous latex that on ingestion may cause death (TSIANG and LI, 1977).

A variety of common plant consituents has been detected in or isolated from the leaves of *B. grandiflora*, e.g. fatty acids, flavonoids, phenolic acids, sterols,

and triterpenoids (DANIEL and SABNIS, 1978; SHARMA et al., 1981; RAMACHANDRAN NAIR et al., 1982). A 20% (w/v) aqueous extract of this species inhibits aflatoxin production in *Aspergillus flavus* and *A. parasiticus* by between 60 and 70%; it inhibits growth of the two fungi by between 27 and 40% (SINHA, 1985).

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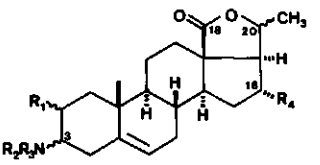
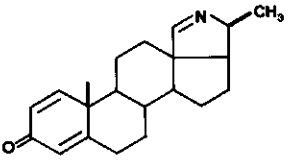
PHYTOCHEMISTRY OF KIBATALIA

The major phytochemical characteristic of the genus is evidently the occurrence of steroidal alkaloids. Detailed studies of *K. laurifolia*, all under the older name *Paravallaris microphylla*, have shown that the bulk of the alkaloid in the leaves, trunk, and roots comprises paravallarine, accompanied by a little of its *N*-methyl derivative (LE MEN, 1960), and paravallaridine, its 16α-hydroxy derivative (LE MEN et al., 1963). All these bases have the unusual feature of a (18 → 20 *S*) lactone function. In addition, extremely small amounts of other hydroxyparavallarines are present (HUSSON et al., 1969). Kibataline, the 3-epimer of paravallarine, has been found in the leaves (CAVÉ et al., 1964), which also contain quite small amounts of several steroidal ketones again with a (18 → 20 *S*) lactone function; no doubt, there is a biogenetic relationship between them and the alkaloids (POTIER et al., 1964; HUSSON et al., 1971).





Maingayine

Paravallarine $R_1 = R_2 = R_4 = H$, $R_3 = CH_3$; 3β, 20β

N_a-Methylparavallarine $R_1 = R_4 = H$, $R_2 = R_3 = CH_3$; 3β, 20β

Kibataline $R_1 = R_4 = H$, $R_2 = R_3 = CH_3$; 3α, 20β

20-*epi*-Kibataline $R_1 = R_4 = H$, $R_2 = R_3 = CH_3$; 3α, 20α

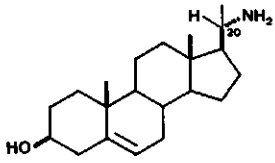
Paravallaridine $R_1 = R_2 = H$, $R_3 = CH_3$, $R_4 = OH$; 3β, 20β

2α-Hydroxy-20-*epi*-*N*-methylparavallarine $R_1 = OH$, $R_2 = R_3 = CH_3$, $R_4 = H$; 3β, 20α

The leaves of *K. gitingensis* appear to be richer in alkaloids. Among those that have been obtained are gitingensine, which is bis(*N*-demethyl)kibataline (AGUILAR-SANTOS, 1965; AGUILAR-SANTOS et al., 1967); the compound has spasmolytic properties (ESTRADA et al., 1963). The bark of this species, on the other hand, contains numerous alkaloids, among them paravallarine and *N*-methylparavallarine, along with their 20-epimers, and lanitine, or 2α-hydroxy-20-*epi*-*N*-methylparavallarine, along with its 2-epimer (BERNAL-SANTOS, 1967; CAVÉ et al., 1967).

More recently, the 20-epimer of kibataline has been isolated as the chief alkaloid occurring in the leaves of *K. anceps* (*Paravallaris macrophylla*) (NGOC et al., 1984).

Unlike the three foregoing species, *K. maingayi* has maingayine in its bark. This is a conanine base, i.e. the oxygen in the heterocyclic ring is replaced by nitrogen, and it is formulated as the 11-deoxy derivative of holonamine, an alkaloid previously isolated from *Holarrhena pubescens* (*H. antidysenterica*). Paravallarine-type bases, like those discussed above, appear to be absent (DAVIS et al., 1970). A range of free and acetylated triterpenes and sterols also occurs in the bark of *K. maingayi* (JEWERS and MANCHANDA, 1970).



Holafebrine

K. arborea is again different in that the only alkaloid so far obtained from its bark is the simple amino-steroid holafebrine (JANOT et al., 1962). This base is also known to occur in *Holarrhena pubescens* (*H. febrifuga*) and *Funtumia africana* (*F. latifolia*) (GOUTAREL, 1964). The latex from the bark contains a very little (3.6%) polyisoprene (VAN DIE, 1955); and it has also been said to contain

a 'toxalbumin', kickxiin, the supposed occurrence of which is presumed to explain the use in folk medicine of the latex as an anthelmintic (BOORSMA, 1899).

Alkaloid tests on the bark and seeds of *K. wigmanii* have given strongly positive responses (BISSET, 1957). Saponins are reported to be present in the leaves, but not the trunk, of *K. blancoi* (ANZALDO et al., 1957); although the saponins are indicated to be steroidal, in keeping with those present in other Apocynaceae they are more likely to be triterpenoid.

In the Apocynaceae there are two main types of nitrogen-containing steroidal secondary metabolites. In one type the nitrogen is present in the form of a simple amino function at C-3 and/or C-20; these compounds are found principally in *Funtumia* species (BISSET, in: ZWETSLOOT, 1981). The second group evidently requires prior oxidation of the C-18 methyl group in order to allow a heterocyclic ring to be formed, as in the conanine derivatives that occur chiefly in *Holarrhena* species (BISSET, in: DE KRUIF, 1981). However, neither group of bases is exclusive to one or other of the genera mentioned.

Kibatalia species show different stages in the biosynthetic pathway. Thus, *K. arborea* contains the simple amino-steroid holafebrine, which has a C-20 amino function. But most of the alkaloids isolated from *Kibatalia* combine the occurrence of a 3-amino function with that of the unusual (18 → 20*S* or 20*R*) lactone function – seen in paravallarine and paravallaridine and their derivatives. On the other hand, maingayine, from *K. maingayi*, is clearly derived from a steroid with an oxidized C-18 methyl group, which has also had the C-20 oxygen function replaced by a nitrogen function, so enabling the heterocyclic ring characteristic of conanine derivatives to be formed. Only further investigation will show whether the occurrence in *Kibatalia* of these three different types of alkaloid parallels any infrageneric taxonomic groupings, e.g. those species described originally as *Paravallaris* as opposed to those described as *Kibatalia* species.

Because of the presence of the C-18 oxygenated function in paravallarine, there has been interest in utilizing it in the preparation of analogues of the mineralocorticoid hormone aldosterone; see, e.g. GOUTAREL, 1964a, b.

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PHYTOCHEMISTRY OF VALLARIOPSIS

No information on the phytochemistry of *Vallariopsis lancifolia* has been seen.

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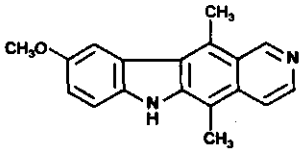
PHYTOCHEMISTRY OF OCHROSIA BORBONICA AND O. OPPOSITIFOLIA

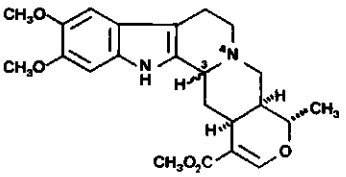
The presence of indole alkaloids is characteristic of *Ochrosia* species.

The major alkaloid in the bark of *O. borbonica* (*O. maculata*) is 9-methoxyellipticine, which has fairly broad-spectrum oncolytic properties. It is the occurrence of ellipticine derivatives, with their potentially useful anti-cancer properties, that has been the focal point in the phytochemical investigation of the genus as a whole. A small amount of the CNS-depressant reserpine is also present (POISSON and MIET, 1967; SVOBODA et al., 1968).



9-Methoxyellipticine

In contrast, the bark of *O. oppositifolia* has a more complicated mixture of alkaloids and it is devoid of ellipticine derivatives. The main base present is isoreserpiline (PEUBE-LOCOU et al., 1972a, b; AMARASEKERA and ARAMBEWELA, 1986) and it is accompanied by a considerable quantity of the stereoisomer reserpiline. The quaternary ammonium base corresponding to isoreserpiline and reserpiline – ochropposine – is also a major constituent. The principal alkaloid of the leaves is again isoreserpiline (AKHTER et al., 1978). At least 9 other indole alkaloids of various types have been obtained from the plant.



Isoreserpiline 3α–H
Reserpiline 3β–H

Ochropposine 

There is an early report that a methoxyellipticine is present in *O. oppositifolia* (BUZAS et al., 1958), but this is almost certainly based on an incorrect identification of the plant material examined.

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