

A revision of *Syzygium* Gaertn. (Myrtaceae) in Indochina (Cambodia, Laos and Vietnam)

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ABSTRACT

The genus *Syzygium* (Myrtaceae) is revised for Indochina (Cambodia, Laos and Vietnam). The species key, descriptions, typification, ecology, conservation status, phenology, vernacular names, usages, distribution maps, selected herbarium images and list of specimens examined are given. A total of fifty-six species are recognised in Indochina. Eight species including *Syzygium bokorensense* W.K.Soh & J.Parn., *S. chantaranothaianum* W.K.Soh & J.Parn., *S. crassiflorum* Merr. & L.M.Perry, *S. cucphuongense* W.K.Soh & J.Parn., *S. glomerulatum* (Gagnep.) Merr. & L.M.Perry, *S. harmandii* (Gagnep.) Merr. & L.M.Perry, *S. pierrei* (Gagnep.) Merr. & L.M.Perry and *S. tonkinense* (Gagnep.) Merr. & L.M.Perry are confined to Indochina. 63 lectotypes were designated and 23 previously accepted species names are now synonyms under *Syzygium*. Vietnam harbours the largest number of species (49), followed by Laos (30) and Cambodia (27). *Syzygium attoupeuense* (Gagnep.) Merr. & L.M.Perry and *Syzygium corticosum* (Lour.) Merr. & L.M.Perry are new records for Thailand.

KEY WORDS

Syzygium,
Myrtaceae,
Indochina,
Cambodia,
Laos,
Vietnam,
taxonomy revision,
lectotypification.

RÉSUMÉ

Révision du genre *Syzygium* Gaertn. (Myrtaceae) en Indochine (Cambodge, Laos et Vietnam).

Le genre *Syzygium* (Myrtaceae) est révisé pour l'Indochine (Cambodge, Laos et Vietnam). La clé, les descriptions, la typification, l'écologie, le statut de conservation, la phénologie, les noms locaux, les usages, les cartes de répartition, des images sélectionnées dans un herbarium et une liste des spécimens examinés de l'espèce sont inclus. On trouve un total de cinquante-six espèces en Indochine. Huit espèces, dont *Syzygium bokorensense* W.K.Soh & J.Parn., *S. chantaranothaianum* W.K.Soh & J.Parn., *S. crassiflorum* Merr. & L.M.Perry, *S. cucphuongense* W.K.Soh & J.Parn., *S. glomerulatum* (Gagnep.) Merr. & L.M.Perry, *S. harmandii* (Gagnep.) Merr. & L.M.Perry, le *S. pierrei* (Gagnep.) Merr. & L.M.Perry et *S. tonkinense* (Gagnep.) Merr. & L.M.Perry ne peuvent être trouvées qu'en Indochine. 63 lectotypes ont été reconnus et 23 noms d'espèces acceptés sont maintenant synonymes sous « *Syzygium* ». Le Vietnam abrite le plus grand nombre d'espèces (49), suivi du Laos (30) et du Cambodge (27). *Syzygium attoupeuense* (Gagnep.) Merr. & L.M.Perry et *Syzygium corticosum* (Lour.) Merr. & L.M.Perry sont maintenant des espèces recensées pour le Cambodge.

MOTS CLÉS

Syzygium,
Myrtaceae,
Indochine,
Cambodge,
Laos,
Vietnam,
révision taxonomique,
lectotypification.

INTRODUCTION

Syzygium Gaertn. is the largest genus in Myrtaceae with c. 1200 species of mostly medium to large trees occurring in the tropics and subtropics from India to the Pacific Islands, and found in a diverse range of habitats from sea shore to montane forest (Parnell *et al.* 2007). The highest concentration of species and morphological variation is found in the Southeast Asian region. The geographical range of *Syzygium* is from Africa through southern Asia, Malesia and Australia to the Pacific Islands. The historical basis and the classification problems have been extensively reviewed and discussed by many authors (Schmid 1972; Craven 2001; Parnell *et al.* 2007).

François Gagnepain, who was the first botanist to revise the Indochinese *Syzygium* under *Eugenia* L. s.l., initially published all the twenty-eight new species in *Notulae Systematicae* (Gagnepain 1917-1918) and later published the completed work in the *Flore générale de l'Indochine* (Gagnepain 1920). His work encompassed fifty-five species from French-Indochina, which corresponds to the currently recognised political boundaries in Laos, Cambodia, Vietnam, Thailand (part of Mekong basin) and South China (Zhanjiang). Merrill & Perry (1938b) later updated the revision based on partly original material supplied by Gagnepain and additional new material from Indochina, mainly collected by Pételot. In their synopsis (Merrill & Perry 1938b), all the Indochinese species were transferred from *Eugenia* L. s.l. to *Syzygium* Gaertn., the species nomenclature was updated, eight new species described and new records added.

Since Gagnepain's revision in 1920, the generic concept of *Eugenia-Syzygium* has changed and the current revisionary works of *Syzygium* in the neighbouring countries including Thailand (Chantaranothai & Parnell 2002) and China (Chen & Craven 2007) have suggested several new records for Indochina. This is not surprising, since the *Flore générale de l'Indochine* project was prematurely initiated considering at the time many areas in Indochina were botanically unexplored. Since then, there have been many new botanical collections from previously inaccessible localities. This coupled with the resurgence of botanical work over the last three decades in Cambodia, Laos and Vietnam has generated a significant amount of new information. Therefore it is now timely to revise *Syzygium* Gaertn. in Indochina (Cambodia, Laos and Vietnam).

CHARACTERS USEFUL IN IDENTIFICATION AND GENERA THAT CAN BE CONFUSED WITH *SYZYGIUM*

Generally, *Syzygium* can be recognised easily by the simple, opposite, gland dotted (punctilate or pustulate) and exstipulate leaves with intramarginal veins. At species level, the vegetative characters that are useful for identification include the nature and colour of the twig, the leaf arrangement, the petiole length and the blade shape, size, colour and venation.

There are a few reproductive characters useful for identifying species. These are the inflorescence type and length, the hypanthium shape and size, the presence or absence of

pedicel, the calyptrate or free sepals and to a limited extent, the fruit shape and size. At the infrageneric level, the hypanthium shape, the ovule arrangement and placentation, the anther orientation and the presence or absence of seed intercotyledonary intrusion are useful for identifying sub-generic groups.

In having opposite leaves and intramarginal veins, herbarium specimens of *Syzygium* are often confused with other genera such as *Eugenia*, *Garcinia* L., *Memecylon* L. and Rubiaceae Juss. All the taxa mentioned above, except for *Eugenia*, do not have a punctilate or pustulate leaf surface (oil glands). *Garcinia* has leaves with petiole bases that clasp the twig while Rubiaceae has interpetiolar stipules. *Memecylon* usually has a shiny and wrinkled leaf, and the stamens are crescent-shaped. *Eugenia* has hairy vegetative shoots and inflorescences, and few flowers, from one to three per inflorescence.

MATERIAL AND METHODS

Most of the taxonomic publications relevant to Indochina and neighbouring regions were consulted. For the present treatment, dried plant specimens acquired from different herbaria (A, BK, BKF, BM, CPNP, E, GH, HN, K, KEP, L, NY, P, TCD, U and VFU) were examined. In addition to this, images and references downloaded from online herbaria were also used (A, GH, K, MO, NY and US). In this study, over 4000 specimens from Indochina and other regions were studied; either on loan or *in situ* in the various herbaria. The study presented here deals with revisionary work of a number of different species within *Syzygium*. In practice this means that herbarium specimens of the same phenotypic assemblage were sorted and grouped together. These groups were then either associated with an existing type specimen, which is linked to a particular taxon name. After the herbarium specimens were sorted into groups, their morphological characters were examined. Dichotomous keys based on vegetative and reproductive macromorphological characters were constructed.

Unless indicated, all macromorphological measurements and observations, including colour, texture and shape are recorded from herbarium specimens. When no holotype or lectotype is available, then a lectotype is designated or a neotype selected by following the guidelines in the *International Code of Botanical Nomenclature* (McNeill *et al.* 2006). Discussion for each instance of this is found in the relevant species notes. Species synonyms were gathered from relevant publications, notably the *World Checklist of Myrtaceae* online database (Govaerts *et al.* 2015) and personal observations from herbarium specimens. When possible, the synonyms listed in this account were verified by examining the types or voucher specimens. In some instances the synonyms were excluded when they were found not to conform with the species studied here. We applied the *IUCN Red List Categories and Criteria* ver. 3.1 (IUCN 2001) in assessing the conservation status for each species. About 60% of herbarium specimens used in this study are more than fifty years old

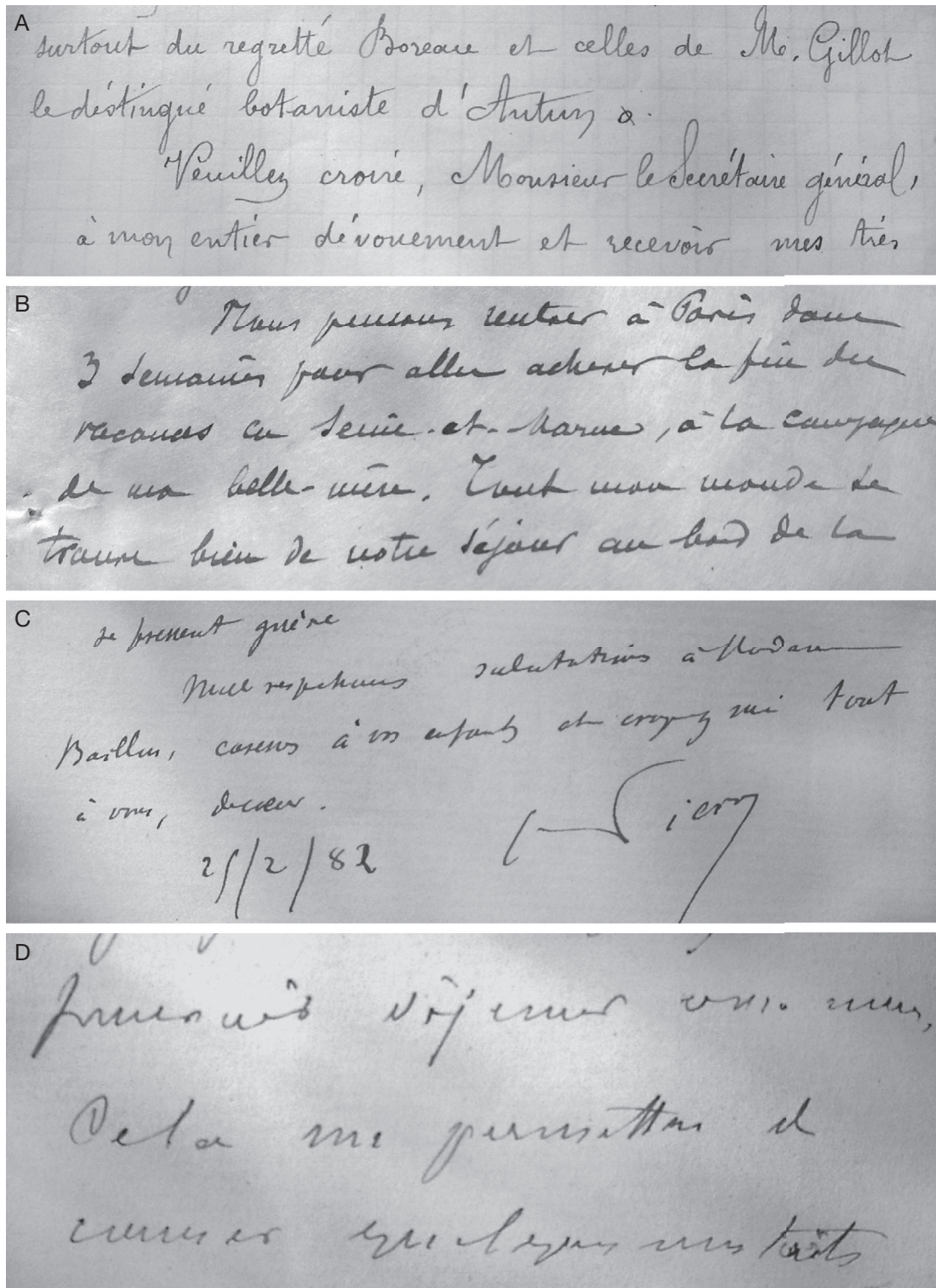


FIG. 1. — Autographs of selected plant collectors or botanists relevant to Indochina: **A**, Gagnepain F.; **B**, Harmand J.; **C**, Pierre L.; **D**, Thorel C.

(1861-1959) and since then, the land-use, demography and forest cover in Indochina has drastically changed. Therefore the conservation status given is possibly overoptimistic and an underestimation of the current level of threat.

All specimens examined from Indochina are listed. Specimens from countries outside Indochina are listed only for

species with a narrow distributional range. The information from herbarium label were databased using BRAHMS ver. 6.04. The species distributions in Indochina were mapped using DIVA-GIS ver. 6. The coordinates for mapping species distribution were gathered from herbarium labels, gazetteers, maps and *NGA Geonet Names Server* database ([ADANSONIA, sér. 3 • 2015 • 37 \(2\)](http://earth-</p>
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info.nga.mil/gns/html/index.html). The names of major areas (provinces) follow the standard used in the *Flore du Cambodge du Laos et du Viêt Nam* publication. Distributions outside of Indochina were obtained from herbarium specimens and relevant literature. List of examined specimens were organised alphabetically in the following sequence: country, major area, collector's name and numerically by collector's number. The distributions of commercially cultivated species (*Syzygium aqueum* (Burm. f.) Alston, *S. aromaticum* (L.) Merr. & L.M.Perry, *S. malaccense* (L.) Merr. & L.M.Perry and *S. samarangense* (Blume) Merr. & L.M.Perry) were not mapped.

SPECIES CONCEPT, INFRAGENERIC AND INFRASPECIFIC CLASSIFICATION

For practicality in species identification, a morphological species concept (Sneath & Sokal 1973; Burger 1975; Stuessy 2009) was employed in this study. The phylogenetic based infrageneric classification of *Syzygium* proposed by Craven & Biffin (2010) was adopted for this study. This implies that the genera *Acmena* DC. and *Cleistocalyx* Blume are now circumscribed in the genus *Syzygium*. Within *Syzygium*, four out of a total of six subgenera are currently documented in Indochina; *Acmena* (DC.) Craven & Biffin, *Perikion* Craven & Biffin, *Sequestratum* Craven & Biffin and *Syzygium*.

Gagnepain (1917; 1920) recognised five sections within *Syzygium* (excluding *Acmena*) based on the number of fertile locule and the number of petals and their coherence. In accordance with Henderson (1949), we do not find the locule and petal characters taxonomically useful in delimiting subgeneric groups nor species. Therefore we do not accept Gagnepain's infrageneric classification of *Syzygium*.

Infraspecific rank is recognised if a taxon shows a clear geographical distinction or a small amount of overlap and where morphological distinction is minor. In the present treatment, we did not recognise any infraspecific ranks for the following reasons: firstly, due to the paucity of the Indochinese collections and the lack of geographical and ecological information, it is difficult to ascribe allopatric or peripatric speciation with much confidence; secondly, there exists complex patterns of variation in some widespread species (e.g. *Syzygium antisepticum* (Blume) Merr. & L.M.Perry, *S. borneense* (Miq.) Miq., *S. claviflorum* (Roxb.) Wall ex Steudel, *S. cumini* (L.) Skeels and *S. hancei* Merr. & L.M.Perry) that do not show clear morphological discontinuities, therefore making identification of infraspecific ranks difficult or impossible. A comprehensive study focusing on each species or group of species is desirable. This should entail detailed phenotypic documentation, field observations and population genetic study. In the case of rheophytic species, those that has been formally recognised as distinct species from their close allies are maintained here in this study until further evidence is available to decide on their status (e.g. *Syzygium abortivum* (Gagnep.) Merr. & L.M.Perry and *S. tsoongii* (Merr.) Merr. & L.M.Perry). Morphological similarity among rheophytes is a result of convergent evolution; allopatric (ecological or geographical) evolution is thought to be the main mechanism of speciation for rheophytes (Van Steenis 1981; Mitsui *et al.* 2007). Because of this, ecological

and geographical criteria are essential in deciding infraspecific rank. Unfortunately, these two crucial pieces of information are often lacking for Indochinese species. All formally recognised infraspecific names are listed in the list of synonyms to highlight morphological variation within the respective species and brief comments on our observations are given.

LECTOTYPIFICATION OF INDOCHINESE *SYZYGIUM*

In his protologue, Gagnepain (1917-1918) usually cited one or more gatherings (i.e. plants from particular localities) and he did not indicate any as type. These gatherings are usually in duplicates and are mostly kept in P (some duplicates are found in BM, E, K, L & NY). Under article 9.2 of *International Code of Botanical Nomenclature* (McNeill *et al.* 2006), all of these specimens are available for lectotypification. In the case where the species have been 'lectotypified' by later workers, there is often no annotation reflect in this on the specimens and there are duplicates and undifferentiated sheets at P. Under article 9.15, second step lectotypification to narrow down to a single specimen is possible and undertaken herein.

All the material deposited in P has been annotated by Gagnepain on the *Herb. Museum Paris* label (in addition to the *Herb. Museum Paris* label, the collector's label is sometimes present). The difficulty lies in locating the material that was cited in the protologue. The specimen numbers indicated in the protologue are in fact usually species numbers and rarely collection numbers. Therefore gatherings from different localities often have the same specimen number, as they are filed within the same species pile (pers. obs. in P; Sovanmoly Hul pers. comm., April 2009). This is very obviously the case in Pierre's and Thorel's collections. Furthermore, the labels on duplicates are often incomplete, sometimes without locality, dates, specimen number or notes. However, usually among a set of duplicates, there is one specimen with a complete and original label by the collector and it is therefore essential to be able to recognise the collector's handwriting (Fig. 1A-D). We reproduce these samples herein because the problems we found in respect of *Syzygium* are duplicated for other groups and because samples of the collectors' handwritings are not readily available. Pierre's Herbarium contains much of Harmand's collection and, as a result, there are sometimes two specimen numbers on one herbarium sheet – we cite such specimens as, for example, *Pierre 3290 (Harmand 1172)*. In some cases the developmental stage of the specimens coupled with the label information are good indicators as to whether or not they belong to the same gathering. A specimen is different if it has a different collection date and/or locality (the number could be absent or similar).

For Indochina, when lectotypification is required we have used two criteria to guide selection of lectotype. Firstly, in general we have selected the material in best physical condition, but have also, when possible, selected herbarium specimens with Delpy's or Gagnepain's drawings attached, because the details in these drawings were used extensively by Gagnepain (1917-1918) in his species descriptions. In the Myrtaceae collections in P, Delpy's drawings are usually attached to the respective herbarium specimens.

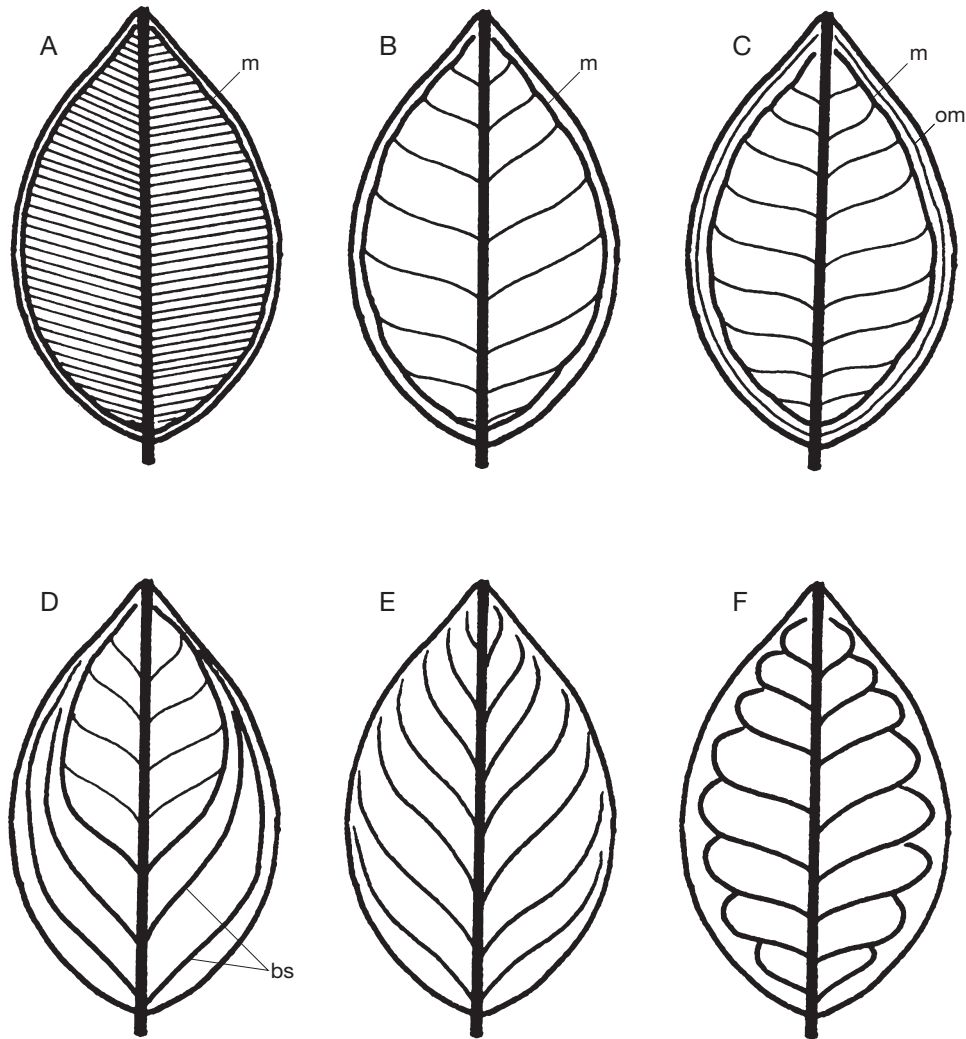


FIG. 2. — Leaf venation type in *Syzygium*. Abbreviations: **m**, intramarginal vein; **om**, outer intramarginal vein; **bs**, basal secondary veins. Drawing by the authors.

SYSTEMATICS

Genus *Syzygium* Gaertn.

De Fructibus et Seminibus Plantarum 1: 166, t. 33 (1788), *nom. cons.* — *Eugenia* subg. *Syzygium* (Gaertn.) Wight, *Illustrations of Indian Botany* 2: 12, 15 (1841). — *Jambosa* sect. *EuSyzygium* Miq., *Flora van Nederlandsch Indië* 1: 447 (1855). — *Eugenia* sect. *Syzygium* (Gaertn.) M.R.Henderson, *The Gardens' Bulletin Singapore* 12: 17 (1949). — Type: Sri Lanka (*Syzygium caryophyllaeum* Gaertn.) (lecto-, WAG![WAG0002464]), designated by McVaugh, *Taxon* 5: 164 [1956]).

SYNONYMY LIST

For generic synonyms see Farr & Zijlstra (1996-onwards) and Craven & Biffin (2010).

DESCRIPTION

Tree to 35 m tall or shrub 1-3 m tall. Indumentum mostly absent, rarely present. Oil glands present in almost all organs, punctilate or pustulate on surface.

Twig

Terete, subangular, angular (3- or 4-angled) or winged when mature, 2-5 mm diameter, stout or slender, surface usually smooth, sometimes flaky or fissured, colour whitish, greyish, pale brownish to dark brownish, contrasting or not to leaf or petiole colour.

Leaves

Usually opposite (decussate) or subopposite, sometimes alternate or verticillate in whorls of three, petiolate or sessile, 2.5-50 × 2-9 cm, 1.5 to 12 times as long as wide, elliptic, ovate, obovate, lanceolate to oblong, base attenuate, cuneate, rounded to cordate, margin flat or recurved inward, apex usually acute or acuminate, sometimes rounded, rarely cuspidate or mucronate, acumen absent or present, 0.3-2 cm long, sometimes deflexed, blade chartaceous, subcoriaceous to coriaceous, upper surface usually punctilate, rarely pustulate, lower surface always pustulate, cork warts (black dots) always present, leaf yellowish brown, pale to dark brownish or greenish, always paler below, sometimes shiny on both surfaces

or just the lower surface; midrib often sunken above, rarely flat, mostly smoothly raised below, rarely angled; secondary veins 7-45 per side, 0.5-20 mm apart, 30-60 degrees from midrib, prominent or faint, raised or sunken above, always raised below, narrowly (Fig. 2A) or widely spaced (Fig. 2B, C) and connecting to the prominent inner intramarginal veins, sometimes 1-3 basal secondary veins (acrodromous veins; Fig. 2D) arcuate and not connecting but often extending to form outer intramarginal veins (Fig. 2C), sometimes intramarginal veins absent and all secondary veins arcuate (Fig. 2E) or looped (Fig. 2F) to form pinnate-like venation; intermediate secondaries present or absent, one to two in between secondaries, prominent or faint; tertiary veins prominent or faint, reticulate, subscalariform or scalariform; intramarginal veins frequently present and always prominent, 0.5-5 mm from leaf margin, straight or scalloped, sometimes smaller outer intramarginal veins present (Fig. 2C); petiole 0.1-3 cm, 1/4-1/140 of blade length, 0.5-5 mm diameter, slender or stout, brownish to dark brownish, to blackish, contrasting or not to blade colour.

Inflorescence

Terminal or axillary on leafy twig or on leafless twig near proximal end, 1-17 cm long, solitary, racemose or paniculate-cymose (first to fourth order branching), flowers few to many, one to 300, spreading or in compact heads; axes angular or terete, usually smooth, rarely flaky; bracts and bracteoles persistent or caducous, 0.3-2 × 0.3-2 mm, triangular, elliptic or lanceolate.

Flowers

Sessile or pedicellate, pedicel 0.05-2 cm long, hypanthium 1-20 × 0.3-20 mm, obconic, pyriform, elongate or clavate, usually smooth, sometimes glaucous, corrugate or warty, pseudostalk distinct or indistinct, 1-13 mm long; sepals 4-5, free or calyptrate (dome-shaped), triangular, ovate, semi-orbicular or orbicular, 0.3-10 × 0.6-18 mm, equal or unequal in size, if unequal outer lobes smaller than inner lobes; petals 4-6, rarely 8, free or coherent, 1-17 × 1-17, semi-orbicular to orbicular; stamens many, outer stamens 1-30 mm long; anther 0.2-2 mm long, mostly oblong and sacs parallel, dehiscence by longitudinal slits or wider than long and sacs divaricate, dehiscence by apical slits (only in Subg. *Acmena*), connective gland conspicuous or inconspicuous; style 0.8-40 mm long; ovary inferior, 2 locules, rarely 3, all fertile, placenta mostly axile-median, rarely axile-apical (only in Subg. *Acmena*), ovules 5-35 per locules, arranged in two longitudinal rows or radiating.

Fruit

A berry, 0.5-7 cm long, pyriform, globose, depressed globose, ellipsoid to obloid, surface smooth to rugose; with apical cavity, deep or shallow, surrounded by calyx ring, with crown-like persistent sepal lobes or undulating rim (formed from base of caducous sepal lobes or small sepals ring); seed 1-2, subglobose or ellipsoid, 0.35-3 cm, testa loosely or closely adhering to pericarp, cotyledons free or undivided, inter-cotyledonary intrusion present or absent, if present ramified from the side or apex.

KEYS TO SPECIES OF *SYZYGIUM* Gaertn. IN INDOCHINA

Two keys to the species of *Syzygium* in Indochina are provided using vegetative characters either in combination with fruiting or flowering characters.

Key A. — This key is based mainly on vegetative and flowering characters. Unless indicated, all observed characters are based on dried herbarium specimens. The species positions in the key are arranged to reflect as much as possible their phenetic and hypothesised phylogenetic affinities.

- 1. Anther sacs divergent; placentation axile-apical 2. *S. acuminatissimum* (Blume) DC. (Subg. *Acmena*)
- Anther sacs parallel; placentation axile-median 2
- 2. Hypanthium clavate or elongate with long pseudostalk, ovules in two longitudinal rows 3
- Hypanthium obconic or pyriform, ovules irregularly arranged, radiating 12 (Subg. *Syzygium*)
- 3. Hypanthium glaucous; petiole dark brownish to blackish, contrasting to blade colour 4 (Subg. *Sequestratum*)
- Hypanthium not glaucous; petiole brownish, not contrasting to blade colour 7
- 4. Inflorescence racemose, short (2-2.5 cm long), few flowered (2-4) 6. *S. araiocladum* Merr. & L. M. Perry
- Inflorescence paniculate, first to second order branching, long (3-7 cm long), many flowered (30-100) 5
- 5. Hypanthium abruptly constricting to pseudostalk; leaf apex with distinct acumen 40. *S. odoratum* (Lour.) DC.
- Hypanthium gradually narrowing to pseudostalk; leaf obtuse or acute, without distinct acumen 6
- 6. Leaf blade elliptic to ovate, 1 to 3.5 times as long as wide 4. *S. antisepticum* (Blume) Merr. & L.M.Perry
- Leaf blade lanceolate, 3.5 to 5 times as long as wide 54. *S. tsoongii* (Merr.) Merr. & L.M.Perry
- 7. Hypanthium wall not fibrous 8 (Subg. *Syzygium*)
- Hypanthium wall fibrous 9 (Subg. *Perikion*)

8. Flower sessile 8. *S. attenuatum* (Miq.) Merr. & L.M.Perry
 — Flower pedicellate 7. *S. aromaticum* (L.) Merr. & L.M.Perry
9. Leaf blade subsessile, petiole very short (0.05-0.1 cm); leaf base cordate, sometimes rounded
 11. *S. boisianum* (Gagnep.) Merr. & L.M.Perry
 — Leaf blade petiolate, petiole long (0.3-0.6 cm); leaf base cuneate or attenuate 10
10. Leaf blade lanceolate 1. *S. abortivum* (Gagnep.) Merr. & L.M.Perry
 — Leaf blade elliptic, oblong-elliptic, ovate to obovate 11
11. Leaf blade small, 4-8.5 × 1-4 cm; petiole short, 0.15-0.2 cm 16. *S. championii* (Bentham) Merr. & L.M.Perry
 — Leaf blade large, 6-22 × 1.5-7.5 cm; petiole long, 0.3-0.6 cm 18. *S. claviflorum* (Roxb.) Wall ex Steude
12. Hypanthium large, ≥ 1 cm long; inflorescence racemose 13
 — Hypanthium small, < 1 cm long; inflorescence paniculate 24
13. Leaves verticillate, arranged in whorls of three at twig-end 14
 — Leaves in pairs, opposite or subopposite at twig-end 16
14. Inflorescence terminal, rarely axillary on leafy twig 23. *S. diospyrifolium* (Wall. ex Duthie) S.N.Mitra
 — Inflorescence axillary on leafless proximal end of twig 15
15. Leaf blade large, 15-35 × 6-18 cm 25. *S. formosum* (Wall.) Masam.
 — Leaf blade small, 11-18 × 1.5-2.5 cm 29. *S. harmandii* (Gagnep.) Merr. & L.M.Perry
16. Inflorescence axillary on leafless proximal end of twig 35. *S. malaccense* (L.) Merr. & L.M.Perry
 — Inflorescence terminal or axillary on leafy twig 17
17. Leaf blade > 20 cm long 18
 — Leaf blade ≤ 20 cm long 19
18. Tertiary venation ladder-like (scalariform); leaf blade oblong elliptic, 3 to 4 times as long as wide
 36. *S. megacarpum* (Craib) Rathakr. & N.C.Nair
 — Tertiary venation net-like (reticulate); leaf blade lanceolate, 5 to 9 times as long as wide
 20. *S. crassiflorum* Merr. & L.M.Perry
19. Basal secondary veins arcuate, not connecting to each other 20
 — Basal secondary veins connecting to each other 21
20. Leaf subsessile, petiole ≤ 2 mm long; leaf base cordate; hypanthium apex abruptly constricted to pseudostalk;
 fruit turbinate (*in vivo*) 5. *S. aqueum* (Burm. f.) Alston
 — Leaf petiolate, petiole > 2 mm long; leaf base cuneate, rounded or slightly cordate; hypanthium gradually constricted
 to pseudostalk; fruit pyriform to subglobose (*in vivo*) 46. *S. samarangense* (Blume) Merr. & L.M.Perry
21. Petiole < 3 mm long 22
 — Petiole ≥ 3 mm long 23
22. Leaf base cuneate; tertiary veins reticulate 42. *S. pierrei* (Gagnep.) Merr. & L.M.Perry
 — Leaf base cordate; tertiary veins scalariform to subscalariform 17. *S. chantaranothaianum* W.K.Soh & J.Parn.
23. Leaf apex gradually narrowing without distinct acumen; hypanthium greenish (*in vivo*)
 32. *S. jambos* (L.) Alston
 — Leaf apex with distinct acumen; hypanthium reddish-green (*in vivo*)
 47. *S. siamense* (Craib) Chantar. & J.Parn.
24. Inflorescence axillary on leafless proximal end of twig 25
 — Inflorescence terminal or axillary on leafy twig 29
25. Sepals calyprate; intramarginal veins absent, all secondary veins arcuate 37. *S. nervosum* A.Cunn. ex DC.
 — Sepals free; intramarginal veins present 26
26. Basal secondary veins connect to adjacent secondary veins to form intramarginal veins 27
 — Basal secondary veins arcuate and not connecting to adjacent secondary veins to form intramarginal veins 28
27. Twig terete; secondary veins ≥ 20 pairs per side, narrowly spaced (2-5 mm) 22. *S. cumini* (L.) Skeels
 — Twig angular (4-angled) and winged; secondary veins < 20 pairs per side, widely spaced (5-15 mm)
 50. *S. tetragonum* (Wight) Wall. ex Walp.

28. Petals free; leaf base slightly unequal; leaf blade brownish 43. *S. polyanthum* (Wight) Walp.
 — Petals coherent; leaf base equal; leaf blade greenish 10. *S. balsameum* (Wight) Walp.
29. Inflorescence hairy 30
 — Inflorescence glabrous 31
30. Leaf blade hairy; twig brownish not contrasting to leaf colour; secondary veins widely spaced, ; tertiary veins subscalariform 55. *S. vestitum* Merr. & L.M.Perry
 — Leaf blade glabrous; twig whitish contrasting to leaf colour; secondary veins narrowly spaced (1-3 mm); tertiary veins reticulate 33. *S. levinei* (Merr.) Merr. & L.M.Perry
31. Sepals calyptrate 38. *S. nigrans* (Gagnep.) Craven & Biffin
 — Sepals free 32
32. Inflorescence short, ≤ 3 cm long 33
 — Inflorescence long, > 3 cm long 35
33. Leaf blade lanceolate, 5 to 8 times as long as wide 48. *S. sterrophyllum* Merr. & L.M.Perry
 — Leaf blade elliptic to obovate, 1.5 to 3 times as long as wide 34
34. Leaf blade large (usually > 3 cm long); leaf dark greenish brown 28. *S. hancei* Merr. & L.M.Perry
 — Leaf blade small (≤ 3 cm long); leaf light brownish 15. *S. buxifolium* Hook. & Arn.
35. Flower pedicellate 36
 — Flower sessile 41
36. Inflorescence unbranched 3. *S. angkai* (Craib) Chantar. & J.Parn.
 — Inflorescence branched at least once 37
37. Basal secondary veins arcuate, not connecting to adjacent secondary veins 38
 — Basal secondary veins connecting to adjacent secondary veins 40
38. Twig whitish, contrasting to leaf colour; leaf blade 3 to 4 times as long as wide
 56. *S. zimmermannii* (Warb. ex Craib) Merr. & L.M.Perry
 — Twig brownish, not contrasting to leaf colour; leaf blade 2 to 3 times as long as wide 39
39. Tertiary veins reticulate; secondary veins 7-15 mm apart; peduncle surface flaky
 30. *S. hemisphericum* (Wight) Alston
 — Tertiary veins subscalariform; secondary veins 15-20 mm apart; peduncle smooth
 31. *S. imitans* Merr. & L.M.Perry
40. Leaf blade small (< 10 cm long), elliptic, oblong-elliptic or ovate, base cuneate and slightly attenuate; midrib smoothly raised below... 34. *S. lineatum* (DC.) Merr. & L.M.Perry
 — Leaf blade large (≥ 10 cm long), obovate, base strongly attenuate; midrib angled below
 24. *S. fastigiatum* (Bl.) Merr. & L.M.Perry
41. Inflorescence with flowers clustering at branch-ends, compact; branch-ends with 7-13 flowers 42
 — Inflorescence not compact at branch-ends; branch-ends with 3 flowers 50
42. Intramarginal veins absent, all secondary veins arcuate
 26. *S. glomerulatum* (Gagnep.) Merr. & L.M.Perry
 — Intramarginal veins present 43
43. Secondary veins sunken above 13. *S. borneense* (Miq.) Miq.
 — Secondary veins raised above 44
44. Hypanthium large, > 5 mm long; sepals unequal, inner sepals larger than outer sepals 45
 — Hypanthium small, ≤ 5 mm long; sepals equal 46
45. Secondary veins 8-12 per side, 8-10 mm apart 27. *S. grande* (Wight) Walp.
 — Secondary veins 20-25 per side, 2-5 mm apart 41. *S. pachysarcum* (Gagnep.) Merr. & L.M.Perry
46. Twigs whitish, contrasting to leaf colour 47
 — Twigs brownish, not contrasting to leaf colour 48
47. Leaf blade elliptic or obovate, one to two times as long as wide 22. *S. cumini* (L.) Skeels
 — Leaf blade lanceolate, 2.5 to six times as long as wide... 45. *S. ripicola* (Craib) Merr. & L.M.Perry

48. Leaf apex mucronate 21. *S. cucphuongense* W.K.Soh & J.Parn.
 — Leaf apex blunt, acute or acuminate 49
49. Secondary veins narrowly spaced, 2-3 mm; leaf apex without acumen
 51. *S. thorelii* (Gagnep.) Merr. & L.M.Perry
 — Secondary veins widely spaced, 5-8 mm; leaf apex with distinct acumen
 53. *S. tonkinense* (Gagnep.) Merr. & L.M.Perry
50. Leaf subsessile, petiole very short, ≤ 2 mm long, $\frac{1}{25}$ - $\frac{1}{60}$ of blade length; base cordate 51
 — Leaf petiolate, petiole long, ≥ 3 mm, $\frac{1}{7}$ - $\frac{1}{22}$ of blade length; base cuneate or attenuate... 52
51. Twig whitish, contrasting to leaf colour... 14. *S. bullockii* (Hance) Merr. & L.M.Perry
 — Twig dark brownish, not contrasting to leaf colour... 12. *S. bokorensis* W.K.Soh & J.Parn.
52. Leaf blade lanceolate, 5 to 8 times as long as wide 9. *S. atopeuense* (Gagnep.) Merr. & L.M.Perry
 — Leaf blade elliptic, ovate, obovate to oblong, 1.5 to 4 times as long as wide 53
53. Twig strongly angular (4-angled) and winged 44. *S. praecox* (Roxb.) Rathkr. & N.C. Nair
 — Twig terete 54
54. Secondary veins narrowly spaced, ≤ 2 mm 49. *S. syzygioides* (Miq.) Merr. & L.M.Perry
 — Secondary veins widely spaced, ≥ 4 mm 55
55. Hypanthium small, ≤ 2.5 mm long 19. *S. corticosum* (Lour.) Merr. & L.M.Perry
 — Hypanthium large, > 3 mm long 56
56. Leaf blade dark brown to blackish 52. *S. thumra* (Roxb.) Merr. & L.M.Perry
 — Leaf blade yellowish brown 39. *S. oblatum* (Roxb.) Wall. ex Steudel

Key B. — This key is based mainly on vegetative and fruiting characters. Unless indicated, all observed characters are based on dried herbarium specimens. *Syzygium chantaranothaijanum*, *S. fastigiatum*, *S. glomerulatum*, *S. harmandii*, *S. pierrei*, *S. thumra*, *S. tonkinense* and *S. zimmermannii* were excluded from this key because their fruits were not seen.

1. Seed with intercotyledonary intrusion 2
 — Seed without intercotyledonary intrusion 6
2. Fruit depressed globose 2. *S. acuminatissimum* (Blume) DC.
 — Fruit ellipsoid to obovoid 3 (Subg. *Perikion*)
3. Leaf blade subsessile, petiole very short, 0.05-0.1 cm; leaf base cordate, sometimes rounded
 11. *S. boisianum* (Gagnep.) Merr. & L.M.Perry
 — Leaf blade petiolate, petiole long, 0.3-0.6 cm; leaf base cuneate or attenuate 4
4. Leaf blade lanceolate 1. *S. abortivum* (Gagnep.) Merr. & L.M.Perry
 — Leaf blade elliptic, oblong-elliptic, ovate to obovate 5
5. Leaf blade small, 4-8.5 \times 1-4 cm; petiole short, 0.15-0.2 cm 16. *S. championii* (Benth) Merr. & L.M.Perry
 — Leaf blade large, 6-22 \times 1.5-7.5 cm; petiole long, 0.3-0.6 cm 18. *S. claviflorum* (Roxb.) Wall ex Steude
6. Fruit diameter > 4 cm long 7
 — Fruit ≤ 4 cm long 15
7. Leaves verticillate, arranged in whorls of three at twig-end 25. *S. formosum* (Wall.) Masam.
 — Leaves in pairs, opposite or subopposite at twig-end 8
8. Inflorescence axillary on leafless proximal end of twig 35. *S. malaccense* (L.) Merr. & L.M.Perry
 — Inflorescence terminal or axillary on leafy twig 9
9. Leaf blade > 20 cm long 36. *S. megacarpum* (Craib) Rathkr. & N.C.Nair
 — Leaf blade ≤ 20 cm long 10
10. Basal secondary veins arcuate, not connecting to each other 11
 — Basal secondary veins connecting to each other 12

11. Leaf subsessile, petiole ≤ 2 mm long; leaf base cordate; fruit turbinate (*in vivo*) 5. *S. aqueum* (Burm. f.) Alston
 — Leaf petiolate, petiole > 2 mm long; leaf base cuneate, rounded or slightly cordate; fruit pyriform to subglobose (*in vivo*) 46. *S. samarangense* (Blume) Merr. & L.M.Perry
12. Secondary veins narrowly spaced, ≤ 2 mm apart 49. *S. syzygioides* (Miq.) Merr. & L.M.Perry
 — Secondary veins widely spaced, > 2 mm apart 13
13. Leaf drying pale brownish, coriaceous 27. *S. grande* (Wight) Walp.
 — Leaf drying greenish, subcoriaceous to chartaceous 14
14. Leaf apex gradually narrowing without distinct acumen 32. *S. jambos* (L.) Alston
 — Leaf apex with distinct acumen 47. *S. siamense* (Craib) Chantar. & J.Parn.
15. Fruit distinctly whitish 16 (Subg. *Sequestratum*)
 — Fruit not distinctly whitish, greenish, yellowish or reddish 19
16. Infructescence racemose, short, 2-2.5 cm long 6. *S. araiocladum* Merr. & L. M. Perry
 — Infructescence paniculate, first to second order branching, long, 3-7 cm long 17
17. Leaf apex with distinct acumen 40. *S. odoratum* (Lour.) DC.
 — Leaf obtuse or acute, without distinct acumen 18
18. Leaf blade elliptic to ovate, 1 to 3.5 times as long as wide 4. *S. antisepticum* (Blume) Merr. & L.M.Perry
 — Leaf blade lanceolate, 3.5 to 5 times as long as wide 54. *S. tsoongii* (Merr.) Merr. & L.M.Perry
19. Leaves verticillate, arranged in whorls of three at twig-end
 23. *S. diospyrifolium* (Wall. ex Duthie) S.N.Mitra
 — Leaves in pairs, opposite or subopposite at twig-end 20
20. Leaf blade > 20 cm long 20. *S. crassiflorum* Merr. & L.M.Perry
 — Leaf blade ≤ 20 cm long 21
21. Infructescence hairy 22
 — Infructescence glabrous 23
22. Leaf hairy; twig brownish not contrasting leaf colour; secondary veins widely spaced; tertiary veins subscalariform 55. *S. vestitum* Merr. & L.M.Perry
 — Leaf glabrous; twig whitish contrasting to leaf colour; secondary veins narrowly spaced (1-3 mm); tertiary veins reticulate 33. *S. levinei* (Merr.) Merr. & L.M.Perry
23. Infructescence axillary on leafless proximal end of twig 24
 — Infructescence terminal or axillary on leafy twig 28
24. Intramarginal veins absent, all secondary veins arcuate 37. *S. nervosum* A.Cunn. ex DC.
 — Intramarginal veins present 25
25. Basal secondary veins connecting to adjacent secondary veins to form intramarginal veins 26
 — Basal secondary veins arcuate and not connecting to adjacent secondary veins to form intramarginal veins 27
26. Twig terete; secondary veins ≥ 20 pairs per side, narrowly spaced, 2-5 mm 22. *S. cumini* (L.) Skeels
 — Twig angular (4-angled) and winged; secondary veins < 20 pairs per side, widely spaced, 5-15 mm
 50. *S. tetragonum* (Wight) Wall. ex Walp.
27. Leaf base slightly unequal; leaf blade brownish 43. *S. polyanthum* (Wight) Walp.
 — Leaf base equal; leaf blade greenish 10. *S. balsameum* (Wight) Walp.
28. Infructescence short, ≤ 3 cm long 29
 — Infructescence long, > 3 cm long 31
29. Leaf blade lanceolate, 5 to 8 times as long as wide 48. *S. sterrophyllum* Merr. & L.M.Perry
 — Leaf blade elliptic to obovate, 1.5 to 3 times as long as wide 30
30. Leaf blade larger, usually > 3 cm long; leaf dark greenish brown 28. *S. hancei* Merr. & L.M.Perry
 — Leaf blade smaller, ≤ 3 cm long; leaf light brownish 15. *S. buxifolium* Hook. & Arn.
31. Infructescence unbranched 3. *S. angkai* (Craib) Chantar. & J.Parn.
 — Infructescence branched at least once 32

32. Secondary veins narrowly spaced, 1-3 mm apart 33
 — Secondary veins widely spaced, 4-20 mm apart 40
33. Leaf base cordate to rounded 12. *S. bokorensense* W.K.Soh & J.Parn.
 — Leaf base attenuate 34
34. Leaf apex acuminate with distinct acumen 35
 — Leaf apex acute without distinct acumen 36
35. Inflorescence with first order branching only 8. *S. attenuatum* (Miq.) Merr. & L.M.Perry
 — Inflorescence with second order branching 34. *S. lineatum* (DC.) Merr. & L.M.Perry
36. Fruit diameter \geq 1 cm 37
 — Fruit diameter $<$ 1 cm 39
37. Inflorescence with second order branching; leaf drying pale brownish
 38. *S. nigrans* (Gagnep.) Craven & Biffin
 — Inflorescence with first order branching; leaf drying pale greenish 38
38. Leaf blade lanceolate, 6.5-11.5 \times 2-3 cm 44. *S. ripicola* (Craib) Merr. & L.M.Perry
 — Leaf blade obovate, 8-12 \times 3.5-5 cm 7. *S. aromaticum* (L.) Merr. & L.M.Perry
39. Leaves verticillate at twig end 9. *S. attopeuense* (Gagnep.) Merr. & L.M.Perry
 — Leaves opposite or subopposite at twig end 51. *S. thorelii* (Gagnep.) Merr. & L.M.Perry
40. Leaf base cordate 14. *S. bullockii* (Hance) Merr. & L.M.Perry
 — Leaf base attenuate or cuneate 41
41. Secondary veins sunken above 13. *S. borneense* (Miq.) Miq.
 — Secondary veins raised above 42
42. Basal secondary veins arcuate 43
 — Basal secondary veins connecting to intramarginal vein 44
43. Tertiary veins reticulate; secondary veins 7-15 mm apart 30. *S. hemisphericum* (Wight) Alston
 — Tertiary vein subscalariform; secondary veins 15-20 mm apart 31. *S. imitans* Merr. & L.M.Perry
44. Twig strongly angular (4-angled) and winged 44. *S. praecox* (Roxb.) Rathkr. & N.C. Nair
 — Twig terete 45
45. Fruit diameter \leq 0.5 cm 19. *S. corticosum* (Lour.) Merr. & L.M.Perry
 — Fruit diameter $>$ 0.5 cm 46
46. Secondary veins less than 15 per side 21. *S. cucphuongense* W.K.Soh & J.Parn.
 — Secondary veins more than 15 per side 47
47. Upper surface pustulate or punctilate 39. *S. oblatum* (Roxb.) Wall. ex Steudel
 — Upper leaf surface plain, not pustulate or punctilate 41. *S. pachysarcum* (Gagnep.) Merr. & L.M.Perry

1. *Syzygium abortivum* (Gagnep.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 101 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Cây cỏ Việt Nam)* 2: 45, fig. 3722 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 900 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 244 (2007). — *Eugenia abortiva* Gagnep., *Notulae Systematicae* 3: 316 (1917); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 802, fig. 86 (1920). — Type: Laos, Viangchan [Vien-chang, Vien-tiane], fl., *Thorel s.n.* [2245] (lecto-, P![P00589305], here designated; isolecto-, P![P00589306]). — Remaining former syntypes: Laos, between Xiengkouang and Pak-lay, fl., *Thorel s.n.* [2245] (P!); Thailand, Lakhon Nakhon Panom, fl., *Thorel s.n.* [2245] (P![P00589304]) (see Note).

ADDITIONAL MATERIAL EXAMINED. — Laos. *d'Alleizette s.n.* (L). Vietnam. Thua Thien-Hue: Hue, 1927, I-V, *Squires 106* (A, K). Huong Phu, 4.IX.1980, *Thai Thuan 735* (HN); Mt. Bach Ma, 27.VII.1943, *Vidal 795A* (L, P). — *sin. loc.*, *Anon. HLF 1606* (HN).

DISTRIBUTION. — Burma, Thailand, Laos and Vietnam (Fig. 3).

ECOLOGY OR HABITAT. — Primary forest, near waterfall.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: July, September. Fruiting: not documented.

VERNACULAR NAMES. — Vietnam: Ruri (Thua Thien-Hue), Tram lac thai.

DESCRIPTION

Tree small. Glabrous.

Twig

Angular when young, terete when old *c.* 2 mm diameter, stout, surface smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite, subcoriaceous, greenish, (4-)5-7 × 0.7-1(-1.5) cm, 5 to 6 times as long as wide, lanceolate, base strongly attenuate, apex acute or obtuse, acumen absent; midrib sunken above, raised below; secondary veins 20-25 per side, narrowly spaced, *c.* 2.5 mm apart, *c.* 45 degrees from midrib, faint and raised above, prominent below; tertiaries prominent, of secondary strength, reticulate; intramarginal veins *c.* 0.5 mm from leaf margin, straight; petiole 3-4 mm, 1/3-1/24 of blade length, *c.* 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig, 1.3-1.7 cm long, solitary or racemose, flowers few, 1 to 5, not compact; axes 3-7 mm long; bracts and bracteoles persistent, lanceolate to elliptic.

Flower

White (*in vivo*), sessile, hypanthium not glaucous, not fibrous, 10-12 × 3 mm, clavate, pseudostalk distinct, 5-7 mm long; sepals 4, free, *c.* 1 × 1 mm, triangular; petals 4, coherent, 2-5 × 2-4 mm, orbicular; stamens 10-12 mm long; anther sacs parallel, connective gland inconspicuous; style *c.* 10 mm long, ovules *c.* 10 per locule, arranged in two longitudinal rows.

Fruit

Ellipsoid, 1 × 0.5 cm, surface smooth, calyx ring with smooth or undulate rim, seed intercotyledonary intrusion present, ramifying from side.

NOTES

Although in the protologue *Thorel 2245*, which is a species number, was cited for three different localities (Vien-chang, Lakhon and Xieng-kuoang-Pak-Lay), in P the specimens are unnumbered.

Contrary to what Gagnepain (1920) had reported, in this study, dissections of mature flowers from specimens cited by Gagnepain (*Thorel s.n.* [2245]) and other collected materials (*Squire 106* and *Vidal 795A*) showed that the ovary has two fertile locules instead of one. The flowers examined by Gagnepain were probably aberrant.

This species is morphologically close to *S. claviflorum*. Morphologically it is similar to *S. claviflorum* in having a clavate hypanthium, racemose inflorescence and seed intercotyledonary intrusion. Its narrow lanceolate leaves resemble the rheophytic form of *S. claviflorum*. *Vidal 795A* is the only collection indicating a rheophytic habitat. More ecological and geographical information is needed to determine the real status of this species.

2. *Syzygium acuminatissimum* (Blume) DC.

Prodromus Systematis Naturalis Regni Vegetabilis 3: 261 (1828). — *Myrtus acuminatissima* Blume, *Bijdragen tot de Flora van Nederlandsch-Indië* 17: 1088 (1826). — *Jambosa acuminatissima* (Blume) Hassk., *Catalogus Plantarum in Horto Botanico Bogoriensi Cultarum Alter*: 362 (1844). — *Eugenia acuminatissima* (Blume) Kurz, *Preliminary Report on the Forest and Other Vegetation of Pegu, Appendix A*: lxiii (1875), *nom. illeg., non* Miq. (1846). — *Acmena acuminatissima* (Blume) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 12 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 43, fig. 3715 (1992); M.C.Le & T.H.Le, *Forest Plants (Thực vật rừng)*: 320, fig. 271 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 891 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 242 (2007). — Type: *sin. loc.* [Java mountain in protologue], *Blume s.n.*, (holo-, L![L0484157]).

Syzygium subdecurrens Miq., *Flora van Nederlandsch Indië* 1(1): 449 (1855). — *Eugenia subdecurrens* (Miq.) Merr. & Chun, *Sunyatsenia* 2: 289 (1935). — Type: Indonesia, Java, Ungaran [Oengaran], 3000-4000 ft, *Junghuhn s.n.* (holo-, U![U0004930]; iso-, L![L0329868]).

Eugenia cumingiana D. Vidal, *Phanerogamae Cumingianae Philippinarum*: 173 (1885). — *Syzygium cumingianum* (D.Vidal) Gibbs, *Journal of Linnean Society (Botany)* 42: 76 (1914). — Type: Philippines, Albay Province, *Cuming 925* (lecto-, PNH†; isolecto-, K!, L![2 sheets], MO!).

Xenodendron polyanthum K.Schum. & Lauterb., *Die Flora der Deutschen Schutzgebiete in der Südsee*: 461 (1900), t. 16. — *Acmena polyantha* (K.Schum. & Lauterb.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 11 (1938). — Type: Papua New Guinea, Sattelberg, 7.XII.1898, *Bamler 5* (holo-, B†; iso-, A![frag., A00068813]), here designated).

Eugenia cuspidato-obovata Hayata, *Icones Plantarum Formosanarum* 3: 116 (1913). — *Syzygium cuspidato-obovatum* (Hayata) Mori, *Transactions of the Natural History Society of Taiwan* 28: 439 (1938). — Type: (holo-, TI *n.v.*; iso-, TAI *n.v.*). (*vide* Chang [1993: 888]).

Eugenia laevifolia Ridl., *The Transactions of the Linnean Society of London (Botany)* 9: 48 (1916). — *Acmena laevifolia* (Ridl.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 18 (1938). — Type: Irian Jaya, Camp I, 25 miles from Setakwa River, *Boden-Kloss s.n.* (holo-, K!; iso-, BM!).

Eugenia attenuatifolia Merr., *Philippine Journal of Science* 18: 299 (1921). — Type: Philippines, Canta Duanes, Mt. Mariguindon, 26.XI.1917, *Bur. Sci. 30314 (Ramos)* (holo-, PNH †; iso-, A![69614], K!, NY!, P *n. v.* [P05229770], US!).

Acmena dielsii Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 18 (1938). — Type: New Guinea, Gawaree, 22.XI.1925, *Brass 675 (A n.v. [68803 & 68804], BRI n.v.)*. (*vide* Hartley & Craven [1977: 331]).

[*Syzygium altissimum* Wall., *Wallich Numer. List 2588* (1831) (K-W!), *nom. nud.*].

[*Eugenia eucaudata* Elmer in Merr., *An Enumeration of Philippine Flowering Plants* 3: 176 (1923), *nom. nud.*].

[*Eugenia saligna* auct. non *Jambosa saligna* Miq. (1855): C.B.Rob, *Philippine Journal of Science*, Section C Botany 4: 392 (1909). — Vouchers: Philippines, Albay, *Cuming 925* (L!); Philippines, Province of Benguet, Mt. Tonglon, *For. Bur. 5044 (Curran)* (L!).

ADDITIONAL MATERIAL EXAMINED. — Laos. Khammouan: Nakai, *M.F. Newman Lao 850* (E).

Thailand. Loc: III.1929, *Kerr 8749* (TCD); Phu Krading, 13.IX.1990, *P.Chantaranothai, Simpson, K.Sridit & Parnell 90/192* (TCD). — Nakhon Si Thammarat: Khao Luang, 18.V.1968, *Van Beusekom & C.Phengklai 842* (L, P). — Songkla: Khao Khao, 28.VII.1928, *Kerr 15964* (K). — Surah Thani: Ko Samui, 1927, *Put 1294* (TCD).

Vietnam. Dac Lak: Duc Minh, 9.XII.1979, *Tue 300* (HN). — Quang Ninh: Ha Coi, Tsai Wong Mo Shan and vicinity, *W.T.Tsang 27062* (K); *idem*, *W.T.Tsang 27134* (K); *idem*, 23.VI-31.VIII.1939, *W.T.Tsang 29366* (K); Dam Ha, Sai Vong Mo Leng, 18.V-5.VII.1940, *W.T.Tsang 30088* (BKF).

DISTRIBUTION. — Widespread from South China to the Solomon Islands. In Indochina, this species is undercollected and only documented so far in Laos and Vietnam but possibly also occurs in Cambodia (Fig. 3).

ECOLOGY OR HABITAT. — In primary or secondary forest to 1450 m on sandy or clayey soil.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

VERNACULAR NAME. — Thoa (Vietnam).

USES. — The wood is used for furniture and boat building (Le & Le 2000).

DESCRIPTION

Tree to 35 m tall. Glabrous.

Twig

Terete or subangular, 2-3 mm diameter, slender, smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite to subopposite, chartaceous, pale brownish, 8-9 × 2.5-3 cm, 3 times as long as wide, elliptic, ovate, base cuneate, slightly attenuate, apex acute or acuminate, mostly with distinct acumen, acumen 0.5-1 cm long, 1/5 of blade length; midrib sunken above, raised below; secondary veins 10 to 15 per side, narrowly spaced, 2-3 mm apart, ascending *c.* 60 degrees from midrib, faint above, prominent or faint below, very slender; tertiary veins prominent or faint, reticulate, slender; intramarginal *c.* 1 mm from margin, slightly looped, sometimes first pairs of basal secondary veins arcuate, extend from base to half way or near leaf apex, forming outer intramarginal veins; petiole 5 mm long, 1/16-1/18 of blade length, *c.* 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal, to 5 cm long, paniculate, usually third order branching, sometimes fourth order, flowers many, 30 to 45; axes to 5 cm long; bracts and bracteoles caducous.

Flowers

Small, sessile, hypanthium not glaucous, not fibrous, 3.5-4 × 2.5-3 cm, obconic, pseudostalk distinct, 1.5-2 mm long; sepals 4, free, triangular, undulate on rim and inconspicuous; petals 4, coherent, 1 × 1 mm, orbicular; stamens *c.* 1 mm long, anthers sacs divergent, connective gland conspicuous; style

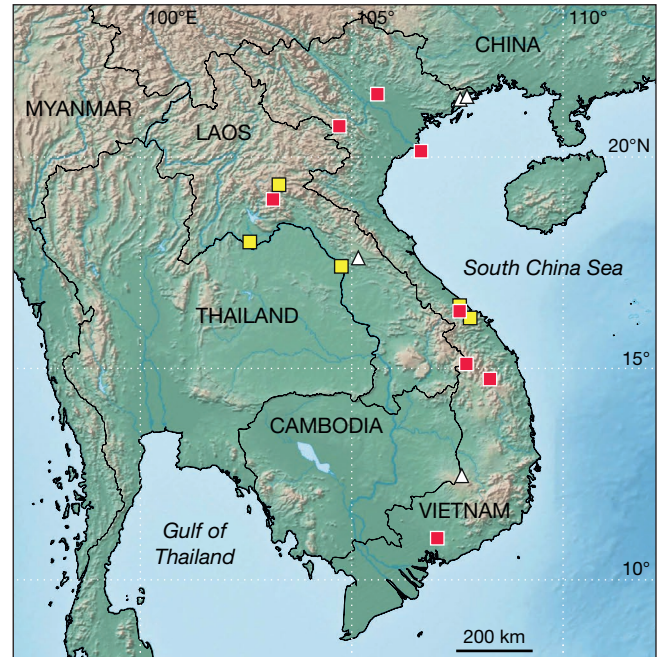


FIG. 3. — Distribution of *Syzygium abortivum* (Gagnep.) Merr. & L.M.Perry (■), *Syzygium acuminatissimum* DC. (△) and *Syzygium angkai* (Craib) P.Chantar. & J.Parn. (■) in Indochina.

1-1.3 mm long, ovules *c.* 8 per locule, axile-apical, radiating horizontally in single array surrounding placenta.

Fruit

Depressed globose, 1.5 × 1.2 cm, surface smooth, dark purple when ripe (*in vivo*), calyx ring with smooth rim, seed intercotyledonary intrusion present, ramifying from seed apex.

NOTE

Syzygium acuminatissimum is a very polymorphic species. Its morphological variations were extensively discussed in Merrill & Perry (1938a) and Hartley & Craven (1977). Merrill & Perry (1938a) observed morphological variation in the frequency of gland dots, the branchlet texture, leaf venation, leaf shape and leaf arrangement. They found, however, that these morphological variations intergraded and no distinct forms were recognised. Hartley & Craven (1977) recognised three entities in Papuan species: Entity I is pubescent while the Entity II and Entity III are glabrous. Entity III differs from Entity II in having larger fruit width (3-4.5 cm vs 1-2 cm) and pedicel width (5-10 mm vs 1 mm), otherwise both cannot be differentiated on the basis of sterile or flowering specimens. The Indochinese and Thai specimens seem to fall into Entity II; they are glabrous with small fruits (1.4 mm wide).

3. *Syzygium angkai* (Craib) Chantar. & J.Parn.

Kew Bulletin 48: 592 (1993); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 244 (2007). — *Eugenia angkai* Craib, *Bulletin of Miscellaneous Information (Royal Botanic Gar-*

dens, *Kew*) 1929: 115 (1929). — Type: Thailand, Doi Inthanon [Doi Angkhae], 30.IV.1921, *Kerr* 5287 (lecto-, BK!, designated by Chantaranothai & Parnell [1993: 592]; isolecto-, BM!, K!, TCD!).

Eugenia spissa Craib, *Bull. Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)* 1930: 169 (1930). — *Syzygium angkae* subsp. *spissum* (Craib) Chantar. & J.Parn., *Kew Bulletin* 48: 592 (1993). — Type: Thailand, Chumphon, Tasan, 28.I.1927, *Kerr* 11666 (lecto-, BK! designated by Chantaranothai & Parnell [1993: 592]; isolecto-, ABD *n.v.*, BM!, K!).

[*Eugenia ngawunensis* Parkins in Chantaranothai & Parnell, *Thai Forest Bulletin (Botany)* 21: 36 (1994), *nom. nud.* — Vouchers: Burma, Tenasserim, Htahpe Chaung, Ngawun reserve, *C.E. Parkinson* 1614 (K!); Burma, Mergui, Ngawun reserve, *R.N. Parker* 2595 (K!).

ADDITIONAL MATERIAL EXAMINED. — Laos. Xieng Khouang: Phou Bia, 15.IV.1932, *Kerr* 21064 (L); *idem*, *Kerr* 21066 (L).

Thailand. Chiang Mai: Doi Inthanon, 7.X.1990, *P.Chantaranothai, R.Pooma, Simpson & Parnell* 90/657 (TCD); Doi Angkha, 8.IV.1935, *H.B.G. Garret* 938 (TCD); *idem*, 9.V.1939, *H.B.G. Garret*. 1120 (TCD); Doi Chiang, 27.IX.1971, *G.Murata, C.Phengkhilai & K.Iwatsuki* 15168 (L); Amphoe Mae Taeng, 23.X.1979, *T.Shimizu et al.* *BKF* 78041 (BKF). — Kamphaeng Phet: 7.VI.1922, *Kerr* 6089 (TCD). — Kanchanaburi: Khao Yai, 6.IV.1968, *van Beusekom* 366 (BKF). — Loei: Phu Luang, 11.IX.2003, *Fennelly* 7 (TCD); *idem*, 19.II.1989, *Kerr* 17150 (TCD); *idem*, 26.X.1996, *Parnell* 98/16 (TCD). — Nan: Phu Kha, 16.VIII.1995, *Parnell, Pendry & R.Pooma* 95/109 (TCD). — Payap: Doi Chiengdao, 7.XII.1965, *Hennipman* 3261 (L). — *sin. loc.*, 19.II.1989, *Kerr* 17150 (L, TCD). Vietnam. Dong Nai: Trang Bom, 13.V.1965, *Martin* 936 (P). — Kon Tum: Dak Glei, 22.XI.1995, *Ayeryanov et al.* *VH* 1895 (HN); Mang Canh, 23.XI.1988, *T.D.Dai* 249 (HN). — Son La: Xuan Nha, XI.2003, *Phuong* 7134 (HN). — Thanh Hoa: Dau Be, 21.VIII.2002, *Anon. s.n.* (HN). — Thua Thien-Hue: Mt. Bach Ma, 5.VIII.1942, *Vidal* 794A (P). — Vinh Phuc: Mt. Tam Dao, 26.VII.1976, *Anon. LX-VN* 189 (HN).

DISTRIBUTION. — Burma, Thailand, Laos and Vietnam (Fig. 3).

ECOLOGY OR HABITAT. — In primary forest to 1450 m.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: April, May, July, August, November. Fruiting: March, May, September.

DESCRIPTION

Tree to 15 m tall. Glabrous.

Twig

Terete, *c.* 2 mm diameter, slender, smooth, whitish to pale brownish, contrasting to leaf colour.

Leaves

Opposite, chartaceous, greenish, 6–8.5 cm × 3.5–4.5 cm, 1.5 to 2 times as long as wide, elliptic, base cuneate, apex mostly cuspidate, sometimes acuminate, acumen 0.5–1.5 cm long, 1/5–1/10 of blade length; midrib sunken above, raised below; secondary veins 25–30, narrowly spaced, 1–2 mm apart, spreading, 75 degrees ascending from midrib, faint and raised above, prominent to faint below, slender; tertiaries faint, reticulate; intramarginal veins prominent, *c.* 1 mm from leaf margin, straight; petiole *c.* 8 mm long, 1/7–1/10 of blade length; petiole *c.* 1 mm diameter, slender, dark brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig, short, 0.6–0.8 cm long, racemose, flowers few, 5 to 7; axes 0.6–0.8 cm long; bracts and bracteoles persistent, triangular.

Flowers

Whitish or greenish white (*in vivo*), pedicellate, pedicel *c.* 0.1 cm long, hypanthium not glaucous, not fibrous, 5 × 3 mm, obconic, pseudostalk indistinct, to 1.5 mm long; sepals 4, free, *c.* 1 × 2 mm, semiorbicular, distinct; petals 4, free, 5 × 4.7 mm, orbicular; outer stamens 5 mm long, anther sacs parallel, connective gland inconspicuous; style *c.* 6 mm long long, ovules *c.* 9 per locule, irregularly arranged, radiating.

Fruit

Depressed globose, 1.5 × 1.8 cm, surface smooth, calyx ring prominent and persistent with sepal lobes, seed intercotyledonary intrusion absent.

NOTE

Syzygium angkae is a new record for Vietnam. Chantaranothai & Parnell (2002) recognised two subspecies: subspecies *angkae* (sepal > 1 mm, longer petiole, shorter peduncle, occurring at 800–1950 m altitude) and subspecies *spissum* (sepal < 1 mm, shorter petiole, longer peduncle, occurring at 50–700 m altitude). However, we observed an overlap in the length of petiole and peduncle for both of these subspecies.

4. *Syzygium antisepticum* (Blume) Merr. & L.M.Perry (Fig. 4)

Memoirs of the American Academy of Arts and Sciences 18: 159 (1939); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — *Calyptrothos aromatica* Blume, *Bijdragen tot de Flora van Nederlandsch-Indië* 17: 1092 (1826), *nom. illeg.*, non A.St.-Hil. (1824). — *Caryophyllus antisepticus* Blume in DC, *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 262 (1828), *nom. nov.* — *Jambosa aromatica* Miq., *Flora van Nederlandsch Indië* 1(1): 436 (1855). — *Eugenia antiseptica* (Blume) Kuntze, *Revisio Generum Plantarum* 1: 238 (1891). — Type: Indonesia, Java (Mt. Pantjar in protologue), *Blume s.n.* (lecto-, NY![00386778], here designated; isolecto-, U![U0258717]) (see Note 1).

Eugenia grata Wight, *Illustrations of Indian Botany* 2: 15 (1841). — [*Syzygium gratum* Wall., *Wallich Numer. List* 3586 (1831) (K-W!), *nom. nud.*]. — *Acmena grata* (Wight) Walp., *Repertorium Botanices Systematicae* 2: 181 (1843). — *Syzygium gratum* (Wight) S.N.Mitra, *The Indian Forester* 99: 100 (1973). — Type: Burma, Moulmyne, 1827, *Wallich Numer. List* 3586 (lecto-, K![‘914 Hb. Mergui’, *Herb. Hooker*], here designated; isolecto-, K![3 sheets: ‘Mergui, Griffith s.n.’, *Herb. Hooker*; ‘Mergui, Griffith s.n.’, *Herb. Hooker*; *Herb. Bentham*]) (*vide* Noltie [2005: 358]).

Myrtus quadrangularis Buch.-Ham. *ex Duthie in Hooker, Flora of British India* 2: 486 (1878), *nom. inval.*, *pro syn.* — Voucher: *n.v.* (*vide* Govaerts *et al.* [2015]).

Eugenia cuprea Koord. & Valetton, *Bulletin de l’Institut Botanique de Buitenzorg* 2: 6 (1899), *nom. illeg.*, non (O.Berg) Nied. (1893). — Type: Indonesia, Java, Tjibodas, Preanger, *Herb. Koorders* (lecto-, L![KDS 5478β, L0420061], here designated; isolecto-, L![KDS 5631β, L0420062]).



FIG. 4. — Infructescence of *Syzygium antisepticum* (Blume) Merr. & L.M.Perry. Photo courtesy of Nguyen Van Dung and John Tan. Scale bar: 5 cm.

Eugenia glaucalyx Merr., *Publications of the Bureau of Science Government Laboratories* 35: 50 (1905). — *Syzygium glaucalyx* (Merr.) Merr., *Philippine Journal of Science* 79: 391 (1951). — Type: Philippines, Borden 2748 (lecto-, A n.v. [frag., 69701] designated by Chantaranonthai & Parnell (1994: 71); isolecto-, US!).

Eugenia collinsae Craib, *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)* 1928: 237 (1928). — Type: Thailand, Chonburi, Sriracha, 4.IV.1922, Collins 782 (lecto-, BK! designated by Chantaranonthai & Parnell (1994: 71); isolecto-, ABD n.v., El, Kl, TCD!, US!).

Eugenia grata Wight var. *nervosum* Craib, *Florae Siamensis Enumeratio* 1: 646 (1931). — Type: Thailand, Nakhon Si Thammarat, Sichon, 12.V.1928, Kerr 15690 (lecto-, BK!, designated by Chantaranonthai & Parnell [1994: 71]; isolecto-, ABD n.v.).

Syzygium ovatifolium Merr. & L.M.Perry, *Memoirs of the American Academy of Arts and Sciences* 18: 161 (1939). — Type: Malaysia, Borneo, Sabah, Mt. Kinabalu, Tenompok, IX.1932, J & M.S. Clemens 28748 (holo-, A n.v. [71377]; iso-, BM!, NY!, Kl, L!, M!).

Syzygium gratum var. *confertum* Chantar. & J.Parn., *Kew Bulletin* 48: 599 (1993). — Type: Thailand, Ranong, Kraburi, Nikom Pak Chom, Pawta Luang Keow, S.Pengnaren & S.S. 534 (holo-, BKF!).

[*Eugenia scabrida* Wall., *Wallich Numer. List 3564D* (1831) (K-W!), *nom. nud.*].

[*Eugenia zeylanica* auct. non (L.) Wight (1841): Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 804 (1920), *incl.* forma *angustifolia*, forma *parvifolia* et forma *laxiflora*. — *Syzygium zeylanicum* auct. non (L.) DC. (1828): Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 101 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Cây cỏ Việt Nam)* 2: 62, fig. 3771 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 910 (2003)] (see Note 2).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampong Chhnang: Kralanh forest reserve, 13.III.1914, Chevalier 31945 (P); *idem*, 12.II.1918, Chevalier 36889 (P); *idem*, 12.II.1918, Chevalier 36974 (P). — Kampong Speu: Kirirom, 27.II.1966, Dy Phon 95 (P); Samroang Tong, Phnum Chreav [Mt. Cherev], IV.1870, Pierre 979 (P). — Kampong Thum: Lecomte & Finet s.n. (P). — Kampot: Mt. Bokor, 4.II.1999, Bansok 26 (K); 26.III.1904, Geoffray 372 (P); 24.II.1896, Hanh s.n. (P); Phnom Kamchay, 8.II.1896, Hanh 97 (P); Mt. Bokor, 10.III.2001, Middleton & M.Monyrak 669 (A, P); *idem*, 20.II.1960, Smitinand & Abbe 6489 (K); *idem*, Popok Vil waterfall, 17.III.1970, Stone 9216 (P); *idem*, 20.XII.1965, Vidal 4773 (P). — Kandal: Phnom Penh, VI.1909, d'Alleizette s.n. (L). — Koh Kong: Che Ko, 24.II.1965, T.Kira, K.Hozumi, K.Yoda & S.Kokawa 952 (BKF). — Preah Vihear: Mlu Prey, I.1876, Pierre 3195 (*Harmand* 252) (P). — Pursat: Kol Totung, VII.1965, Martin 164 (P); 26.II.1960, Smitinand, L.B., E.C. Abbe & Rollet 9662 (K). — Siem Reap: VI.1909, d'Alleizette s.n. (L); Kralanh, Prey Kralanh, 18.IV.1909, Magnen, Gourgand & Châtillon 2 (P); *idem*, Magnen, Gourgand & Châtillon 3 (P). — *sin. loc.* Aubréville 29 (P); *sin. loc.*, Collard 54 (P); *sin. loc.*, Guinet 108 (P).

Laos. Semoun basin, 1875-1877, *Harmand* s.n. (K). — Attopeu: Bolaven plateau [Attopeu plateau], III.1877, Pierre 3197 (*Harmand* 1333) (P). — Bolikhmxai: Khamkeuth, Temple Garden, 2 km southeast of town, 23.IV.2000, Soejarto, S.Bouamanivong, S.Vorasing & M.Sensavang 11419 (GH). — Khammouan: Nakai, 24.V.2006, K.Nanthavong & Ridsdale BT 512 (E). — Viangchan: Pha That Luang, 6.IV.1949, Vidal 1107B (P); Ban Saphang Meuk, 5.II.1950, Vidal 1169B (P); Phou Khaokhoay, 29.X.1971, Vidal 5626 (P). — between Ubon and Kemmarath: 1866-1868, *Thorel* s.n. (BM, P).

Vietnam. Annam: *Pierre* s.n. (P). — Cochinchina: *Pierre* s.n. (BM, P); between Ho Chi Minh and Cay Cong, IV.1866, *Pierre* 6253 (P); 1862-1866, *Thorel* s.n. (K); Thuoc Thau?, 1862-1866, *Thorel* s.n. (K). — Da Nang: Tourane and vicinity, V.1927, J. & M.S. Clemens 3778 (A, BM); *idem*, V.1927, J. & M.S. Clemens 4215 (A, K); *idem*, 5-9.IX.1927, J. & M.S. Clemens 4490 (P). — Dac Lak: 11.III.1953, Schmid s.n. (P); Ban Trang, Schmid 1001 (P). — Khanh Hoa: Poulo-Condor, *Germain* 56 (P). — Kon Tum: Dak Poko river, 20 km from Dak Glei village, 30.III.1995, *Averyanov et al.* VH 1000 (P); Ngoc Linh, NW slope of Mt. Ngoc Linh, 15.IV.1995, *Averyanov et al.* VH 1412 (P); Dak Glei, 18.III.1978, *Bien* 483 (HN); Dak To, 4.IV.1978, *Phuong* 464 (HN). — Lam Dong: Dalat, 22.IV.1955, Schmid s.n. (P); *idem*, 29.IV.1955, Schmid s.n. (P). — Quang Tri: *Chevalier* 40207 (*de Pirey* 21) (P); 1919, *Chevalier* 41215 (*de Pirey* 20) (P). — Tay Ninh: Cai Cong, 23.IV.1866, *Pierre* 106 (BM).

DISTRIBUTION. — Widespread from India to Southeast Asia. In Indochina, found in Cambodia, Laos and Vietnam (Fig. 5).

ECOLOGY OR HABITAT. — Occurs in wide range of habitat, in primary and secondary forest, dwarf forest, bush, savanna, along roadsides, marshes and by the sea shore, to 1300 m.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: January to October. Fruiting: February to May.

VERNACULAR NAMES. — Cambodia: Pring lies (Kampot), Renh (Kampong Chhnang), Smach (Pursat, Kampong Chhnang & Kampong Thum), Smach daom (Kampot, Kampong Spoe & Koh Kong), Sme (Siem Reap). Laos: Phak Sa Mek (Viangchan). Vietnam: Chen (Quang Tri), Tram tich lan (Vietnam), Tram sang (Tay ninh), Tram vo do (Vietnam).

USES. — The fruit and young leaves edible, the bark is used for making torches and as red dye for fabrics and fishing nets. The plant is also used as traditional medicine against syphilis and dysentery (Dy Phon 2000). The wood is used as timber for building houses (Lemmens *et al.* 1995).

DESCRIPTION

Shrub (2-3 m) or tree to 20 m tall. Glabrous.

Twig

Angular and slightly winged when young, terete when old, fissured or fibrous on surface, 1-2 mm diameter, surface smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite, subcoriaceous to coriaceous, yellowish brown, (2.5-)3-8(-13.5) × 1.5-5 cm, 1 to 3.5 times as long as wide, elliptic to ovate, base rounded to cuneate, apex acute or obtuse, acumen indistinct; midrib sunken above, raised below; secondary veins 10-15 per side, widely spaced, 2-7 mm apart, *c.* 45 degrees ascending from midrib, prominent and raised above, prominent below, slender; tertiaries prominent or faint, reticulate; intramarginal veins 0.5-1 mm from leaf margin, straight; petiole 2-6 mm long, 1/12-1/30 of blade length, *c.* 1-1.5 mm diameter, stout, dark brownish to blackish, contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 3-7 cm long, paniculate, first to second order branching, flowers many, to

39, in clusters of 3 to 6 flowers at lateral branches, 9 at terminal of main axes, lateral branches long or very short (c. 1 mm); axes 2.5-6.5 cm long; bracts and bracteoles caducous, ovate.

Flowers

Whitish (*in vivo*), sessile, hypanthium corrugated, glaucous, not fibrous, c. 5-7 × 2-2.5 mm, elongate, pseudostalk distinct, 0.5-2 mm long; sepals 4-5, free, c. 0.5 × 1 mm, triangular; petals 4-5, coherent, 2-3 × 2-3 mm, orbicular; outer stamens 0.5-0.8 cm long, anther sacs parallel, connective gland conspicuous; style 5-8 mm long, ovules 10-12 per locule, in 2 longitudinal rows.

Fruit

Whitish (*in vivo*), globose, 0.5 × 0.5 cm, surface smooth, calyx ring with persistent sepal lobes, seed intercotyledonary intrusion absent.

NOTES

1. Blume (1826) initially described this species under *Calyptranthes aromatica* but later placed it under *Caryophyllus* using a new epithet *antisepticus* because the earlier epithet was preempted by *Caryophyllus aromatica* L. Miquel (1855) decided that this species belong to *Jambosa* and changed the name by using the oldest epithet to *Jambosa aromatica*. This species is currently classified under *Syzygium* and hence the name *Syzygium antisepticum* is accepted. The specimens used by Blume to describe *Calyptranthes aromatica*, in U and NY, are flowering specimens collected from Mt. Pantjar in Java. The duplicate in NY is annotated by Blume as '*Calyptranthes aromatica*'. The duplicate in U, which was annotated by Miquel as '*Jambosa aromatica*, Java, monte', is possibly from Junghuhn's collection (fruiting specimens on upper-side of sheet) and Blume's collection (flowering specimen on lower-side of sheet) mounted on the same sheet. Because of the ambiguity of the material in U, the duplicate in NY was chosen as the preferred lectotype.

2. *Syzygium zeylanicum* (L.) DC. and *S. antisepticum* are considered by many authors as closely related with the same geographical distribution, polymorphic and are vegetatively inseparable. The two species can, however, be differentiated by the surface texture of the hypanthium: warty in *S. zeylanicum* while smooth or wrinkled in *S. antisepticum*. Until a comprehensive study is undertaken to resolve this complex species, we tentatively accept this division. All Indochinese specimens have a wrinkled or smooth hypanthium, therefore they are grouped into *S. antisepticum*. Throughout its range and also in Indochina, this species is very polymorphic and therefore we do not accept Gagnepain's formal recognition of the narrow leaf form (forma *angustifolia*), small leaf form (forma *parviflora*) and lax inflorescence form (forma *laxiflora*).

5. *Syzygium aqueum* (Burm. f.) Alston

Annals of the Royal Botanic Gardens (Peradeniya) 11: 204 (1929); M.F.Newman et al., *A Checklist of the Vascular Plants of Lao PDR*:



FIG. 5. — Distribution of *Syzygium antisepticum* (Blume) Merr. & L.M.Perry (■), *Syzygium araiocladum* Merrill & L. M. Perry (△) and *Syzygium attenuatum* (Miq.) Merr. & L.M.Perry (▲) in Indochina.

244 (2007). — [*Jambosa aquea* Rumph., *Herbarium Amboinense* 1: 126, t. 38, fig. 2, 1741, *nom. inval.*]. — *Eugenia aquea* Burm. f., *Flora Indica*: 114 (1768). — *Jambosa ? aquea* (Burm. f.) DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 288 (1828). — *Malidra aquea* (Burm. f.) Raf., *Sylva Telluriana*: 107 (1838). — *Cerocarpus aqueus* (Burm. f.) Hassk., *Flora* 25, suppl.: 36 (1842). — Type: Icon in Rumphius, *Herbarium Amboinense* 1: 126, t. 38, fig. 2 (1741); Indonesia, Ambon, *Robinson Pl. Rumph. Amboin.* 192 (epi-, L!, here designated, suggested by Merrill (1917); isoepi-, A *n.v.*, BM *n.v.*, BO *n.v.*, K *n.v.*, L!, N.Y *n.v.*, US *n.v.*).

Eugenia javanica Lam., *Encyclopédie Méthodique (Botanique)* 3: 200 (1789). — *Jambosa javanica* (Lam.) K. Schum. & Lauterb., *Die Flora der Deutschen Schutzgebiete in der Südsee*: 470 (1900). — *Myrtus javanica* (Lam.) Spreng., *Systema Vegetabilium* 2: 484 (1825). — *Syzygium javanicum* (Lam.) Miq. ex Masam., *Enumeratio Phanerogamarum Bornearum*: 530 (1942), *non* (Lam.) Miq. (1855). — Type: Indonesia, Java, *Commerson s.n.* (holo-, P-LA![P00297990]).

Eugenia obversa Miq., *Analecta Botanica Indica* 1: 18 (1850). — *Syzygium obversum* (Miq.) Masam., *Enumeratio Phanerogamarum Bornearum*: 535 (1942). — Type: Indonesia, Borneo, *Korthals s.n.* (holo-, L![L0329634]).

Jambosa madagascariensis Blume, *Museum Botanicum Lugduno-Batavum* 1: 103 (1850). — Type: Madagascar, *Chapelier s.n.* (holo-, L![sheet no. 898.203-25]; iso-, P *n.v.*).

ADDITIONAL MATERIAL EXAMINED. — Cambodia. Phnom Penh., VI.1909, *d'Alleizette s.n.* (L).

Vietnam. Hanoi City: 25.V.1886, *Balansa* 2866 (P).

DISTRIBUTION. — Widely cultivated in the tropics, including Cambodia, Laos and Vietnam. Possibly native to Malesia.

ECOLOGY OR HABITAT. — Cultivated at lowland.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

VERNACULAR NAME. — Water apple (general).

USES. — The fruit is edible.

DESCRIPTION

Tree to 5 m tall. Bark smooth, pale brownish. Glabrous.

Twig

Terete, 2.5–4 mm diameter, stout, surface smooth, pale brownish, not contrasting to leaf colour.

Leaves

Opposite, sessile, chartaceous, brownish to greenish, 10–15 × 5–7 cm, 2 times as long as wide, elliptic, oblong-elliptic to ovate, base cordate, apex acute, broadly acute or obtuse; midrib sunken above, raised below; secondary veins 10–12 per side, broadly distanced, 10–20 mm apart, *c.* 45 degrees ascending from midrib, prominent and raised above, prominent below; tertiaries prominent, reticulate; intramarginal 3–6 mm from leaf margin, straightly or slightly looped, sometimes a pair of basal secondary veins arcuate and extending to form outer intramarginal veins; petiole 1–2 mm long, $\frac{1}{75}$ – $\frac{1}{100}$ of blade length, 1.5–2 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Terminal, axillary on leafy or leafless twig, to 6 cm long, racemose, flowers few, 3 to 7; axes to 5 cm long; bracts and bracteoles caducous.

Flowers

Whitish to yellowish (*in vivo*), big, pedicellate, pedicel 1–2 cm, hypanthium greenish (*in vivo*), not glaucous, not fibrous, 10–22 × 10–15 mm, pyriform, apex tapering abruptly into distinct pseudostalk, *c.* 5 mm long; sepals greenish (*in vivo*), 4, free, semiorbicular, 2.5–3 × 3–4 mm; petals 4, free, ovate to orbicular, 5–6 × 5–7 mm; outer stamens 12–13 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 15–16 mm long, ovules *c.* 30 per locule, irregularly radiating.

Fruit

Pinkish to reddish (*in vivo*), turbinate, top flattened, 4–5 × 3–4 cm, surface smooth, shiny, calyx ring with inflexed, fleshy sepal lobes, seed intercotyledonary intrusion absent.

NOTES

1. *Syzygium samarangense* and *S. aqueum* are widely cultivated in the tropics ranging from India through Southeast Asia to the Pacific Islands. In the field, both species are distinct and easily recognised. In *S. aqueum*, the leaves are sessile and the base cordate, the flower is smaller and the hypanthium and fruit are abruptly constricted at the pseudostalk. In *S. samarangense* by contrast, the leaves are petiolate, the base is rounded or slightly cordate, the flower is larger, the hypanthium broader and gradually

constricted to the pseudostalk and the fruit is pyriform to subglobose. In the dried state, these characters are difficult to see. For example, the fleshy and watery fruit, are the most striking characters for distinguishing the two species, but do not preserve well in the herbarium. This is further complicated by some overlapping vegetative characters between the two species. Lamarck (1789) hesitantly associated *Eugenia javanica* with *Jambosa aquea* Rumph. and hence many authors have interpreted and used the name in part 'pro parte'. However, Blume (1826), who was the first to describe *S. samarangense*, considered *Myrtus javanica* (= *E. javanica*) and *Jambosa aquea* as conspecific but different from *S. samarangense*. *Eugenia javanica* Lam. had been associated by some authors with specimens belonging to *S. samarangense* but the type which we have examined, belongs to *S. aqueum*. In general there is an agreement among botanists that *S. samarangense* and *S. aqueum* are two distinct species but the problem is the misapplied name of *E. javanica* Lam.

2. After having seen the type specimens, the following names, which are included as the synonyms for *S. aqueum* in the *World Checklist of Myrtaceae* (Govaerts *et. al.* 2008, 2015) were omitted here and transferred to *S. samarangense*: *Eugenia alba* Roxb., *Eugenia mindanaensis* C.B. Rob., *Jambosa ambigua* Blume, *Myrtus obtusissima* Blume = *Jambosa obtusissima* (Blume) DC., *Myrtus timorensis* Zipp. ex Span. = *Jambosa timorensis* (Zipp. ex Span.) Blume.

6. *Syzygium araiocladum* Merr. & L. M. Perry

Journal of the Arnold Arboretum 19: 225 (1938); J. Chen & Craven, *Flora of China* 13: 356 (2007). — Type: China, Kwangsi, Shap Man Taai Shan, near Hoh Lung Village, Shang-sze district, VI.1933, *W.T. Tsang* 22559 (lecto-, BM!, here designated; isolecto-, A *n.v.* [71302 & 71303], S!). — Remaining former syntypes: China, Guangxi, Shang-sze district, Shap Man Taai Shan, near Hoh Lung Village, VI.1933, *W.T. Tsang* 22482 (BM!).

ADDITIONAL MATERIAL EXAMINED. — Vietnam. Quang Ninh: Dong Bong, 12.II.1977, *V.N. Trinh* 51 (VFU); Ha Coi, Tsai Wong Mo Shan and vicinity, 3.V-22.VI.1939, *W.T. Tsang* 29081 (A, E, K, P); Dam Ha, Sai Vong Mo Leng, VII-IX.1940, *W.T. Tsang* 30349 (E, K, P).

DISTRIBUTION. — South China (Guangxi and Hainan) and North Vietnam (Quang Ninh) (Fig. 5).

ECOLOGY OR HABITAT. — In primary forest, to 270 m.

CONSERVATION STATUS. — IUCN Global Status: Data Deficient (DD); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: May to September. Fruiting: February.

DESCRIPTION

Shrub to 3 m tall. Glabrous.

Twig

Angular and winged when young, terete when old, 0.5–1 mm diameter, slender, surface smooth, brownish, contrasting or not to leaf colour.

Leaves

Opposite, chartaceous, yellowish brown, silky below, 3-5 × 0.8-1.7 cm, 3 times as long as wide, elliptic, ovate, base cuneate, apex acuminate, acumen prominent, 1-2 cm long, ¼-½ times of blade length; midrib sunken above, raised below; secondary veins slender, *c.* 12 per side, widely spaced, 1-2 mm apart, *c.* 60 degrees ascending from midrib, faint on both surfaces; tertiaries faint, reticulate; intramarginal veins 0.5-1 mm from leaf margin, straight; petiole 2-3 mm long, ⅓-½ of blade length, *c.* 0.5 mm diameter, slender, blackish, contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 2-2.5 cm long, racemose, flowers few, 2 to 4; axes *c.* 1 cm long; bracts and bracteoles caducous.

Flowers

Whitish (*in vivo*), sessile, hypanthium corrugated, glaucous, not fibrous, *c.* 10 × 2.5 mm, elongate, pseudostalk distinct, *c.* 4 mm long; sepals 4-5, free, *c.* 0.5 × 1 mm, triangular; petals 4-5, coherent, 2 × 2 mm, orbicular; outer stamens *c.* 0.5 cm long, anther sacs parallel, connective gland conspicuous; style *c.* 5 mm long, ovules 10 to 12 per locule, in 2 longitudinal rows.

Fruit

Globose, 0.5 × 0.5 cm, surface smooth, calyx ring with persistent sepal lobes, seed intercotyledonary intrusion absent.

NOTE

Syzygium araiocladum is vegetatively similar to *S. jasminifolium* (Ridl.) Chantar. & J.Parn. from Thailand and Peninsular Malaysia but differs in the inflorescence type which is spreading with caducous bracts vs clustered with persistent bracts respectively.

7. *Syzygium aromaticum* (L.) Merr. & L.M.Perry

Memoirs of the American Academy of Arts and Sciences 18: 196 (1939); P.H.Hô, *An Illustrated Flora of Vietnam (Cây cỏ Việt Nam)* 2: 45, fig. 3720 (1992); P.Dy Phon, *Plant Use in Cambodia*: 376 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 900 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 244 (2007). — *Caryophyllus aromaticus* L. *Species plantarum* 1: 515 (1753). — Type: *Herb. Clifford: 207, Caryophyllus 1* (lecto-, BM![BM000628747], designated by McVaugh [1989: 528]). (For synonyms see Govaerts *et al.* 2015)

ADDITIONAL MATERIAL EXAMINED. — Vietnam. Dong Nai, Bien Hoa, VII.1909, *d'Alleizette s.n.* (L).

DISTRIBUTION. — Native to Moluccas Is. but widely cultivated in the tropics for clove production. Introduced and cultivated in Indochina.

ECOLOGY OR HABITAT. — Cultivated, to 900 m.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

VERNACULAR NAMES. — Cambodia: Khan phluu, Khlam puu. Laos: Dok chan, Kanz phu. Vietnam: Dinh huong.

USES. — The dried flower bud is the source of cloves. In addition to the flower, other parts of the plant such as the fruit, flower stalk and leaf are used to produce clove oil. (for detail on usage see de Guzman & Siemonsma 1999).

DESCRIPTION

Due to the paucity of collections from Indochina, the description presented here is partly based on herbarium specimens from other regions.

Tree to 20 m tall. Glabrous.

Twig

Terete, *c.* 2 mm diameter, stout, surface smooth, whitish, contrasting to leaf colour.

Leaves

Opposite, subcoriaceous, pale greenish, 8-12 × 3.5-5 cm, 2 to 3 times as long as wide, obovate, base strongly attenuate, apex acute, blunt, acumen absent; midrib sunken above, raised below; secondary veins 20-30 per side, narrowly spaced, 2-3 mm apart, 60-70 degrees from midrib, faint and raised above, prominent below; tertiaries faint, reticulate; intramarginal veins 1-1.5 mm from leaf margin, straight; petiole, 1.5-2.5 cm long, ⅓-½ of blade length, *c.* 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal, 3-5 cm long, paniculate, first order branching, flowers few, *c.* 15, not compact; axes 2.5-3 mm long; bracts and bracteoles caducous, triangular.

Flowers

Pale yellowish (*in vivo*), pedicellate, pedicel thick, stout, 3-7 mm long, hypanthium not glaucous, not fibrous, 11-12 × 3 mm, clavate, tapering gradually, pseudostalk distinct; sepals 4, free, 3.5-4 × 3-3.5, ovate; petals 4, free, 7-8.5 × 7 × 8 mm, orbicular; outer stamens 7-7.5 mm long; anther sacs parallel, connective gland inconspicuous; style *c.* 4 mm long, ovules *c.* 16 per locule, arranged in two longitudinal rows.

Fruit

Reddish, 2-2.5 cm, obovoid, calyx ring with undulating rim, seed intercotyledonary intrusion absent.

8. *Syzygium attenuatum* (Miq.) Merr. & L.M.Perry

Memoirs of the American Academy of Arts and Sciences 18: 185 (1939). — *Jambosa attenuata* Miq., *Flora van Nederlandsch Indië* 1(1): 437 (1885). — *Eugenia attenuata* (Miq.) Koord. & Valetton, *Mededeelingen uit's Lands Plantentuin* 40: 121 (1900). — [*Syzygium attenuatum* (Miq.) Masam., *Enumeratio Phanerogamarum Bornearum*: 523 (1942), *nom. illeg.*]. — Type: Indonesia, Java, Ungaran [Oengan], *Junghuhn s.n.* (holo-, L![U0005205]).

Eugenia penangiana Duthie in Hooker, *Flora of British India* 2: 486 (1878). — Type: Peninsular Malaysia, Penang, Government Hill, *Maingay 744* (holo-, K!).

Eugenia purpuricarpa Elmer, *Leaflets of Philippine Botany* 4: 1435 (1912). — Type: Philippines, Palawan, Puerto Princesa (Mt. Pulgar), III.1911, *Elmer 12818* (holo-, PNH†; iso-, A![69768 & 69769], BM!, GH!, K!, P n. v. [P05228855]).

Eugenia circumscissa Gagnep., *Notulae Systematicae* 3: 321 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 841 (1920). — *Cleistocalyx circumscissa* (Gagnep.) P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 63, fig. 3774 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 892 (2003). — *Syzygium attenuatum* subsp. *circumscissum* (Gagnep.) Chantar. & J.Parn., *Kew Bulletin* 48: 593 (1993). — [*Syzygium circumscissum* (Gagnep.) Craven *et al.*, *Blumea* 51: 136 (2006), *sphalm.*]. — Type: Vietnam, Bien Hoa, Chiao-xham, *Pierre 6279* (lecto-, P![P00589289] designated by Chantaranothai & Parnell (1993: 593); isolecto-, K![K000276203]; A![frag., A00069417]).

Eugenia rhamphiphylla Craib, *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)* 1930: 168 (1930). — *Syzygium rhamphiphyllum* (Craib) C.E.C. Fisch., *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)* 1937: 438 (1937). — Type: Thailand, Satul, Klawng Ton, 10.III.1928, *Kerr 14444* (lecto-, BK! designated by Chantaranothai & Parnell (1994: 41); isolecto-, ABD n.v., BM!, K!).

Eugenia barringtonii Hole ex Chalk & Chattaway, *Tropical Woods* 41: 24 (1935), *nom. nud.* (*fide* Chantaranothai & Parnell [1994: 41]).

Eugenia attenuata var. *ophirensis* M.R. Hend., *The Gardens' Bulletin Singapore* 12: 241 (1949). — *Syzygium attenuatum* var. *ophirensis* (M.R. Hend.) I.M.Turner, *The Gardens' Bulletin Singapore* 47: 371 (1995). — Type: Peninsular Malaysia, Johor, Mt. Ophir, *Ridley 3298* (holo-, SING!; iso-, K!).

Eugenia attenuata var. *montana* M.R. Hend., *The Gardens' Bulletin Singapore* 12: 242 (1949). — *Syzygium attenuatum* var. *montanum* (M.R. Hend.) Chantar. & J.Parn., *Kew Bulletin* 48: 593 (1993). — Type: Peninsular Malaysia, Pahang, Cameron Highlands, *SFN 23559* (*Henderson*), (holo-, SING!; iso-, K!).

ADDITIONAL MATERIAL EXAMINED. — **Thailand.** Chanthaburi: Kao Petchakut, IV.1925, *Noe 88*. — Nakhon Si Thammarat: Khao Luang, *Ploenchit 291* (BKF). — Ranong: Kao Talu, II.1927, *Kerr 11785* (BKF). — Satun: Adang, 12.I.1938, *Kerr 14014* (BKF); Khuan Kalong, 11.II.1961, *Smitinand 7168* (BKF). — Trang: Khao Chong, 2.V.1969, *S.Phusomsaeng 245* (BKF).

DISTRIBUTION. — Widespread from Southeast Asia to New Guinea. Recorded in Burma, Thailand, Vietnam, Philippines, Peninsular Malaysia, Borneo, Java and New Guinea (Fig. 5).

ECOLOGY OR HABITAT. — Primary lowland to montane forest, to 1100 m (Thailand).

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Data Deficient (DD).

VERNACULAR NAMES. — Vietnam: Tram o, Tram voi o.

DESCRIPTION

(Due to the paucity of collections from Indochina, the description presented here is partly based on specimens from Thailand)

Tree to 15 m tall. Glabrous.

Twig

Terete, c. 2 mm diameter, slender, surface smooth, pale brownish, contrasting to leaf colour.

Leaves

Opposite, chartaceous to subcoriaceous, pale brownish to yellowish, 4–7 × 1.7–2.5 cm, 2.5 to 3 times as long as wide, elliptic, base strongly attenuate, apex acuminate, acumen c. 0.5 cm long, distinct, 1/8–1/10 of blade length; midrib sunken above, raised below; secondary veins 20–30 per side, 1–2 mm apart, 45–50 degrees from midrib, prominent and raised on both leaf surfaces; tertiaries faint, reticulate; intramarginal veins c. 0.5 mm from leaf margin, straight; petiole 5–8 mm long, 1/8–1/10 of blade length, diameter c. 0.5 mm, slender, pale brownish, not contrasting strongly with blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 4–4.5 cm long, paniculate, to first order branching, flowers 9 to 15; axes 2.5–3 cm long; bracts and bracteoles caducous.

Flowers

Sessile, hypanthium not glaucous, not fibrous, 8–15 × 4–5 mm, clavate (bud globose at apex), narrowing into long distinct pseudostalk, 10–13 mm long; sepals 4, free, 0.4 × 0.6 mm, triangular; petals 4, coherent, 2 × 2 mm, orbicular; outer stamens to 1.5 mm long, anther sacs parallel, connective gland inconspicuous; style 1–1.5 long, stout and thick, locules 2 to 3, ovules 10 to 12 per locule, in two longitudinal rows.

Fruit

Obloid-obovoid, 7–8 × 4–6 mm, surface smooth, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTE

This species is widespread and highly variable in its hypanthium size, leaf size and venation. In Indochina and Thailand subsp. *circumscissum* is recognised and differs from the typical form in having a longer hypanthial cup (> 10 mm long). However, we observed variability in the length of the hypanthial cup and we have not seen any disjunct pattern in this character for this species. This species is undercollected in Indochina and represented by only one collection.

9. *Syzygium attopuense* (Gagnep.) Merr. & L.M.Perry (Figs 6; 7)

Journal of the Arnold Arboretum 19: 107 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 46, fig. 3723 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 901 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 244 (2007). — *Eugenia attopuensis* Gagnep., *Notulae Systematicae* 3: 316 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 816 (1920). — Type: Laos, Bolaven plateau [Attopu plateau], river Semoun, III.1877, *Pierre 3290* (*Harmand 1172*) (lecto-, P![P00589301, Delpy's drawing dated I.1900 attached], here designated; isolecto-, P![4 sheets: P00589302 & P00589303; two others without barcodes – one sheet with label from Herb.



FIG. 6. — Lectotype of *Syzygium attopeuense* (Gagnep.) Merr. & L.M.Perry, *Pierre* 3290 (*Harmand* 1172) (P00589301).

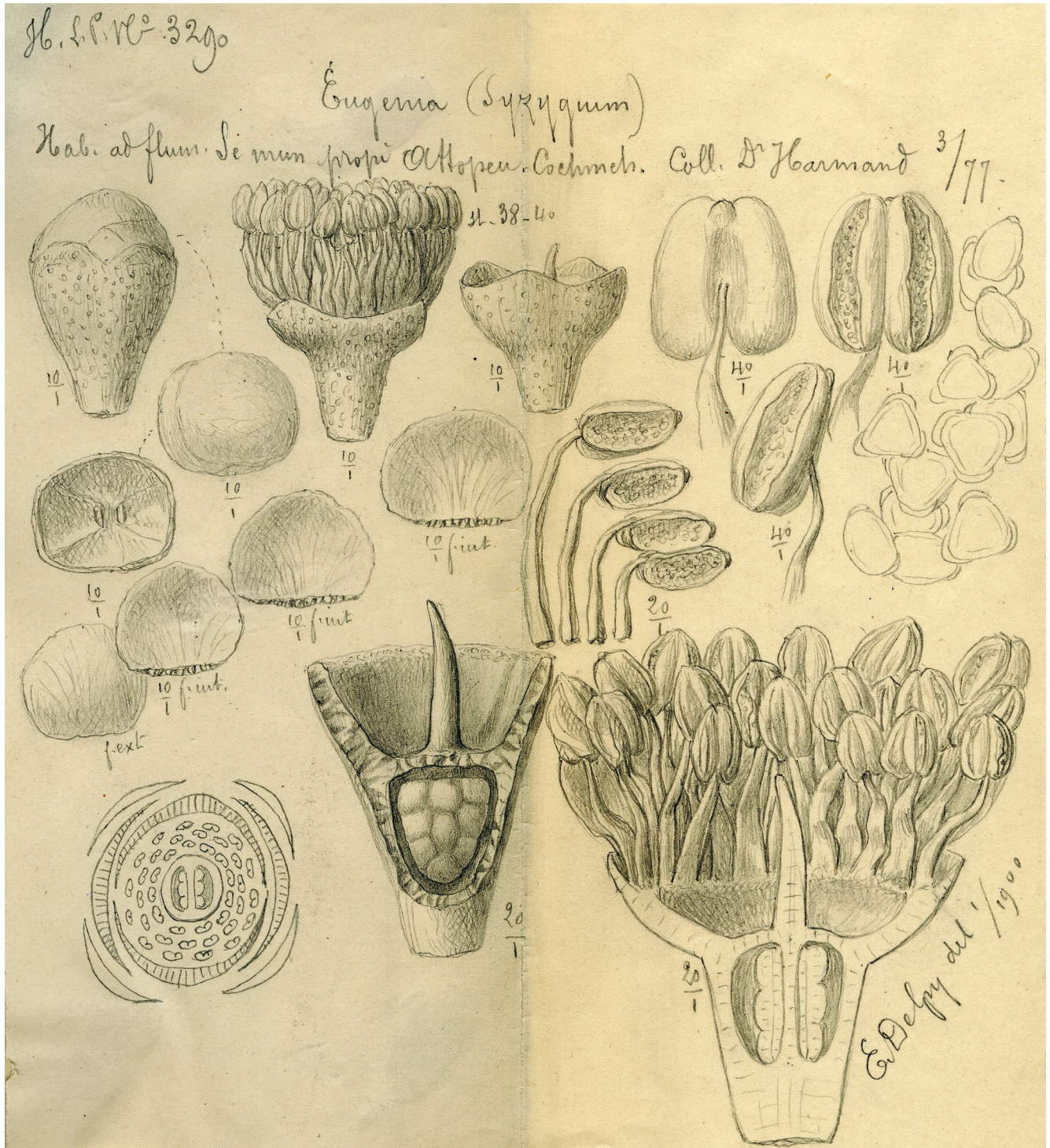


FIG. 7. — Delpy's drawing of the reproductive organs of the lectotype of *Syzygium attopeuense* (Gagnep.) Merr. & L.M.Perry, *Pierre* 3290 (*Harmand* 1172) (P00589301).

Mus. Paris indicating Dr. Harmand expedition at Bassin d'Attopeu, the other sheet with ticket bearing Dr. Harmand's signature and handwriting '200-500 m altitude']).

ADDITIONAL MATERIAL EXAMINED. — **Laos.** Viangchan: Nam Ngum reservoir, 19.X.1974, *Vidal* 5959 (P). — Xaignabouli: Nam Phoun, I.1953, *Vidal* 2102 (P).

Thailand. Phitsanulok: Tung Salaeng Luang NP, *S.Phengnaren* 95 (BKF, L); 12.XII.1965, *M.Tagawa & N.Fukuoka* 2121 (BKF, L); *Vidal* 4558 (P).

Vietnam. Gia Lai: Cheo Reo, Mar., *Schmid s.n.* (P). — Lam Dong: Bi Doup, Mt. Bi Doup, 16.IV.1997, *Averyanov, N.Q.Binh & N.T.Hiep* VH 4003 (HN); *idem*, 20.IV.1997, *Averyanov, N.Q.Binh & N.T.Hiep* VH 4118 (HN). — Ninh Thuan: Ninh Hai, Vinh Hai, 20.III.2003, *Anon. QB* 267 (HN); Phan Rang, 19.IV.1982, *Rejmanek s.n.* (P). — *sin. loc.*, 1922, *Anon. s.n.* (P).

DISTRIBUTION. — Thailand, Laos and Vietnam (Fig. 8).

ECOLOGY OR HABITAT. — Secondary or primary forest, along rivers on rocky terrain, 300 to 1500 m.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Vulnerable (VU B1ab[i, iii]).

PHENOLOGY. — Flowering: January, March, April, October, November, December. Fruiting: April.

VERNACULAR NAMES. — Laos: Khai Noun, Mak Va Nam (Viangchan), Va Nam (Viangchan). Vietnam: Jomau ia (Gia Lai), Riri la-lon.

USES. — The fruit is edible and the roots, after soaking, are used as medicine.

DESCRIPTION

Shrub or tree 3-8 m tall, to 45 cm dbh. Glabrous.

Twig

Subangular, 2-2.5 mm diameter, slender, surface smooth, whitish, contrasting to leaf colour.

Leaves

Verticillate (always verticillate at twig-end) or subopposite, blade subcoriaceous, pale brownish, 5-11.5(-17) × 1-2 cm, 5 to 8 times as long as wide, usually lanceolate, sometimes oblong-elliptic, base strongly attenuate, apex acute or rounded with no distinct acumen; midrib sunken above, raised below; secondary veins 15-20 per side, narrowly or widely spaced, 2-4 mm apart, ascending steeply to 35 degrees from midrib, slender, faint and sunken above, prominent and raised below; tertiaries faint, reticulate; inner intramarginal *c.* 1 mm from leaf margin, straight; petiole *c.* 5 mm long, $\frac{1}{10}$ - $\frac{1}{15}$ of blade length, 1-1.5 mm diameter, slender, dark brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 7-17 cm long, panicle, third order branching, spreading, flowers many, 45 to 153; axes 8-15 cm long; bracts and bracteoles persistent, triangular.

Flowers

Small, sessile, hypanthium not glaucous, not fibrous, 2-3 × 1-1.5 mm, obconic, pseudostalk indistinct; sepals 4, free, 0.3 × 1 mm, semiorbicular; petals 4, coherent, 2 × 2 mm, orbicular; outer stamens *c.* 1.5 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 1.5 mm long, ovules 9-12 per locule, irregularly radiating.

Fruit

Depressed globose, 0.6 × 0.75 cm, surface smooth, calyx ring with undulating rim, seed intercotyledonary intrusion absent.

NOTES

1. This is a new record for Thailand and Vietnam: the species previously being known only from Laos. This lanceolate leaved shrub is possibly a rheophytic as it has been constantly recorded along rivers.

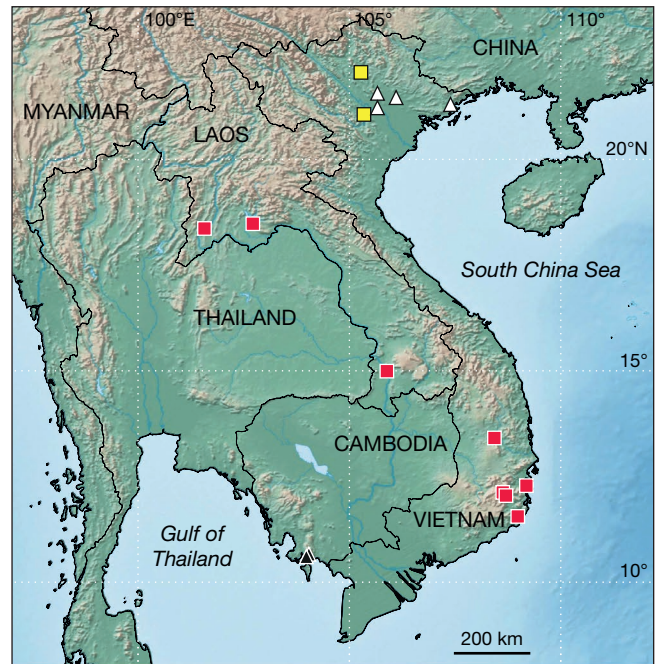


Fig. 8. — Distribution of *Syzygium attopeuense* (Gagnep.) Merr. & L.M.Perry (■), *Syzygium balsameum* Walp. (■), *Syzygium boisianum* (Gagnep.) Merr. & L.M.Perry (△) and *Syzygium bokorensense* W.K.Soh & J.Parn. (▲) in Indochina.

2. Gagnepain (1917) made reference to the *Harmand 1172* collection, which therefore should be the type. However there are five potential type sheets at P from the same gathering and so lectotypification is required. Although the labels vary slightly, we believe that all five sheets come from the same gathering because the specimens are very consistent in morphology and developmental stage.

10. *Syzygium balsameum* (Wight) Walp.

Repertorium Botanices Systematicae 2: 179 (1843); Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 108 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 46, fig. 3724 (1992) [as *Syzygium balsamineum* (Wight) Walp.]; K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 901 (2003). — [*Syzygium balsameum* Wall., *Wallich Numer. List* 3592 (1831) (K-W!, E!) *nom. nud.*]. — *Eugenia balsamea* Wight, *Illustrations of Indian Botany* 2: 16 (1841); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 819 (1920). — *Syzygium balsameum* Wall. ex A.M. & J.M.Cowan, *The Trees of Northern Bengal*, 68 (1929), *nom. superfl.* — Type: Calcutta Botanical Garden introduced from Sillet, *Anon. s.n.* (possibly *Griffith*), with the annotation '*Syzygium balsameum* Wall. herb. Cat. 3592... H[ortus] B[otanicus] C[alcuttensis], Intr. e Silhet', in *Herb. Hooker* (lecto-, K![K000821365], here designated; isolecto- M![M0137263]). (*vide* Noltie [2005: 347]) (see Note 1).

Eugenia balsamea var. *angustifolia* Duthie in Hooker, *Flora of British India* 2: 499 (1879). — Type: India, Assam, Mt. Khasia, 2000 ft., *J.D. Hooker & T. Thomson 10* in *Herb. Hooker* (holo-, K!, iso-, M!).

[*Memecylon floribundum* Wall., *Wallich Numer. List* 4113 (1831) (K-W!, BM!), *nom. nud.*].

ADDITIONAL MATERIAL EXAMINED. — Vietnam. Ha Tay: Mt. Ba Vi, Muongs village, 26.XI.1887, *Balansa* 2878 (K, P); Thu Phap, 22.XI.1888, *Balansa* 2896 (K, L, P). — Tuyen Quang: I.1931, *Anon.* 7 (P).

DISTRIBUTION. — India, Bangladesh, South China (Yunnan), Burma, Thailand, Vietnam and Peninsular Malaysia (Fig. 8). Possibly not yet collected in Cambodia and Laos.

ECOLOGY OR HABITAT. — Primary forest.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: November, January. Fruiting: not documented.

VERNACULAR NAME. — Tram dau (Vietnam).

DESCRIPTION

Tree to 6 m tall. Glabrous.

Twig

Terete, 2-3 mm diameter, stout, smooth, whitish, contrasting to leaf colour.

Leaves

Opposite, chartaceous to subcoriaceous, greenish, 11.5-12.5 × 3-6 cm, 2 to 3 times as long as wide, elliptic, obovate, base strongly attenuate, apex rounded or obtuse, sometimes mucronate, acumen when present very short, *c.* 0.5 cm long, *c.* 1/25 of blade length; midrib sunken above, raised below; secondary veins 12-15 per side, widely spaced, 5-10 mm apart, ascending 45 degrees from midrib, prominent to faint above, prominent below, 1-3 pairs of basal secondary veins arcuate and extending to form outer intramarginal veins; tertiaries prominent or faint, reticulate; intramarginal veins 1-2 mm from margin, looped, outer intramarginal veins present; petiole 1-1.5 cm long, 1/7-1/12 of blade length, 1-1.5 mm diameter, slender, not contrasting to blade colour.

Inflorescence

Axillary on leafless twig, 4-5 cm long, paniculate, second to third order branching, flowers many, 30 to 45; axes *c.* 4-5 cm long; bracts and bracteoles persistent, triangular.

Flowers

Sessile, hypanthium not glaucous, not fibrous, 2.5-3 × 2-2.5 mm, obconic, flattish, pseudostalk distinct, *c.* 1 mm long; sepals 4, free, 1 × 1 mm, roundish, inconspicuous, undulate on rim, erect; petals 4, whitish (*in vivo*), coherent, 1.5 × 1.5 mm, orbicular; outer stamens *c.* 1 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 1.5 mm long, ovules 4-8 per locule, irregular radiating.

Fruit

Globose, 0.5 × 0.5 cm, surface smooth, calyx ring with smooth rim; seed 1, globose, 0.48 × 0.48 cm, cotyledons free, seed intercotyledonary intrusion absent.

NOTE

Wight (1841) described *Eugenia balsamea* based on the specimen supplied by Wallich from the Calcutta Botanic Garden and Jenkins' specimen collected from Assam. Jenkins' specimens are

not to be found in K, E or BM. Therefore Wallich's specimen with the ticket bearing 'HBC intr. e Silhet' and with the stamp of herbarium hookerianum is selected here as the lectotype. A specimen from Wallich's herbarium (K-W) is not selected as the lectotype because it was probably not used by Wight (Noltie 2005).

11. *Syzygium boisianum* (Gagnep.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 115 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Cây cỏ Việt Nam)* 2: 47, fig. 3726 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 901 (2003). — *Eugenia boisiana* Gagnep., *Notulae Systematicae* 3: 318 (1917); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 840, fig. 87 (1921). — Type: Vietnam [Tonkin], Bac Giang, Yen The, around De-tham village, fl., 13.X.1902, *Bois* 236 (lecto-, P![P00589298], here designated; isolecto-, P!).

ADDITIONAL MATERIAL EXAMINED. — Vietnam. Ha Tay: Huong Canh, 1909, *d'Alleizette* 336 (P). — Quang Ninh: Tien Yen, Kau Nga Shan and vicinity, XII.1936, *W.T.Tsang* 27341 (A, E, K, P); *idem*, Ho Yung Shan and vicinity, X.1940, *W.T.Tsang* 30728 (E, K, P). — Thai Nguyen: X.1937, *Pételot* 6202 (A); Son Bot, XII.1937, *Pételot* 6218 (A); Tan Duong, II.1938, *Pételot* 6274 (A, P). — *sin. loc.*, 6.III.1961, *Anon.* 32MB-0064 (VFU).

DISTRIBUTION. — China (Hainan), Thailand and Vietnam (Fig. 8).

ECOLOGY OR HABITAT. — In primary or secondary forest.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: February, October, December. Fruiting: March.

DESCRIPTION

Shrub to 1.6 m tall. Glabrous.

Twig

Angular (4-angled) and winged when young, terete when old, 2-2.5 mm diameter, stout, whitish to greyish brown, not contrasting to leaf colour.

Leaves

Opposite, subsessile, subcoriaceous, pale greenish, (6-)8-14 × (2.5-)3-5.5 cm, 2 to 3 times as long as wide, elliptic, oblong or ovate, base mostly cordate, sometimes rounded, margin flat, apex mostly acuminate, sometimes acute, acumen usually present, 1-2 cm long, 1/6-1/8 of blade length; midrib sunken above, raised below; secondary veins 25-30 per side, widely spaced, 2-5 mm apart, spreading, 70-80 degrees ascending from midrib, prominent or faint, raised above, prominent and raised below; tertiaries prominent or faint below, reticulate; intramarginal veins prominent to 0.5-1 mm from leaf margin, straight; petiole 0.5-1 mm long, very short, 1/80-1/40 of blade length, *c.* 1 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Axillary or terminal on leafy twig, 1.5-2.5 cm long, racemose, flowers few, *c.* 7, fascicled, compact or spreading; axes 0.2-1.5 cm long; bracts and bracteoles persistent, elliptic.



Fig. 9. — Holotype of *Syzygium bokorensis* W.K.Soh & J.Parn., Vidal 4798 (P00557353).

Flowers

Whitish, sessile, hypanthium not glaucous, fibrous, 1-1.5 × 3.5 mm, clavate, pseudostalk distinct, *c.* 2 cm long; sepals 4, not prominent, 0.5 × 2-2.5 mm, triangular, erect; petals 6-8, coherent, 1.5 × 1.5 mm, orbicular; outer stamens 4-6 mm long, anther sacs parallel, connective gland conspicuous; style 0.8-1 cm long, ovules 7-10 per locule, in two longitudinal rows.

Fruit

Ellipsoid to obovoid, 1-1.3 × 0.5-0.7 cm, surface smooth, calyx ring with smooth to undulating rim, seed intercotyledonary intrusion present, ramifying from the side.

NOTE

The fruit of *Syzygium boisianum* is described here for the first time (*Anon.* 32MB-0064). The discovery of the fruit is important for deciding the affinity of this species in relation to *S. claviflorum*. In having a clavate hypanthium, racemose inflorescence and seed with intercotyledonary intrusion, this species is closely associated with *S. claviflorum* and falls into the subg. *Perikion*. The longer leaf form (subsp. *longiflorum* Chantar. & J.Parn.: leaf size 18.6-22.6 × 4.1-6 cm) is confined to Thailand.

12. *Syzygium bokorensis* W.K.Soh & J.Parn. (Fig. 9)

Kew Bulletin 66: 1 (2012). — Type: Cambodia, Kampot, Mt. Bokor, 20.XII.1965, *Vidal* 4798 (holo-, P![P00557353]; iso-, P![P00589386]).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampot: Mt. Bokor, III.1967, *Dy Phon* 1141 (P); *idem*, Popok Vil waterfall, IV.1967, *Dy Phon* 1148 (P); *idem*, 11.XII.2000, *S.Hul et al.* 927 (P); *idem*, 11.XII.2000, *S.Hul et al.* 946 (P); *idem*, 20.XI.1999, *S.Hul et al.* 737 (P); *idem*, 4.XII.1964, *T.Kira, K.Hozumi, K.Yoda & S.Kokawa* 276 (BKF); *idem*, *T.Kira, K.Hozumi, K.Yoda & S.Kokawa* 278 (BKF); *idem*, 7.XII.1968, *Martin* 157 (P); *idem*, XII.1965, *Martin* 806 (P); *idem*, 8.XII.1968, *Martin* 1216 (P); *idem*, 9.III.2001, *Middleton & M.Monyrak* 630 (A); *idem*, Popok Vil waterfall, 17.III.1970, *Stone* 9264 (P).

DISTRIBUTION. — Known only from Bokor National Park, Cambodia (Fig. 8).

ECOLOGY OR HABITAT. — Scrubby forest, along river, flooded area or near waterfall, on sandy soil or podzol, between 800-1050 m.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Near Threatened (NT).

PHENOLOGY. — Flowering: April, November, December. Fruiting: March, December.

VERNACULAR NAME. — Phlong kaaep (Cambodia).

DESCRIPTION

Shrub 0.6-1 m tall. Glabrous.

Twig

Terete, 2-3 mm diameter, stout, slightly flaky, brownish, not contrasting to leaf colour.

Leaves

Opposite, subsessile, coriaceous, brownish, 2.5-5.5 × 2-4 cm, 1 to 1.5 times as long as wide, rounded to broadly elliptic, base strongly cordate to rounded, margin recurved downward, apex obtuse, acute or sometimes acuminate, acumen when present 0.2-0.3 cm long, $\frac{1}{10}$ - $\frac{1}{18}$ of blade length; midrib sunken above, raised below; secondary veins thick, 18-22 per side, narrowly spaced, 1-2 mm apart, *c.* 60 degrees ascending from midrib, prominent and raised on both surfaces; tertiaries faint, reticulate; intramarginal veins *c.* 1 mm from leaf margin, straight, outer intramarginal veins present or absent; petiole 1-2 mm long, $\frac{1}{25}$ - $\frac{1}{50}$ of blade length, 1-2 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 3-5 cm long, paniculate, second order branching, spreading, flowers to 27; axes 2.5-4.5 cm long; bracts and bracteoles persistent, triangular.

Flowers

Sessile, hypanthium greenish (*in vivo*), not glaucous, not fibrous, 3 × 2 mm, obconic, pseudostalk distinct, very short, 1-1.5 mm long; sepals, 4, free, triangular, 1.3-1.5 × 3 mm; petals whitish with tinged red (*in vivo*), 4, free, orbicular, *c.* 2.5 × 2.5 mm; outer stamens *c.* 10 mm long, anther sacs parallel, connective gland conspicuous; style 4.5-5 mm long; ovary 2-locular, ovules *c.* 10 per locule, irregularly radiating.

Fruit

Reddish to purplish (*in vivo*), depressed globose, 0.6 × 0.5 cm, surface smooth, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTE

In Indochina, this species is distinctive in having a leaf that is subsessile, coriaceous and with the base cordate to rounded.

13. *Syzygium borneense* (Miq.) Miq. (Fig. 10)

Flora van Nederlandsch Indië 1(1): 453 (1855). — *Eugenia borneensis* Miq., *Analecta Botanica Indica* 1: 24 (1850), t. 7. — Type: Indonesia, Borneo, Gunung Pamatton, *Korthals s.n.* (lecto-, L![L0009408], here designated) (see Note 1).

Eugenia cinerea Kurz, *Preliminary Report on the Forest and Other Vegetation of Pegu*, Appendix B: 50 (1875). — [*Syzygium cinereum* Wall., *Wallich Numer. List* 3576 (1831) (K-W!), *nom. nud.*; Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 107 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 49, fig. 3734 (1992)]. — *Syzygium cinereum* (Kurz) Chantar. & J.Parn., *Kew Bulletin* 48: 596 (1993); P.Dy Phon, *Plant Use in Cambodia*: 377 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 902 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — Type: Peninsular Malaysia, Penang, *Wallich Numer. List* 3576 (lecto-, K-W! designated by Chantaranothai & Parnell (1993: 596); isolecto-, E!, OXF *n.v.*, L!), *syn. nov.* (see Note 1).



Fig. 10. — Holotype of *Syzygium borneense* (Miq.) Miq., Korthals s.n. (L0009408).

Eugenia microcalyx Duthie in Hooker, *Flora of British India* 2: 493 (1878). — Type: Peninsular Malaysia, Malacca, *Maingay* 727 (lecto-, K!, designated by Chantaranothai & Parnell [1994: 45]).

Eugenia pseudosubtilis King, *Journal of the Asiatic Society of Bengal* 70: 123 (1901). — Type: Peninsular Malaysia, Perak, XII.1884, *King's Collector 6946* (lecto-, BM!, designated by Chantaranothai & Parnell [1994: 52]; isolecto-, K!).

Eugenia pseudosubtilis var. *platyphylla* King, *Journal of the Asiatic Society of Bengal* 70: 124 (1901). — Type: Singapore, Botanical Garden, VIII.1892, *Ridley 3962* (lecto-, K!, here designated).

Eugenia pseudosubtilis var. *subacuminata* King, *Journal of the Asiatic Society of Bengal* 70: 124 (1901). — Type: Peninsular Malaysia, Penang, V.1881, *King's collector 1793* (holo-, K!; iso-, NY!).

Eugenia ixoroides Elmer, *Leaflets of Philippine Botany* 4: 1426 (1912). — Type: Philippines, Palawan, Puerto Princesa, Mt. Pulgar, V.1911, *Elmer 13165* (holo- PNH†; iso-, A! [69716], GH! [69717], K!).

Eugenia litseifolia Merr., *Journal of the Straits Branch Royal Asiatic Society* 77: 215 (1917). — *Syzygium litseifolium* (Merr.) Merr. & L.M.Perry, *Memoirs of the American Academy of Arts and Sciences* 18: 191 (1939). — Type: Malaysia, Borneo, Sarawak, *Native Collector 260* (*Bur. Sci.*) (holo-, PNH †; iso-, K!).

Eugenia irregularis Craib, *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)* 1930: 167 (1930). — *Syzygium irregulare* (Craib) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 107 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 52, fig. 3742 (1992); K.D.Nguyen, (*Myrta-ceae*) *Checklist of Plant Species of Vietnam* 2: 905 (2003). — *E. microcalyx* Duthie var. *irregularis* (Craib) M.R.Hend., *The Gardens' Bulletin Singapore* 12: 207 (1949). — Type: Thailand, Phangnga, takuapa, Kapong, II.1929, *Kerr 17128* (lecto-, BK!, designated by Chantaranothai & Parnell (1994: 45); isolecto-, ABD, BM!, K!, TCD!).

Eugenia operculata Roxb. var. *avicennifolia* Craib, *Florae Siamensis Enumeratio* 1: 654 (1931). — Type: Thailand, Surat, Koh Samui, IV.1927, *Kerr 12646* (lecto-, ABD *n.v.*, designated by Chantaranothai & Parnell (1994: 52); isolecto-, BK!, K!).

Eugenia pseudosubtilis King var. *orientalis* Craib, *Florae Siamensis Enumeratio* 1: 657 (1931). — Type: Thailand, Chumphorn, Siepyuan, XII.1928, *Kerr 16240* (lecto-, BK!, designated by Chantaranothai & Parnell (1994: 52); isolecto-, ABD *n.v.*, BM!, K!, TCD!).

[*Syzygium ribesoides* Wall., *Wallich Numer. List 3553A* (1831) (K-W!), *nom. nud.*].

[*Eugenia brachiata* auct. non Roxb. (1832): Duthie in Hooker, *Flora of British India* 2: 496 (1878) *pro parte*; Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 811 (1920)] (see Note 3).

[*Syzygium tonkinense* auct. non (Gagnep.) Merr. & L.M.Perry (1938): D.D.Soejarto *et al.* *Seed Plants of Cuc Phuong National Park*: 434 (2004). — Vouchers: Ninh Binh, Nho Quan, Cuc Phuong National Park, *Anon. CPNP 3998* (CPNP!) and *3999* (CPNP!).]

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampong Chhnang: Kralanh forest reserve, III.1914, *Chevalier 31733* (P). — Kampong Speu: Preah Khae, 8.VIII.1873, *Pierre s.n.* (P); Samraong Tong, V.1870, *Pierre 988* (P). — Preah Vihear: Ka Kek, II.1876, *Harmand 418* (P). — Pursat: Svay Pak, 6.VII.1965, *Martin 182* (P). — *sin. loc.*, 24.VI.1929, *Béjard 553* (A); *sin. loc.*, 19.I.1907, *Gourgand s.n.* (P); *sin. loc.*, II.1877, *Harmand 866* (P); *sin. loc.*, *Pételot s.n.* (P). **Laos.** Khammouan: Nakai, 27.V.2006, *K.Nanthavong & Ridsdale*

BT 557 (E); Ban Mak Phueang, 10.II.2005, *Newman et al. LAO 29* (E); road along Nakai near Houang Nong Pa, 11.II.2005, *Newman et al. LAO 59* (E); road from Nakai to Nakai-Nam Theun, 17.II.2005, *Newman et al. LAO 265* (E); road along Nakai to Lak Sau, 19.II.2005, *Newman et al. LAO 331* (E).

Vietnam. An Giang: Chau Doc, Mt. Cham, V.1869, *Pierre s.n.* (P). — Cochinchina: *Pierre s.n.* (K); 1868, *Talmy s.n.* (P); *Thorel s.n.* (P); *Thorel 336* (BM, P). — Dong Nai: Bien Hoa, *Vinot s.n.* (K); Bien Hoa, IV.1912, *Vinot 49* (P); Bien Hoa, IV.1912, *Vinot 45* (P). — Ha Tay: Da Chong, 14.IV.1940, *Pételot 2665* (P). — Ho Chi Minh City: Phu My, X.1874, *Godefroy s.n.* (P), 8.III.1911, *Robinson 1011* (P); *Thorel 367* (P); Binh Quoi, VII.1959, *Vu Van Cuong 1306* (P). — Khanh Hoa: Poulo-Condor, *Harmand 886* (P); Poulo-Condor, VIII.1870, *Perry s.n.* (P). — Lam Dong: Bao Loc, 1.V.1953, *Schmid s.n.* (P). — Long An: Moc Hoa, Vam Co Tay, 13.III.1971, *Vu Van Cuong 1644* (P); Moc Hoa, 13.III.1971, *Vu Van Cuong 1651* (P). — Quang Ninh: Dam Ha, Sai Vong Mo Leng, 18.V-5.VII.1940, *W.T.Tsang 29839* (K, P); *idem*, 18.V-5.VII.1940 *W.T.Tsang 29960* (A, K, P). — Tay Ninh: VIII.1891, *Pierre s.n.* (P); 1866, *Pierre s.n.* (P). — Thua Thien-Hue: Bo Giang, 28.VI.1916, *Eberhardt 2772* (P); Bo Giang, 28.VI.1916, *Eberhardt 2786* (P); *Pierre s.n.* (BM); 23.XII.1971, *Vu Van Cuong 1587* (P).

DISTRIBUTION. — Widely distributed from India to the Philippines and from South China to Borneo. In Indochina found in Cambodia, Laos and Vietnam (Fig. 11).

ECOLOGY OR HABITAT. — Primary or secondary forest, road side, swamp, lowland to hill forest to 800 m.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: February-August. Fruiting: February, May, July, August, October.

VERNACULAR NAMES. — Cambodia: Pring bai (Kampong Chhnang), Pring chanloh. Vietnam: Cham (Thua Thien-Hue), Tram ba vo (Annam), Tram dong (Dong Nai), Tram khoai (Thua Thien-Hue), Tram se, Tram trang (Dong Nai).

USES. — The fruit is edible and the wood is used for torches and construction.

DESCRIPTION

Shrub or tree, 4-25 m tall, to 30 cm dbh. Bark pale whitish to brownish; slash bark light brown. Glabrous.

Twig

Terete, *c.* 2-3 mm diameter, stout, surface smooth, whitish, contrasting to leaf colour.

Leaves

Opposite, coriaceous to subcoriaceous, brownish to dark brownish, 6-12 × 3-6.5 cm, 2 to 2.5 times as long as wide, elliptic or obovate, base attenuate, apex mostly acute, sometimes obtuse or cleft, acumen absent; midrib sunken above, raised below; secondary veins 7-10 per side, widely spaced, 5-10 mm apart, *c.* 45 degrees from midrib, prominent, sunken above, raised below, sometimes 1-3 pairs of basal secondary veins arcuate; tertiaries obscure, reticulate; intramarginal veins 1-2 mm from margin, slightly looped; petiole 7-10 mm long, *c.* 1/10 of blade length, 1 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig, 4–7 cm long, paniculate, to second order branching, first order branches spreading, flowers 51–63, the second order branches very short, with a head of 7–9 flowers; axes *c.* 4–7 mm long; bracts and bracteoles persistent, triangular.

Flowers

White to pale yellow (*in vivo*), sessile, hypanthium not glaucous, not fibrous, 1.5–2 × 1.5 mm, obconic, pseudostalk indistinct; sepals 4, free, 0.5–0.7 × 1 mm, semiorbicular; petals 4, coherent, 1.5–2 × 1.5–2 mm, orbicular; stamens 1.5–2 mm long; anther sacs parallel, connective gland conspicuous; style 1–1.5 mm long, ovules 10–14 per locule, irregularly radiating.

Fruit

Reddish (*in vivo*), globose, 1 × 1 cm, surface smooth, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTES

1. This species is polymorphic in leaf shape and size and inflorescence length but the specimens that we have examined throughout its distributional range are consistent and distinctive in twig colour (whitish to greyish), leaf venation (veins sunken above, brownish to dark brownish and basal secondary veins arcuate), inflorescence type (paniculate, to second order branching, flowers compact at branch-end) and hypanthium shape (small, obconic and pseudostalk indistinct). Some of the morphological variations observed perhaps warrant infraspecific rank. *Syzygium borneense* is chosen as the oldest name for this species, although the type has smaller leaves than the typical form. In Thailand, *S. cinereum* and *S. borneense* are treated as separate species with only subtle difference in twig colour: whitish grey in the former species and brown to whitish grey in the latter species but in our opinion they share the same leaf venation, inflorescence and floral type.

2. Chantaranothai & Parnell (1994) referred the specimen *Kerr 12061*, which was earlier identified as *Eugenia myrtillus* by Craib's (1931), to a variety of *S. borneense* (var. *myrtillus*). After having examined the type of *E. myrtillus* Stapf (*Haviland 1109*, K!) and *E. borneense*, we agree with Craib's (1931) identification but disagree with Chantaranothai & Parnell (1994) in treating this specimen as *S. borneense*: its venation is unlike that of *S. borneense*, the secondary veins are numerous and not sunken adaxially and the hypanthium cup has a distinct pseudostalk.

3. Duthie (1878) misidentified specimens belonging to *S. cinereum* as *E. brachiata* Roxb. and Gagnepain (1920) followed his identification.

14. *Syzygium bullockii* (Hance) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 107 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 48, fig. 3720 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2:

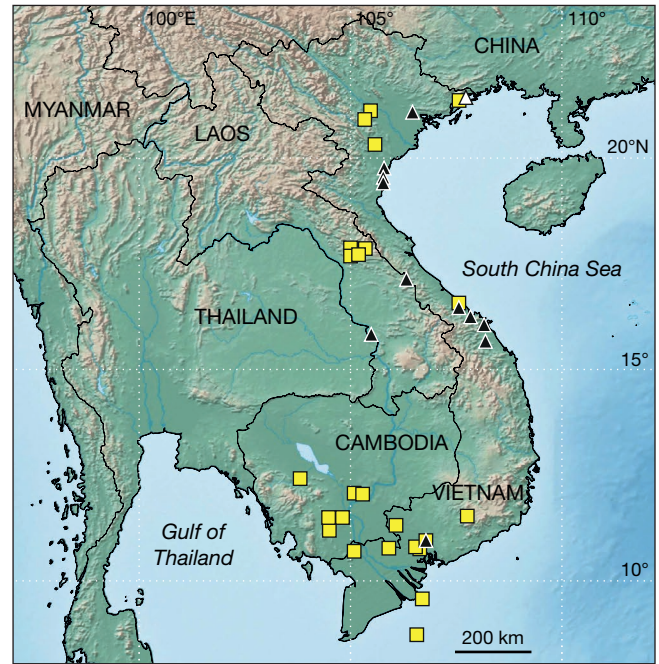


FIG. 11. — Distribution of *Syzygium borneense* (Miq.) Miq. (■), *Syzygium bullockii* (Hance) Merr. & L.M.Perry (▲) and *Syzygium buxifolium* Hook. & Arn. (△) in Indochina.

902 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 244 (2007). — *Eugenia bullockii* Hance, *Journal of Botany, British and Foreign* 16: 227 (1878); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 817 (1920). — Type: China, Hainan, Hoi-hau, *Bullock 20289* (holo-, BM!; iso-, E!, K n.v.).

Syzygium finetii (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 116 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 50, fig. 3736 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 904 (2003). — *Eugenia finetii* Gagnep., *Notulae Systematicae* 3: 324 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 842 (1921). — Type: Vietnam [Annam], Than-hoa, Din-hoa, fl., 8.II.1893, *Bon 5881* (lecto-, P![P00589281], here designated; isolecto-, P!). — Remaining former syntypes: Vietnam, Tourane, Bien-cho, 12.IX.1911, fr., *Lecomte & Finet 883* (P![cited as 983 in protologue]); Vietnam, Lazaret, 12.XI.1911, fr., *Lecomte & Finet 940* (P!, A![frag.]) and *943* (P!), *syn. nov.* (see Note).

[*Myrtus androsaemoides* auct. non L. (1753): Lour., *Flora Cochinchinensis* 312 (1790)] (*vide* Merrill [1935: 284]).

ADDITIONAL MATERIAL EXAMINED. — **China**. Hainan: *A.N.Henry 8083* (P); Po-teng, VI.1935, *F.C.How 72983* (P); Ching Mai, Pak Shik Ling and vicinity, 21.IX.1933, *C.I. Lei 1022* (P). — Guangdong: Zhanjiang [Kouang-tcheou], 29.X.1910, *Decker 96* (P).

Laos. Khammouan: Phou Thane, 1875–1877, *Harmand s.n.* (P). — *sin. loc.*, *Harmand s.n.* (P).

Vietnam. Bac Giang: Viet Yen, 9.X.1909, *Bauche 85* (P). — Da Nang: Tourane and vicinity, V.1927, *J. & M.S. Clemens 3716* (BM, K, P). — Dong Nai: Bien Hoa, VII.1908, *d'Alleizette s.n.* (L). — Quang Binh: Nu Co Regor, 23.VIII.1892, *Bon 5645* (P); Dam Thuy village, VI.1930, *Pételot 6150* (A). — Quang Nam: Que Son, *Anon. LX-VN 3111* (HN). — Than-hoa: Cua Bang, 2.VIII.1892, *Bon 5511* (P). — Thua Thien-Hue: *Eberhardt 2336* (P); Hue, IX.1877, *Pierre 1870* (*Harmand s.n.*) (P); Phu Loc, *Thai & Thuan 136* (HN); Phu Loc, *Thai & Thuan 146* (HN); Phu Loc, *Thai & Thuan 721* (HN).

DISTRIBUTION. — China (Guangdong, Guangxi and Hainan), Laos and Vietnam (Fig. 11).

ECOLOGY OR HABITAT. — In open vegetation, on clay or sandy soil.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: July to September. Fruiting: September to November.

VERNACULAR NAMES. — Vietnam: Cay moc (Annam), Cay sen (Than-hoa).

USES. — The fruit is edible.

DESCRIPTION

Shrub or small tree, to 5 m tall. Glabrous.

Twig

Terete, *c.* 2 mm diameter, stout, surface smooth, whitish, contrasting to leaf colour.

Leaves

Opposite, subsessile, chartaceous to subcoriaceous, dark brownish, 5-10 × 2.5-5 cm, 2-2.5 times as long as wide, elliptic, cordate, margin recurved, apex acute or acuminate, acumen when present to 0.5 mm long, $\frac{1}{20}$ - $\frac{1}{25}$ of blade length; midrib sunken above, raised below; secondary veins 15-25 per side, widely spaced, 4-5 mm apart, 60 degrees ascending from midrib, prominent and raised above, prominent below; tertiaries prominent, reticulate; intramarginal veins *c.* 1 mm from margin, straight; petiole very short, 1-2 mm long, $\frac{1}{37}$ - $\frac{1}{60}$ of blade length, 1-1.5 mm diameter, stout, dark brownish, contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 2.5-4.5 long, paniculate, second order branching, flowers many, to 27, paniculate; axes 2-4 cm long; bracts and bracteoles persistent, triangular.

Flowers

Yellowish or whitish (*in vivo*), sessile, hypanthium not glaucous, not fibrous, *c.* 4 × 2.5 mm, obconic, pseudostalk distinct, 1.5-2 mm long; sepals 4, free, 0.2 × 1 mm, semiorbicular, undulating on hypanthium rim, inconspicuous; petals 4, coherent, 2 × 2.5 mm, orbicular; outer stamens *c.* 5 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 6 mm long, ovules 8-10 per locule, irregularly radiating.

Fruit

Blackish, globose or obovoid, 0.8-1 × 0.6-0.8 cm, surface smooth, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTE

All the specimens cited by Gagnepain (1920) as *Eugenia finetii* are fruiting specimens. In the *Flore Générale de L'Indo-Chine*, Gagnepain (1920) excluded *Eugenia finetii* from the species

key and treated this species as insufficiently known because flowering specimens were unavailable. In the same treatment for *Eugenia bullockii*, Gagnepain (1920) excluded the fruiting character in the species description, although one of the specimens he cited (*Bauche 85*) is a fruiting specimen. After having examined both of these species, we find they are conspecific in having the same infructescence and vegetative characters. The fruits are small and with smooth calyx ring, the twig is whitish and the leaves are very distinctive in having a rounded to cordate base, a very short petiole and a dark brownish blade.

15. *Syzygium buxifolium* Hook. & Arn.

Botany of Captain Beechey's Voyage 187 (1833); Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 104 & 234 (1938) [excl. var. *austrosinense*]; P.H.Hò, *An Illustrated Flora of Vietnam (Cây cỏ Việt-nam)* 2: 48, fig. 3731 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 902 (2003). — *Eugenia sinensis* Hemsl. ex F.B.Forbes & Hemsl., *Linnean Society (Botany)* 23: 298 (1887), *nom. nov.* — Type: China, Canton, *Anon. s.n.* [*Messrs Lay & Collie?*], all sheets annotated by Hooker.f. (holo-, K![*Herb. Hooker* with the annotation '*Syzygium buxifolium*, China, Beechey']; iso-, E![mounted on GL sheet, with the annotation '*Syzygium buxifolium*, Canton, Beechey'], A![frag., A232670]).

Eugenia microphylla Abel, *Narrative of a Journey in the Interior of China* 181, 364 (1818); *non Syzygium microphyllum* Gamble (1919). — Type: China, Jiangxi, 25.XI.1996, *Tan 9611199* (neo-, E![E00261912], here designated; isoneo-, PE!) (see Note 1).

Syllisium buxifolium Meyen & Schauer, *Novorum Actorum Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum* 19, suppl. 1: 334 (1843). — Type: *n.v.* probably in B†. (*vide* Merrill & Perry [1938c: 234])

Eugenia somai Hayata in R.Kanehira, *Formosan Trees*: 255 (1918). — *Syzygium somai* (Hayata) Mori, *Transactions of the Natural History Society of Taiwan* 28: 440 (1938). — Type: Taiwan, *n.v.* (*vide* Chen & Craven [2007: 351]).

Syzygium buxifolium var. *verticillatum* C.Chen, *Harvard Papers in Botany* 11: 25 (2006). — Type: China, Guangxi, Shan Chuen to Chuen Yeun, 12.VII.1937, *T.S.Tsoong 83404* (holo-, A *n.v.*) (*vide* Chen & Craven [2006: 25]).

[*Syzygium microphyllum sensu* Masamune, *Memoirs of the Faculty of Science and Agriculture, Taihoku Imperial University* 11: 323 (1934), *non* Gamble (1919)] (*vide* Merrill & Perry [1938c: 234]).

ADDITIONAL MATERIAL EXAMINED. — **China.** Anhui: Li Shan, *R.C.Ching 3106* (E); Wu Yuan, *R.C.Ching 3306* (E); Wu Yuan, *R.C.Ching 3311* (E). — Fujian: Amoy, *Anon. 631* (E); Foochow, *W.R.Carles 562* (E) & *658* (E); Kushan, near Foochow, *H.H.Chung 12388* (E) & *12786* (E); Ren Hua-Bei Hi Ling, *W.Y.Chun 5620* (E); Pan Ling Tsze, *W.Y.Chun 5879* (E); Shaoguan, Ruyan Yao, Nan Ling nature reserve, *Thomas & Nan Li 7* (E); Sam Kok Shan, *W.T.Tsang 25092* (E); Hwei-Yang, Lin Fa Shan, *W.T.Tsang 25699*. — Guizhou: Tong-Tcheou, *Esquirol 3237* (E) & *3767* (E). — Hong Kong: *Bodinier 1013* (E) & *1149* (E); wood of little Hong Kong, *Bodinier 709* (E). — Hunan: Mt. Mangshan, 21.VI.2004, *B.Z.Xiao 3632*. — Jiangxi: Hong San, *J.L.Gressitt 1553* (E). — Zhejiang: Tai Chow, *R.C.Ching 1314* (E); Ping Yung, *R.C.Ching 1981* (E). **Japan.** Ryukyu, Yacyama Is. *M.Furuse 1058* (TCD). **Taiwan.** Taipei City, Neihu, *Y.C.Chen 14* (E); Pingtung, Lanjenchi, *S.C.Wu & C.C.Ling 1371* (E).

Vietnam. Quang Ninh: Ha Coi, Tsai Wong Mo Shan and vicinity, X.1936, *W.T. Tsang 27051* (E, P).

DISTRIBUTION. — North Vietnam, South China, Hainan, Taiwan and South Japan (Fig. 11).

ECOLOGY OR HABITAT. — In open forest and scrub.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: June to August (China). Fruiting: October to December (China).

VERNACULAR NAME. — Tram la ca na (Vietnam).

USES. — Used as a bonsai tree in China and Taiwan.

DESCRIPTION

Shrub to 3 m tall. Glabrous.

Twig

Angular, slightly winged, terete when old, *c.* 1 mm diameter, slender, surface smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite, coriaceous, pale greenish brown or yellowish brown, 2.5–3 × 1–2 cm, 1.5 to 2 times as long as wide, elliptic to obovate, base cuneate, slightly attenuate, apex acute, obtuse; midrib sunken above, raised below; secondary veins 10–15 per side, narrowly spaced, 1–2 mm apart, *c.* 45 degrees ascending from midrib, faint above and below; tertiaries faint, reticulate; intramarginal veins *c.* 0.5 mm from leaf margin, straight; petiole 3–4 mm long, 1/8–1/12 of blade length, *c.* 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence (recorded from Chinese specimens)

Terminal or axillary on leafy twig, *c.* 1–1.5 cm long, racemose or paniculate, to first order branching, flowers few, 3 to 9; axes *c.* 1 cm long; bracts and bracteoles persistent, triangular.

Flowers (recorded from Chinese specimens)

White (*in vivo*), pedicellate or sessile, pedicel, hypanthium not glaucous, not fibrous, 1.5–2 × 2–3 mm, obconic, pseudostalk indistinct; sepals 4, free, *c.* 0.2 × 0.3 mm, triangular; petals 4, coherent, 1.5–2 × 1.5–2 mm, orbicular; outer stamens *c.* 2.5 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 2.5 mm long, ovules *c.* 8 per locule, radiating.

Fruit

Reddish turning purplish to blackish (*in vivo*), globose to subglobose, 0.5–0.7 × 0.5–0.6 cm, surface smooth, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTES

1. This species was first described by Clark Abel (1818) as *Eugenia microphylla* but in *Syzygium* the specific epithet was invalidated by *S. microphyllum* Gamble (1919). The original material of *E. microphylla* cannot be found in BM, E or K, presumably lost due to shipwreck (Staffeu & Cowan 1976). Based on the protologue, we selected a fruiting specimen from

Jiangxi (*Tan 9611199*) as the neotype of *Eugenia microphylla* Abel. Forbes & Hemsley (1887) moved *S. buxifolium* to *Eugenia* and gave it a new name (*E. sinense*) because the original epithet was preempted by *Eugenia buxifolia* Lam. (1789).

2. In Indochina, Merrill & Perry (1938c) had annotated two specimens as *Syzygium buxifolium*, namely, *Pételot 4678* and *W.T. Tsang 27051*. However, they doubted the identity of *Pételot 4678* which we recognise as *S. hancei*. The specimen *W.T. Tsang 27051*, which was collected near the border of Vietnam and China is, so far, the only collection of *S. buxifolium* known in Indochina.

3. This is a widespread and vegetatively variable species. Merrill & Perry (1938c) recognised one variety, var. *austrosinense*, which was later changed to species level (*Syzygium austrosinense*) by Chang & Miao (1982). In China, a variety with verticillate leaves was formally recognised (var. *verticillatum*). In the current context of our understanding of this species, which is based largely on Chinese specimens, the Indochinese specimen would fall into the strictly opposite leaves variety, var. *buxifolium*.

16. *Syzygium championii* (Benth.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 219 (1938); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 906 (2003). — *Acmena championii* Benth., *Hooker's Journal of Botany and Kew Garden Miscellany* 4: 118 (1852). — *Eugenia championii* (Benth.) Hemsl. ex F.B. Forbes & Hemsl., *Journal of the Linnean Society (Botany)* 23: 296 (1887); Merr., *Lingnan Science Journal* 13: 41 (1934). — Type: Hong Kong, *Champion 321* in *Herb. Bentham* (lecto-, K![specimen on the upper right, labelled 'A' by Merrill], here designated; isolecto-, K!, BM *n.v.*) (see Note 1).

Eugenia henryi Hance, *Journal of Botany, British and Foreign* 23: 7 (1885). — Type: Hainan, Wo-shi, 31.X.1882, *Henry 111* in *Hance Herb. Prop. No 22263* (holo-, BM!; iso-, K *n.v.*).

Eugenia maclurei Merr., *Philippine Journal of Science* 21: 350 (1922). — Type: Hainan, Taai Uen, 26.X.1921, *McClure 7678* (holo-, PNH†; iso-, A![69407], E!, K!, P[P04885064]!).

ADDITIONAL MATERIAL EXAMINED. — **China.** Hainan: Chang-kiang district, Ka Chik Shan and vicinity, 26.IV.1933, *S.K. Lau 1638* (P); Po-teng, IX.1935, *F.C. How 73597* (P). — Hong Kong: 26.IX.1894, *Bodinier 670* (P[P04776862]); Happy Valley, 20.VI.1894, *Bodinier 670* (P); 17.VI.1894, *Bodinier 670* (P[P04776864]).

Laos. Khammouan: Kaeng Maw, Nakai-Nam Theun, 21.X.2005, *Newman et al. LAO 357* (E).

Vietnam. Ninh Binh: VII.1900, *d'Alleizette* (L). — Quang Ninh: Ha Coi, Tsai Wong Mo Shan and vicinity, 23–31.X.1936, *W.T. Tsang 27174* (A, E, K, P); *idem*, 10–17.XI.1936, *W.T. Tsang 27222* (E, K, P); Mon Cay, IX.1936, *W.T. Tsang 26900* (K); IX.1939, *W.T. Tsang 26910* (E, P).

DISTRIBUTION. — China (Guangdong, Guangxi, Hainan), Laos and Vietnam (Fig. 12).

ECOLOGY OR HABITAT. — In primary forest, frequently along river, on sandy soil.

CONSERVATION STATUS. — IUCN Global Status: Data Deficient (DD); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: June–November. Fruiting: September.

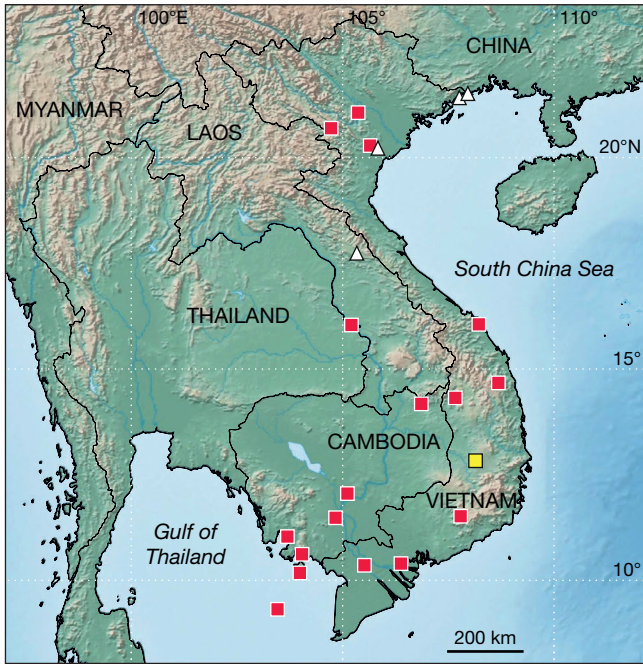


FIG. 12. — Distribution of *Syzygium championii* (Bentham) Merr. & L.M.Perry (Δ), *Syzygium chantaranothaianum* W.K.Soh & J.Parn. (■) and *Syzygium claviflorum* (Roxb.) Wall. ex Steudel (■) in Indochina.

VERNACULAR NAME. — Tram vo dich (Vietnam)

DESCRIPTION

Shrub to 3 m tall. Glabrous.

Twig

Angular and winged when young, terete or subterete when old, *c.* 2 mm diameter, smooth, whitish, sometimes contrasting to leaf colour.

Leaves

Opposite, chartaceous, brownish green, 4-8.5 × 1-4 cm, 2-3 times as long as wide, elliptic to oblong, base cuneate, slightly attenuate and extending to base of petiole, margin flat, apex acuminate, acumen 0.7-1.5 cm long, $\frac{1}{5}$ - $\frac{1}{6}$ of blade length; midrib sunken above, raised below; secondary veins 25-30 per side, narrowly spaced, 1-2 mm apart, 70 degrees ascending from midrib, slender, prominent or faint, raised above, prominent below; tertiaries faint, reticulate; intramarginal *c.* 0.5 mm from margin, straight; petiole short, 1.5-2 mm long, $\frac{1}{30}$ - $\frac{1}{40}$ of blade length, *c.* 1 mm diameter, stout.

Inflorescence

Terminal or axillary on leafy twig, 1.2-3 cm long, racemose, flowers few, 3-7; axes 0.2-1.5 cm long; bracts and bracteoles persistent, lanceolate.

Flowers

Whitish (*in vivo*), sessile, hypanthium not glaucous, fibrous, 1-1.3 × 2-4 mm, clavate, pseudostalk very prominent, 0.6-0.8 cm long, tapering gradually; sepals 4, free, 0.5 ×

2 mm triangular, undulate on hypanthium rim; petals 4, coherent, 1.5 × 1.5, orbicular; outer stamens *c.* 6 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 7 mm long, locules 2-3, ovules *c.* 7 per locule, in two longitudinal rows.

Fruit

Obloid, clavate, 1.25 × 0.5 cm, surface smooth, calyx ring with smooth rim; seed 1, obloid, clavate, 1 × 0.5 cm, seed intercotyledonary intrusion present, ramifying from the apex.

NOTES

1. In the protologue, the description of *Acmena championii* was based on two species mounted on the same herbarium sheet (*Champion 321* and *Champion s.n.*), one belonging to the current species and the other to *Syzygium hancei* (Merrill 1934).

2. *Syzygium championii* is closely related to *S. claviflorum* and falls into the subg. *Perikion* as it has a clavate hypanthium cup, racemose inflorescence and seed with intercotyledonary intrusion. Vegetatively it differs from *S. claviflorum* in its smaller leaf size, shorter petiole and more closely spaced secondary veins.

17. *Syzygium chantaranothaianum* W.K.Soh & J.Parn. (Fig. 13)

Kew Bulletin 66: 2 (2012). — Type: Vietnam, Dac Lak, 4.IV.1954, Schmid *s.n.* (holo-, P![P00589474]).

DISTRIBUTION. — Known only from the type locality in Dac Lak, Vietnam (Fig. 12).

ECOLOGY OR HABITAT. — At the edge of stream on granite, to 1200 m.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: April. Fruiting: not documented.

DESCRIPTION

Tree. Glabrous.

Twig

Angular (4-angled) and winged, *c.* 2 mm diameter, slender, smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite, subsessile, subcoriaceous, dark brownish, silky below, 11-16 cm × 4.5-6 cm, 2 to 3 times as long as wide, ovate to oblong-ovate, base strongly cordate, apex acute to acuminate, acumen when present 1-1.5 cm long, $\frac{1}{10}$ - $\frac{1}{13}$ of blade length; midrib sunken above, raised below; secondary veins 20-25 per side, 6-8 mm apart, 50-60 degrees from midrib, prominent and raised on both surfaces; tertiary veins prominent, scalariform; intramarginal 2-3 mm from margin, straight; petiole 1-2 mm long, $\frac{1}{80}$ - $\frac{1}{130}$ of blade length, 1-1.5 mm diameter, brownish, not contrasting to blade colour.



Fig. 13. — Holotype of *Syzygium chantaranthianum* W.K.Soh & J.Parn., Schmid s.n. (P00589474).

Inflorescence

Terminal, 2-2.5 cm long, racemose, flowers few, 3 to 5; axes 1-1.5 cm long; bracts and bracteole persistent, lanceolate.

Flowers

Pedicellate, pedicel 1-2 mm long, hypanthium not glaucous, not fibrous, 8-10 × 5-6 mm, pyriform, pseudostalk distinct, c. 2 mm long; sepals 4, free, semiorbicular, unequal, outer lobes smaller than inner lobes, outer lobes c. 3.5 × 5 mm, inner lobes c. 4 × 7 mm; petal coherent; outer stamens to 9 mm long, anther sacs parallel, connective gland conspicuous; style c. 0.8 mm long, ovary 2-locular, ovules 69 to 70 per locule, irregularly arranged.

Fruit

Unknown.

NOTE

This species is very distinctive in comparison with other *Syzygium* species in Indochina in having a combination of the following characters: 4-angled and winged twigs, strongly cordate leaf base, subsessile leaf blade with scalariform tertiary veins, racemose inflorescence and large flowers.

18. *Syzygium claviflorum* (Roxb.) Wall. ex Steudel
(Fig. 14)

Nomenclator Botanicus ed. 2, 2: 657 (1841); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 126 (2003). — *Eugenia claviflora* Roxb., [*Hortus Bengalensis* (1814) 37] *Flora indica* 2 [ed. 2, ed. W. Carey]: 488 (1832); Wight, *Icones Plantarum Indiae Orientalis* 2: t. 606 (1843). — *Acmena claviflora* (Roxb.) Walp., *Repertorium Botanices Systematicae*: 181 (1843). — *Clavimyrtes claviflora* (Roxb.) Blume, *Museum Botanicum Lugduno-Batavum* 1: 113 (1850). — *Acmenosperma claviflorum* (Roxb.) Kausel, *Arkiv för Botanik Band* 3: 609 (1957). — Type: *Icones Roxburghianae* no. 2499 (lecto-, K! here designated; isolecto-, CAL n.v.) (see Note 1).

Syzygium wightianum Wall. ex Wight & Arn., *Prodromus Florae Peninsulae Indiae Orientalis*: 330 (1834); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 61, fig. 3769 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 909 (2003). — *Eugenia wightiana* Wight, *Illustrations of Indian Botany* 2: 15 (1841); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 841 (1920). — Type: India, Dindygul Hills, 3000ft, *Wallich Numer. List 3577* (lecto-, K![*Herb. Hooker*], here designated; isolecto-, El, K![*Herb. Bentham*], K-W!), **syn. nov.** (see Note 2).

Jambosa clavata Korth., *Nederlandsch Kruidkundig Archief* 1: 201 (1847). — *Eugenia clavata* (Korth.) Merr., *Journal of the Straits Branch Royal Asiatic Society* 77: 225 (1917). — *Syzygium clavatum* (Korth.) Merr. & L.M.Perry, *Memoirs of the American Academy of Arts and Sciences* 18: 180 (1939). — Type: Indonesia, Borneo, *Korthals s.n.* (holo-, U![L0009414]).

Eugenia leptantha Wight, *Illustrations of Indian Botany* 2: 15 (1841), *nom. illeg., non Benth* (1840); *Icones Plantarum Indiae Orientalis* 2: t. 528 (1843); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 833 (1920). — *Syzygium leptanthum* (Wight) Nied., in Engl. & Prantl. *Natürlichen Pflanzenfamilien* 3(7): 85 (1893). — *Eugenia claviflora* Roxb. var. *leptantha* (Wight) King, *Journal of the Asiatic Society of Bengal* 70: 108 (1901). — *Eugenia leptalea* Craib, *Flo-*

rae Siamensis Enumeratio 1: 649 (1931), *nom. nov. pro Eugenia leptantha* Wight. — *Eugenia claviflora* Roxb. var. *leptalea* (Craib) M.R.Hend., *The Gardens' Bulletin Singapore* 12: 255 (1949). — Type: Burma, Mergui, 'Mergui 854, Griffith', *Griffith s.n.* [*Herb. Hooker*] (lecto-, K!, here designated) (*vide* Noltie [2005: 357]).

Eugenia rhododendrifolia Miq., *Analecta Botanica Indica* 1: 19 (1850), t. 2. — *Syzygium rhododendrifolium* (Miq.) Masam., *Enumeratio Phanerogamarum Bornearum*: 538 (1942). — Type: Indonesia, Borneo, Martapura, *Korthals s.n.* (lecto-, L!, here designated [L0009414]).

Eugenia rhododendrifolia forma *longifolia* Miq., *Analecta Botanica Indica* 1: 20, table 3 (1850). — *Jambosa borneensis* Miq., *Flora van Nederlandsch Indië* 1: 434 (1855), *nom. nov. pro Eugenia rhododendrifolia* forma *longifolia* Miq. — Type: Indonesia, Borneo [Sakoembang], *Korthals s.n.* (lecto-, L!, here designated [L0009415]).

Jambosa melanocarpa Miq., *Flora van Nederlandsch Indië* 1: 430 (1855). — Type: possible type *Anon. s.n.*, Java, with Zollinger's handwriting on the label (U![U0005209]) (in protologue: Indonesia, Java, in the forest of Lampong province, discovered by Zollinger).

Eugenia maingayi Duthie in Hooker, *Flora of British India* 2: 484 (1878). — *Eugenia claviflora* var. *maingayi* (Duthie) King, *Journal of the Asiatic Society of Bengal* 70: 108 (1901). — *Syzygium claviflorum* var. *maingayi* (Duthie) Chantar. & J.Parn., *Kew Bulletin* 48: 590 (1993). — Type: Peninsular Malaysia, Pulau Pinang, *Maingay 750* (lecto-, K!, here designated; isolecto-, K!).

Eugenia ruminata Koord. & Valetton, *Bulletin de l'Institut Botanique de Buitenzorg* 2: 8 (1899). — *Syzygium ruminatum* (Koord. & Valetton) Amshoff in C.A.Backer & R.C.Bakhuizen van der Brink, *Flora of Java* 4b(98): 11 (1944). — Type: possible syntypes Java, *Koorders 5725B* and *5726B* (*vide*: Janssonius & Moll [1906: 984]).

Eugenia claviflora var. *excavata* King, *Journal of the Asiatic Society of Bengal* 70: 108 (1901); M.R.Henderson, *The Gardens' Bulletin Singapore* 12: 257 (1949), fig. 49c. — [*Syzygium excavatum* Wall., *Wallich Numer. List 3574* (1841), *nom. nud.*; Duthie in Hooker, *Flora of British India* 2: 484 (1878), *in syn.*]. — *Syzygium claviflorum* var. *excavatum* (King) Turner, *The Gardens' Bulletin Singapore* 47: 373 (1995). — Type: Peninsular Malaysia, Penang, 'Amherst 1827', *Wallich Numer. List 3574* (lecto-, K-W!, here designated; isolecto-, K![2 sheets, *Herb. Bentham* & *Herb. Hooker*], SING n.v.).

Eugenia claviflora var. *glandulosa* King, *Journal of the Asiatic Society of Bengal* 70: 108 (1901). — *Syzygium claviflorum* var. *glandulosum* (King) Chantar. & J.Parn., *Kew Bulletin* 48: 590 (1993). — Type: Peninsular Malaysia, Malacca, Mt. Ophir, IV.1888, *Hullett 780* (holo-, K!; iso-, SING n.v.).

Eugenia viridifolia Elmer, *Leaflets of Philippine Botany* 4: 1420 (1912). — *Syzygium viridifolium* (Elmer) Merr. & L.M.Perry, *Memoirs of the American Academy of Arts and Sciences* 18: 183 (1939). — Type: Philippines, Palawan, Puerto Princesa, Mt. Pulgar, *Elmer 12975* (holo-, PNH†: iso-, A n.v. [69824], El, GH n.v. [69823], P n.v. [P05229348], US![00118214]).

Eugenia baviensis Gagnep., *Notulae Systematicae* 3: 317 (1917); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 802, fig. 86 1920. — *Syzygium baviense* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 102 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 46, fig. 3725 (1992); P.Dy Phon, *Plant Use in Cambodia*: 377 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 901 (2003); D.D.Soejarto et al., *Seed Plants of Cuc Phuong National Park*: 429 (2004). — Type: Vietnam [Tonkin], Mt. Bavi, valley of Lankok, 24.VI.1877, fl., *Balansa 2880* (lecto-, P![P00589300]; isolecto-, L![L0404219], K![K000276180]), **syn. nov.** (see Note 2).



FIG. 14. — Lectotype of *Syzygium baviense* (Gagnep.) Merr. & L.M.Perry, Balansa 2880 (P00589300); **detail**, close-up of inflorescence. Scale bar: 1 cm.

Eugenia fraseri Ridl., *Journal of Botany, British and Foreign* 68: 33 (1930). — *Syzygium fraseri* (Ridl.) Masam., *Enumeratio Phanerogamarum Bornearum*: 528 (1942). — Type: Malaysia, Borneo, Sabah, Kudat, I.1885, *Fraser 139* (K n.v.; SING n.v.) (fide Merrill & Perry [1939: 183]).

Eugenia claviflora var. *montana* M.R.Hend., *The Gardens' Bulletin Singapore* 12: 260 (1949). — *Syzygium claviflorum* var. *montanum* (M.R.Hend.) Turner, *The Gardens' Bulletin Singapore* 47: 373 (1995). — Type: Peninsular Malaysia, Terengganu, Gunung Padang, *SFN 33914* (holo-, SING n.v.; iso-, K!, L!).

Eugenia claviflora var. *riparia* M.R.Hend., *The Gardens' Bulletin Singapore* 12: 257 (1949). — *Syzygium claviflorum* var. *riparium* (M.R.Hend.) Turner, *The Gardens' Bulletin Singapore* 47: 373 (1995). — Type: Peninsular Malaysia, Pahang, Kuala Tahan, *Seimund 927* (holo-, SING n.v.; iso-, K!).

[*Syzygium longiflorum* Wall., *Wallich Numer. List* 3572 B (1831) (E!, K-W!, L!, P!) *nom. nud.*].

[*Syzygium suavissimum* Wall., *Wallich Numer. List* 3573A (1831) (K-W!) *nom. nud.*].

[*Syzygium lanceolatum* auct. non *Eugenia lanceolata* Lam. (1789): Wight & Arn., *Prodromus Florae Peninsulae Indiae Orientalis*: 330 (1834); Wight, *Icones Plantarum Indiae Orientalis* 2: t. 530 (1843)].

ADDITIONAL MATERIAL EXAMINED. — **Cambodia**. Kampong Chhnang: Kralanh forest reserve, 11.III.1914, *Chevalier 31723* (P). — Kam-pot: Mt. Bokor, *Dy Phon 1145* (P); Mt. Bokor, 10.III.2001, *Mid-dleton & M.Monyrak 660* (P). — Kandal: Phnom Penh, *Béjaud 558* (P). — Koh Kong: Kompong Som, 5.V.2008, *K.C.Cheng, S.Hul, David & Leti CL 965* (P). — Ratanikiri: Virachey National Park, 17.XII.2005, *Thomas et al. 83* (E). — *sin. loc. Hance, H.F. 19247* (BM).

Laos. Kemmarath, *Thorel s.n.* (P).

Vietnam. An Giang: Mt. Lap Vo, *Pierre s.n.* (BM). — Ba Ria-Vung Tau: Ba Ria, III.1918, *Chevalier 36811* (P). — Cochinchina: VIII.1869, *Pierre s.n.* (P). — Da Nang: Tourane vicinity, 12.II.1960, *Smitinand & Abbe 6428* (K, L). — Ha Tay: Mt. Ba Vi, 12.VI.1888, *Balansa 2877* (P); Mt. Ba Vi, Lankok valley, 24.VI.1887, *Balansa 2880* (P). — Ken Giang: Dao Tho Chu, 9.IV.1987, *Bin 1075* (HN); Phu Quoc Is., 1874, *Pierre s.n.* (GH, P); Phu Quoc Is., I.1874, *Pierre s.n.* (P). — Kon Tum: Huyen Sa Thay, 17.XI.1976, *Dung 323* (HN); Huyen Sa Thay, 16.XI.1978, *T.D.Dai 222* (HN). — Lam Dong: 1959, *Schmid s.n.* (P); 27.II.1954, *Schmid VN 1368* (P); Bao Loc, *Schmid VN 1390* (P). — Ninh Binh: Nho Quan, Cuc Phuong National Park, 11.VI.1970, *Anon. s.n.* (HN). — Son La: Xuan Nha, XI.2003, *Phuong 7187* (HN). — Tay Ninh: Ben Tranh, IV.1866, *Pierre s.n.* (P).

DISTRIBUTION. — Widely distributed from India to the Northern Australia. In Indochina it occurs in Cambodia and Vietnam and may possibly occur in Laos but so far it has not been collected there (Fig. 12).

ECOLOGY OR HABITAT. — Lowland to montane forest, secondary, primary and beach forest, to 1050 m alt.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: January, February, March, June, November. Fruiting: March, April, June, August.

VERNACULAR NAMES. — Cambodia: Prin ach kanndaor, Prin ach romearng. Vietnam: Tram trang (Ba Ria-Vung Tau).

USES. — The fruit is edible while the wood is used as firewood and for construction.

DESCRIPTION

Tree to 8 m tall, to 20 cm dbh. Glabrous.

Twig

Terete to subangular, 1-2.5 mm diameter, stout, smooth or fissured, brownish, not contrasting to leaf colour.

Leaves

Opposite, chartaceous to coriaceous, greenish to yellowish brown, (6-)8-10(-22) × (1.5-)2-3.5(-7.5) cm, 2-4 times as long as wide, elliptic, ovate, sometimes obovate, base cuneate, slightly attenuate, margin flat, apex mostly acute without acumens, sometimes acuminate with distinct acumens, acumens when present 0.3-0.5(-1) cm long, $\frac{1}{10}$ - $\frac{1}{24}$ of blade length; midrib sunken above, raised below; secondary veins 15-30 side per blade, narrowly or widely spaced, 1.5-5(-10) mm apart, ascending 60-70 degrees from midrib, prominent or faint, raised above, prominent below; tertiaries prominent or faint below, reticulate; intramarginal veins 1-3 mm from margin, straight; petiole 3-5(-6) mm long, $\frac{1}{14}$ - $\frac{1}{44}$ of blade length, 1-2 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig, (1.5-)2-3.5 cm long, racemose, flowers few, 3-8, usually 7, sometimes fascicled with at most 3 inflorescences clumping together; axes 0.5-2 cm long; bracts and bracteoles caducous.

Flowers

White (*in vivo*), sessile, hypanthium not glaucous, fibrous, 1.5-2 × 0.3-0.5 cm long, clavate, tapering gradually into narrow base, pseudostalk distinct, 5-10 mm long; sepals 4, free, 0.5-1 × 0.8-2.5 mm, triangular, tip blunt; petals 4-6, coherent (sometimes petals agglutinate to hypanthium, looking as if free), (1-)1.5-2.5 × (1-)1.5-2.5 mm, orbicular; outer stamens 5-10 mm long, anther sacs parallel connective gland inconspicuous; style 5-8 mm long, ovules 10-24 per locule, in two longitudinal rows.

Fruit

Reddish (*in vivo*), ellipsoid to obovoid, 1-1.5 × 0.5-0.9 cm, surface smooth, calyx ring with smooth rim, pericarp 0.5-1 mm thick, seed intercotyledonary intrusion present, ramifying from the side.

NOTES

1. Hyland (1983) designated Wight's drawing (*Icones Plantarum Indiae Orientalis* 2: t. 528 [1843]) of *Eugenia leptantha* as a neotype of *Eugenia claviflora* on the ground that Roxburgh (1832) failed to cite any specimen for typification. However Wight's illustration was not drawn from Roxburgh's plate. There is no suitable specimen of Roxburgh at BM and K. We disagree with Ashton (2009), who choose *Wallich 3575B* (K-W!) as the lectotype of *Eugenia claviflora* on the basis that the ticket bearing '*Syzygium claviflorum* Wall.' on the sheet is in Roxburgh's handwriting. In fact the writing is Wallich's and in any case Roxburgh who had died in 1815, could not

have labelled it as '*Syzygium claviflorum* Wall.'. In this study, Roxburgh's icon is chosen as the lectotype of *S. claviflorum* because it vividly depicts two distinguishing characters for this species, the clavate hypanthium and racemose inflorescence.

2. In Indochina, Gagnepain (1920) grouped *Eugenia baviensis* and *E. wightiana* into sections II and IV respectively with the differences in the petal number being 4 to 5 in *E. baviensis* and 8 to 12 in *E. wightiana*. We have examined the flowers of *E. wightiana* and found that the petal number varies from 4 to 6. In the *Flora of China* account (Chen & Craven 2007), *Syzygium baviense* is differentiated from *S. claviflorum* on the basis of the style length, *c.* 3 mm and 10–15 mm respectively. We regard all the morphological differences mentioned above as variation seen within a morphologically variable *S. claviflorum*.

3. *Syzygium claviflorum* is characterised by its short racemose inflorescence, clavate hypanthium with ovules arranged in longitudinal rows and seed with intercotyledonary intrusion. This is a variable species in leaf size and shape, and inflorescence size. Nevertheless, we agree with Chantaranothai & Parnell (1994) that the variation is continuous and not discrete. At the extreme poles of the continuum, however, are morphologically distinct forms which could be easily perceived as distinct species per se. Some of the variation seen in the herbarium collections may be correlated with the environment. For example specimens found in beach forest (*T.Smitinand & E.C.Abbe 6428*) and stunted montane forest (*Dy Phon 1145* and *Middleton & Monyrak 660*) from Indochina have stouter twigs, thicker leaves, an involute leaf margin and short petioles with the leaf base attenuate. *Syzygium iwahigense* (Elmer) Merr. (type: *Elmer 12743*, K!) from the Philippines, which resembles *S. claviflorum*, shows the foregoing vegetative characters and was documented as growing in a dry rocky habitat. Other ecological forms that have been formally described are the rheophytic form (*Syzygium claviflorum* var. *riparium*) with linear lanceolate leaves and the montane form (*Syzygium claviflorum* var. *montana*) with stout twigs, leaf stalks and coriaceous leaves. Field observations, ecological and population genetic studies are needed to resolve the status of *Syzygium claviflorum* and its allies.

19. *Syzygium corticosum* (Lour.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 105 (1938); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 903 (2003). — *Eugenia corticosa* Lour., *Flora Cochinchinensis* 1: 308 (1790), ed. Willd. 376 (1793); Merr., *A commentary on Loureiro's 'Flora Cochinchinensis'*, *Transactions of the American Philosophical Society* 24(2): 284 (1935). — *Myrtus corticosa* (Lour.) Spreng., *Systema Vegetabilium* 2: 488 (1825). — Type: Vietnam [Cochinchina], Thua Thien-Hue, Hue, *Loureiro s.n.* (holo-, BM!).

ADDITIONAL MATERIAL EXAMINED. — **Thailand.** Lampang: Chae Son, Chae Son National Park, 29.I.1997, *Maxwell 97-84* (BKF). **Vietnam.** Da Nang: Ba Na National Park, V.1927, *J. & M.S. Clemens 3532* (BM). — Quang Nam: Tra My, *N.Q.Binh & D.D.Cuong VN 1150* (HN).

DISTRIBUTION. — Thailand and Vietnam (Fig. 15).

ECOLOGY OR HABITAT. — Primary forest, to 950 m.



FIG. 15. — Distribution of *Syzygium corticosum* (Lour.) Merr. & L.M.Perry (■), *Syzygium crassiflorum* Merr. & L.M.Perry (△) and *Syzygium cucphuongense* W.K.Soh & J.Parn. (▲) in Indochina.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: January, May, June. Fruiting: not documented.

VERNACULAR NAME. — Cay tram boi (Vietnamese).

DESCRIPTION

Tree to 17 m tall, 25 cm dbh. Glabrous.

Twig

Terete, *c.* 1.5 mm diameter, slender, surface smooth, brownish to whitish, not contrasting to leaf colour.

Leaves

Opposite, chartaceous, pale brownish to greenish, 5.5–12 × 3–7 cm, 1.6 to 4 times as long as wide, elliptic, base attenuate, *c.* 30 degrees from midrib, apex acuminate, acumen *c.* 0.5 cm long, $\frac{1}{11}$ – $\frac{1}{17}$ of blade length, tip deflexed; midrib sunken above, raised below; secondary veins 8–10 per side, widely spaced, 4–10 mm apart, *c.* 60 degrees from midrib, faint and raised above, prominent below; tertiaries faint, reticulate; intramarginal veins distinct, *c.* 2–0.5 mm from margin, looped, outer intramarginal veins present; petiole, 8–12 mm long, $\frac{1}{5}$ – $\frac{1}{7}$ of blade length, 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 5.5–7 cm long, paniculate, to second order branching, flowers many, *c.* 65; axes 5.5–7 cm long; bracts and bracteoles caducous.

Flowers

Sessile, small, hypanthium, not glaucous, not fibrous, 2.5 × 1.5 mm, obconic, pseudostalk *c.* 1 mm long; sepals 4, free, *c.* 0.2 × 0.5 mm, undulating on hypanthium rim; petals 4, coherent, *c.* 1 × 1 mm, orbicular; stamens *c.* 1 mm long; anther sacs parallel, connective gland inconspicuous; style *c.* 2 mm long, ovules *c.* 10 per locule, irregularly radiating.

Fruit

Globose, 0.3 × 0.3 cm, surface smooth, calyx ring with smooth rim.

NOTE

Eugenia corticosa was described by João de Loureiro and published in the *Flora Cochinchinensis* in 1790. In 1927, Chaplain and Mrs. J.C. Clemens in an attempt to gather representative specimens in Loureiro's *Flora Cochinchinensis*, made extensive botanical collections at Hue and the surrounding areas where Loureiro was likely to have made his collection. Gagnepain (1920) omitted this species from his revision because of the poor type material. Merrill & Perry (1938b) later reinstated the species after acquiring new material from Clemens' collection (*Clemens 3532*). After examining the type of *Eugenia corticosa* in BM, Clemens' specimens and additional new material from Vietnam (*VN 1151*) and Thailand (*Maxwell J.F. 97-84*), we fully concur with Merrill & Perry (1938b) that *Syzygium corticosum* is a distinct species.

20. *Syzygium crassiflorum* Merr. & L.M.Perry
(Fig. 16)

Journal of the Arnold Arboretum 19: 114 (1938); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 903 (2003). — Type: Vietnam [Annam], *Clemens 3831* (holo-, A! [71326]; iso-, K[K000276205]!, NY!).

ADDITIONAL MATERIAL EXAMINED. — Laos. Xaignabouli: Pak Lay, 7.I.1953, *Vidal 2118* (P)
Vietnam. Ha Tay: Mt. Ba Vi, VII.1928, *d'Alleizette s.n.* (L).

DISTRIBUTION. — Laos and Vietnam (Fig. 15).

ECOLOGY OR HABITAT. — Primary forest.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering and fruiting: May to July.

VERNACULAR NAMES. — Laos: Choum kieng pa (Xaignabouli). Vietnam: Tram hoa day.

DESCRIPTION

Tree. Glabrous.

Twig

Terete, 4-5 mm diameter, stout, smooth or flaky, brownish, not contrasting to leaf colour.

Leaves

Opposite, thickly coriaceous, pale greenish, 27-38 × 3-6.5 cm, 5 to 9 times as long as wide, linear lanceolate, base strongly cordate, margin recurved, apex acute, blunt, no acumen; midrib sunken above, raised below; secondary veins 30-40 per side, widely spaced, 7-10 mm apart, 70-80 degrees ascending from midrib, prominent and raised on both surfaces; tertiary veins prominent, reticulate; intramarginal veins *c.* 2 mm from margin, straight, outer intramarginal veins present; petiole 7-10 mm long, 1/30-1/40 of blade length, 4-5 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Terminal, possibly solitary or racemose, flowers few, possibly one to three.

Flowers

Reddish, large, hypanthium not glaucous, not fibrous, *c.* 2.5 cm × 1 cm, pyriform, pseudostalk distinct, *c.* 1.5 cm long; sepals 4, free, unequal, inner lobe 2 × 1.7 cm, outer lobe 1.5 × 1 cm, semiorbicular; petals not seen; outer stamens 5 cm long, anther sacs parallel, connective gland inconspicuous.

Fruit

Subglobose, 2.5 × 2.5 cm, surface smooth, calyx ring with persistent sepal lobes.

NOTE

In this study, floral characters was added to the description for the first time based on the specimen *d'Alleizette s.n.* The large and lanceolate leaves of this species is distinctive and resemble *S. tekuensis* from Peninsular Malaysia but differ in having glabrous leaves vs velvety hairy.

21. *Syzygium cucphuongense* W.K.Soh & J.Parn.
(Fig. 17)

Kew Bulletin 66: 3 (2012). — Type: Vietnam, Ninh Binh, Nho Quan, Cuc Phuong National Park, 15.VI.2001, *P.K.Loc PKL 10455* (holo-, CPNP! [sheet no. 00587]; iso-, CPNP! [sheets no. 09334, 09309, 09310, 09307]).

[*Syzygium melanophyllum* auct. non Hung T.Chang & R.H.Miao (1982): D.D.Soejarto *et al.*, *Seed Plants of Cuc Phuong National Park*: 432 (2004)] (*vide* type of *Syzygium melanophyllum* Hung T.Chang & R.H.Miao: China, Yunnan, *Y.F. Li 3376* [holo-, HITBC!]).

PARATYPES. — Vietnam, Ninh Binh, Cuc Phuong National Park, 17.IX.1999, *Cuong 530* (GH).

DISTRIBUTION. — Known only from the type locality at the Cuc Phuong National Park, Vietnam (Fig. 15).

ECOLOGY OR HABITAT. — Primary lowland to hill forest.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Near Threatened (NT).

PHENOLOGY. — Flowering: June. Fruiting: August, September.



Fig. 16. — Isotype of *Syzygium crassiflorum* Merr. & L.M.Perry, Clemens 3831 (K000276205).

DESCRIPTION

Tree to 48 m tall, to 60 cm dbh. Bark smooth, whitish grey, slash bark dark reddish violet. Glabrous.

Twig

Terete, 2-3 mm diameter, stout, surface smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite, subcoriaceous, dark brownish, young leaves reddish (*in vivo*), 7.5-14 × 3.5-5.5 cm, 2 to 3 times as long as wide, elliptic, obovate or elliptic, base attenuate, 30-45 degrees ascending from midrib, margin flat, apex mucronate, acumen 0.3-0.5 cm long, 1/17-1/35 of blade length; midrib sunken above, raised below; secondary veins 10-13 per side, widely spaced, 6-10 mm apart, 50-60 degrees from midrib, prominent and raised above, prominent below; tertiaries prominent, reticulate; intramarginal veins 2-3 mm from leaf margin, straight or slightly scalloped, outer intramarginal veins present or absent; petiole 1.5-2.5 cm long, 1/5-1/6 of blade length, 1-1.5 mm diameter, stout, dark brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, to 8 cm long, paniculate, second order branching, flowers many, to 300, in heads of 7 to 9 flowers; axes to *c.* 8 cm long; bracts and bracteoles caducous.

Flowers

Sessile, hypanthium not glaucous, not fibrous, *c.* 4 × 3 mm, obconic, pseudostalk distinct, *c.* 2 mm long; sepals violet (*in vivo*), 4, free, 1.5 × 2 mm, triangular; petals whitish (*in vivo*), 4, free, 2 × 3 mm, suborbicular; outer stamens to 7 mm long, anther parallel, connective gland conspicuous; style *c.* 5 mm long, ovules *c.* 18 per locule, irregularly radiating.

Fruit

Blackish, depressed globose, *c.* 1 × 1.5 cm, surface smooth, calyx ring with smooth to undulate rim, seed intercotyledonary intrusion absent.

NOTE

Syzygium cucphuongense can be distinguished from other *Syzygium* species by its dark brownish leaf (when dried) with attenuate base and mucronate apex, and paniculate inflorescence with flowers clustering at the branch-ends.

22. *Syzygium cumini* (L.) Skeels

Bulletin U.S. Department of Agriculture, Bureau of Plant Industry 248: 25 (1912); Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 108 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 45, fig. 3721 (1992) [as *S. cumini* (L.) Druce, *nom. illeg.*]; V.D.Nguyen, *Medicinal plants of Vietnam, Cambodia and Laos*: 286 (1993); M.C.Le & T.H.Le, *Forest Plants (Thực vật rừng)*: 319, fig. 270 (2000); P.Dy Phon, *Plant Use in Cambodia*:

378 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 903 (2003); V.S.Hoang, N.Khamseng & P.J.A. Kessler, *Blumea* 49: 315 (2004); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — *Myrtus cumini* L., *Species plantarum* 1: 471 (1753). — *Calyptanthes cumini* (L.) Pers., *Synopsis Plantarum* 2: 32 (1806). — *Eugenia cumini* (L.) Druce, (*Report*) *Botanical Exchange Club and Society of the British Isles* 3: 418 (1914); Merr., *An interpretation of Rumphius' Herbarium Amboinense, Bureau of Science Publication* 9: 394 (1917). — Type: Sri Lanka, *Herb. Hermann* 1: 45, No. 185, right specimen [BM000621389] (lecto-, BM! designated by Kostermans [1981: 134] & Verdcourt [2001: 72]) (see Note 1).

Eugenia caryophyllifolia Lam., *Encyclopédie méthodique (Botanique)* 3 (1): 198 (1789). — *Calyptanthes caryophyllifolia* (Lam.) Willd., *Annalen der Botanick (ed. Usteri)* 17: 22 (1796). — *Syzygium caryophyllifolium* (Lam.) DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 260 (1828). — *Eugenia jambolana* var. *caryophyllifolia* (Lam.) Duthie in Hooker, *Flora of British India* 2: 499 (1879). — *Syzygium cumini* var. *caryophyllifolium* (Lam.) K.K.Khann, *Flora of Bihar, Analysis*: 199 (2001). — Type: *Herb. Lamarck vol. 32, sheet no. 104* (lecto-, P-LA![P00297819], here designated). — Remaining syntype: *Herb. Lamarck vol. 32, sheet no. 105* (P-LA![P00297820]).

Eugenia jambolana Lam., *Encyclopédie Méthodique (Botanique)* 3(1): 198 (1789); Gagnep., in Lecomte, *Flore générale de l'Indochine* 2: 818 (1920). — *Calyptanthes jambolana* (Lam.) Willd., *Annalen der Botanick (ed. Usteri)* 17: 23 (1796). — *Syzygium jambolanum* (Lam.) DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 259 (1828). — Type: Icon in Rumphius, *Herbarium Amboinense* 1: 131, t. 42 (1741) (lecto-, here designated [based on *Jambolana* Rumph.]). — Remaining former syntype: *Herb. Lamarck vol. 32, sheet no. 50*, with Lamarck's label (P-LA![P00297765]) (see Note 2).

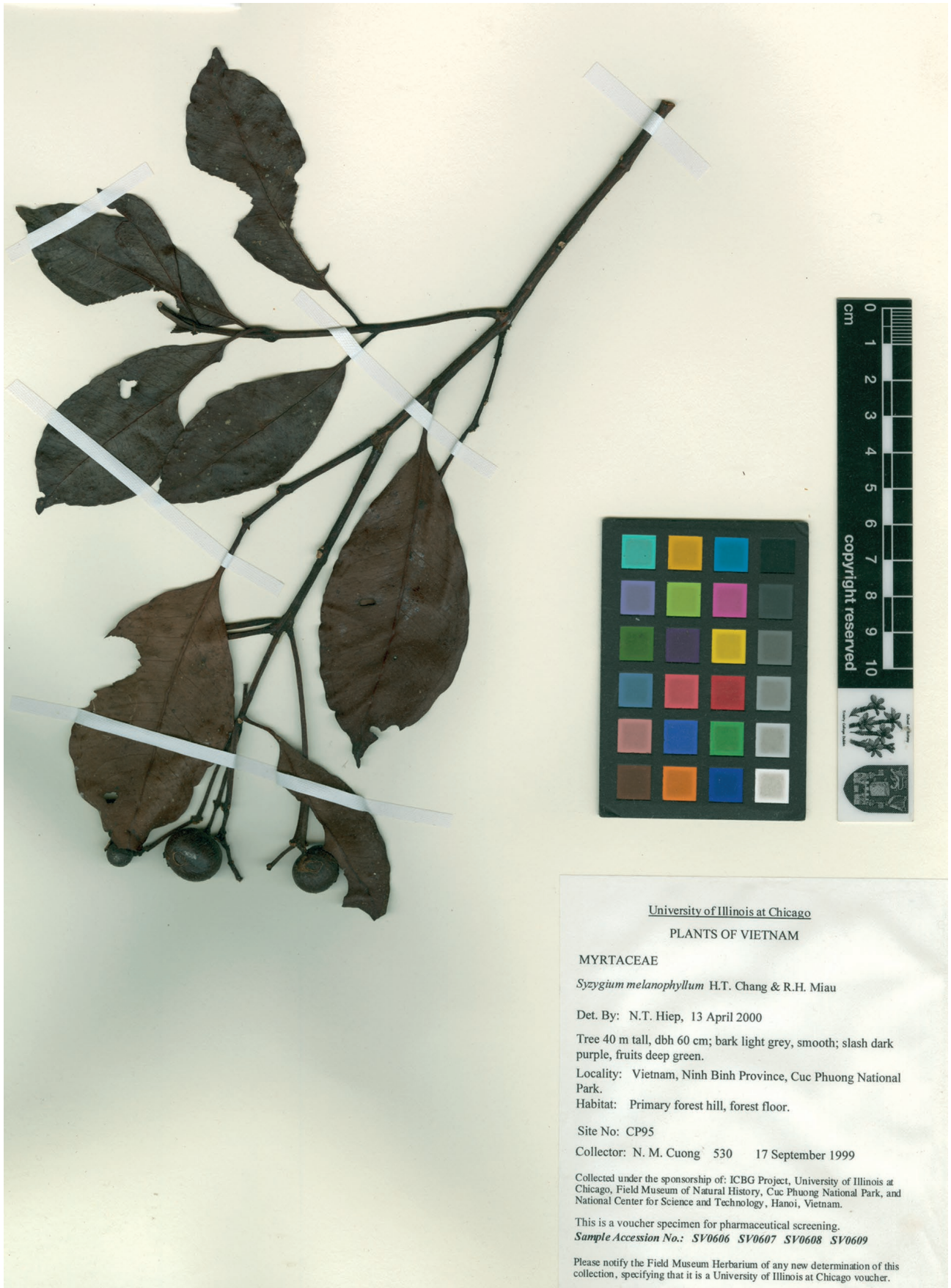
Eugenia obovata Poir., *Encyclopédie Méthodique (Botanique)*, suppl. 3: 124 (1813). — *Myrtus obovata* (Poir.) Spreng., *Systema Vegetabilium* 2: 486 (1825). — *Syzygium obovatum* (Poir.) DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 259 (1828). — Type: La Réunion, *Commerson s.n.* (holo-, FI *n.v.*) (*vide* Scott [1990: 40]).

Syzygium fruticosum DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 260 (1828); Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 109 (1938). — *Eugenia fruticosa* (DC.) Roxb., [*Hortus Bengalensis*: 37 (1814), *nom. nud.*] *Flora indica* 2 [ed. 2, ed. W. Carey]: 487 (1832); *Icones Roxburghianae* no. 1440 (K!); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 843 (1920). — Type: Chittagong, *Roxburgh s.n.* (lecto-, G-DC![in *Herb. Lambert 1816*, microfiche L.], here designated; isolecto- BM![ticket in Wallich's handwriting 'Eugenia fruticosa, Roxburgh'], BR *n.v.*, K-W! (= *Wallich 3559A?*), P!) (see Notes 2 and 3).

Eugenia obtusifolia Roxb., *Flora indica* 2 [ed. 2, ed. W. Carey]: 485 (1832). — *Syzygium obtusifolium* (Roxb.) Kostel., *Allgemeine Medicinisch-Pharmazeutische Flora* 4: 1532 (1835). — *Eugenia jambolana* var. *obtusifolia* (Roxb.) Duthie in Hooker, *Flora of British India* 2: 500 (1879). — *Syzygium cumini* var. *obtusifolium* (Roxb.) K.K.Khanna, *Flora of Bihar, Analysis*: 202 (2001). — Type: *Icones Roxburghianae* no. 2070 (lecto-, K! here designated; isolecto- CAL *n.v.*) (see Note 2).

Eugenia brachiata Roxb., *Flora indica* 2 [ed. 2, ed. W. Carey]: 488 (1832). — Type: *Icones Roxburghianae* no. 1978 (holo-, K!; iso-, CAL *n.v.*).

Eugenia calyptrata Roxb. ex Wight & Arn., *Prodromus Florae Peninsulae Indiae Orientalis*: 329 (1834) [as synonym of *Eugenia jambolanum*, *nom. nud.*]. — Voucher: India, *Roxburgh s.n.*, (K![*Herb. Benthani*], BM!, BR *n.v.*, P!).



University of Illinois at Chicago
 PLANTS OF VIETNAM

MYRTACEAE
Syzygium melanophyllum H.T. Chang & R.H. Miao

Det. By: N.T. Hiep, 13 April 2000
 Tree 40 m tall, dbh 60 cm; bark light grey, smooth; slash dark purple, fruits deep green.
 Locality: Vietnam, Ninh Binh Province, Cuc Phuong National Park.
 Habitat: Primary forest hill, forest floor.

Site No: CP95
 Collector: N. M. Cuong 530 17 September 1999

Collected under the sponsorship of: ICBG Project, University of Illinois at Chicago, Field Museum of Natural History, Cuc Phuong National Park, and National Center for Science and Technology, Hanoi, Vietnam.

This is a voucher specimen for pharmaceutical screening.
 Sample Accession No.: SV0606 SV0607 SV0608 SV0609

Please notify the Field Museum Herbarium of any new determination of this collection, specifying that it is a University of Illinois at Chicago voucher.

FIG. 17. — Paratype of *Syzygium cucphuongense* W.K.Soh & J.Parn., N. M. Cuong 530 (GH).

Syzygium pseudojambolana Miq., *Flora van Nederlandsch Indië* 1: 458 (1855). — Type: Indonesia, Java, Djokjokarta, *Herb. Junghuhn* 33 (holo-, L![L0329920]), **syn. nov.**

Eugenia tenuis Wall ex Duthie in Hooker, *Flora of British India* 2: 500 (1879). — *Syzygium tenue* (Duthie) N.P.Balakr., *Bulletin of the Botanical Survey of India* 22: 175 (1980 publ. 1982). — Type: Nepal, Sukanaghar, *Hamilton* 1165 in *Wallich Numer. List 3570* (lecto-, K-W! here designated; isolecto-, E!).

Eugenia tsoi Merr. & Chun, *Sunyatsenia* 2: 291 (1935). — *Syzygium cumini* var. *tsoi* (Merr. & Chun) Hung T.Chang & R.H.Miao, *Acta Botanica Yunnanica* 4: 22 (1982). — Type: China, Hainan, Yaichow, Namshan Ling, *Tso* 23006 (holo-, A![69412]; iso-, E!, K!, NY!).

Calyptanthes oneillii Lundell, *Bulletin of the Torrey Botanical Club* 64: 554 (1937). — Type: Belize, Belize District, c. 7 km NW of Belize, 21.VIII.1936, *H.O'Neill* 8764 (holo-, MICH![MICH1109776]; WIS!).

[*Jambolifera pedunculata* auct. non L., (1753): Hoult., *Natuurlijke Historie* 2,2: 273, fig. 1 (1774). — Voucher: *L n.v.*, not found] (see Note 4).

[*Jambolifera pendunculata* auct. non L., (1753): Lour. *Flora Cochinchinensis* 230. 1790. — *Jambolifera chinensis* Spreng., *Systema Vegetabilium* 2: 216 (1825), *nom. nov.*] (*vide* Merrill [1935: 220 & 284]) (see Note 4).

[*Jambolifera coromandelica* Hoult., *Natuurlijke Historie* 2,2: 275, fig. 2 (1774). — Voucher: *L n.v.*, not found] (see Note 4).

[*Calyptanthes capitellata* Buch.-Ham. ex Wall., *Wallich Numer. List 3560D* (1831) (K-W!), *nom. nud.*].

[*Calyptanthes tenuis* Buch.-Ham. ex Wall., *Wallich Numer. List 3570 [Hamilton 1165]* (1831) (K-W!), *nom. nud.*].

[*Eugenia frondosa* Wall., *Wallich Numer. List 3560G* (1831) (K-W!), *nom. nud.*].

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampong Chhnang: *Chevalier* 32026 (P); 2.XII.1917, *Chevalier* 35782 (P). — Kam-pot: III.1914, *Chevalier* 31770 (P). — Kandal: Phnom Penh, 10.VII.1933, *Béjaud* 562 (P); Phnom Penh, *Béjaud* 570 (P). — Kompong Speu: Samraong Tong, IV.1879, *Pierre* 989 (P). — Ratanakiri: Bantuk, 9.I.1969, *Martin* 1404 (P); *idem*, 1.IX.1969, *Martin* 1404 (P). — Siem Reap: Angkor Thom, *Thorel* (P). — Stung Treng: Thala Barivat, 26.VII.2000, *M.Monyrak* 169 (K). — *sin. loc.*, *Béjaud* 363 (P); *sin. loc.*, *Béjaud* 559 (P); *sin. loc.*, 19.V.1924, *Herbier Forestier du Cambodge* 504 (P); *sin. loc.*, 27.IV.1907, *Magnen, Gourgand & Châtillon s.n.* (P); *sin. loc.*, IV.1907, *Pételot s.n.* (P); *sin. loc.*, IV.1870, *Pierre* 989 (BM); *sin. loc.*, XII.1876, *Pierre* 3190 (*Harmand s.n.*) (P).

Laos. Attopeu: Bolaven plateau [Attopeu plateau], *Harmand s.n.* (P). — Bolikhamxai: Khamkeuth, Ban Namphao, 22.IV.2000, *Soejarto, S.Bouamanivong, M.Sensanang & S.Vorasing* 11378 (P). — Champassak: *Maxwell* 98-431 (L). — Khammouan: Nakai, 23.V.2006, *K.Nanthavong & Ridsdale* BT 493 (E); Ban Phong Tiou, 12.IV.1950, *Vidal* 1209 (P). — Savannakhet: Ban Chai, 20.V.1949, *Vidal* 947 B (P). — Viangchan: Muang Ban, 27.III.1932, *Kerr* 21278 (L); Pak Lay, *Thorel s.n.*; (P); Tha Ngon, 13.XI.1949, *Vidal* 1122 B (P). — Xaignabouli: 1.II.1965, *Vidal* 4283 (P). — Xieng Khouang: Xieng Khouang, IV.1952, *Vidal* 2202 (P). — *sin. loc.*, 17.III.1956, *Tixier* 9 (P).

Vietnam. Cochinchina: *Pierre s.n.* (BM, P); *Talmy s.n.* (P). — Hao Binh: 5.V.1938, *Pételot* 6394 (A). — Ho Chi Minh City: *Thorel s.n.* (P). — Kontum: Dak Poko river, 30.III.1995, *Averyanov et al.*

VN 1010 (P). — Lam Dong: Mt. Lang Bian, 24.IV.1919, *Chevalier* 40296 (P); Lang Hanh, 19.IX.1965, *Martin* 958 (P); Dalat, III.1932, *Squires* 925 (BM, K); Lang Ang, 2.IV.1964, *Schmid s.n.* (P); Dalat, *Schmid* 1000 (P). — Quang Nam - Da Nang: Mt. Bana, V.1927, *J. & M.S. Clemens* 4040 (A, BM, K). — Tay Ninh: Cai Cong, 23.IV.1866, *Pierre s.n.* (P). — Tonkin: Mu Cua, 23.VIII.1892, *Bon* 5643 (P). — Vinh Phuc: Vinh Yen, IV.1931, *Pételot* 4679 (P). — *sin. loc.*, 20.IV.1923, *Service Général des Forêts* 7 (P); *sin. loc.*, *Pierre s.n.* (P).

DISTRIBUTION. — Widespread in the tropics and subtropics in Africa, Asia, Australia to the Pacific. In Indochina, it occurs in Cambodia, Laos and Vietnam (Fig. 18).

ECOLOGY OR HABITAT. — Primary or secondary forest, from lowland to montane forest, swamp and savannah, to 1200 m.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: March to December. Fruiting: July, December.

VERNACULAR NAMES. — Cambodia: Krian (Ratanakiri), Pring (Kampong Chhnang), Pring bai, Pring das krebe, Pring kom (Kandal), Pring thom (Kandal), Pring toeuk (Stung Treng). Laos: Hai kham (Xaignabouli), Ma va (Viangchan), Sa (Xieng Khouang), Sa leng, Va. Vietnam: Cay voi rung (Tonkin), Emao (Lam Dong), Tram ba vo, Tram goi, Tram moc, Tram voi, Tram xe (Tay Ninh), Voi rung.

USES. — The fruits and young leaves are eaten by the local. The wood is used for fuel, construction and carpentry. The fruit decoction is used to treat stomach ache (Le & Le 2000). The decoction of leaves, wood and fruit is used as antidiabetic medicine (Dy Phon 2000). The juice from leaves is used to treat dysentery and cleaning wounds (Hoang *et al.* 2004) (for further usages see Verheij & Coronel 1992).

DESCRIPTION

Tree to 35 m tall, 45 cm dbh. Bark unknown, slash bark unknown. Glabrous.

Twig

Terete, c. 2 mm diameter, stout, smooth, whitish, contrasting to leaf colour.

Leaves

Opposite, chartaceous to subcoriaceous, light brownish to greenish, 7-12 × 4-6 cm, 1-2 times as long as wide, elliptic or obovate, base cuneate, apex mostly acuminate, sometimes obtuse, acumen to 0.5-0.7 cm long, 1/4-1/8 of blade length; midrib sunken above, raised below; secondary veins 20-30 pairs, narrowly spaced, 2-5 mm apart, ascending c. 50 degrees from midrib, faint and raised above, prominent below; tertiaries prominent, slender, reticulate; intramarginal veins prominent, 1-2 mm from leaf margin, straight; petiole 1.5-2 cm, 1/4-1/8 of blade length, 1-1.5 mm diameter, long, slender, brownish, not contrasting to blade colour.

Inflorescence

Axillary on leafless twig, rarely terminal, 4-9 cm long, paniculate, second to third order branching, first order branch spreading and long, second or third order branch very short, flowers many, 45-99, in heads of 9 to 18 flowers; axes 4-9 cm long; bracts and bracteoles caducous, triangular.

Flowers

Sessile, cream or whitish (*in vivo*), hypanthium not glaucous, not fibrous, 2.5–3 × 2–2.5 mm, obconic, pseudostalk very short or indistinct, to 1 mm long; sepals 4, free, 0.3–1 × 0.5 mm, triangular; petals 4, coherent, 1.5–3 × 1.5–3 mm, orbicular; stamens 4–5 mm; anther sacs parallel, connective gland inconspicuous; style 2–5 mm long, ovule irregularly radiating.

Fruit

Blackish, globose to ellipsoid, 10–15 × 6–10 mm, smooth, blackish, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTES

1. Kostermans (1981) designated Hermann's herbarium material in BM as the type, but this choice was overlooked by Scott (1990) who designated 637.10 (LINN) as the lectotype. Chantaranonthai & Parnell (1994) pointed out that the type designated by Scott is not *S. cumini*. Verdcourt (2001) made a second step lectotypification of Kostermans' typification in selecting one of the two undifferentiated sheets in Hermann's herbarium.

2. *Syzygium cumini* is a widespread species and is found in the wild and cultivation. The consumption of its fruits by the local in Southeast Asia was documented as early as the sixteenth century by Rumphius (1741) and Lamarck (1789) which could possibly imply that the species was already in cultivation before that. At present, *S. cumini* is widely cultivated throughout its range in the tropics and subtropics, and to date, many cultivars have been created (Verheij & Coronel 1992). Therefore it is not surprising to see wide morphological variation with gradation in the leaves and fruits of *S. cumini* in term of their size, colour and shape. As a result of this, many new species have been described by various authors based on these subtle and overlapping morphological variation of the leaf and fruit. For example, Roxburgh (1832) recognised four distinct species: *Eugenia caryophyllifolia* Lam., *E. jambolana* Lam., *E. obtusifolia* Roxb. and *E. fruticosa* Roxb. Duthie (1879) later sunk two of the species (*Eugenia caryophyllifolia* and *E. obtusifolia*) to a variety of *E. jambolana* and recognised an additional new species, *Eugenia tenuis*. In our opinion, it is best to treat these morphological variations as infraspecific variants (subspecies, variety or form): extensive field observations and genetic study encompassing the species geographical range are needed to confirm this.

3. In the *Flore générale de l'Indochine* account, *Syzygium fruticosum* was represented by a single collection in Thailand (Kerr 625, TCD!). Due to insufficient information, Gagnepain (1920) excluded this species from the species key. The original understanding of *S. fruticosum* by Roxburgh (1832) and followed closely by Duthie (1879), is that it differs from the typical *S. cumini* in being a shrub (vs tree), in having globose fruit (vs oblong fruit) and a shorter petiole (vs longer petiole). Over the years, the species concept of *S. fruticosum* seems to have changed or expanded since it was first described by Roxburgh in 1832. For example, in Thailand *S. fruticosum* is a tree to 12 m tall; it differs from *S. cumini* in its decurrent leaf base, shorter and prominently

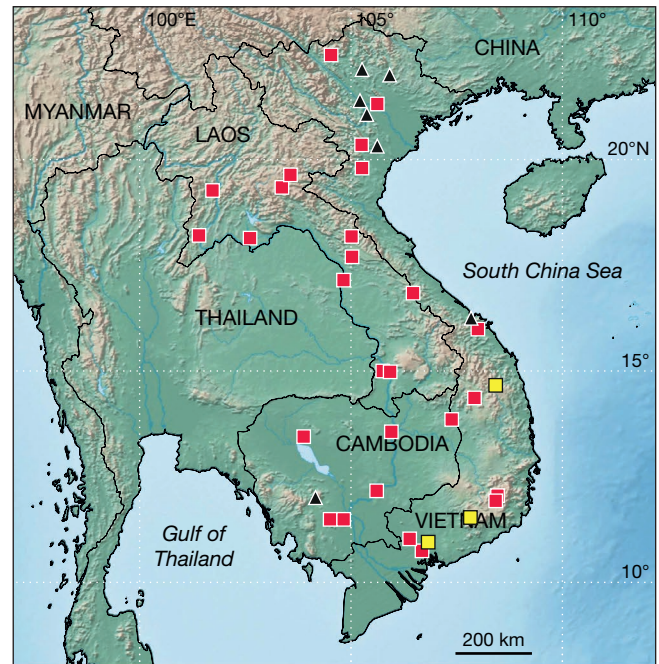


FIG. 18. — Distribution of *Syzygium cumini* (L.) Skeels (■), *Syzygium diospyrifolium* (Wall. ex Duthie) S.N.Mitra (▲) and *Syzygium fastigiatum* (Blume) Merr. & L.M.Perry (■) in Indochina.

angled peduncle and shorter pseudostalk (Chantaranonthai & Parnell 2002). In China, *S. fruticosum* differs from *S. cumini* in its obconic flower bud (vs obovoid or subglobose) and narrower leaves (Chen & Craven 2007). We consider *S. fruticosum* as conspecific to *S. cumini* in having the same flower morphology, leaf venation and inflorescence type. The range of other morphological variation observed in *S. fruticosum* is in accordance with *S. cumini*.

4. In the protologue, the description provided by Houttuyn (1774) is for a member of the Rutaceae: it is likely that he had used Linnaeus' species name and description of *Jambolifera pedunculata* which is actually *Acronychia laurifolia* Blume (Rutaceae) but the drawing he used was of *Syzygium cumini*. In the same publication, the description and plate for *Jambolifera coromandelica* is not of *S. cumini* but possibly a member of Solanaceae or Sapotaceae. The same goes for Loureiro's *Jambolifera pendunculata*, which is just a case of a misapplied name. (for further discussion on *Jambolifera pendunculata* L., see Merrill [1917]).

23. *Syzygium diospyrifolium* (Wall. ex Duthie) S.N.Mitra (Fig. 19)

The Indian Forester 99: 100 (1973). — *Eugenia diospyrifolia* Wall. ex Duthie in Hooker, *Flora of British India* 2: 472 (1878). — *Jambosa diospyrifolia* (Wall. ex Duthie) C.E.C.Fisch., *Records of the Botanical Survey of India* 12: 95 (1938). — *Syzygium diospyrifolium* (Wall. ex Duthie) K.N. Bahadur & R.C. Gaur, *Indian Journal of Forestry* 1: (1978), *nom. illeg. superfl.* — Type: Bangladesh, Silhet, *Wallich Number List* 3617 (lecto-, K![*Herb. Hooker*], here designated; isolecto-, K![*Herb. Benthani*], K-W!).

[*Eugenia diospyrifolia* var. *lanceolata* auct. non (Korth. ex Miq.) Craib: Craib, *Florae Siamensis Enumeratio* 1: 639 (1931). — Voucher: Thailand, Pattani, Betong, *Kerr 7688* (K!) (see Note 1).

[*Eugenia formosa* Wall. var. *ternifolia* auct. non (Wall.) Masam. (1942): Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 837 (1921), *quoad specim.* *Balansa 2865*, *Chevalier 37702* and *Eberhardt 4532*. (see *Syzygium formosum*)].

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampong Spoe: Phnum Aural, 8.III.2001, *K.Eangbhourt, M.Sophal & S.Kosal MoE Herb. Cat. 661* (K).

Vietnam. Bac Kan: Cho Moi, *Eberhardt 4532* (P). — Ha Tay: Mt. Ba Vi, Lankok valley, 16.IV.1888, *Balansa 2865* (K, P). — Ninh Binh: Nho Quan, Cuc Phuong National Park, *Anon. 10369* (CPNP). — Phu Tho: Chan Moung forest reserve, 18.IV.1914, *Chevalier 30093* (P). — Thua Thien-Hue: Phu Loc, 2.IX.1980, *Phuc 81* (HN); 19.III.1980, *Thai & Thuan 553* (HN); Phu Loc, 28.VIII.1980, *Thai & Thuan 657* (HN). — Tuyen Quang: Hui La forest reserve, 8.V.1918, *Chevalier (Fleury) 37702* (P). — *sin. loc.*, 15.V.1998, *Franck VN 381* (HN).

DISTRIBUTION. — India, Burma, Peninsular Malaysia, Thailand, Cambodia and Vietnam (Fig. 18). Possibly occurs in Laos but not yet collected there.

ECOLOGY OR HABITAT. — In lowland forest, to 350 m alt.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: March, May, August, September. Fruiting: not documented.

VERNACULAR NAMES. — Vietnam: Cay doi (Phu Tho), Cay quoi (Bac kan).

USES. — The fruit is edible and sold in food market.

DESCRIPTION

Tree to 10 m tall, to 20 cm dbh. Bark smooth greyish. Glabrous.

Twig

Angular (3-angled) at node, terete at internode, 2-3 mm diameter, slender, surface smooth, brownish to whitish, not contrasting to leaf colour.

Leaves

Verticillate (always verticillate at twig-end), rarely opposite, chartaceous to subcoriaceous, greenish brown, 11-18.5 × 3-7.5 cm, 2 to 5 times as long as wide, oblanceolate or elliptic, base cordate, margin wavy, apex acute without distinct acumen; midrib sunken above, raised below; secondary veins 10-14 per side, 10-15 mm apart, c. 45 degrees or more ascending from midrib, prominent and raised above, prominent below; tertiaries prominent, reticulate; intramarginal veins 2-5 mm from leaf margin, looped, outer intramarginal veins present; petiole 3-5 mm long, 1/30-1/60 of blade length, 1-2 mm diameter, not contrasting to blade colour.

Inflorescence

Terminal, rarely axillary on leafy twig, 4-5 cm long, racemose, flowers few, 3 to 7, arranged in whorl of three; axes 1-2 cm long; bracts and bracteoles persistent, triangular.

Flowers

Big, pedicellate, pedicel 1.5-2.5 cm long, hypanthium not glaucous, not fibrous, 15-20 × 15-20 mm, pyriform, pseudostalk distinct, tapering gradually, 1-5 mm long; sepals reddish green (in vivo), 4, free, semiorbicular, unequal, outer sepals 2-3 × 4 mm, inner sepals 5 × 7; petals white (in vivo), 4, free, 9-12 × 9-12 mm, orbicular; outer stamens c. 2 cm long, anther sacs parallel, connective gland conspicuous; style 3-5 mm long, ovules 30-35 per locule, irregularly radiating.

Fruit

Globose to subglobose, 1.8 × 2 cm, surface smooth, calyx ring with persistent sepal lobes, seed intercotyledonary intrusion absent.

NOTES

1. Craib (1931) referred *Kerr 7688* to *Jambosa lanceolata* Korth. ex Miq. as a variety of *Syzygium diospyrifolium* under var. *lanceolata*. In our opinion, these two taxa are in fact different species. The type of *Jambosa lanceolata* (holotype: Sumatra, G. Melintang, *Korthals s.n.*, L![L0009610]) differs from *S. diospyrifolium* in having longer and narrower leaves and strongly winged and auriculate twigs, while in *S. diospyrifolium* the twig is terete and the leaves are shorter and broader.

2. *Syzygium diospyrifolium* and *S. formosum* are morphologically similar in having verticillate terminal leaves, a cordate leaf base and a racemose inflorescence with large flowers arranged in whorls of three. *S. diospyrifolium* differs, however, from *S. formosum* in having smaller leaves, greenish leaves (vs brownish) and an inflorescence borne on leafy twigs (vs an inflorescence borne on leafless twigs).

24. *Syzygium fastigiatum* (Bl.) Merr. & L.M.Perry

Memoirs of the American Academy of Arts and Sciences 18: 152 (1939); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 904 (2003); M.F.Newman et al., *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — *Calyptranthes fastigiata* Bl., *Bijdragen tot de Flora van Nederlandsch-Indië* 17: 1090 (1826). — *Caryophyllus fastigiatus* (Bl.) DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 262 (1828); Miq., *Flora van Nederlandsch Indië* 1: 465 (1855). — *Eugenia fastigiata* (Bl.) Koord. & Valetton, *Mededeelingen uit's Lands Plantentuin* 40: 104 (1900). — Type: *Sin. loc.* [Java], annotation by Blume '*Calyptranthes fastigiata*, 2188/a, 1826', *Blume s.n.* (holo-, L![sheet no. 908.146-1771]).

Calyptranthus floribunda Bl., *Bijdragen tot de Flora van Nederlandsch-Indië*: 1091 (1826). — *Caryophyllus floribundus* (Bl.) DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 262 (1828). — *Eugenia confertiflora* Koord. & Valetton, *Mededeelingen uit's Lands Plantentuin* 40: 106 (1900), *nom. nov.*, *nom. illeg. non* A. Gray (1854). — Type: Indonesia, Java, *Blume s.n.* (holo-, L![L0009426]).

Eugenia bracteolata Wight, *Illustrations of Indian Botany* 2: 15 (1841) [bractiolata], in *Icones Plantarum Indiae Orientalis* 2: t. 531 (1843); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 815 (1920). — *Acmena bracteolata* (Wight) Walp., *Repertorium Botanices Systematicae* 2: 181 (1843). — *Syzygium bracteolatum* (Wight) Masam., *Enumeratio Phanerogamarum Bornearum*: 524 (1942), *nom. illeg.*; P.H.Hô, *An Illustrated Flora of Vietnam (Cây cỏ Việt Nam)* 2: 47, fig. 3728 (1992). — Type: Burma, Mergui,



FIG. 19. — Inflorescence of *Syzygium diospyrifolium* (Wall. ex Duthie) S.N.Mitra. Photo by Pranom Chantaranonthai. Scale bar: 2 cm.

Anon. s.n. (presumably by Griffith) (holo-, K![*Herb. R. Wight., Prop. 'Myrtaceae, Feb. 1835'*, annotated by Wight. E.A. bracteolate RWIII]; iso-, K![*Herb. Hooker, 'Mergui Griffith'* annotated by Hooker]) (*vide* Noltie [2005: 357]).

Eugenia sablanensis Elmer, *Leaflets of Philippine Botany* 1: 328 (1908). — Type: Philippines, Luzon, Benguet Province, Boguis, III.1907, *Elmer* 8879 (holo-, PNH†; iso-, A *n.v.* [69776], K!, NY!).

Eugenia bibracteata Greves, *Journal of Botany, British and Foreign* 61, suppl.: 18 (1923). — *Syzygium bibracteatum* (Greves) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 23: 249 (1942). — Type: New Guinea, Sogere, Mt. Wori wori, *Greves* 729, (holo-, K!; iso-, A![69584], BM!, E!, G!).

Eugenia elmeri Merr., *Plantae Elmerianae Borneenses, University of California Publications in Botany* 15: 218 (1929). — *Syzygium elmeri* (Merr.) Masam., *Enumeratio Phanerogamarum Bornearum*: 528 (1942). — Type: Malaysia, Borneo, Sabah, near Tawau, Elphinstone province, X.1922 to III.1923, *Elmer* 21448 (PNH†; iso-, BR!, CAS!, GH *n.v.*, K!, L!, M!, MICH!, NY!, P *n.v.* [P05322288], PH!, S!, US!).

ADDITIONAL MATERIAL EXAMINED. — **Thailand.** Narathiwat: Sungai Kolok, 28.II.1974, K. & S.S. Larsen BKF 70849 (BKF). — Surah Thani: II.1930, *Kerr* 18155 (TCD).

Vietnam. Cochinchina: *Pierre s.n.* (K, P). — Dong Nai: Bien Hoa, III.1877, *Pierre s.n.* (P). — Lam Dong: Bao Loc, *Schmid s.n.* (P). — Kon Tum: *Phuong* 1231 (HN).

DISTRIBUTION. — Widespread from India, China, Southeast Asia to Papua New Guinea. In Indochina found in Vietnam and probably in Cambodia and Laos but not yet collected there (Fig. 18).

ECOLOGY OR HABITAT. — In primary forest.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: March. Fruiting: not documented.

VERNACULAR NAME. — Tram tieu diep (Vietnam).

USES. — The wood is used for house building and light construction (Lemmens *et al.* 1995).

DESCRIPTION

Tree to 20 m tall, 45 cm dbh. Bark unknown; slash bark unknown. Glabrous.

Twig

Angular (4-angled) and winged, *c.* 3 mm diameter, stout, surface smooth, occasionally lenticellate, brownish, not contrasting to leaf colour.

Leaves

Opposite, coriaceous, brownish, 11.5-16.5(-27) × 4.5-7 cm, 2 times as long as wide, obovate, base, strongly attenuate, margin flat, apex shortly acuminate, mostly rounded or obtuse, acumen when present to 1 mm long, $\frac{1}{100}$ of blade length; midrib flat above, raised and angled below; secondary veins 28-30 per side, narrowly spaced, 2-3 mm apart, spreading, *c.* 60 degrees from midrib, prominent and raised on both surfaces; tertiaries faint, reticulate; intramarginal veins *c.* 1 mm from leaf margin, straight; petiole 5-7 mm long, $\frac{1}{4}$ - $\frac{1}{16}$ of blade length, *c.* 1 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Terminal, 7.5-10 cm long, paniculate, flat-top, second order branching, flowers many, to 135, dense; axes 7.2-9.7 cm long; bracts and bracteoles persistent, triangular.

Flowers

Pedicellate, pedicel *c.* 1 mm long, hypanthium not glaucous, not fibrous, 2.5-3 × 2 mm, obconic, pseudostalk indistinct; sepals 4, free, 0.5-0.6 × 0.5-0.7 mm, semiorbicular; petals 4, coherent, 1.5-2 × 1.5-2 mm, orbicular; outer stamens 2-2.5 mm long, anther sacs parallel, connective gland conspicuous; style 1 mm long, ovules *c.* 5 per locule, irregularly, radiating.

Fruit

Ellipsoid, 0.6 × 0.5 cm, surface smooth, brownish, calyx ring with persistent sepal lobes, lobed, seed intercotyledonary intrusion absent.

NOTES

This is a widespread species but undercollected in Indochina.

25. *Syzygium formosum* (Wall.) Masam.

Enumeratio Phanerogamarum Bornearum: 528 (1942); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 50, fig. 3737 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 904 (2003); D.D.Soejarto *et al.* *Seed Plants of Cuc Phuong National Park*: 430 (2004). — *Eugenia formosa* Wall., *Plantae Asiaticae Rariores* 2: 6, t. 108 (1830). — *Jambosa formosa* (Wall.) G.Don, *A General History of the Dichlamydeous Plants* 2: 969 (1832). — [*Jambosa formosa* Wight, *Illustrations of Indian Botany* 2: 14 (1841), *nom. nud.*]. — Type: Burma, Moulmein, *Wallich Numer. List 3609* (lecto-, (K-W)!), here designated; isolecto-, K![*Herb. Hooker*].

Eugenia ternifolia Roxb., [*Hortus Bengalensis* (1814) 37, *nom. nud.*] *Flora indica* 2 [ed. 2, ed. W. Carey]: 489 (1832); Wight, *Icones Plantarum Indiae Orientalis* 2: t. 611 (1843). — *Jambosa ternifolia* (Roxb.) Walp., *Repertorium Botanices Systematicae* 2: 191 (1843). — *Eugenia formosa* Wall. var. *ternifolia* (Roxb.) Duthie in Hooker, *Flora of British India* 2: 471 (1878) [excl. *Wallich Numer. List 2309*, Silhet, K! = *S. malaccense*]; Gagnep. in

Lecomte, *Flore générale de l'Indochine* 2: 837 (1921), *pro parte*, incl. specim. *Pierre s.n.* (Mt. Chereer) and *Thorel s.n.* (cultivated). — *Syzygium ternifolium* (Roxb.) P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 59, fig. 3762 (1992). — Type: *Icones Roxburghianae* no. 2495 (lecto-, K! here designated; isolecto-, CAL n.v.).

Jambosa mappacea Korth., *Nederlandsch Kruidkundig Archief* 1: 200 (1847). — *Syzygium mappaceum* (Korth.) Merr. & L.M.Perry, *Memoirs of the American Academy of Arts and Sciences* 18: 164 (1939). — Type: Indonesia, Borneo, *Korthals s.n.* (holo-, L![L0009653]; iso-, L![L0638268]) (see Note).

Eugenia perakensis King, *Journal of the Asiatic Society of Bengal* 70: 81 (1901). — *Syzygium perakense* (King) I.M.Turner, *Journal of the Singapore National Academy of Science* 22-24: 22 (1996). — Type: Peninsular Malaysia, Perak, Larut, II.1884, *King's collector 5595* (holo-, K!; iso BM!, P[P05238586]), *syn. nov.* (see Note).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia**. Kampong Speu: Samroang Tong, Phnum Chreav [Mt. Cherev], IV.1870, *Pierre 993* (BM, K, P). — Kampot: Mt. Bokor, 10.III.2001, *Middleton & M.Monyrak 671* (P). — Kandal: Phnom Penh, *Béjaud 552* (P). **Vietnam**. Cochinchina: *Thorel s.n.* (P). — Dong Nai: Bao Chanh, .IX.1865, *Pierre 86* (P). — Ken Giang: Donai highland, Langanh station, 3.X.1932, *Poilane 21066* (P). — Ninh Binh: Nho Quan, Cuc Phuong National Park, 8.V.1971, *CPNP 3984* (CPNP). — *sin. loc.* 22.IV.1984, *Bai Due Binh B 992* (K).

DISTRIBUTION. — India, Bangladesh, Burma, Thailand, Cambodia, Vietnam, Peninsular Malaysia and Borneo. (Fig. 20).

ECOLOGY OR HABITAT. — Primary forest and swamp.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: April, May, October. Fruiting: not documented.

VERNACULAR NAMES. — Cambodia: Prin ach romeang (Kandal). Vietnam: Tram dep, Tram chum ba, Tram dai loan.

USES. — The fruit edible.

DESCRIPTION

Tree to 7 m tall. Bark greyish, lenticellate. Glabrous.

Twig

Angular (3-angled) at node, not winged, terete at internode, 4-5 mm diameter, stout, surface smooth, greyish or whitish, not contrasting to leaf colour.

Leaves

Verticillate (always verticillate at twig-end), rarely subopposite, chartaceous to subcoriaceous, dark brownish to yellowish brown, 15-35 × 6-18 cm, 2 to 4 times as long as wide, usually oblanceolate or sometimes elliptic, base cordate, margin wavy, apex acute, without distinct acumen; midrib sunken above, raised below; secondary veins 13-14 per side, 15-20 mm apart, ascending *c.* 45 degrees or more from midrib, prominent and raised on both surfaces; tertiaries prominent, reticulate; intramarginal veins 4-5 mm from leaf margin, looped, outer intramarginal veins present; petiole 0.5-2 cm long, $\frac{1}{30}$ - $\frac{1}{70}$ of blade length, 3-5 mm diameter, not contrasting to blade colour.

Inflorescence

Axillary on leafless twig, 4-6 cm long, racemose, flowers few, 3 to 7, arranged in whorl of three; axes 1-2 cm long; bracts and bracteoles persistent, triangular.

Flowers

Big, pedicellate, pedicel 1.5-2.5 cm long, hypanthium not glaucous, not fibrous, 15-20 × 15-20, pyriform, pseudostalk distinct or indistinct, tapering gradually, 1-5 mm long; sepals reddish, 4, free, unequal, semiorbicular, outer sepal *c.* 4 × 7 mm, inner sepals *c.* 7 × 12; petals reddish, 4, free, 9-12 × 9-12 mm, orbicular; outer stamens *c.* 2 cm long, anther sacs parallel, connective gland conspicuous; style 4-5 mm long, ovules 30-12 per locule, irregularly radiating.

Fruit (based on Flora of Thailand account)

Depressed globose, 3-4 cm long, calyx ring with persistent sepal lobes.

NOTE

The type of *Syzygium perakense* from Peninsular Malaysia and *S. mappaceum* from Borneo match with the type of *S. formosum* in having large leaves that are arranged in whorls of three at the twig-ends, a racemose inflorescence borne on leafless twigs and pedicellate flowers. In addition to this, *S. perakense* shares the same type of swampy habitat with *S. formosum*. We concur with Miquel (1855), who had recognised *Jambosa mappacea* as conspecific with *S. formosum*. The specimen *Niyomdham 5184* (BKF!) from Thailand, which was identified as *S. perakense* (Chantaranothai 2001) belongs to *S. formosum*.

26. *Syzygium glomerulatum* (Gagnep.) Merr. & L.M.Perry
(Figs 21; 22)

Journal of the Arnold Arboretum 19: 112 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 51, fig. 3738 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 904 (2003). — *Eugenia glomerulata* Gagnep., *Notulae Systematicae* 3: 325 (1918); Gagnep. in Lecomte *Flore générale de l'Indochine* 2: 826, fig. 89-1 & -2. (1921). — Type: Cambodia, Kampong Speu, Samraong Tong, Mt. Schroll, VI.1870, *Pierre s.n.* (lecto-, P![P00589212], with a drawing by Delpy dated XI.1899 attached, here designated; isolecto-, P![2 sheets, P00589213 & P00589214], E!, K![K000276210]) (see Note 1).

ADDITIONAL MATERIAL EXAMINED. — **Vietnam.** Dac Lak: Dak Nang, Dao Nghia, 17.V.1979, *Phdong 939* (HN). — Lam Dong: *Schmid s.n.* (P).

DISTRIBUTION. — Cambodia and Vietnam (Fig. 20).

ECOLOGY OR HABITAT. — In primary and secondary forest.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: May to June. Fruiting: not documented.

VERNACULAR NAME. — Tram chum (Vietnam).

DESCRIPTION

Tree. Glabrous.



FIG. 20. — Distribution of *Syzygium formosum* (Wallich) Masam. (■), *Syzygium glomerulatum* (Gagnep.) Merr. & L.M.Perry (■) and *Syzygium grande* Walp. (▲) in Indochina.

Twig

Terete, 3 mm diameter, stout, smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite, chartaceous, shiny, brownish, 12-17.5 × 6.5-8.5 cm, 2-2.5 times as long as wide, elliptic to broadly elliptic, base cuneate, slightly attenuate, apex acute or acuminate, acumen 0.3-0.6 cm long, $\frac{1}{30}$ - $\frac{1}{40}$ of blade length; midrib sunken above, raised below; secondary veins 8-10 per side, 12-15 mm apart, 60-70 degrees from midrib, arcuate 1-2 mm from margin, intramarginal veins absent; tertiary veins prominent, subscalariform; petiole 4-7 mm long, $\frac{1}{17}$ - $\frac{1}{35}$ of blade length, 2 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Terminal, 5.5-6.5 cm long, second to third order, flowers many, to 488 flowers, in heads of 9-60 flowers; axes 5-5.5 cm long; bracts and bracteoles persistent, triangular.

Flowers

Sessile, hypanthium 2-3 × 1.7-2 mm, obconic, pseudostalk indistinct or very short, *c.* 1 mm long; sepals 4, free, 1.5 × 1.8 mm, semiorbicular; petals 4-5, free, 1.5 × 1.5 mm, orbicular; outer stamens *c.* 1.5 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 2 mm long, ovules 5-10 per locule, irregularly radiating.

Fruit

Unknown.



FIG. 21. — Lectotype of *Syzygium glomerulatum* (Gagnep.) Merr. & L.M.Perry, *Pierre* s.n. (P00589212); detail, close-up of inflorescence. Scale bar: 1 cm.

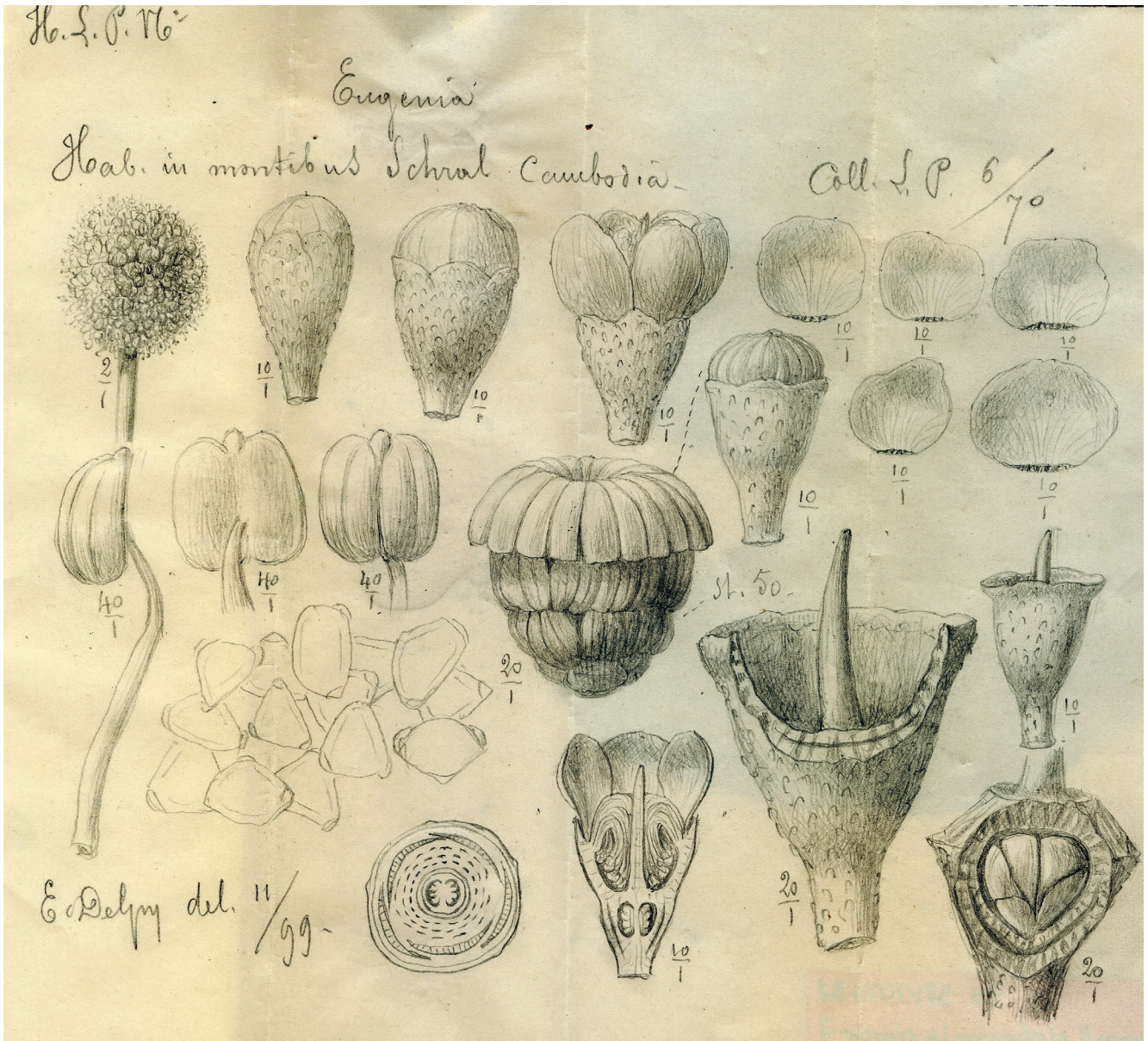


FIG. 22. — Delpy's drawing on the reproductive organs of the lectotype of *Syzygium glomerulatum* (Gagnep.) Merr. & L.M.Perry, *Pierre* s.n. (P00589212).

NOTES

1. *Pierre* s.n. from Cambodia (Mt. Schroll) is the only specimen cited by Gagnepain (1918), however lectotypification is required as there are three undifferentiated sheets.

2. This species is distinctive in having a very compact inflorescence and the leaf venation is atypical for *Syzygium* as the secondary veins do not form distinct intramarginal veins, instead they are pinnate-like and arcuate near the leaf margins.

27. *Syzygium grande* (Wight) Walp.

Repertorium Botanices Systematicae 2: 180 (1843); Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 112 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 51, fig. 3739 (1992) [as *Syzygium*

grandis]; K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 904 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — *Eugenia grandis* Wight, *Illustrations of Indian Botany* 2: 17 (1841), *nom. nov. pro Eugenia cymosa* Roxb., *Flora indica* 2 [ed. 2, ed. W. Carey]: 492 (1832), *nom. illeg., non* Lam. (1789), *non Syzygium cymosa* DC. (1828); Wight, *Icones Plantarum Indiae Orientalis* 2: t. 614 (1843); Gagnep. *in* Lecomte, *Flora générale de l'Indochine* 2: 826 (1921). — *Jambosa grandis* (Wight) Blume, *Museum Botanicum Lugduno-Batavum* 1: 108 (1850). — Type: *Icones Roxburghianae* no. 2498 (lecto-, K!, here designated; isolecto-, CAL n.v.).

Jambosa firma Wall. *ex* Blume, *Museum Botanicum Lugduno-Batavum* 1: 108 (1850). — [*Eugenia firma* Wall., *Wallich Numer. List 3603A, nom. nud., nom. illeg., non* DC. (1828)]. — *Syzygium firmum* (Blume) Thwaites & Hook.f., *in* Thwaites, *Enumeratio Plantarum Zeylaniae*: 417 (1864). — Type: Bangladesh, Silhet, *Wallich Numer. List 3603A* (lecto-, L![L0404160], here designated, K-W!, K![*Herb. Bentham*], P!).

Eugenia montana Wight, *Icones Plantarum Indiae Orientalis* 3: t. 1060 (1846), *nom. illeg., non* Aubl. (1775). — *Syzygium montanum* Thwaites & Hook.f., in Thwaites, *Enumeratio Plantarum Zeylaniae* : 116 (1859), *nom. illeg., non* Gamble (1919). — *Syzygium tamilnadensis* Rathakr. & V.Chithra, in N.C.Nair & A.N.Henry, *Flora of Tamil Nadu* 1: 158 (1983). — *Syzygium gadgilii* M.R.Almeida, *Flora of Maharashtra* 2: 273 (1998), *nom. superfl.* — Type: India, Neilgherries, *Herb. Gardner s.n.* [*Herb. Hooker & Herb. Bentham*] (*n.v.*) (*vide* Noltie [2005: 359]).

Eugenia laosensis Gagnep., *Notulae Systematicae* (Paris) 3: 326 (1917) *pro parte* [excl. *spec. Thorel s.n.*, Nong-kay (P!) = *S. thumra*]. — *Syzygium laosense* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 113 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 52, fig. 3743 (1992); P.Dy Phon, *Plant Use in Cambodia*: 579 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 905 (2003). — Type: Laos, Preah Vihear, Mulu-prey, *Harmand 260* ([first-step] lecto-, P!, first designated by Chantaranothai & Parnell [1994]); *Pierre 3193* (*Harmand 260*), fl., XII.1875 ([second-step] lecto-, P![P00589203] with attached Delpy drawing dated I.1900, here designated; isolecto-, BM!, P!, 2 sheets [P00589204 & P00589205]). — Remaining former syntypes: Laos, Khone, *Harmand 135* (P!) (see Note 1).

Eugenia laosensis var. *quocensis* Gagnep., *Notulae Systematicae* (Paris) 3: 327 (1917). — *Syzygium laosense* var. *quocense* (Gagnep.) Hung T.Chang & R.H.Miao, *Flora Reipublicae Popularis Sinicae* 53: 70 (1984). — Type: Vietnam (cited as Cambodia in the protologue), Ken Giang, Phu Quoc Is., vernacular name Tam-xe, fl., XI.1874, *Pierre s.n. in Herb. Hort. Bot. Saigonensis* (lecto-, P![P00589200], here designated; isolecto-, P![2 sheets, P00589201 & P00589202]; E!).

Syzygium endertii Merr. & L.M.Perry, *Memoirs of the American Academy of Arts and Sciences* 18: 167 (1939). — Type: East Kalimantan, Kutet, near Kg Sabantulung, 1925, *Endert 1523*, (holo-, BO *n.v.*; iso-, A/[frag.], L!, [L0329615]).

Syzygium megalophyllum Merr. & L.M.Perry, *Memoirs of the American Academy of Arts and Sciences* 18: 179 (1939). — Type: Malaysia, Borneo, Sabah, VII.1896, *Creagh s.n.* (holo-, NY![00405152]; iso-, A *n.v.*, K!).

Syzygium grande var. *parviflorum* Chantar. & J.Parn., *Kew Bulletin* 48: 598 (1993). — Type: Thailand, Chaiyaphum, Pu Kio, 25.II.1931, *Kerr 20267* (holo-, K!, iso-, BK!).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampong Speu: Samraong Tong, Mt. Tamire, V.1870, *Pierre 992* (K, P).

Laos. Champassak: Bassac, 1866-1868, *Thorel s.n.* (P). — Louang Phabang: Paksanan, 23.III.1956, *Tixier 6* (P).

Vietnam. Cochinchina: 1875, *Godefroy s.n.* (P). — Ba Ria - Vung Tau: Ba Ria, XII.1866, *Pierre s.n.* (P); Binh Duong: Ben Cat, XII.1865, *Pierre s.n.* (K). — Da Nang: Tourane and vicinity, V-VII.1927, *J. & M.S. Clemens 3777* (BM, K); *idem*, 5.IX.1927, *J. & M.S. Clemens 3395* (BM, P). — Gia Lai: Ayun Pa , 22.IV.1978, *Phdong 582* (HN).

DISTRIBUTION. — Widespread, from Seychelles to Borneo. In Indochina found in Cambodia, Laos and Vietnam (Fig. 20).

ECOLOGY OR HABITAT. — In forest or planted along roadside.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: March, May, November, December. Fruiting: April, May, September.

VERNACULAR NAMES. — Cambodia: Pring chan. Vietnam: Tram dai, Tram deo, Tram to, Tram xe (Phu Quoc).

USES. — This species is planted on roadsides. The wood is used for house and ship building (Lemmens *et al.* 1995).

DESCRIPTION

Tree to 20 m tall, *c.* 20 cm dbh. Bark brownish to greyish. Glabrous.

Twig

Terete, 4-5 mm diameter, stout, surface smooth, slightly flaky, greyish to whitish, contrasting to leaf colour.

Leaves

Opposite, coriaceous, pale brownish, 10-18.5 × 5-8 cm, 2 times as long as wide, elliptic to ovate, base, cuneate, slightly attenuate, apex obtuse, acute, without acumen, tip deflexed; midrib sunken above, raised below; secondary veins 8-12 per side, widely spaced, 8-10 mm apart, 60-70 degrees ascending from midrib, very prominent and raised on both leaf surfaces; tertiaries prominent, reticulate; intramarginal veins 3-5 mm from margin, looped, outer intramarginal veins present or absent; petiole 1-2 cm long, 1/9-1/12 of blade length, 2-3 mm diameter, stout, dark brown or blackish, contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 4-6.5 cm long, paniculate, first to second order branching, flowers many, 35 to 105, compact at branch-end; axes *c.* 4-6 cm long; bracts and bracteoles caducous.

Flowers

White, sessile, hypanthium not glaucous, not fibrous, 7-8 × 6-7, obconic, pseudostalk distinct, 2.5-3 mm long; sepals 4, free, semiorbicular, unequal, outer sepals 2.5 × 2.6-3 mm, inner sepals 3 × 4.2-4.5 mm; petals 4, free, 5-6 × 5-6 mm, orbicular; outer stamens 2-2.2 cm long, anther sacs parallel, connective gland inconspicuous; style *c.* 10 mm long, ovules 12-15 per locule, irregularly radiating.

Fruit

Subglobose, 7 × 7 cm, surface smooth, calyx ring with smooth rim; seed 1, subglobose, 4.4 × 4 cm, seed intercotyledonary intrusion absent.

NOTES

1. Second step lectotypification is required and undertaken here for *Eugenia laosensis*. Chantaranothai & Parnell (1994) were the first to designate a lectotype but there are three undifferentiated sheets of *Harmand 260* at P.

2. This species is morphologically variable in leaf and inflorescence size.

28. *Syzygium hancei* Merr. & L.M.Perry (Figs 23; 24)

Journal of the Arnold Arboretum 19: 242 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 51, fig. 3750 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2:



FIG. 23. — Holotype of *Syzygium hancei* Merr. & L.M.Perry, Sampton & Hance 13754 (BM).

904 (2003); J. Chen & Craven, *Flora of China* 13: 356 (2007). — *Eugenia minutiflora* Hance, *Journal of Botany, British and Foreign* 9: 5 (1871); *non Syzygium minutiflorum* (Bedd.) Gamble (1919). — Type: China, Kwangtung, Hui-tung, *Sampton & Hance 13754* (holo-, BM!; iso-, A! [frag., A00069409], K!). (see Note 1)

Eugenia bonii Gagnep., *Notulae Systematicae* 3: 318. 1917; Gagnep., in Lecomte, *Flore générale de l'Indochine* 2: 808, fig. 87 (1920). — *Syzygium bonii* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 102 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 48, fig. 3729 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 901 (2003). — Type: Vietnam [Annam], Than-hoa, Cua-bang, fl., 17.VIII.1812, *Bon 5603* (lecto-, P! [P00589297], here designated; isolecto-, P! [2 sheets, one sheet with barcode P00589368 & the other sheet without barcode and with Gagnepain's drawing attached]), **syn. nov.**

Eugenia campylocarpa Gagnep., *Notulae Systematicae* (Paris) 3: 320 (1917). — *Syzygium campylocarpum* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 116 (1938). — Type: Laos, Attopeu, Bolaven plateau [Attopeu plateau], fl., III.1877 *Harmand 1257* (lecto-, P! [P00589291], here designated; isolecto-, P! [4 sheets: 2 sheets with barcodes P0058992 & P00589293, both with tickets bearing Harmand's signature, 2 other sheets without barcode, *Pierre 3189* [Harmand 1257]), **syn. nov.** (see Note 2).

Eugenia mekongensis Gagnep., *Notulae Systematicae* 3: 328 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 807 (1920). — *Syzygium mekongense* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 102 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 54, fig. 3747 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 906 (2003); D.D.Soejarto et al. *Seed Plants of Cuc Phuong National Park*: 432 (2004), [excl. *S. szemaoense* = *Memecylon* sp.]; M.F.Newman et al., *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — Type: Thailand, between Ubon and Kemmarat, Ubon river, fl., *Thorel s.n.* (lecto-, P! [P00589243], here designated). — Remaining former syntypes: Cambodia, Kandal, around Phnom Penh, *Gourgand* (A n.v., P!); Vietnam [Annam], Than-hoa, fr., *Bon 5808* (P! [2 sheets, P0089195 & P00589196]); Vietnam [Cochinchina], Dong Nai, Baria, Mt. Dinh, *Pierre s.n.* (P!), **syn. nov.**

Syzygium petelotii Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 103 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 55, fig. 3752 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 907 (2003). — Type: Vietnam [Tonkin], Phu Tho, Phu Ho, *Pételot 1043* (holo-, A!; US!), **syn. nov.**

Syzygium szemaoense Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 105 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 61, fig. 3770 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 908 (2003); J. Chen & Craven, *Flora of China* 13: 352 (2007). — Type: China, Yunnan, Szemao, *Henry 12138* (holo-, NY!; iso-, A!, K!), **syn. nov.**

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampong Spoe: Phnum Aural, 8.III.2001, *K.Eanghourt, M.Sophal & S.Kosal MoE Herb. Cat.* 670 (K). — Kampot: Mt. Bokor, Popok Vil waterfall, 8.III.2001, *Middleton & M.Monyrak 623* (P); *idem*, 11.XII.2000, *S.Hul et al.* 954 (P). — Kandal: Phnom Penh, *Gourgand s.n.* (P). — *sin. loc. Gourgand s.n.* (P).

Vietnam. Cochinchina: X.1866, *Pierre s.n.* (P). — Da Nang: Son Tra, 9.VII.1986, *Anon. LX-VN 2768* (HN). — Dac Lak: Duc Minh, 9.XII.1979, *Anon. 574* (HN); Dak Nang, Dao Nghia, 17.V.1979, *Phuong 925* (HN). — Dong Nai: Mt. Dinh, *Pierre s.n.* (BM, E). — Gia Lai: Ayun Pa, 21.IV.1988, *Bien 764* (HN); K'bang, 20.XI.2005, *N.Q.Binh & D.D.Cuong VN 1620* (HN). — Ha Giang: Bac

Quong, 14.VII.2001, *N.Q.Binh, D.D.Cuong & Schnitzler VN 848* (HN). — Ha Tay: Mt. Ba Vi, *Pételot 2596* (A). — Khanh Hoa: Nha Trang, VI.1909, *d'Alleizette s.n.* (L). — Kon Tum: 30.XI.1978, *H.H.Dung 383* (HN). — Lam Dong: Bao Loc, *Lien 252* (HN); Da Chay, 16.IV.1997, *Averyanov & N.Q.Binh VH 3988* (HN); Daa Lao, 16.V.1953, *Schmid s.n.* (P). — Lao Cai: Chapa, VII.1931, *Pételot 4678* (A). — Ninh Binh: Nho Quan, Cuc Phuong National Park, 8.VIII.1999, *N.M.Cuong, H.L.Quyen & M.V.Xinh NMC 402* (CPNP); Nho Quan, Cuc Phuong National Park, 17.IX.1999, *N.M.Cuong, H.L.Quyen & M.V.Xinh NMC 523* (CPNP); Nho Quan, Cuc Phuong National Park, 24.VII.2000, *N.M.Cuong, H.L.Quyen & M.V.Xinh NMC 877* (CPNP). — Quang Ninh: Ha Coi, Tsai Wong Mo Shan and vicinity, XI.1936, *W.T.Tsang 27247* (K, P); Tien Yen, Kau Nga Shan and vicinity, I.1937, *W.T.Tsang 27485* (K, P); *idem*, XII.1936, *W.T.Tsang 27389* (K, P); Dam Ha, Sai Vong Mo Leng, *W.T.Tsang 30068* (E, P); *idem*, VII.1940, *W.T.Tsang 30383* (K, P); *idem*, VII.1940, *W.T.Tsang 30417* (A, K, P);. — Than-hoa: *Bon 5808* (P). — Thua Thien-Hue: Bach Ma, *Nham 559* (HN). — Vinh Phuc: Me Linh, Ngoc Thanh, 27.VI.2000, *Phuong 3049* (HN).

DISTRIBUTION. — China (Fujian, Guangdong, Guangxi and Hainan), Cambodia, Laos, Thailand and Vietnam (Fig. 27).

ECOLOGY OR HABITAT. — Primary and secondary forest, and along rivers.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: March to October. Fruiting: November to April.

VERNACULAR NAMES. — Cambodia: Hong tuk, Pring teuk (Kampong Spoe). Vietnam: Phen den, Tram, Tram cuulong.

USES. — The fruit is edible.

DESCRIPTION

Shrub or tree to 20 m tall, to 25 cm dbh. Bark brownish or greyish, slash bark dark purplish. Glabrous.

Twig

Terete, subangular or 4-angled, 1.5-2 mm diameter, stout, surface smooth, brownish, not contrasting to blade colour.

Leaves

Opposite to subopposite, subcoriaceous to coriaceous, dark greenish to brownish, 3-7.5 × 1.5-3 cm, 2 to 3 times as long as wide, elliptic to obovate, base cuneate, slightly attenuate, margin flat, apex acute, acuminate, obtuse or rounded, acumen when present 0.4-0.6 cm long, 1/2-1/4 of blade length; midrib sunken above, raised below; secondary veins 10-20 per side, narrowly spaced, 1-3 mm apart, 45-60 degrees from midrib, faint and raised on both surfaces; tertiaries faint, reticulate; intramarginal veins 0.5-1 mm from leaf margin, straight; petiole 3-7 cm long, 1/9-1/15 of blade length, c. 1 mm diameter, stout, dark brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig, 1-2 cm long, paniculate, first order branching, flowers few, 5-23; axes 0.8-1.5 cm long; bracts and bracteoles persistent.



FIG. 24. — Lectotype of *Syzygium mekongense* (Gagnep.) Merr. & L.M.Perry, Thorel s.n. (P00589243).

Flowers

Whitish sessile or pedicellate, pedicel 0.5-1 mm, hypanthium pale greenish (*in vivo*), not glaucous, not fibrous, 1.5-4 × 1.5-3.5 mm, obconic, pseudostalk indistinct; sepals whitish (*in vivo*), 4, free, triangular, 0.2-0.3 × 0.4-0.5 mm, undulate on rim; petals whitish (*in vivo*), 4, coherent, 1.5 × 1.5 mm, orbicular; stamens, outer stamens 1.5-4.5 mm long, anther sacs parallel, connective gland conspicuous; style 1-3 mm long, ovules 20-30 per locule, irregularly radiating.

Fruit

Dark purplish to blackish (*in vivo*), obloid to globose, 0.8-1 × 0.6-1 cm, surface smooth, calyx ring with smooth rim; seed 1-2, ovoid, 1 × 0.5 cm, seed intercotyledonary intrusion absent.

NOTES

1. This is a highly variable species. *Syzygium bonii*, *S. campylocarpum*, *S. hancei*, *S. mekongense*, *S. petelotii* and *S. szemaoense* are similar in their short inflorescences with persistent bracts, small obconic hypanthium, coherent petals, subcoriaceous to coriaceous leaves, dark greenish-brown leaf blade and faint venation. *Syzygium campylocarpum* and *S. bonii* deviate from the typical form in having whiter twigs. In addition to this, *S. campylocarpum* also has thinner leaves (Anon. 574, Lien 252, Schmid s.n. [Daa Lao, 16.V.1953]). Gagnepain (1917) acknowledged the similarities between *S. mekongense* and *S. hancei*, but considered them as different species on the basis of the size of leaf and flower bud. Since the last revision, there have been many new collections of *S. mekongense* and *S. hancei* from the continental Southeast Asia and China. Based on the current herbarium collections, we find the variation of leaf size and flower is continuous without clear disjunction.

2. In the protologue (Gagnepain 1917), *Harmand 1257* is the only specimen number cited for *Eugenia campylocarpa*. However, lectotypification is required as there are five potential type sheets at P. Two of the isotypes were labelled *Harmand 1237* instead of *1257* and we believe this is a typographical error in the labels.

29. *Syzygium harmandii* (Gagnep.) Merr. & L.M.Perry (Figs 25; 26)

Journal of the Arnold Arboretum 19: 115 (1938); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 905 (2003). — *Eugenia harmandii* Gagnep., *Notulae Systematicae* 3: 325 (1918), et in Lecomte, *Flore générale de l'Indochine* 2: 840, fig. 89 (1921); M.F.Newman et al., *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — Type: Laos, Champassak, Bassac, fl., III.1877, *Pierre 3207* (*Harmand 1169*) (lecto-, P![P00589208], with a drawing by Delpy dated II.1900 attached, here designated; isolecto-, P![2 sheets, P00589206 & P00589207]) (see Note).

ADDITIONAL MATERIAL EXAMINED. — Cambodia. Kampot: Mt. Bokor, 20.XI.1999, *S.Hul et al.* 732 (P). — *sin. loc.* *Hanh* 53 (P).

DISTRIBUTION. — Cambodia and Laos (Fig. 27).

ECOLOGY OR HABITAT. — Primary forest.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: March and November. Fruiting: not documented.

DESCRIPTION

Shrub. Glabrous.

Twig

Angular (4-angled) and winged, 4-5 mm diameter, stout, surface smooth, brownish, not contrasting to leaf colour.

Leaves

Verticillate, coriaceous, dark greenish, 11-18 × 1.5-2.5 cm, 7 to 12 times as long as wide, linear lanceolate, base cordate or rounded, margin flat, apex acute, without acumen; midrib sunken above, raised below; secondary veins 12-14 per side, 10 mm apart, 30-40 degrees from midrib, prominent and sunken above, prominent below; tertiaries faint, reticulate; intramarginal veins prominent, c. 1 mm from leaf margin, straight; petiole 2-5 mm long, $\frac{1}{40}$ - $\frac{1}{85}$ of blade length, 4 mm diameter, stout, dark brownish, not contrasting to blade colour.

Inflorescence

Axillary on leafless twig, c. 5 cm long, racemose, flowers few, c. 5; axes 0.8 cm long; bracts and bracteoles persistent, triangular.

Flowers

Large, pedicellate, pedicel 1-2 cm long, hypanthium not glaucous, not fibrous, 1.5-1.75 × 1-1.5 cm, pyriform, pseudostalk distinct, c. 0.5-1 cm long; sepals 4, free, semiorbicular, unequal, outer sepals 4-5 × 8-10 mm, inner sepals 8-10 × 11-13 mm; petals 8, free, unequal, outer 4 petals 8 × 8 mm, inner 4 petals 13 × 10 mm, orbicular; outer stamens c. 2 cm long, anther sacs parallel, connective gland inconspicuous; style c. 10 long, ovules 18-20 per locule, irregularly radiating.

Fruit

Unknown.

NOTE

This species is morphologically close to *Syzygium diospyrifolium* and *S. formosum* in having twig-ends with verticillate leaves, cordate to subcordate leaf bases, racemose inflorescences and big flowers.

30. *Syzygium hemisphericum* (Wight) Alston

In Trimen, *A Revised Hand-Book to the Flora of Ceylon* 6, suppl. (1931) 115. — *Eugenia hemispherica* Wight, *Illustrations of Indian Botany* 2: 14 (1841); Wight, *Icones Plantarum Indiae Orientalis* 2: t. 525 (1843). — *Jambosa hemisphaerica* (Wight) Walp., *Repertorium Botanices Systematicae* 2: 191 (1843). — *Strongylocalyx hemisphaericus* (Wight) Blume, *Museum Botanicum Lugduno-Bataavorum* 1: 89 (1850). — Type: Sri Lanka, Moray Estate, Maskeliya, garden of Superintendent's Bungalow, XII, *Kostermans 27242*, (neo-, L![sheet no. 457086], here designated; iso-, PDA *n.v.*) (see Note 1).



FIG. 25. — Lectotype of *Syzygium harmandii* (Gagnep.) Merr. & L.M.Perry, Pierre 3207 (Harmand 1169) (P00589208); A, close-up of flowers; B, close-up of twig showing leaves arranged in whorls of three. Scale bars: 1 cm.

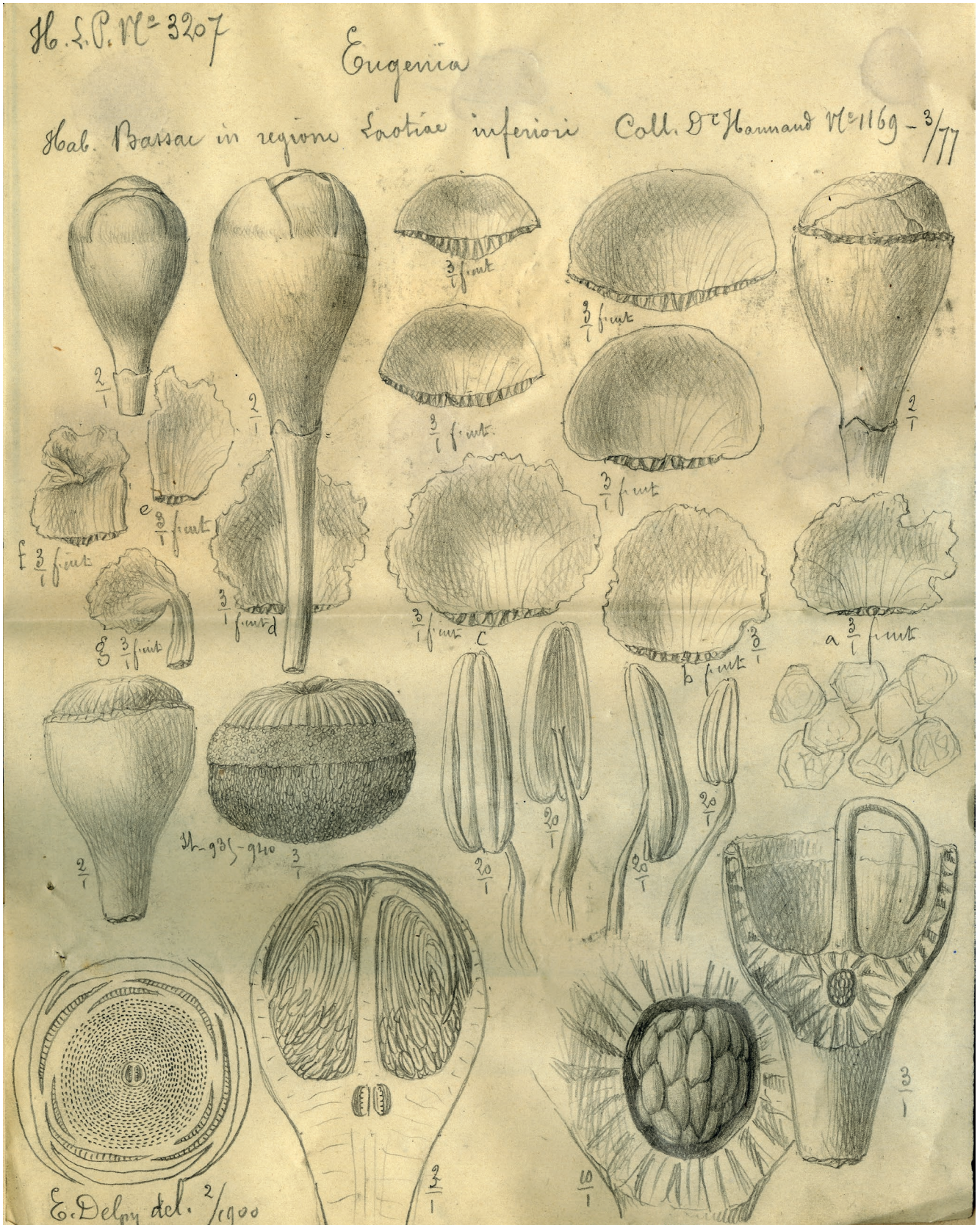


FIG. 26. — Delpy's drawing on the reproductive organs of the lectotype of *Syzygium harmandii* (Gagnep.) Merr. & L.M.Perry, *Pierre* 3207 (*Harmand* 1169) (P00589208).

Eugenia chanlos Gagnep., *Notulae Systematicae* (Paris) 3: 320 (1917). — *Syzygium chanlos* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 109 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 49, fig. 3732 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 902 (2003). — Type: Vietnam [Cochinchina], Dong Nai, Mt. Dinh, fl., III.1867, *Pierre s.n.*, (lecto-, P![P00589354] with a drawing by Delpy dated I.1900 attached; isolecto-, P!). — Remaining former syntypes: Cambodia, Kampong Chhnang, fl., 16.IV.1909, *Magnien, Gour-gand & Châtillon s.n.* (P![P00589290]); Vietnam [Cochinchina], Mu-xoai, fl., III.1867, tree 12-18 m, 300m alt., *Pierre s.n.* (P!, 3 sheets); Vietnam [Cochinchina], Dong Nai, Mt. Dinh, V.1866, fl, *Pierre s.n.* (P![2 sheets]), **syn. nov.** (see Note 2).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampong Chhnang: *Béjaud* 567 (P). — Kampong Thum: Prasat Sambour, 27.V.2001, *K.Eanghourt & M.Monyrak* 859 (K). — Siem Reap: Angkor Thom, VI.1909, *d'Alleizette s.n.* (L); Banteay Srei, Khnar Sanday, 26.IV.1924, *Dy Phon* 509 (P).

Laos. Khammouan: Nakai, 23.V.2006, *Nanthavong, K. & Ridsdale* BT 489 (E).

Sri Lanka. Deltota, V.1856, *C.P. 2450* (BM); Botanical Garden Peradeniya, VII, *Kostermans* 277732 & 277733 (L); Botanical Garden Peradeniya, IV, *Kostermans* 27504 (L); Kandy district, Moray Estate, Maskeliya, XII, *Kostermans* 27242 (L); *idem*, 22.XI.1974, *Davidse et al.* 8679 (L).

Vietnam. Cochinchina: *Pierre s.n.* (A, P). — Da Nang: Tourane and vicinity, V.1927, *J. & M.S. Clemens* 4155 (K). — Dac Lak: Krong No, 9.IV.1954, *Schmid s.n.* (P). — Thua Thien-Hue: Mt. Bach Ma, 16.VI.1944, *Vidal* 796 A (P).

DISTRIBUTION. — India, Sri Lanka, Thailand, Cambodia, Laos and Vietnam (Fig. 27).

ECOLOGY OR HABITAT. — Primary and secondary forest, to 300-600 m alt.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: March to June. Fruiting: May.

VERNACULAR NAMES. — Cambodia: Pring chan (Siem Reap), Pring Sratoap (Kampong Thum & Kampong Chhnang). Vietnam: Tram sung, Tram trang.

DESCRIPTION

Tree to 18 m tall, to 30-41 cm dbh. Bark smooth, greyish to brownish; slash bark brownish. Glabrous.

Twig

Terete, *c.* 2 mm diameter, smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite to subopposite, blade chartaceous, greenish, 9-13 × 3-5 cm, 2 to 3 times as long as wide, elliptic to oblong-elliptic, base attenuate, apex acuminate, with distinct acumen, acumen *c.* 0.5 long, $\frac{1}{10}$ - $\frac{1}{25}$ of blade length; midrib sunken above, raised below; secondary veins 10-12 per side, widely spaced, 7-15 mm apart, spreading, *c.* 70 degrees ascending from midrib, prominent and raised on both surfaces, slender, 2-3 pairs of basal secondary veins arcuate; tertiaries prominent, reticulate; intramarginal *c.* 2 mm, looped; petiole 1-1.5 cm long, $\frac{1}{8}$ - $\frac{1}{9}$ of blade length, *c.* 1 mm diameter, slender, brownish, not contrasting to blade colour.

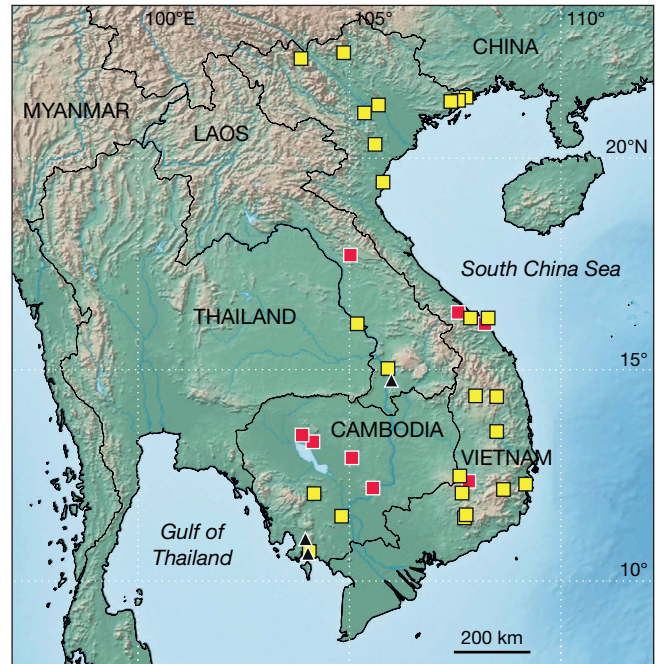


FIG. 27. — Distribution of *Syzygium hancei* Merr. & L.M.Perry (■), *Syzygium harmandii* (Gagnep.) Merr. & L.M.Perry (▲) and *Syzygium hemisphericum* (Wight) Alston (■) in Indochina.

Inflorescence

Terminal, rarely axillary on leafy twig, 3-6 cm long, first order branching, spreading, flowers 9 to 16; axes 2.5-5.5 cm long; bracts and bracteoles caducous, triangular.

Flowers

Pedicellate, pedicel 3-4 mm long, hypanthium not glaucous, not fibrous, 5-6 × 3-4 mm, pyriform, pseudostalk distinct, *c.* 2 mm long; sepals 4, free, 0.6-1 × 1.5 mm, triangular; petals 4, free, 2.5-4 × 2.5-3 mm, orbicular; outer stamens 5-10 mm long, anther sacs parallel, connective gland conspicuous; style 7-8 mm long, ovules 10-15 per locule, irregularly radiating.

Fruit

Ovoid, 3 × 2.5 cm, surface smooth, calyx ring with persistent sepal lobes, intercotyledonary intrusion absent.

NOTES

1. We concur with Noltie (2005), after having examined the specimens at E, K, BM, L and P herbarium, that there are no possible types available for typification. The specimens seen by Wight (1841) may be lost and there is no indication in the protologue what specimen he had used. In the protologue, the epithet is based on the hemispherical shape of the flower bud which Wight stated as distinctive for this species. The illustration in Wight's *Icones* (1843) clearly portrays the hemispherical flower bud, the inflorescence type and leaf shape. However, the illustration fails to show other important diagnostic characters such as the leaf venation and flower pedicel. Furthermore, a hemispherical or globular flower bud is insufficient to represent this species because this character

also occurs in other *Syzygium* species (e.g., *S. tonkinense*). We have examined a number of specimens cited by Kostermans (1981) in his revision of Ceylonese *Syzygium* and decided to choose *Kostermans 27242* (L!) as the neotype because it is a well preserved flowering specimen that shows the floral type and leaf venation.

2. *Syzygium hemisphericum* can be distinguished from other *Syzygium* species by the presence of two to three pairs of arcuate basal secondary veins, pedicellate flower and terminal paniculate inflorescence. *Syzygium chanlos* is conspecific with *S. hemisphericum* in having the same morphological characters.

31. *Syzygium imitans* Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 113 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 52, fig. 3741 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 905 (2003); J. Chen & Craven, *Flora of China* 13: 346 (2007). — Type: Vietnam, Tonkin, Chapa, *Pételot 6147* (holo-, A! [69427]; iso-, US!).

ADDITIONAL MATERIAL EXAMINED. — China. Guang Dong: Taan Fan, *W.T.Tsang 26698* (P).

Vietnam. Quang Ninh: Mon Cay, IX.1939, *W.T.Tsang 26890* (E, K, P n.v. [P00589374]); Ha Coi, Tsai Wong Mo Shan and vicinity, XI.1936, *W.T.Tsang 27232* (E, K, P n.v. [P00589375]), Dam Ha, Sai Vong Mo Leng and vicinity, 18.VII-9.IX.1940, *W.T.Tsang 30415* (A, K, P n.v. [P04776691]). — Thua Thien-Hue: Mt. Bach Ma, *T.D.Dai 313* (HN).

DISTRIBUTION. — South China (Guangxi and Guangdong) and Vietnam (Fig. 28).

ECOLOGY OR HABITAT. — In open vegetation.

CONSERVATION STATUS. — IUCN Global Status: Data Deficient (DD); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: July to September. Fruiting: November.

VERNACULAR NAME. — Tram sao (Vietnam).

DESCRIPTION

Tree to 6 m tall. Glabrous.

Twig

Terete, 2.5-3 mm diameter, stout, surface smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite to subopposite, chartaceous, greenish, 10-18 × 5-7.5 cm, 2 to 3 times as long as wide, elliptic to oblong-elliptic, base cuneate to slightly attenuate, apex acuminate, acumen (0.3-)-0.7-1 cm long, $\frac{1}{15}$ - $\frac{1}{35}$ of blade length; midrib sunken above, raised below; secondary veins slender, 10-15 per side, 15-20 mm apart, c. 70 degrees ascending from midrib, prominent and raised on both surfaces, 1-3 pairs of basal secondary veins arcuate to form faint outer intramarginal veins; tertiaries prominent, subscalariform; intramarginal veins 2-3 mm from leaf margin, looped, outer intramarginal veins present; petiole 1-2 cm long, $\frac{1}{10}$ - $\frac{1}{14}$ of blade length, 2-2.5 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Terminal, 8-10 cm long, paniculate, second to third order branching, spreading, flowers many, to 60; axes 7.5-9.5 cm long; bracts and bracteoles caducous.

Flowers

Whitish (*in vivo*), pedicellate, pedicel 1-2 mm, hypanthium not glaucous, not fibrous, 5-7 × 4-6 mm, pyriform, pseudostalk distinct, 1.5-2 mm long; sepals 4, free, 1.5-2.5 × 4-4.5 mm, semiorbicular; petals 4, coherent, 4-5 × 5-6 mm, orbicular; outer stamens 6-10 mm long, anther sacs parallel, connective gland conspicuous; style c. 6 mm long, ovules 20-25 per locule, irregularly radiating.

Fruit

Depressed globose, 1.3-1.5 × 1.2-1.3 cm, surface smooth, calyx ring with persistent sepal lobes, seed intercotyledonary intrusion absent.

NOTE

This species is morphologically close to *Syzygium globiflorum* (Craib.) Chantar. & J.Parn but differs in having basal secondary veins that arcuate (vs connecting to form intramarginal veins), inflorescence with second order branching (vs first order branching), many flowers (vs few flowers) and short pedicel (vs long pedicel).

32. *Syzygium jambos* (L.) Alston

In Trimen, *A Revised Hand-Book to the Flora of Ceylon* 6 (suppl.): 115 (1931); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 44, fig. 3718 (1992); M.C.Le & T.H.Le, *Forest Plants (Thực vật rừng)*: 312 (2000); P.Dy Phon, *Plant Use in Cambodia*: 378 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 905 (2003); D.D.Soejarto *et al.*, *Seed Plants of Cuc Phuong National Park*: 430 (2004) [incl. *S. zimmermannii*]; V.S.Hoang, N.Khamseng & P.J.A. Kessler, *Blumea* 49: 315 (2004). — *Eugenia jambos* L., *Species plantarum* 1: 470 (1753); Lour. *Flora Cochinchinensis* 307. 1790; Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 834 (1920) [excl. var. *sylvatica* Gagnep.]; M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — *Myrtus jambos* (L.) Kunth, *Nova Genera et Species Plantarum* 6: 144 (1823). — *Jambosa vulgaris* DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 286 (1828). — *Eugenia vulgaris* (DC.) Baill., *Hist. Pl.* 6: 345 (1876). — *Jambosa jambos* (L.) Millsp., *Publications of the Field Columbian Museum, Botanical Series* 2: 80 (1900). — *Plinia jambos* (L.) M.Gómez, *Flora Habanera*: 292 (1914). — Type: Sri Lanka, *Herb. Hermann* 2: 220, no. 188 (lecto-, BM![BM000621575 & BM000621576], designated by Fawcett & Rendle [1926: 352]).

Eugenia malaccensis Lour. *Flora Cochinchinensis* 1: 306. 1790, *nom. illeg. non L.* (1753). Type: not seen. (*fide* Merrill [1935: 285])

Eugenia malaccensis Blanco, *Flora de Filipinas*, ed. 1: 415 (1837); *ibid.*, ed. 2: 290 (1845); *ibid.*, ed. 3: 173 (1878); Merr., *Species Blancoanae*: 290 (1918), *nom. illeg. non L.* (1753). — Type: Philippines, Luzon, Antipolo, 24.I.1915, *Sp. Blancoan. 0809* (neo-, US! here designated).

Jambosa palembanica Blume, *Museum Botanicum Lugduno-Batavum* 1: 93 (1850). — Type: Sumatra, Palembang, *Blume s.n.* (L n.v.) (*fide* Miquel [1855: 425]).

Eugenia monantha Merr., *Journal of the Straits Branch Royal Asiatic Society* 79: 22 (1918). — *Syzygium monanthum* (Merr.) Merr. & L.M.Perry, *Memoirs of the American Academy of Arts and Sciences* 18: 163 (1939). — *Syzygium merrillii* Masam., *Enumeratio Phanerogamarum Bornearum*: 534 (1942), *nom. superfl.* — Type: Malaysia, Borneo, Sarawak, Rejang, Belaga, *Haviland* 2146 (holo-, K!; iso-, A![frag.], NY![frag.]), **syn. nov.**

Syzygium jambos var. *linearilimum* Hung T.Chang & R.H.Miao, *Acta Botanica Yunnanica* 4: 17 (1982). — Type: China, Yunnan, *Zhiat Z.H.* 1146 (holo-, KUN *n.v.*). (*vide* Chen & Craven [2007: 344]).

ADDITIONAL MATERIAL EXAMINED. — **Laos.** Cahn Trap?, *Spire* 1025 (P).

Vietnam. Cao Bang: Apr-May, *Pierre s.n.* (P). — Hanoi City: *Demange s.n.* (P). — Ninh Binh: Nho Quan, Cuc Phuong National Park, *CPNP 4001* (P), *CPNP 4000* (CPNP), *CPNP 3994* (CPNP), *CPNP 3990* (CPNP), *CPNP 3988* (CPNP). — Phu Tho: Chan Moung forest reserve, 21.IV.1914, *Chevalier* 30092 (P). — Quang Ninh: Tien Yen, I.1937, *W.T.Tsang* 27482 (E, K); Dam Ha, Sai Vong Mo Leng, V-VII.1940, *W.T.Tsang* 29926 (A, E, K). — between Sontay and Thu Phap: Baa Tai valley, 12.IV.1888, *Balansa* 2861 (P). — Thanh Hoa: Cho Bo, Black river, 1887, *Balansa* 2862 (K, P); Nhu Xuan, Xuan Quy, 24.IV.1996, *N.T.Ninh & Dumontet VN 95* (HN). — Tonkin: *Bon* 4607 (P). *sin. loc.* V.1887. — *Pierre* 1962 (P).

DISTRIBUTION. — Widespread from India to Borneo. In Indochina found in Laos and Vietnam (Fig. 28). Possibly it occurs in Cambodia but has not yet been collected.

ECOLOGY OR HABITAT. — In forest or planted in villages.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: January, April. Fruiting: May.

VERNACULAR NAMES. — Cambodia: Chumpu. Vietnam: Bodao, Cay doi (Phu Tho), Gioi, Ly, Roi.

USES. — The fruit is edible. The tree is planted on roadsides. The liquid of the boiled leaves is used to treat fever and the pulverised leaves are rubbed on the body to treat small pox (Verheij & Coronel 1992; Dy Phon 2000).

DESCRIPTION

Tree to 6 m. Glabrous.

Twig

Terete, 2-3 mm diameter, stout, slightly fissured, brownish, not contrasting to leaf colour.

Leaves

Opposite, subcoriaceous, greenish, 11-18 × 1.5-4.5, 3.5 to 7 times as long as wide, lanceolate or elliptic, base attenuate to slightly cuneate, apex acute, tapering gradually into narrow point, acumen absent; midrib sunken above, raised below; secondary veins 12-20 per side, widely spaced, 7-17 mm apart, *c.* 35-45 degrees from midrib, prominent and raised above, prominent below; tertiaries prominent, reticulate; intramarginal veins *c.* 0.5 mm from leaf margin, straight or slightly scalloped; petiole 0.3-1 cm long, 1/20-1/40 of blade length, 1-2 mm diameter, stout, dark brownish, not contrasting to blade colour.



FIG. 28. — Distribution of *Syzygium imitans* Merr. & L.M.Perry (▲), *Syzygium jambos* (L.) Alston (■) and *Syzygium levinei* (Merr.) Merr. & L.M.Perry (■) in Indochina.

Inflorescence

Terminal, to 4 cm long, racemose, flowers few, 1 to 5; axes *c.* 3 cm long; bracts and bracteoles caducous.

Flowers

White (*in vivo*), pedicellate, pedicel *c.* 1 cm, hypanthium not glaucous, not fibrous, 10-20 × 7-10 mm, pyriform, pseudostalk distinct, 5-10 mm long; sepals 4, free, unequal, outer lobes *c.* 1 × 1 mm, triangular; petals 4, free, unequal, outer lobes 4 × 6 - 7 mm, inner lobes 5-6 × 7-8 mm, semiorbicular; outer stamens 25-30 mm long, anther sacs parallel, connective gland inconspicuous; style 35-40 mm long, ovules *c.* 30 per locule, radiating.

Fruit

Yellowish, globose, 5 × 5 cm, surface smooth, calyx ring with persistent sepal lobes, pericarp *c.* 6-10 mm thick, seed intercotyledonary intrusion absent.

NOTE

This species close to *Syzygium siamense*. (see notes on *S. siamense* for detail).

33. *Syzygium levinei* (Merr.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 110 & 227 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 53, fig. 3745 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 906 (2003); D.D.Soejarto *et al.*, *Seed Plants of Cuc Phuong National Park*: 431 (2004) [*pro parte*]. — *Eugenia levinei* Merr., *Lingnan Science Journal* 13: 39 (1934). — Type: China, Kwangtung, Lofoushan, *Merrill* 10713 (holo-, PNH†; iso-, A![A00069406]).

[*Eugenia millettiana* sensu Dunn & Tutcher, *Kew Bulletin* additional series 10: 105 (1912); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 823 (1920)] (*vide* Merrill [1934: 39]).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Siem Reap: Angkor Thom, VI.1909, *d'Alleizette s.n.* (L).

Vietnam. Ha Tay: Thu Phap, VIII.1887, *Balansa* 2887 (K, P); Son Tay, III.1885, *Balansa* 2888 (K, P); Son Tay, VIII.1887, *Balansa* 2894 (K, P); Hill between Son Tay and Mt. Ba Vi, 3.VIII.1886, *Balansa* 2891 (K, P); Son Tay, 27.X.1938, *Pételot* 2124 (A). — Hanoi City: Ninh Thai?, 14.III.1890, *Bon* 4297 (P). — Khanh Hoa: Nha Trang, VI.1909, *d'Alleizette s.n.* (L). — Long An: Ben Tram, 15.IX.1905, *Prades* 702 (P). — Ninh Binh: Nho Quan, Cuc Phuong National Park, 2.X.1970, *Quynh* 29 (CPNP); 12.VIII.1966, *Anon.* 121 D (CPNP). — Phu Tho: Phu Ho, IX.1923, *Pételot* 1510 (A). — Quang Ninh: Ha Coi, Tsai Wong Mo Shan and vicinity, XI.1936, *W.T. Tsang* 27216 (P); Dam Ha, Sai Vong Mo Leng, 18.VII-9.IX.1940, *W.T. Tsang* 30405 (P). — Thanh Hoa: Black river, 1.1932, *Pételot* 4319 (P). — Tonkin: *Bon* 5056 (P).

DISTRIBUTION. — South China (Guangdong, Guangxi, Hainan and Hong Kong), Cambodia and Vietnam (Fig. 28).

ECOLOGY OR HABITAT. — In forest.

CONSERVATION STATUS. — IUCN Global Status: Data Deficient (DD); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: June, August, September, October. Fruiting: January, March, October, December.

VERNACULAR NAMES. — Vietnam: Sam (Long An), Tram nui.

DESCRIPTION

Tree to 8 m tall. Glandular hairy only on the inflorescence.

Twig

Terete, 1-2 mm diameter, slender, smooth, whitish, contrasting to leaf colour.

Leaves

Opposite, chartaceous, dark to pale brownish, 5-9 × 2.5-3.5 cm, 2-3 times as long as wide, elliptic to obovate, base cuneate to attenuate, apex acuminate with distinct acumen, acumen 0.5-1 cm long, $\frac{1}{6}$ - $\frac{1}{9}$ of blade length; midrib sunken above, raised below; secondary veins slender, 20-25 per side, narrowly spaced, (1-)2-3 mm apart, ascending 60-70 degrees from midrib, prominent and raised above, prominent below; tertiaries faint, reticulate; intramarginal veins 0.5-1 mm, straight; petiole 5-7 mm long, $\frac{1}{10}$ - $\frac{1}{18}$ of blade length, c. 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal, sometimes axillary on leafy twig near twig-end, 4-8 cm long, paniculate, first to second order branching, flowers many, 29-47; axes 3.5-7.5 cm long; bracts and bracteoles caducous, triangular.

Flowers

White (*in vivo*), sessile, hypanthium not glaucous, not fibrous, 3-4 × 3-4 mm, obconic, pseudostalk distinct, 1-2 mm long; sepals 4, free, 1.5 × 0.5 mm, triangular; petals 4, coherent, orbicular; outer stamens c. 5 mm long, anther sacs parallel,

connective gland conspicuous; style 6-6.5 mm long, ovules 16-18 per locule, arranged irregularly and radiating.

Fruit

Dark brown, ovoid, 0.8 × 0.7 cm, surface smooth, calyx ring with smooth rim, pericarp c. 0.1 mm thick, seed intercotyledonary intrusion absent.

NOTE

This species is distinctive in having a hairy inflorescence and leaves with dark brownish colour that contrast strongly to the whitish twig. This is a common and widespread species within its distribution range but is possibly undercollected in Indochina.

34. *Syzygium lineatum* (DC.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 109 (1938); Merr. & L.M.Perry, *Memoirs of the American Academy of Arts and Sciences* 18: 172 (1939); Amshoff, *Blumea* 5: 499 (1945) [*excl. in syn. Syzygium cerasiforme* (Blume) Merr. & L.M.Perry]; P.H.Hò, *An Illustrated Flora of Vietnam (Càico Vietnam)* 2: 53, fig. 3746 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 906 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — *Myrtus lineata* Blume, *Bijdragen tot de Flora van Nederlandsch-Indië* 17: 1087 (1827), *nom. illeg., non Sw.* (1788). — *Jambosa lineata* DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 287 (1828); Miq., *Flora van Nederlandsch Indië* 1: 428 (1855). — *Clavimyrthus lineata* (DC.) Blume, *Museum Botanicum Lugduno-Batavum* 1: 113, t. 116 (1850), *incl. var. procera, membranacea & varingifolia*. — *Eugenia lineata* (Blume) Duthie in Hooker, *Flora of British India* 2: 487 (1878), *nom. illeg., non DC.* (1828) [*excl. Eugenia corymbosa* Wall., *Wallich Numer. list No. 3566F* (K-W!), *nom. nud.*]. — Type: Indonesia, Java, in sylvis montanis, *Blume* 1498 (holo-, L![sheet no. 944.234-470, 471, 2 sheets marked as referenced]; iso-, G n.u.) (see Notes 1 and 2).

Syzygium longiflorum K.Presl, *Abhandlungen der Königlichen Böhmischen Gesellschaft der Wissenschaften* 5, 3: 500 (1845); P.Dy Phon, *Plant Use in Cambodia*: 579 (2000). — *Eugenia longiflora* (K.Presl) Fern.-Villar, *Novissima Appendix ad Floram Philippinarum* ed. 3, vol. 4:86 (1880); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 822 (1920). — Type: Philippines, Cagayan Province, Luzon, 1841, *Cuming* 1296 (holo-, BM!; iso-, E![E00504489], L![L0009641], MO![MO-313636]).

Clavimyrthus lineata (DC.) Blume var. *membranacea* Blume, *Museum Botanicum Lugduno-Batavum* 1: 116 (1849). — Type: Indonesia, Java, *Herb. Blume s.n.* (lecto-, L![sheet no. 898.203-482], here designated; isolecto-, L![3 sheets: sheet no. 898.203-481, 483, 908.1510-5], K!).

Clavimyrthus lineata (DC.) Blume var. *procera* Blume, *Museum Botanicum Lugduno-Batavum* 1: 116 (1849). — Type: Indonesia, Java, 'in monte Murio', Nogosaren, *Waitz s.n. in Herb. Blume* (holo-, L![sheet no. 898.203-477]).

Clavimyrthus lineata (DC.) Blume var. *varingifolia* Blume, *Museum Botanicum Lugduno-Batavum* 1: 116 (1849) ('*varingaefolia*'). — Type: Indonesia, Borneo, *Blume s.n.* (holo-, L![sheet no. 908.151-12]; iso-, K!).

Clavimyrthus latifolia Blume, *Museum Botanicum Lugduno-Batavum* 1: 117 (1849). — *Jambosa latifolia* (Blume) Miq., *Flora van Nederlandsch Indië* 1: 429 (1855). — Type: Borneo, *Herb. Korthals* (L n.u.). (*vide* Merrill & Perry [1939: 172]).

Jambosa symphytocarpa Korth., *Nederlandsch Kruidkundig Archief* 1: 201 (1848) [*J. symphytocarpa*]. — *Clavimyrthus symphytocarpa* Blume, *Museum Botanicum Lugduno-Batauum* 1: 113 (1850). — Type: Sumatra, proper Loebe-Kilangan, *Herb. Korthals* (L. n. v.). (fide Govaerts et al. [2015]).

Jambosa teysmannii Miq., *Flora van Nederlandsch Indië* 1(1): 429 (1855). — *Eugenia teysmannii* (Miq.) Koord. & Valetton, *Mededeelingen uit's Lands Plantentuin* 40: 164 (1900). — *Syzygium teysmannii* (Miq.) Masam., *Enumeratio Phanerogamarum Bornearum*: 540 (1942). — Type: Indonesia, Java, Anon. s.n. [possibly Teysman] (holo-, L![L0009642]; iso-, K![annotated by Miquel as '*Jambosa teysmannii*']).

Jambosa rubricaulis Miq., *Flora van Nederlandsch Indië* 1(1): 432 (1855). — *Eugenia rubricaulis* (Miq.) Duthie, in Hooker, *Flora of British India* 2: 487 (1878). — Type: Indonesia, Java, Dieng, *Jungbunh* s.n. (lecto-, U![sheet no. 255732B], here designated).

Eugenia marivelesensis Merr., *Phillipine Journal of Science* 1, suppl. 1: 106 (1906). — Type: Philippines, Luzon, Bataan Province Lamao river, *Borden* 618 (lecto-, K![designated by Chantaranothai & Parnell [1994: 84]; isolecto-, NY!).

Eugenia miquelii Elmer, *Leaflets of Philippine Botany* 4: 1441 (1912). — Type: Philippines, Mindanao, District of Davao, Todaya (Mt. Apo), *Elmer* 11240 (holo-, PNH†; iso-, A![69750], E![E00504468], GH![69751], NY![00118062], P n. v. [P05321013]).

Eugenia longicalyx Ridl., *Journal of Botany, British and Foreign* 68: 11 (1930). — *Syzygium longicalyx* (Ridl.) Masam., *Enumeratio phanerogamarum Bornearum*: 533 (1942). — Type: British North Borneo, VII.1896, *Creagh* s.n. (holo-, K!; iso-, SING n. v.).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampong Spoe: Phnum Aural, 3.III.2001, *K.Eanghourt, M.Sophal & S.Kosal MoE Herb.* 584 (K). — Kampong Thum: Kampong Soai, II.1875, *Harmand* 375 (L). — Kampot: Phnom Kamchay, 15-19.III.1914, 19.IV.1914, *Chevalier* 30066 (P); Mt. Bokor, 8.III.2001, *Middleton & M.Monyrak* 605 (A, K); *idem*, 6.V.1999, *M.Monyrak* 25 (K). — Kandal: Phnom Penh, VI.1909, *d'Alleizette* s.n. (L); *idem*, *Béjaud* 554 (P); *idem*, 5.IV.1933, *Béjaud* 560 (P); *idem*, *Magnien, Gourgand & Châtillon* s.n. (P). — Koh Kong: Botum Sakor, Prolean, 3.XII.1968, *Martin* 1085 (P); Thma Bang, Ta Tey Leu, 29.I.1970, *Martin* 1676 (P). — Kompong Speu: Samraong Tong, IV.1870, *Pierre* 986 (P). — Preah Vihear: Mulu Prey, I.1876, *Pierre* 3091 (P); *idem*, *Pierre* 3091 (*Harmand* 252) (L). — Siem Reap: Phnom Koulen, 17.XII.2000, *S.Hul et al.* 1004 (P). — *sin. loc.*, 1963, *Guinet* 172 (P).

Laos. Khammouan: Ban Mak Phueang, 12.II.2005, *Newman, Thomas, K.E.Armstrong, K.Sengdala & Lamxay* LAO 159 (E). — *sin. loc.* *Harmand* 466 (P).

Vietnam. Lang-than, *Thorel* s.n. (P). — Binh Duong: Thu Dau Mot, 1862-1866, *Thorel* 1011 (P). — Cochinchina: 1868, *Talmy* s.n. (P). — Dong Nai: Bien Hoa, 10.V.1967, *Vu Van Cuong* 452 (P); *idem*, *Vu Van Cuong* 452 (P). — Ho Chi Minh City: 1.I.1966, *Vidal* 4974 (P). — Ken Giang: Phu Quoc Is., 20.I.1874, *Pierre* s.n. (P). — Lam Dong: Mt. Gia Rich, *Averyanov et al.* VH 4540 (HN); Minrong Sekang, 26.II.1953, *Schmid*, s.n. (P). — Ninh Binh: Nho Quan, Cuc Phuong National Park, 25.V.2000, *Soejarto & N.M.Cuong* 11642 (GH). — South Vietnam, 9.III.1971, *Vu Van Cuong* 1640 (P). — Tay Ninh: Cai Cong, IV.1866, *Pierre* s.n. (P).

DISTRIBUTION. — Widespread, occurring in China (Guangxi), Burma, Thailand, Cambodia, Laos, Vietnam, Peninsular Malaysia, Sumatra, Borneo, Java and the Philippines (Fig. 29).

ECOLOGY OR HABITAT. — Primary or secondary forest, along roadsides, stunted forest, savannah, river banks, limestone hills, to 850 m.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

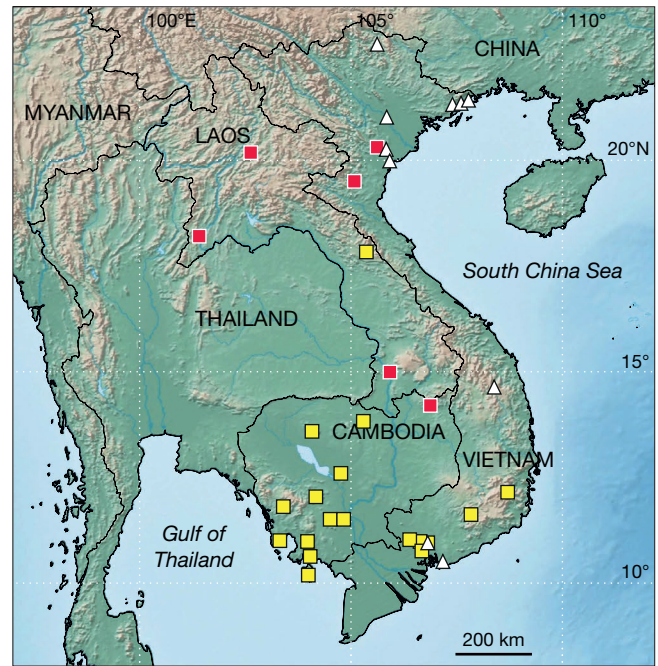


Fig. 29. — Distribution of *Syzygium lineatum* (DC.) Merr. & L.M.Perry (■), *Syzygium megacarpum* (Craib) Rathakr. & N.C.Nair (■) and *Syzygium nervosum* A.Cunn. ex DC. (△) in Indochina.

PHENOLOGY. — Flowering: December to June. Fruiting: January, March.

VERNACULAR NAMES. — Cambodia: Pring, Pring bay chom (Kandal), Pring chan (Kampot, Koh Kong), Pring chom (Kandal), Pring kbal khmum (Kandal), Pring phnom (Koh Kong), Pring sambak salp (Kandal), Smach teuk (Kampong Spoe). Vietnam: Tram hang (Dong Nai), Tram hoa dai, Tram ba vo.

USES. — The fruits is edible; consumed fresh or cooked. The wood is used in construction.

DESCRIPTION

Tree to 10 m tall. Bark flaky. Glabrous.

Twig

Terete, 2-3 mm diameter, slender, surface smooth or fissured, whitish to brownish, sometimes contrasting to leaf colour.

Leaves

Opposite, chartaceous to subcoriaceous, light yellowish to greenish brown, 6-9 × 2.2-4.5 cm, 2 to 3.5 times as long as wide, elliptic, oblong-elliptic or ovate, base cuneate, slightly attenuate, apex acuminate, acumen distinct, 0.5-1.3 cm long, 1/6-1/16 of blade length; midrib sunken above, raised below; secondary veins very slender, 20-30 per side, narrowly spaced, 1-2(-3) mm apart, 60-70 degrees from midrib, faint and raised above, prominent below; tertiaries faint, reticulate; intramarginal veins c. 1 mm from margin, straight; petiole 6-8 mm long, 1/9-1/15 of blade length, c. 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, to 12 cm long, paniculate, second order branching, flowers 9 to 21; axes *c.* 1.1 cm long; bracts and bracteoles persistent, triangular.

Flowers

Whitish (*in vivo*), pedicellate, pedicel *c.* 1 mm, hypanthium not glaucous, not fibrous, 5-7 × 3-4 mm, pyriform, pseudostalk distinct, 2-4 mm long; sepals 4, free, 2-3 × 3 mm, semiorbicular; petals 4, free, 3 × 3 mm, orbicular; outer stamens 0.9-1 cm long, anther sacs parallel, connective gland conspicuous; style *c.* 5-10 mm long, ovules 10-15 per locule, irregularly radiating.

Fruit

Globose, 0.9 × 0.9 cm, surface smooth, calyx ring with persistent sepal lobes, seed intercotyledonary intrusion absent.

NOTES

1. Blume's (1826) *Myrtus lineata* is illegitimate and de Candolle (1828) having seen the dried specimen of the type communicated by Blume, made a new combination, *Jambosa lineata*. Therefore it can be safely presumed that *Myrtus lineata* and *Jambosa lineata* are homotypic. In the same publication, de Candolle (1828) made a new combination of *Myrtus lineata* Sw. from the Caribbean as *Eugenia lineata* (Sw.) DC, a name which Duthie (1878) apparently was not aware of but which pre-empted his *E. lineata* (Blume) Duthie.

2. Amshoff (1945) included *Syzygium cerasiforme* (Blume) Merr. & L.M.Perry in *S. lineatum* without referring to the type. A specimen in L (L00941!), annotated by Blume as '*Myrtus cerasiformis*', is the type of *Myrtus cerasiformis* but it does not conform morphologically with *S. lineatum* and in our opinion is conspecific to *S. racemosum* (Blume) DC. (holotype: *Blume s.n.*, L![L0329986]). *Syzygium racemosum* differs from *S. lineatum* in having a shorter inflorescence, sessile flowers and darker leaf colour that contrasts strongly to the whitish twig.

3. *Syzygium lineatum* is a widespread and morphologically distinctive species in having slender and narrowly spaced secondary veins (*Calophyllum*-like) and a paniculate inflorescence with pedicellate flowers.

35. *Syzygium malaccense* (L.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 215 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Cây cỏ Việt Nam)* 2: 44, fig. 3717 (1992); P.Dy Phon, *Plant Use in Cambodia*: 579 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 906 (2003). — *Eugenia malaccensis* L., *Species plantarum* 1: 470 (1753); Roxb., [*Hortus Bengalensis* (1814) 37] *Flora indica* 2 [ed. 2, ed. W. Carey]: 483 (1832); Merr., *An interpretation of Rumphius' Herbarium Amboinense*, Bureau of Science Publications 9: 398 (1917); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 839 (1920). — *Caryophyllus malaccensis* (L.) Stokes, *A Botanical Materia Medica* 3: 72 (1812). — *Myrtus malaccensis* (L.) Spreng., *Systema Vegetabilium* 2: 484 (1825). — *Jambosa malaccensis* (L.) DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 286 (1828). — Type: Icon in van Rheede, *Hortus Malabaricus* 1: 29, t. 18 (1678) (lecto-, here designated) (see Note).

Eugenia macrophylla Lam., *Encyclopédie Méthodique (Botanique)* 3: 196 (1789). — *Myrtus macrophylla* (Lam.) Spreng., *Systema Vegetabilium* 2: 483 (1825), *nom. illeg., non* J.St.-Hil. (1800). — *Jambosa macrophylla* (Lam.) DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 286 (1828). — Type: *Sonnerat s.n.* in *Herb. Lamarck* (lecto-, P-LA![P00297788], here designated; isolecto-, P-LA![P00297789]).

Jambosa domestica DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 288 (1828). — Type: Icon in Rumphius, *Herbarium Amboinense* I: 121, t. 37 (1741) (lecto-, here designated). — Representative specimen: *Robinson Pl. Rumph. Amb. 194 (n.v.)* (fide Merrill [1917: 398]).

Eugenia purpurea Roxb. [*Hort. Beng.* (1814) 37, *nom. nud.*] *Flora indica* 2 [ed. 2, ed. W. Carey]: 483 (1832). — *Jambosa purpurascens* DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3 (1828) 286. — *Jambosa purpurea* (Roxb.) Wight & Arn., *Prodromus Florae Peninsulae Indiae Orientalis*: 333 (1834). — *Jambosa domestica* var. *purpurea* (Roxb.) Blume, *Museum Botanicum Lugduno-Batavum* 1: 92 (1849). — *Eugenia malaccensis* var. *purpurea* Duthie, in Hooker, *Flora of British India* 2 (1878) 472. — Type: *Icones Roxburghianae no. 1438* (lecto- K! here designated; CAL n.v.).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** *sin. loc.*, XI.1875, *Pierre 3201* (*Harmand 48*) (P).

Laos. Xaignabouli: 30.X.1965, *Vidal 4178* (P).

Vietnam. Cochinchina: *Thorel 371* (P). — Dong Nai: Mt. Dinh, 20.III.1918, *Chevalier 36807* (P). — Hanoi City: *Pételot 3387* (P).

DISTRIBUTION. — Mainland Southeast Asia to Southwestern Pacific. In Indochina it occurs in Cambodia, Laos and Vietnam.

ECOLOGY OR HABITAT. — Cultivated. Possibly originate from Malesia.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

VERNACULAR NAMES. — Cambodia: Chumpu, Kraham. Laos: Kieng (Xaignabouli). Vietnam: Dieu do.

USES. — Cultivated as a fruit tree. In Cambodia, the fruit, seed and leaves are used to treat fever while the root is diuretic (Dy Phon 2000). (For further detail see Verheij & Coronel 1992).

DESCRIPTION

Tree to 8 m tall. Glabrous.

Twig

Angular (4-angled), terete, *c.* 4 mm diameter, stout, surface smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite, chartaceous, pale brownish, 15-30 × 8-12 cm, 2 to 3.5 times as long as wide, elliptic, oblanceolate or obovate, base strongly attenuate, *c.* 25-30 degrees ascending from midrib, margin flat to wavy, apex mostly acuminate, acumen when present 0.5-1 cm long, 1/20-1/28 of blade length; midrib sunken above, raised below; secondary veins 8-12 per side, widely spaced, 10-15 mm apart, *c.* 45 degrees ascending from midrib, prominent to faint and raised above, prominent and raised below, 1-3 pairs of basal secondary veins arcuate, extending from base to half way or near leaf apex, forming outer intramarginal veins; tertiaries prominent, reticulate; intramarginal veins extending from well above the leaf base (after basal secondary veins) to leaf apex,



FIG. 30. — Inflorescence of *Syzygium megacarpum* (Craib) Rathakr. & N.C.Nair. Photo courtesy of Pranom Chantaranonthai. Scale bar: 5 cm.

c. 5 mm from margin, looped, outer intramarginal veins present; petiole 1-1.5 cm long, $\frac{1}{14}$ - $\frac{1}{28}$ of blade length, *c.* 2 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Axillary on leafless twig, 3-4 cm long, racemose, flowers few, 3 to 15; axes 1.5-2.5 cm long; bracts and bracteoles caducous.

Flowers

Pedicellate, pedicel 0.3-0.5 cm, hypanthium 1.3-1.5 × 0.7-0.8 cm, pyriform, pseudostalk distinct, 5-7 mm long; sepals 4, free, semiorbicular, unequal, outer lobes 3-3.2 × 5 mm, inner lobes 5-6 × 7 mm.; petals 4, free, 6-7 × 7-8 mm, orbicular; outer stamens *c.* 1.5 cm long, anther sacs parallel, connective gland conspicuous; style 1.9-2 mm long, ovules 10-15 per locule, irregularly radiating.

Fruit

Reddish, oblong to subglobose, 7 × 5 cm, surface smooth, calyx ring with persistent sepal lobes, seed 1, globose, 2 × 2 cm, seed intercotyledonary intrusion absent.

NOTE

For the purpose of typification, Rheede's icon is chosen as the lectotype because the drawing of the floral parts, fruit and leaves is a better representation of *Syzygium malaccense* than Hermann's icon (*Herb. Hermann* 5: 241, No. 187, BM!). There is no potential specimen at G or LINN for lectotypification.

36. *Syzygium megacarpum* (Craib) Rathakr. & N.C.Nair (Fig. 30)

Journal of Economic and Taxonomic Botany 4: 287 (1983). — *Eugenia macrocarpa* Roxb., (*Hortus Bengalensis* [1814] 37, *nom. nud.*) *Flora indica* 2 [ed. 2, ed. W. Carey]: 497 (1832), *nom. illeg., non* Schlecht. & Cham. (1830). — *Jambosa macrocarpa* Blume, *Museum Botanicum Lugduno-Batavum* 1: 99 (1850); Miq., *Flora van Nederlandsch Indië* 1: 417 (1855). — *Eugenia megacarpa* Craib, *Florae Siamensis Enumeratio* 1: 652 (1931). — *Syzygium macrocarpum* (Miq.) Bahadur & R.C.Gaur, *Indian Journal of Forestry* 1: 349 (1978). — *Syzygium macrocarpum* (Roxb.) N.P., *Flora of Jowai and vicinity Meghalaya* 1: 201 (1981). — Type: *Icones Roxburghianae* no. 2260 (lecto-, K!, here designated; isolecto-, CAL n.v.).

Jambosa coarctata Blume, *Museum Botanicum Lugduno-Batavum* 1: 99 (1850). — Type: *Blume s.n.* (holo- L *n.v.*; iso- K! [K000800147]) (fide Chantaranothai & Parnell 1994).

Eugenia malayana Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 838 (1920), *nom. nov.*, *sphalm. non Jambosa confusa* Bl. (1850) & *Jambosa lanceolata* Korth. ex Miq. (1855); M.R.Henderson, *The Gardens' Bulletin Singapore* 12: 202 (1949). — *Syzygium malayanum* (Gagnep.) I.M.Turner, *Journal of the Singapore National Academy of Science* 22-24: 21 (1996); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 906 (2003); D.D.Soejarto *et al.*, *Seed Plants of Cuc Phuong National Park*: 431 (2004). — Vouchers: Laos, Attopeu, Bolaven plateau [Attopeu plateau], III.1877, *Harmand 1314* (P); Laos, Louang Phabang, base of Phou Phung, 31.XII.1953, *Vidal 2577* (P); Laos, Xaignabouli, Pak Lay, *Thorel s.n.* (P); Laos, *sin. loc.* 4.X.1913, *Dussaud s.n.* (P) (see Note).

Eugenia latilimba Merr., *Lingnan Science Journal* 13: 64 (1934). — *Syzygium latilimbium* (Merr.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 216 (1938); M.C.Le & T.H.Le, *Forest Plants (Thực vật rừng)*: 312 (2000). — Type: China, Hainan, Chim Shan, Fan Maan Ts uen, 4-20.V.1932, *McClure 20098*, (holo-, PNH†; iso-, A! [29405], BML, K!, P!).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia**. Ratanikiri: Virachey National Park, O Tayak river, 11.XII.2005, *Thomas et al. 14* (E). **Vietnam**. Nghe An: Quy Chau, 10.II.2004, *N.Q.Binh & D.D.Cuong VN 1261* (HN). — Ninh Binh: Nho Quan, Cuc Phuong National Park, *Anon. NMC 1685* (CPNP), 25.V.1992; *idem*, *Anon. NMC 149* (CPNP). — *sin. loc.*, *Anon. LX-VN 267* (HN).

DISTRIBUTION. — India (Assam), Bangladesh, China (Hainan, Guangxi and Yunnan), Burma, Thailand, Cambodia, Laos and Vietnam (Fig. 29).

ECOLOGY OR HABITAT. — Primary forest.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: May, December. Fruiting: not documented.

VERNACULAR NAMES. — Laos: Kiem nam (Louang Phabang). Vietnam: Roi rung, Gioi rung.

DESCRIPTION

Tree to 10 m tall, to 20 cm dbh. Bark brownish, slash bark dark greyish. Glabrous.

Twig

Terete or subangular, 3-4 mm diameter, stout, surface smooth, greyish or pale brownish, not contrasting to leaf colour.

Leaves

Opposite, coriaceous, greenish, 23-28(-50) × 7.5-9 cm, 3 to 4 times as long as wide, oblong-elliptic, base cordate, sometimes rounded, margin flat, apex acute or acuminate, acuminate when present *c.* 1 cm long, 1/28 of blade length; midrib sunken above, raised below; secondary veins *c.* 10 per side, widely spaced, 5-7 mm apart, 60-70 degrees from midrib, faint and raised above, prominent and raised below; tertiaries prominent, scalariform to subscalariform; intramarginal veins *c.* 5 mm from leaf margin, straight; petiole *c.* 1 cm long, 1/25-1/28 of blade length, 2-3 mm diameter, stout, wrinkled, dark brownish to blackish, contrasting to blade colour.

Inflorescence

Terminal, 4-6 cm long, racemose, flowers few, 3 to 9; axes 1.5-3.5 cm long; bracts and bracteoles caducous.

Flowers

Pedicellate, pedicel *c.* 1 cm, hypanthium not glaucous, not fibrous, 15-20 × 15-20 mm, pyriform, pseudostalk distinct, *c.* 5 mm long; sepals pinkish, 4, free, unequal, semiorbicular, outer lobes 5 × 10 mm, inner lobes 8-10 × 15-18 mm; petals whitish, 4, free, 15-17 × 17 mm, suborbicular; outer stamens whitish, 25-50 mm long, anther sacs parallel, connective gland conspicuous; style 20-25 mm long, ovules 20-30 per locule, irregularly radiating.

Fruit

Globose, 5 × 6 cm, surface smooth, calyx ring with undulating rim, seed intercotyledonary intrusion absent.

NOTE

Gagnepain (1920) referred to the Indochinese specimens as conspecific with *Jambosa confusa* and partly with *Jambosa lanceolata*. He proposed the new name *Eugenia malayana* upon realising that the new combination for *Eugenia* was preempted by *Eugenia confusa* DC. and *Eugenia lanceolata* Lam. Henderson (1949) later used this new name for species in Peninsular Malaysia (*FMS 33413*, K!, KEP!) but cautioned that he did not see any original material of *E. malayana*, *J. confusa* or *J. lanceolata*. The leaves of *J. confusa* (type: *Blume s.n.*, L! barcode L0009609) and *J. lanceolata* (type: *Korthals s.n.*, L! barcode L0009610) are brownish in colour and narrower than in *Syzygium megacarpum* and in our opinion do not resemble Indochinese specimens. We are also doubtful about the identity of *E. malayana* from Peninsular Malaysia (*FMS 33413* & *FRI 13528*, KEP!) which in our opinion resembles *S. tekuense* (M.R.Hend.) I.M.Turner as the leaves are very long, tapering gradually toward the apex and dark brownish in colour when dried.

37. *Syzygium nervosum* A.Cunn. ex DC.

Prodromus Systematis Naturalis Regni Vegetabilis 3: 260 (1828). — *Cleistocalyx nervosus* (A.Cunn. ex DC.) Kosterm., *Bulletin of the Botanical Survey of India* 29: 17 (1987 publ. 1989), *sphalm. nervosum, comb. illeg., non* (Lour.) Blume (1850). — *Cleistocalyx nervosus* (A.Cunn. ex DC.) P.H.Hô, *An Illustrated Flora of Vietnam (Cây cỏ Việt Nam)* 2: 63, fig. 3776 (1992). — Type: *Roxburgh s.n.* in *Herb. Lambert 1816* (holo-, G-DC [microfiche E!]). (see Panigrahi & Mishra [1985] and Turner & Ghandi [2005] for detailed discussions on the typification; see Note 1 for discussion on *S. angkolanum*).

Eugenia operculata Roxb. [*Hortus Bengalensis* (1814) 37, *nom. nud.*] *Flora indica* 2 [ed. 2, ed. W. Carey]: 486 (1832); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 817 (1920). — *Syzygium operculatum* (Roxb.) Nied. in Engl. & Prantl., *Natürlichen Pflanzenfamilien* 3(7): 85 (1893), *nom. illeg.* — *Cleistocalyx operculatus* (Roxb.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 18: 337 (1937) [excl. *Syzygium angkolanum* Miq.], *nom. nov. pro Syzygium nervosum* DC.; V.D.Nguyen, *Medicinal plants of Vietnam, Cambodia and Laos*: 282 (1993). — Type: *Roxburgh s.n.* in *Herb. Lambert, 1816* (lecto-, G-DC! [microfiche]), designated by Panigrahi & Mishra [1985: 298].

- Eugenia paniala* Roxb. [*Hortus Bengalensis* (1814) 37, *nom. nud.*] *Flora indica* 2 [ed. 2, ed. W. Carey]: 489 (1832). — *Eugenia operculatus* var. *paniala* (Roxb.) Duthie in Hooker, *Flora of British India* 2: 498 (1879), *comb. illeg.* — *Cleistocalyx operculatus* var. *paniala* (Roxb.) Chantaranothai & J.Parn., *Kew Bulletin* 48: 591 (1993). — *Cleistocalyx nervosus* var. *paniala* (Roxb.) J.Parn. & Chantaranothai, *Novon* 6: 201 (1996). — *Cleistocalyx cerasoides* var. *paniala* (Roxb.) I.M.Turner, *The Gardens' Bulletin Singapore* 57: 26 (2005). — Type: *Icones Roxburghianae* no. 2255 (lecto-, K! here designated; isolecto-, CAL n.v.) (see Note 2).
- Calyptanthus makal* Blanco, *Flora de Filipinas*, ed. 1 (1837) 419, *nom. illeg.*, *non* Raeusch. (1797). — *Calyptanthus zuzygium* Blanco, *Flora de Filipinas*, ed. 2: 293 (1845), *nom. illeg.*, *non* Sw. (1788); Merr., *Species Blancoanae*: 288 (1918) [as synonym of *Eugenia clausa* C.B.Rob.]. — Type: Philippines, Rizal Province, Antipolo, *Sp. Blancoan. 0978* (neo-, US![00689480], here designated).
- Eugenia cerasoides* Roxb., *Flora indica* 2 [ed. 2, ed. W. Carey]: 488 (1832). — *Syzygium cerasoides* (Roxb.) Raizada, *The Indian Forester* 84: 478 (1958). — *Syzygium cerasoides* Raizada, *The Indian Forester* 93: 755 (1967), *nom. illeg.* — *Cleistocalyx cerasoides* (Roxb.) I.M.Turner, *The Gardens' Bulletin Singapore* 57: 26 (2005). — Type: *Icones Roxburghianae* no. 2256 (lecto-, K!, designated by Turner & Ghandi [2005: 25]).
- Calyptanthus mangiferifolia* Hance ex Walp., *Annales Botanices Systematicae* 2: 629 (1852). — Type: China, Macao, Hance Herb. (BM n.v.) (*vide* Merrill & Perry [1937: 337]).
- Syzygium nodosum* Miq., *Flora van Nederlandsch Indië* 1(1): 447 (1855). — Type: Indonesia, Java, Palengang, *Junghuhn s.n.* (lecto-, L![U0004982], here designated; isolecto-, [L0012413]).
- Eugenia operculata* var. *obovata* Kurz, *Forest flora of British Burma* 1: 482 (1877). — [*Syzygium obovatum* Wall., *Wallich Numer. List 3552A & B* (1831), *nom. nud.*]. — [*Syzygium wallichianum* K.Presl, *Abhandlungen der Königlichen Böhmischen Gesellschaft der Wissenschaften* 5, 3: 500 (1845), *nom. nov.*, *nom. nud.*]. — *Syzygium nervosum* var. *obovatum* (Kurz) A.Kumar, *Journal of Economic and Taxonomic Botany* 7: 664 (1985 publ. 1986). — Type: Bangladesh, Sille, *Fide Silva s.n.*, *Wallich Numer. List 3552A* (1831) (lecto-, K-W! here designated; isolecto-, E!, P!).
- Eugenia holtziana* F.Muell., *Australasian Journal of Pharmacy* 1: 199 (1886), *sphalm. holtzei*, in *Systematic Census of Australian Plants* 2: 101 (1889). — Type: Australia, *Moritz Holtze 44* (holo-, MEL n.v.) (*vide* Hyland [1983: 108]).
- Eugenia clausa* C.B.Rob., *Philippine Journal of Science*, Section C Botany 4: 380 (1909). — Type: Philippines, Luzon, Province of Rizal, Bosoboso, *Bur. Sci. 6760 (Robinson)* (holo-, K n.v.; iso-, BR!).
- Eugenia divaricatocymosa* Hayata, *Icones Plantarum Formosanarum* 3: 118 (1913). — Type: China, Hainan, VI.1909, *Konishi s.n.* (holo-, TI n.v.) (*vide* Merrill & Perry [1937: 337]).
- Eugenia suavis* Ridl., *Journal of the Federated Malay States Museums* 5: 160 (1915). — Type: Peninsular Malaysia, hill of Koh Samui, V.1913, *Robinson 5730* (K!), *syn. nov.* (see Note).
- [*Calyptanthus cuneata* Buch.-Ham. ex Wall., *Wallich Numer. List 3557B* (1831), *nom. nud.* (E!, K-W!).]
- [*Calyptanthus grandis* Buch.-Ham. ex Wall., *Wallich Numer. List 3554* (1831), *nom. nud.* (E!, K-W!).]
- [*Calyptanthus tatna* Buch.-Ham. ex Wall., *Wallich Numer. List 3555* (1831), *nom. nud.* (E!, K-W!).]
- [*Calyptanthus costata* Buch.-Ham. ex Wall., *Wallich Numer. List 3556* (1831), *nom. nud.* (E!, K-W!).]
- [*Syzygium panealla* Wall., *Wallich Numer. List 3557A* (1831) (K-W!, E!), *nom. nud.*].
- [*Syzygium polyanthum* auct. *non* (Wight) Walp. (1843): *Thwaites, Enumeratio Plantarum Zeylaniae*: 116 (1859), spec. *C.P. 2801* (PDA n.v.)] (*vide* Kostermans [1981: 121]).
- ADDITIONAL MATERIAL EXAMINED. — **Vietnam.** Ba Ria-Vung Tau: Ba Ria, IV.1861, *Pierre s.n.* (P). — Bac Kan: Ba Be National Park, 12.VII.2004, *Daniel, N.T.Hiep & P.V.The DA 4752* (HN). — Cochinchina: *Pierre s.n.* (BM, E, K). — Dong Nai: Bien Hoa, IX.1865, *Pierre 56* (P). — Hanoi City: 30.III.1888, *Balansa 2871* (P). — Kontum: Kon Plong, 16.XI.1988, *Hien 366* (HN). — Lam Dong: 14.XII.1952, *Schmid s.n.* (P); 27.II.1953, *Schmid s.n.* (P). — Ninh Binh: 21.IV.1882, *Bon 1515* (P). — Quang Ninh: Tien Yen, Hong Du forest reserve, VII.1918, 30.VI-3.VII.1918, *Chevalier 37911* (P); Ha Coi, Tsai Wong Mo Shan and vicinity, 5.V-22.VI.1939, *W.T.Tsang 29208* (P); Dam Ha, Sai Vong Mo Leng, 18.V-5.VII.1940, *W.T.Tsang 29997* (P); *idem*, 8.V-5.VII.1940, *W.T.Tsang 30053* (P); *idem*, 18.VII-9.IX.1940, *W.T.Tsang 30343* (P). — Thanh Hoa: Cu Phach, 1885-1889, *Balansa 2872* (BM, K, L, P).
- DISTRIBUTION. — Widespread from Nepal to North Australia. In Indochina only documented in Vietnam and possibly not yet collected in Cambodia and Laos (Fig. 29).
- ECOLOGY OR HABITAT. — In forest and cultivated.
- CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).
- PHENOLOGY. — Flowering: March, April, July, November, December. Fruiting: not documented.
- VERNACULAR NAMES. — Vietnam: Diang (Dong Nai), Voi (Ninh Binh & Thanh Hoa), Voi (Vietnam).
- USES. — The fruit is edible. The leaves are used as a beverage and are believed to be stomachic. A decoction of the leaves and flower buds is used as an antiseptic for washing boils and ulcers (Nguyen 1993). The wood is used for house building (Lemmens *et al.* 1995).
- DESCRIPTION
- Tree to 15 m tall. Bark greyish or brownish. Glabrous.
- Twig*
- Terete, 2-3 mm diameter, stout, smooth, whitish to pale brownish, sometimes contrasting to leaf colour.
- Leaves*
- Opposite, chartaceous, pale greenish, 10-18 × 6.5-7 cm, 2-3 times as long as wide, elliptic to obovate, base cuneate, slightly attenuate, 50-60 degrees ascending from midrib, margin flat, apex blunt, acute or acuminate, acumen when present *c.* 1 cm long, 1/5-1/20 of blade length; midrib sunken above, raised below; secondary veins 10 to 13 per side, widely spaced, 15-20 mm apart, ascending *c.* 60 degrees from midrib, prominent and raised above, prominent below; tertiaries prominent, subscalariform; intramarginal veins absent, secondary veins looped near margin, pinnate-like, 3-5 mm from leaf margin; petiole 2-3 cm long, 1/6-1/7 of blade length, *c.* 2 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Axillary on leafless twig, 5-10 long, paniculate, second order branching, flowers many, 45-63, compact; axes 5-10 cm long; bracts and bracteoles caducous, triangular.

Flowers

White (*in vivo*), pedicellate, pedicel 0.5-2 mm long, hypanthium not glaucous, not fibrous, 3-4 mm long, obconic, pseudostalk indistinct, very short, *c.* 1 mm long or less; sepals calyptrate, dome shaped, 1-2 × 2-3 mm, apex apiculate; petals 4, detached together with calyptrate calyx; outer stamens 5-6 mm long, anther sacs parallel, connective gland conspicuous; style 5-7 mm long, ovules 12-15 per locule, irregularly radiating.

Fruit

Globose, 1×1 cm, surface smooth, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTES

1. Merrill & Perry (1937) regarded *Syzygium angkolanum* as conspecific with the *S. nervosum* but acknowledged the peculiarity in the type specimens (*Junghuhn 100*, U![U005201]; *Junghuhn s.n.*, U![U0005201]) in having terminal and axillary inflorescences near the twig apex. We believe *Syzygium angkolanum* is not conspecific with *S. nervosum* because it not only differs in the inflorescence position but also in having intramarginal veins and in absence of calyptrate sepals.

2. *Syzygium nervosum* is found in the wild and cultivation. We agree with the formally recognised of the cultivated form as var. *paniala*: it differs from the wild form in having larger flower and fruit.

38. *Syzygium nigrans* (Gagnep.) Craven & Biffin (Fig. 31)

Blumea 51: 138 (2006). — *Eugenia nigrans* Gagnep., *Notulae Systematicae* (Paris) 3: 329 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 814 (1920). — *Cleistocalyx nigrans* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 18: 336 (1937); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 63, fig. 3775 (1992). — Type: Vietnam [Cochinchina], Tay Ninh, Cai Cong, fl., *Pierre s.n.* (cited as *Pierre 1934* in the protologue) ([first-step] lecto-, P!, first designated by Merrill & Perry (1937: 336); [second-step] lecto-, P![P00589224], here designated; isolecto-, P![P00589223] BM!). — Remaining former syntypes: Vietnam, Binh Duong, Thu-dau-mot, fl., *Thorel s.n.* (P![2 sheets, P00589193 & P00589194]) (see Note 1).

Syzygium stictanthum Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 116 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 58, fig. 3759 (1992); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 242 (2007). — Type: Laos, Khammouan, Xa Ngom, *Pételot 4675 (Colani)* (holo-, A![71337]; iso-, MICH![MICH1109590], NY![00405596 & 00405597], US![00118293]), syn. nov. (see Note 2).

ADDITIONAL MATERIAL EXAMINED. — **Laos**. Khammouan: Xa Ngom, XII.1930, *Pételot 4675* (US).

Thailand. Nakhon Ratchasima: Mt. Khao Yai, 2.X.1984, *G. Murata, C. Phengklai, S. Mitsuta, H. Nagamasu & N. Nantasana 37145 and 37150* (BKF).

Vietnam. Ho Chi Minh City: 19.VII.1873, *Pierre s.n.* (P). — Lam Dong: Ma Sra, 1.III.1955, *Schmid s.n.* (P). — Tay Ninh: Cai Cong, *Pierre s.n.* (BM, P). — *sin. loc.*, 1862-1866, *Thorel 396* (P).

DISTRIBUTION. — In continental Southeast Asia in Thailand, Laos and Vietnam (Fig. 32).

ECOLOGY OR HABITAT. — Primary forest.

CONSERVATION STATUS. — IUCN Global Status: Near Threatened (NT); IUCN Regional (Indochina) Status: Near Threatened (NT).

PHENOLOGY. — Flowering: March, October, December. Fruiting: July, December.

VERNACULAR NAMES. — Vietnam: Tram hoa co dom, Tram la den.

DESCRIPTION

Tree to 6 m tall. Glabrous.

Twig

Terete, *c.* 2 mm diameter, stout, surface smooth, brownish, contrasting to leaf colour.

Leaves

Opposite, subcoriaceous, dark brownish, shiny above, 7.5-9.2 × 2.8-4 cm, 2 to 3 times as long as wide, obovate, elliptic, base attenuate, *c.* 45 degrees ascending from midrib, apex mostly acuminate, acute or rounded, acumen 0.4-0.5 cm long, 1/8-1/20 of blade length, margin flat; midrib sunken above, raised below; secondary veins 12-18 per side, narrowly spaced, 2-5 mm apart, ascending *c.* 45 degrees from midrib, slender, faint on both surfaces; tertiaries faint, reticulate; intramarginal veins faint, 0.5-1 mm from leaf margin, straight; petiole 0.7-1 cm long, 1/9-1/13 of blade length, *c.* 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 5-6 cm long, paniculate, second to third order branching, flowers many, *c.* 100; axes 5-6 cm long; bracts and bracteoles caducous.

Flowers

Sessile, hypanthium not glaucous, not fibrous, 4-5 × 2.5-3 mm, obconic, pseudostalk very short, 1-1.5 mm long; sepals calyptrate, apex blunt, dome-shaped, 1.5-2 × 2.5-3 mm; outer stamens 6-7 mm long, anther sacs parallel, connective gland conspicuous; style 6-7 mm long, ovules 8-10 per locule, irregularly radiating.

Fruit

Subglobose, 1.4-1.6 × 1.3-1.4 cm, surface smooth, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTES

1. Merrill & Perry (1937) designated *Pierre 1934* as the lectotype. Pierre's specimen numbered 1934 from Cay Cong was cited in the protologue, however we only found two sheets of unnumbered Pierre's specimens in P annotated by him with the locality 'Cay cong'. We believe these are the specimens that



FIG. 31. — Lectotype of *Syzygium nigrans* (Gagnep.) Craven & Biffin, Pierre s.n. (P00589224); detail, close-up of inflorescence showing flowers with calyprate sepals. Scale bar: 0.5 cm.

Gagnepain (1918) referred to as *Pierre 1934* and which were used in his description. Second step lectotypification is required as there are two undifferentiated sheets of Pierre's specimens.

2. *Syzygium stictanthum* was described by Merrill & Perry (1938b) from the duplicates in A and NY but the flowers on these specimens lack a corolla. Although Merrill noted that vegetatively this species is similar to *Cleistocalyx nigrans*, he ascribed the specimens to *Syzygium* on the assumption that the flowers are not calyptrate. The duplicate in US which we suspect was overlooked by Merrill, clearly shows calyptrate flowers. Evidently, in our opinion, *C. nigrans* and *S. stictanthum* are conspecific.

39. *Syzygium oblatum* (Roxb.) Wall. ex Steudel

Nomenclator Botanicus ed. 2 (1841) 657; Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 101 (1938); Merr. & L.M.Perry, *Memoirs of the American Academy of Arts and Sciences* 18: 187 (1939); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 54, fig. 3748 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 906 (2003). — *Eugenia oblata* Roxb., [*Hortus Bengalensis* (1814) 37, *nom. nud.*] *Flora indica* 2 [ed. 2, ed. W. Carey]: 493 (1832); *Icones Roxburghianae* no. 2262 (K!). — [*Syzygium oblatum* Wall., *Wallich Numer. List* 3569 (1831) (K-W!), *nom. nud.*]. — *Acmena oblata* (Roxb.) Walp., *Repertorium Botanices Systematicae* 2: 181 (1843). — *Strongylocalyx oblatum* (Roxb.) Blume, *Museum Botanicum Lugduno-Batavum* 1: 89 (1850). — Type: Chittagong, *Roxburgh s.n.*, (lecto-, BM!, here designated, a ticket with Wallich's handwriting 'Eugenia oblata, 3107'; isolecto-, P!).

Eugenia laevicaulis Duthie in Hooker, *Flora of British India* 2: 492 (1878). — *Syzygium laevicaule* (Duthie) Masam., *Enumeratio Phanerogamarum Bornearum*: 531 (1942). — *Syzygium oblatum* var. *laevicaule* (Duthie) Chantar. & J.Parn., *Kew Bulletin* 48: 607 (1993). — Type: Malaysia, Malacca, *Maingayi* 753 (holo-, K!; iso-, K!).

Eugenia oblongifolia var. *robusta* King, *Journal of the Asiatic Society of Bengal* 70: 112 (1901). — Type: Peninsular Malaysia, Perak, *Scortechini* 216 (holo-, K!).

Eugenia limnoea Ridl., *Journal of the Straits Branch Royal Asiatic Society* 79: 64 (1918). — Type: Peninsular Malaysia, 1898, *Ridley* 9378a (lecto-, K!, here designated; isolecto-, SING!).

Eugenia laxiuscula Ridl., *Journal of the Federated Malay States Museums* 10: 133 (1920). — Type: Peninsular Malaysia, Langkawi, Pulau Butang, *Curtis* 973 [in protologue as *Curtis* 975] (holo-, K!; SING *n.v.*).

Eugenia compongensis Gagnep., *Notulae Systematicae* (Paris) 3: 323 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 828 (1920). — *Syzygium compongense* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 112 (1938). — Type: Cambodia, Kampong Svay, fl., II.1876, *Harmand s.n.* (lecto-, P![P00589284]; isolecto-, P![2 sheets, P00589283 & P00589285], K![K000276207]), *syn. nov.* (see Note 1).

Eugenia limnaea Ridl. var. *gracilior* Craib, *Florae Siamensis Enumeratio* 1: 650 (1931). — Type: Thailand, Trat, Koh Chang, Kalwng Mayom, *Kerr* 6843 (lecto-, BM!, designated by Chantaranothai & Parnell (2002: 881): isolecto-, ABD *n.v.*, K!).

Eugenia brantiana M.R.Hend., *The Gardens' Bulletin Singapore* 11: 313 (1947). — Type: Peninsular Malaysia, Johor, Sg. Pontian Besar, 12.XI.1939, *SFN* 36754 (*Henderson*) (lecto-, K!, here designated; isolecto-, K!, SING!).

Syzygium pulchellum (Roxb.) Wall. ex Govaerts in Govaerts *et al.*, *World Checklist Myrtaceae*: 410 (2008). — *Eugenia pulchella* Roxb., [*Hortus Bengalensis* (1814) 37, *nom. nud.*] *Flora indica* 2 [ed. 2, ed. W. Carey]: 496 (1832). — [*Syzygium pulchellum* Wall., *Wallich Numer. List* 3566A,B (1831) (K-W!), *nom. nud.*]. — *Jambosa pulchella* (Roxb.) Miq., *Flora van Nederlandsch Indië* 1(1): 422 (1855). — Type: *Icones Roxburghianae* no. 2506 (lecto-, K! here designated; isolecto-, CAL *n.v.*).

[*Eugenia comosa* Wall., *Wallich Numer. List* 3566C,D (1831) (K-W!), *nom. nud.*].

[*Eugenia chlorantha* auct. non Duthie (1878): Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 806 (1920); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 49, fig. 3733 (1992) (as *Syzygium chloranthum*); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 903 (2003) (as *Syzygium chloranthum*). — Vouchers: Thailand, Chiangmai, *Kerr* 1785 (BKF!, K!, P!); Nghe An, Co-ba forest reserve, *Chevalier* 32362 (P! L!).] (*fide* type of *Eugenia chlorantha* Duthie: *Wallich Numer. List* 3581 [K-W!]).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia**. Kampong Thum: Kralam forest reserve, 29.V.1909, *Magnen, Gourgand & Châtilon s.n.* (P). — Kampot: 10.V.1895, *Hanh s.n.* (P); 16.X.1903, *Geoffray* 60 (P). — Koh Kong: Cardamom Mountains, 4.IV.1969, *Martin* 1567 (P); *idem*, 10.II.1970, *Martin* 1753 (P); Kiri Sakor, 19.V.1999, *Bansok* 64 (K). — Siem Reap: 22.II.1924, *Diffon* 510 (P).

Laos. Khammouan: Nong Sa Mek, 11.II.2005, *Newman, Thomas, Armstrong, K.Sengdala & Lamxay* LAO 77 (E).

Vietnam. Ba Ria-Vung Tau: Ba Ria, X.1868, *Talmy s.n.* (P). — Binh Duong: Thu Dau Mot, *Pierre s.n.* (BM, E). — Cochinchina: *Thorel* 1203 (GH). — Da Nang: Tourane and vicinity, May-July 1927, *J. & M.S. Clemens* 3395 (P). — Dong Nai: Bien Hoa, 10.V.1967, *Vu Van Cuong* 452 (P). — Gia Lai: Ayun Pa, *K.Dao* 308 (HN); K'bang, 24.II.1988, *Phuong* 1447 (HN). — Khanh Hoa: Nha Trang, VI.1909, *d'Alleizette s.n.* (P). — Kon Tum: Dak To, *K.Dao* 226 (HN); *idem*, 7.IV.1988, *Nham* 290 (HN). — Lam Dong: Bao Loc, 18.IV.1984, *Anon.* 1666 (HN); Bao Loc, 22.V.1980, *Lien* 196 (HN); Di Linh, Ha Nam Ninh, 15.V.1980, *Tue* 496 (HN). — Nghe An: Co Ba forest reserve, 6.V.1915, *Chevalier* 32362 (P); Ban Muong, 4.IV.1998, *Soejarto; Ninh, T.N. & P.H.Hoang* 10218 (A). — Ninh Binh: Nho Quan, Cuc Phuong National Park, 22.IV.1971, *CPNP* 3974 (CPNP); 23.IV.1971, *CPNP* 3976 (CPNP). — Quang Duc-Lam Dong: 17.III.1953, *Schmid s.n.* (P). — Tay Ninh: Cai Cong, *Pierre s.n.* (P). — Thanh Hoa: Nhu Xuan, Xuan Quy, 24.IV.1996, *N.T.Ninh & Dumontet* VN 93 (HN).

DISTRIBUTION. — India, South China, continental Southeast Asia to Borneo. In Indochina it occurs in Cambodia, Laos and Vietnam (Fig. 32).

ECOLOGY OR HABITAT. — in primary and secondary forest from lowland to hill terrain, swamp and along rivers, to 800 m.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: February, October. Fruiting: April, May.

VERNACULAR NAMES. — Cambodia: Pring Kbal Komprak (Siem reap), Kbal Ta (Siem reap), Pring Chan (Koh Kong), Pring Santop (Koh Kong), Pring Kbal Ta (Kampong Thum). Vietnam: Cay tram (Thanh Hoa), Tram hang (Dong Nai), Tram hoa xanh (Vietnam), Tram la den (Vietnam), Tram rong (Vietnam).

USES. — The fruit is edible and the wood is used for house building (Lemmens *et al.* 1995).

DESCRIPTION

Tree to 10 m tall, to 25 cm dbh. Bark greyish, slash bark purplish-brown. Glabrous.

Twig

Terete, c. 3 mm diameter, stout, surface smooth or flaky, pale brownish, not contrasting to leaf colour.

Leaves

Opposite, coriaceous to subcoriaceous, yellowish brown, upper surface pustulate or punctilate, 10-17 × 4-7 cm, 1.5-3.5 times as long as wide, elliptic, oblong-ovate or oblong-elliptic, base cuneate, c. 60 degrees ascending from midrib, slightly attenuate, margin flat, apex acute or acuminate, acumens when present 0.8-1.5 cm long, $\frac{1}{13}$ - $\frac{1}{30}$ of blade length; midrib sunken above, raised below; secondary veins slender, 24-30 per side, widely spaced, 5-7 mm apart, c. 60 degrees from midrib, prominent and raised on both surfaces; tertiaries prominent, reticulate; intramarginal veins 1-1.5 mm from leaf margin, straight; petiole 0.7-1.5 cm, $\frac{1}{10}$ - $\frac{1}{25}$ of blade length, c. 2 mm diameter, stout, brownish to blackish, sometimes contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 5-6.5 cm long, panicate, second to third order branching, flowers many, to 300; axes c. 10 cm long; bracts and bracteoles caducous, triangular.

Flowers

Sessile, hypanthium not glaucous, not fibrous, 5-6 × 3-4 mm, obconic, pseudostalk distinct, very short, c. 1 mm long; sepals 4-5, free, 1-1.5 × 3 mm, semiorbicular; petals 4-5, coherent, 4-6 × 4-6 mm, orbicular; outer stamens 1-1.3 cm long, anther sacs parallel, connective gland conspicuous; style 8-10 mm long, ovules 15-20 per locule, irregularly radiating.

Fruit

Globose, 2.2 × 1.7 cm, surface smooth, calyx ring with undulating rim, seed intercotyledonary intrusion absent.

NOTES

1. Gagnepain (1920) grouped *Syzygium oblatum* and *S. compongense* into sections II and III respectively based on the petals being coherent in *S. oblatum* and free in *S. compongense*. However, the flowers in the type of *S. compongense* are still in bud with an intact corolla and therefore we could not assess if the petals are coherent or not. On the basis of similarity of the leaf (venation, shape and size), inflorescence and flower type of *S. compongense* and *S. oblatum*, we consider these species to be conspecific.

2. *Syzygium oblatum* is a widespread species exhibiting variability in the leaf, inflorescence and flower size. In Thailand, specimens with smaller leaves, less conspicuous venation and shorter inflorescence than the typical form are formally recognised as var. *laevicaule*.

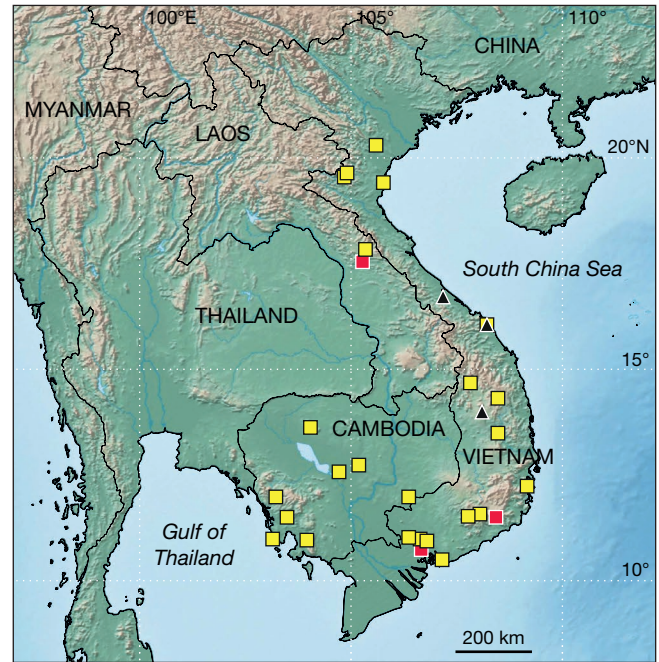


FIG. 32. — Distribution of *Syzygium nigrans* (Gagnep.) Craven & Biffin (■), *Syzygium oblatum* (Roxb.) Wallich ex Steudel (□) and *Syzygium odoratum* (Lour.) DC. (▲) in Indochina.

40. *Syzygium odoratum* (Lour.) DC.

Prodromus Systematis Naturalis Regni Vegetabilis 3: 260 (1828); Merr., *A commentary on Loureiro's 'Flora Cochinchinensis'*, *Transactions of the American Philosophical Society* 24(2): 285 (1935); Merr. & L.M. Perry, *Journal of the Arnold Arboretum* 19: 102 & 225 (1938); P.H. Hò, *An Illustrated Flora of Vietnam (Cây cỏ Việt Nam)* 2: 54, fig. 3749 (1992); K.D. Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 907 (2003). — *Opa odorata* Lour., *Flora Cochinchinensis* 309 (1790). — *Eugenia odorata* (Lour.) Wight, *Illustrations of Indian Botany* 2: 16 (1841). — *Eugenia millettiana* Hemsl. ex F.B. Forbes & Hemsl., *Journal of the Linnean Society (Botany)* 23: 297 (1887), *nom. nov.* — Type: Vietnam [Cochinchina], *Loureiro s.n.* (holo-, BM!).

Eugenia deckeri Gagnep., *Notulae Systematicae* 3: 323 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 807 (1920). — Type: Tonkin [China], Kouang-tcheou [Zhanjiang], 20.X.1910, *Decker 15* (holo-, P![P00589282]).

ADDITIONAL MATERIAL EXAMINED. — **China**. Guangdong: *D. Hooker 141* (E); Hoi Kong, 2.VI.1929, *Tsiang Ying 2549* (P). — Hainan: Ngai, Wong Kam Shan, *S.K. Lau 564* (BM).

Vietnam. Da Nang: Tourane and vicinity, 29.VI.1927, *J. & M.S. Clemens 3778* (A, BM); *idem*, 10.VIII.1927, *J. & M.S. Clemens 4215* (A). — Gia Lai: Dak Doa, 30.XI.1978, *Dung 380* (HN); *idem*, Hien 606 (HN). — Quang Tri: II.1919, *Chevalier 41231 (de Pirey 67)* (P).

DISTRIBUTION. — China (Guangdong and Hainan) and Vietnam (Fig. 32).

ECOLOGY OR HABITAT. — In open area, dunes and bushes.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: June, October, November. Fruiting: not documented.

VERNACULAR NAME. — Tram thom (Vietnam).

DESCRIPTION

Tree to 7 m tall. Glabrous.

Twig

Terete, 1.5–2 mm diameter, slender, surface smooth, pale brownish, not contrasting to leaf colour.

Leaves

Opposite, subcoriaceous, yellowish brown, 4–8 × 1.2–3 cm, 2.5 to 3 times as long as wide, elliptic, base cuneate and slightly attenuate, apex acuminate, acumen prominent, 1–2 cm long, 1/3–1/5 times of blade length; midrib sunken above, raised below; secondary veins slender, 12–15 per side, widely spaced, 2–5 mm apart, *c.* 45 degrees ascending from midrib, faint and raised above, prominent below; tertiaries faint, reticulate; intramarginal veins *c.* 1 mm from leaf margin, straight; petiole *c.* 3 cm long, 1/21–1/26 of blade length, *c.* 1 mm diameter, slender, dark brownish to blackish, contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 4.5–6 cm long, paniculate, first to second order branching, flowers many, to 100; axes 4–5 cm long; bracts and bracteoles caducous, lanceolate.

Flowers

Sessile, hypanthium glaucous, not fibrous, *c.* 5 × 2 mm, clavate, corrugated, glaucous, purplish, abruptly constricted to distinct pseudostalk, *c.* 2 mm long; sepals 4–5, free, *c.* 0.5 × 1 mm, triangular; petals 4–5, coherent, 2 × 2 mm, orbicular; outer stamens *c.* 0.5 cm long, anther sacs parallel, connective gland conspicuous; style *c.* 5 mm long, ovules *c.* 12 per locule, in 2 longitudinal rows.

Fruit

Whitish, globose, 0.4 × 0.4 cm, surface smooth, calyx ring with persistent sepal lobes, seed intercotyledonary intrusion absent.

NOTE

As this species has an elongated glaucous and purplish hypanthium, *Syzygium odoratum* belongs to subg. *Sequestratum*. Morphologically, this species is close to *S. antisepticum* but differs in having a distinct leaf acumens and a hypanthial cup that is abruptly constricted to the pseudostalk instead of tapering. The habitat of this species seems to confine to open vegetation such as dunes and bushes. Whether this is an ecotype of *S. antisepticum* or a distinct species in itself that has diverged from the latter, still requires investigation.

41. *Syzygium pachysarcum* (Gagnep.) Merr. & L.M.Perry
(Figs 33; 34)

Journal of the Arnold Arboretum 19: 110 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 55, fig 3751 (1992) [as *Zyzygium pachysarcum*]; K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 907 (2003). — *Eugenia pachysarca* Gagnep., *Notulae Systematicae* 3: 329. 1918; Gagnep. in Lecomte, *Flore générale*

de l'Indochine 2: 824 (1920). — Type: Cambodia, Kampong Speu, Samraong Tong [Au Samrong], Mt. Schrall, '10 m tree', fl., IV.1870, *Pierre* 987 (lecto-, P![P00589190] with attached Delpy drawing dated I.1900, here designated; isolecto-, P![2 sheets, P00589191 & P00589192], BM!, NY![405069], E![E00284097]) (see Note 1).

Eugenia tramnion Gagnep., *Notulae Systematicae* (Paris) 3: 332 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 824 (1920). — [*Eugenia rubicunda* Gagnep., in sched., nom. nudum.]. — *Syzygium tramnion* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 111 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 60, fig. 3765 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 909 (2003). — Type: Vietnam [Cochinchina], Tay Ninh, Cai Cong [Cay-cong], fl. & fr., V.1866, *Pierre* 115 (lecto-, P![P00589173], with Delpy drawing dated II.1900 attached, here designated; isolecto-, P![P00589174], with two Delpy's drawings of flowers and fruits dated XI.1899 attached). — Remaining former syntypes: Vietnam [Cochinchina], An Giang, Lap Vo [Lap-vo], fl., VIII.1869, *Pierre s.n.* (cited as *Pierre* 115 in the protologue) (P!); Vietnam [Cochinchina], fl., *Thorel s.n.* (P![P00589260]); Vietnam [Cochinchina], Mu-xoai, fl., tree 12–18 m, III.1867, *Pierre s.n.* (cited as *Pierre* 115 in the protologue) (P![P00589261], K!, BM!); Vietnam [Cochinchina], Tay Ninh, Cai Cong [Cay-cong], fl., 2.IV.1866, *Pierre s.n.* (P![P00589262] with Delpy's drawing dated XI.1899 attached); *idem*, fl., *Pierre s.n.* (P![P00589263]), **syn. nov.** (see Notes 2 and 3).

Eugenia tinctoria Gagnep., *Notulae Systematicae* (Paris) 3: 334 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 824 (1920). — *Syzygium tinctorium* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 112 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 59, fig. 3763 (1992); P.Dy Phon, *Plant Use in Cambodia*: 580 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 909 (2003). — Type: Cambodia, Kampong Chhnang, Kralanh forest reserve, fl., 8–11.III.1914, *Chevalier* 30041 (*Fleury*) (cited as 31984 in the protologue) (lecto-, P![P00589216], here designated; isolecto-, P![2 sheets]). — Remaining former syntypes: Cambodia, fl. & fr., *Magnien, Gourmand & Châtillon s.n.* (P![3 sheets, P00589217, P00589218 & P00589219]); Cambodia, Kampong Chhnang, fl., *Chevalier* 30041 (cited as 31984 in the protologue) (P![P00589216]); Cambodia, Pursat, fl., 14.III.1914, *Chevalier* 31984 (cited as 30041 in the protologue) (P![P00589177]); Vietnam [Cochinchina], Dong Nai, Bien Hoa, fl., *Vinot* 34 (P![P00589215]), **syn. nov.** (see Note 2).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampong Cham: Stung Trang, *Herbier Forestier du Cambodge* 505 (P). — Kampong Chhnang: III.1909, *Magnien, Gourmand & Châtillon* 2 (P). — Kampong Thum: Kampong Takong, Phnom Barung Reserve, 9.V.1924, *Herbier Forestier du Cambodge* 505 (P). — Kandal: Phnom Penh, *Béjaud* 569 (P). — Siem Reap: Banteay Srei, Khnar Sanday, 22.II.1924, *Herbier Forestier du Cambodge Diffon* 19 (P). **Laos.** Savannakhet: Champone, Ban Phay, 8.VIII.2000, *Soejarto; B.H.Southavong; & Samphan* 11489 (GH). **Thailand.** Nakhon Ratchasima: Pak Thong Chai, 26.III.1968, *S.Phengnaven* 593 (L). **Vietnam.** Binh Dinh: Nuoc Ngot, V.1959, *H.H.Pham* 5014 (P). — Dong Nai: Bien Hoa, VI.1909, *d'Alleizette* (L). — Kon Tum: Bien 709 (HN); Kon Plong, 16.VII.1978, *K.Dao* 268 (HN).

DISTRIBUTION. — Endemic to Continental Southeast Asia and found in Cambodia, Laos, Thailand and Laos (Fig. 35).

ECOLOGY OR HABITAT. — In primary forest to 300 m.

CONSERVATION STATUS. — IUCN Global Status: Near Threatened (NT); IUCN Regional (Indochina) Status: Near Threatened (NT).



Fig. 33. — Lectotype of *Syzygium pachysarcom* (Gagnep.) Merr. & L.M.Perry, *Pierre 987* (P00589190); detail, close-up of inflorescence. Scale bar: 0.5 cm.

PHENOLOGY. — Flowering: February, March, April, Jun, August, November. Fruiting: April, May, July, August.

VERNACULAR NAMES. — Cambodia: Pring Kbal (Siem reap), Pring Phnom (Kampong Thum), Pring tasar, Pring thom (Kampong Chhnang & Pursat), Prinh thmar (Kandal). Laos: Mak va (Savannakhet). Vietnam: Tram day, Tram nac day, Tram nion (Tay Ninh), Tram nhuom, Tram rim, Tram sung (Dong Nai).

USES. — The fruit edible and wood used in carpentry. The bark is used as yellowish brown dye to colour fabric (Dy Phon 2000).

DESCRIPTION

Tree to 25 m tall, to 30 cm dbh. Bark greyish, slash bark pale brownish. Glabrous.

Twig

Terete, *c.* 2-3 mm diameter, stout, surface smooth, dark brownish, not contrasting to leaf colour.

Leaves

Opposite, coriaceous, dark brownish, crushed leaves aromatic (*in vivo*), 8.5-11.5 × 3.5-5.5 cm, 2 to 3 times as long as wide, elliptic, base cuneate, slightly attenuate, *c.* 45 degrees ascending from midrib, margin flat, apex acute or acuminate, acumen when present *c.* 1 cm long, $\frac{1}{9}$ - $\frac{1}{11}$ of blade length; midrib sunken above, raised below; secondary veins slender, 20-25 per side, widely spaced, 2-5 mm apart, *c.* 60 degrees from midrib, prominent and raised on both surfaces; tertiary veins prominent, reticulate; intramarginal 2-3 mm from leaf margin, straight to looped, outer intramarginal veins present; petiole *c.* 1 cm long, $\frac{1}{9}$ - $\frac{1}{11}$ of blade length, *c.* 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal, 3.5-6 cm long, paniculate, first to second order branching, flowers many, 21-105, in heads of 7 to 10 flowers; axes 3-5.5 cm long, the second order branch very short, *c.* 1 mm; bracts and bracteoles persistent, triangular.

Flowers

Yellowish, sessile, hypanthium not glaucous, not fibrous, 5-6 × 3-5 mm, obconic, pseudostalk distinct or indistinct, very short, 1.5-2 mm long; sepals 4, free, semiobicular, unequal, outer sepals *c.* 2 × 1.5-3 mm, inner sepals *c.* 3 × 2 mm; petals 4, free, 2.5-3 × 3-4 mm, orbicular; outer stamens 5 mm long, anther sacs parallel, connective gland conspicuous; style 6-7 mm long, ovules 7-12 per locule, irregularly radiating.

Fruit

Obovoid or ellipsoid, 1.5-2 × 0.7-1.5 cm, surface smooth, calyx ring with undulating rim, seed intercotyledonary intrusion absent.

NOTES

1. *Pierre 987* collected from Mt. Schroll is the only gathering cited in the protologue, lectotypification is required as there are three potential type sheets at P. We believe all the duplicates are from the same gathering because they shared the same herbarium information (date and locality) annotated by Pierre.

2. Gagnepain (1920) separated *Eugenia tinctoria* from *E. pachysarca* and *E. trammion* by the calyx length (> 2 mm in *Eugenia tinctoria* vs ≤ 1.5 mm in *E. pachysarca* and *E. trammion*). *Eugenia pachysarca* differs from *E. trammion* in the absence of pustulation on the calyx, an acute leaf apex and faint leaf venation, whereas in *E. trammion* the calyx is pustulate, the leaf apex is acuminate and the leaf venation is prominent. However, we found these characters are not very important for delimiting species in *Syzygium*. We believe that these three species are conspecific because they share the same inflorescence and leaf venation type.

3. In the protologue, the collections from Cai Cong, Lap Vo and Mu Xoai were given the same number, *Pierre 115*. This is the species number and not the collector's number. Gagnepain wrote two names on the same label on all the herbarium sheets: '*Eugenia rubicunda* Gagnep.' and '*Eugenia trammion* Gagnep.' Gagnepain must have initially annotated the sheets as *Eugenia rubicunda* and later changed the name to *Eugenia trammion* upon realizing *E. rubicunda* was preempted by Wight (1843).

42. *Syzygium pierrei* (Gagnep.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 114 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 56, fig. 3753 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 906 (2003). — *Eugenia pierrei* Gagnep., *Notulae Systematicae* 3: 330 (1917); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 836 (1920). — Type: Vietnam [Cochinchina], Thua Thien-Hue, near Bo Giang [Bao-chiang], fl., VII.1877, *Pierre 1818* (lecto-, P!, with attached Delpy's drawing dated III.1900, here designated; isolecto-, P![2 sheets, P00589188 & P00589189]). Remaining former syntype: Vietnam [Cochinchina], Dong Nai, Bien Hao, Tri Huyen, fl., V.1867, *Pierre s.n.* (P![P00589425] with attached Delpy's drawing dated III.1900, K![K000800073]).

ADDITIONAL MATERIAL EXAMINED. **Laos.** Champassak: Pathoumphone, Nong Hin, 7.VII.2000, *Middleton & Lamxay 265* (P). **Vietnam.** Dong Nai: Bien Hoa, Tri Huyen, IV.1869, *Pierre s.n.* (P).

DISTRIBUTION. — Found only in Laos and Vietnam (Fig. 35).

ECOLOGY OR HABITAT. — Primary forest.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: April, May, July. Fruiting: not documented.

DESCRIPTION

Shrub to 3 m tall. Bark brownish. Glabrous.

Twig

Terete or subangular, *c.* 2 mm diameter, stout, surface smooth, greyish to whitish, contrasting to leaf colour.

Leaves

Opposite, chartaceous, brownish, 8.5-10 × 2.5-4.5 cm, 2-3.5 times as long as wide, elliptic, sometimes obovate, base cuneate, apex acute and obtuse, acumen indistinct; midrib flat above, raised below; secondary veins slender, 6-10 per side, 5-10 mm apart, 45-50 degrees ascending from midrib, prominent and flattish above, prominent and raised below;

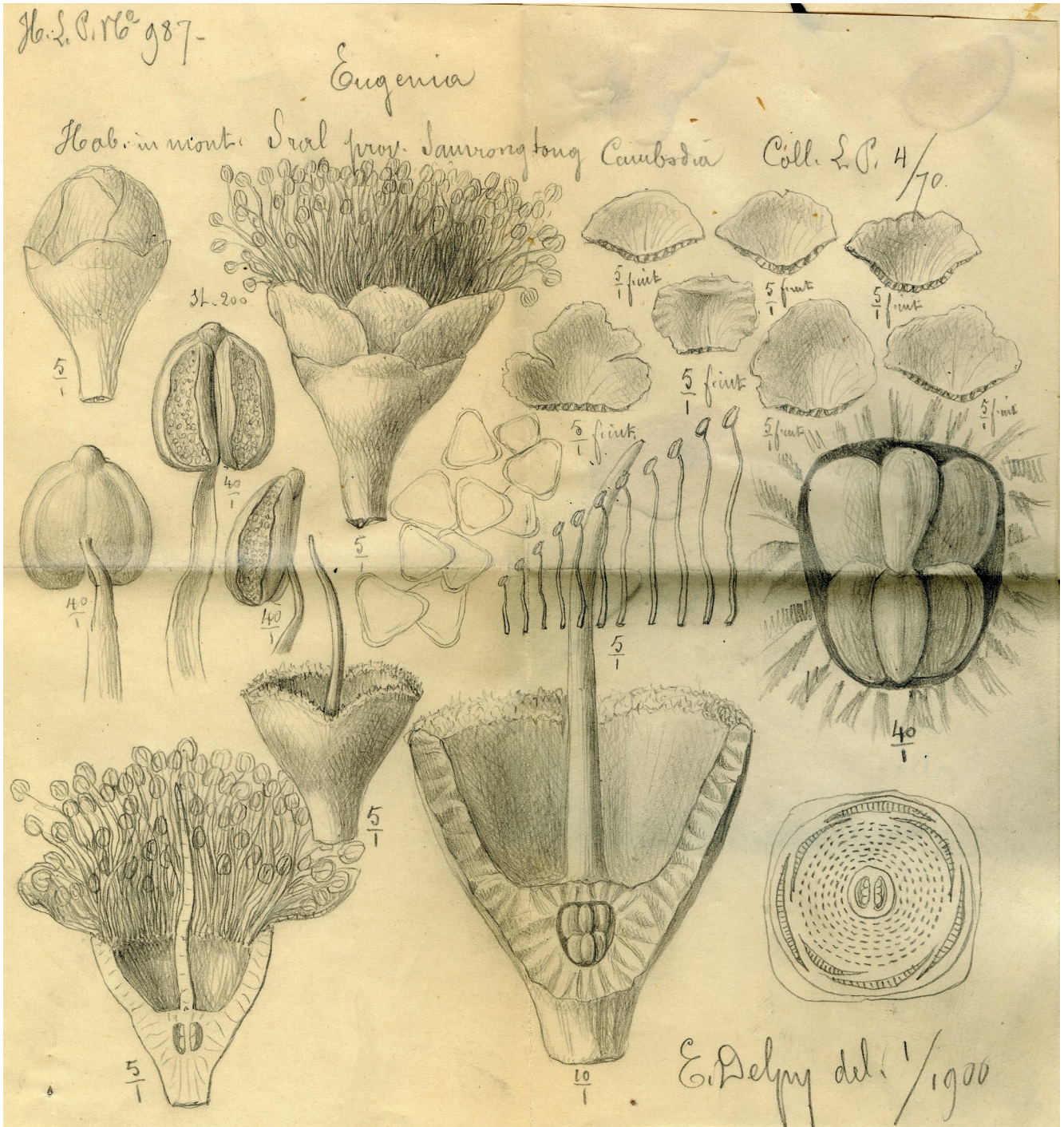


FIG. 34. — Delpy's drawing of the reproductive organs of the lectotype of *Syzygium pachysarcom* (Gagnep.) Merr. & L.M.Perry, *Pierre* 987 (P00589190).

tertiaries prominent, reticulate; intramarginal *c.* 2 mm from leaf margin, looped; petiole 2-2.5 mm long, $\frac{1}{30}$ - $\frac{1}{50}$ of blade length, 1-2 mm diameter, slender or stout, dark brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig, 3-4.5 cm long, racemose, flowers few, 3 to 5, spreading; axes 0.5-2 cm long; bracts and bracteoles caducous, elliptic.

Flowers

Pedicellate, pedicel 1-1.5 cm, hypanthium not glaucous, not fibrous, 15-20 × 6-8 mm, pyriform, pseudostalk distinct, *c.* 7 mm long; sepals 4, free, semiorbicular, unequal, inner lobes *c.* 3 × 5 mm, outer lobes *c.* 4-7 mm; petals 4, free, *c.* 5 × 6 mm, orbicular; outer stamens *c.* 10 mm long, anther sacs parallel, connective gland conspicuous; style 4.5 mm long, ovules 20-23 per locule, irregularly radiating.

Fruit

Not seen but according to Gagnepain (1920) the young fruit is pyriform with fleshy crown.

NOTE

Syzygium pierrei resembles *S. zimmermannii* but differs in its short petiole and unbranched inflorescence.

43. *Syzygium polyanthum* (Wight) Walp.

Repertorium Botanices Systematicae 2: 180 (1843); Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 108 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Cây cỏ Việt Nam)* 2: 56, fig. 3754 (1992); P.Dy Phon, *Plant Use in Cambodia*: 580 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 907 (2003); Newman; *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — *Eugenia polyantha* Wight, *Illustrations of Indian Botany* 2: 17 (1841). — Type: Burma '19. Mergui. Arbor.', *Griffith s.n.*, [*Herb. Hooker, Herb. E.I.C. 2394*] (lecto-, K!, here designated). (*vide* Noltie [2005: 360]) (see Note).

Eugenia pamtensis Miq., *Analecta Botanica Indica* 1: 22, t. 4 (1850). — *Syzygium pamtense* (Miq.) Masam., *Enumeratio Phanerogamarum Bornearum*: 536 (1942). — Type: Indonesia, Borneo, Gunung Pammaton, *Korthals s.n.* (lecto-, L![L0600898]).

Eugenia microbotrya Miq., *Analecta Botanica Indica* 1: 27, t. 10 (1850). — *Syzygium microbotryum* (Miq.) Masam., *Enumeratio Phanerogamarum Bornearum*: 534 (1942). — Type: Indonesia, Borneo, 'rivier Ariname', *Korthals s.n.* (holo-, L![L0600897]).

Eugenia lucidula Miq., *Flora van Nederlandsch Indië* 1: 444 (1855). — [*Myrtus cymosa sensu* Blume, *Bijdragen tot de Flora van Nederlandsch-Indië*: 1086 (1826), *non* Spreng (1825)]. — *Syzygium cymosum* Korth., *Nederlandsch Kruidkundig Archief* 1: 202 (1847), *nom. illeg.*, *non* DC (1828). — Type: Indonesia, Java, *Anon. s.n.*, a ticket bearing Miquel's handwriting 'Eugenia lucida Miq., Java' (lecto-, L![sheet no. 904.324-22], here designated; isolecto-, L![sheet no. 898.203-599], K![*Herb. Hooker*]).

Eugenia nitida Duthie in Hooker, *Flora of British India* 2: 496 (1878), *nom. illeg.*, *non* Vell. (1829). — Type: Malay Peninsular, *Maingay* 728 (holo-, K!).

Eugenia atropunctata C.B.Rob., *Philippine Journal of Science*, Section C Botany 4: 385 (1909), *nom. illeg.*, *non* Steudel (1843). — Type: Philippines, Luzon, Cagayan, *Cuming 1308* (lecto-, K!, here designated; isolecto-, A![frag., 69613], BM!, PNH†).

Eugenia lambii Elmer, *Leaflets of Philippine Botany* 4: 1430 (1912). — Type: Philippines, Mt. Pulgar, Palawan, 1911, *Elmer 13047* (holo-, PNH†; iso-, A![69724], BISH![BISH1003660], CAS![CAS00124111], E![E00504497], F![F0065375F], GH![GH00069723], K!, NY![NY00405173 & NY00405174], U![U0246317], US![US00118019]).

Eugenia holmanii Elmer, *Leaflets of Philippine Botany* 7: 2354 (1914). — Type: Philippines, Mt. Urdaneta, Mindanao, *Elmer 13356* (holo-, PNH†; iso-, A![69708 & 69709], GH![GH00069709]).

Eugenia resinosa Gagnep., *Notulae Systematicae* (Paris) 3: 331 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 820 (1920). — Type: Vietnam [Annam], Nghe An, Co Ba forest reserve, fl., 15.III.1914, *Chevalier 30186 (Fleury)* (lecto-, P![P00589184], here designated; isolecto-, P![2 sheets, P00589185 & P00589186]). — Remaining former syntypes: Thailand, Kemmarat, 1866-1868, fl., *Thorel s.n.* (P!); Vietnam [Cochinchina], Ben Tre, Mo Cay, fl.,

II.1865, *Pierre 424* (P![3 sheets], BM!); Vietnam [Cochinchina], Binh Duong, Thi Tinh, fl., *Thorel 1184* (P!); Vietnam [Cochinchina], Binh Duong, Thu Dau Mot, fl., *Thorel s.n.* (P!); Vietnam [Cochinchina], Dong Nai, Tri Huyen, X.1872, fl., *Pierre s.n.* (P!); Vietnam [Cochinchina], Ken Giang, Phu Quoc, fl., I.1874, *Pierre 1416* (cited as *Pierre 1406* in the protologue) (P![3 sheets]); Vietnam [Tonkin], D'Along bay, fl., 1911, *Lecomte & Finet 799* (P![2 sheets]); Vietnam [Tonkin], Dap-can, fl., 1909, d'*Alleizette 338* (P![P00589383], L![L0404200]); Vietnam [Tonkin], Ding-bang, between Hanoi and Sontay, 18.XII.1890, *Balansa 4829* (P!); Vietnam [Tonkin], Nam Dinh, Tralu, fl., IV.1914, *Lemarié s.n.* (P![2 sheets]); Vietnam [Tonkin], Ninh Binh [Ninh Thinh], fl. & fr., 16.VIII.1882, *Bon 1696* (P![2 sheets]); *idem*, Ninh Binh, fl., 9.VIII.1882, *Bon 1673* (P!); *idem*, fl., *Bon 3655 n.v.*

Eugenia polyantha var. *sessilis* M.R.Hend., *The Gardens' Bulletin Singapore* 12: 212 (1949). — *Syzygium polyanthum* var. *sessile* (M.R.Hend.) I.M.Turner, *Journal of the Singapore National Academy of Science* 22: — 24: 23 (1997). — Type: Peninsular Malaysia, Johor, Sungai Kaya, 17.III.1937, *SFN 32413 (Henderson)* (holo-, SING *n.v.*; iso-, K!, L!).

[*Syzygium micranthum* Blume ex Miq., *Analecta Botanica Indica* 1: 22 (1850) as syn., in sched., *nom. nud.* — Voucher: Indonesia, Borneo, Pamatton, *Korthals s.n.*, annotated by Blume as '*Syzygium micranthum* Bl.' (L![L0600900])].

[*Eugenia balsamea* auct. *non* Wight (1841): Ridley, *The Flora of the Malay Peninsula* 1: 754 (1922).] (*vide* Craib [1931: 656]).

[*Eugenia cerasoides* auct. *non* Roxb. (1832): Miq., *Analecta Botanica Indica* 1: 27 (1850). — Voucher: s. loc. *Korthals s.n.* (L![L0600879])].

ADDITIONAL MATERIAL EXAMINED. — **Cambodia**. Kampong Speu: Phnum Aural, 19.II.2001, *K.Eanghourt, M.Sophal & S.Kosal Boyce MoE Herb. Cat.* 568 (K). — Koh Kong: Thma Bang, Ta Tey Leu, 28.I.1970, *Martin 1675* (P); 22.I.1966, *Vidal 5010* (P). — Kampong Speu: Samraong Tong, IV.1870, *Pierre 988* (P).

Vietnam. Bac Ninh: Dap Cau, V.1909, d'*Alleizette 338* (L). — Ha Tay: Huong Canh, IV.1908, *Chevalier s.n.* (L). — Ha Tinh: Huong Khe, 18.VIII.2001, *N.Q.Binh, D.D.Cuong & Schnitzler VN 869* (HN). — Hai Phong: Haiphong botanical garden, I.XII.1885, *Balansa 1146* (L). — Hanoi City: II.1932, *Pételot 4305* (P); Hanoi Botanical Garden, 21.X.1902, *Bois 352* (P). — Lam Dong: 138 km, route between Saigon-Dalat, 21.II.1954, *Schmid s.n.* (P); Bao Loc, 27.II.1959, *Schmid s.n.* (P). — Ninh Binh: Cho Ganh, X.1923, *Pételot 1481* (A); Cho Ganh, X.1923, *Pételot 1481* (P). — Phu Tho: 14.IX.2000, *Phuong 3422* (HN). — Quang Ninh: Dam Ha, Sai Vong Mo Leng, 18.V.1940, *W.T.Tsang 30136* (A, E, L); VII.1940, *W.T.Tsang 30426* (A, E, K), V.1940, *W.T.Tsang 30077* (E, K, P), *W.T.Tsang 30181* (BKE, E, L); 18.VII-9.IX.1940, *W.T.Tsang 30426* (A, K); Tien Yen, Kau Nga Shan and vicinity, *W.T.Tsang 27477* (E). — between Son Tay and Tu Phap, X.1887, *Balansa 2895* (P); *sin. loc.*, II.1938, *Pételot 6276* (P); Mo Leay?, *Pierre s.n.* (E); Dalat, route to Saigon, 15.IV.1953, *de Sigaldy & Dau 86/ITS* (P); *sin. loc.*, 16.I.1971, *Vu Van Cuong 1587* (P).

DISTRIBUTION. — India, Burma, Thailand, Cambodia, Laos, Vietnam, Peninsular Malaysia, Sumatra, Borneo, Java and Philippines (Fig. 35).

ECOLOGY OR HABITAT. — Secondary forest in sandy-clay soils to 400 m.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: January to May, August, September, October, December. Fruiting: February, July.

VERNACULAR NAMES. — Cambodia: Pring sratoab, Pring siphlae (Koh Kong). Vietnam: Co phan (Nghe An), San (Ben Tre, Nam Dinh, Nghe An, Ninh Binh), San thuyen.

USES. — The fruit is edible. The wood is used in construction (Lemmens *et al.* 1995). In Cambodia, a decoction of the wood is used to treat diarrhoeas (Dy Phon 2000).

DESCRIPTION

Shrub or tree, to 22 m tall, to 50 cm dbh. Bark greyish brown. Glabrous.

Twig

Terete, 1-2 mm diameter, slender, surface smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite, chartaceous, dark brownish, 6-10 × 3-4 cm, 2 to 3 times as long as wide, elliptic or oblong-elliptic, base cuneate, unequal, slightly attenuate, *c.* 35-45 degrees ascending from midrib, margin flat, apex mostly acuminate, sometimes acute, acumen when present 0.5-1 cm long, $\frac{1}{10}$ - $\frac{1}{20}$ of blade length; midrib sunken above, raised below; secondary veins slender, 7-9 per side, widely spaced, 6-10 mm apart, 45-60 degrees ascending from midrib, prominent and raised above, prominent below, 1-3 pairs of basal secondary veins arcuate and extending to form outer intramarginal veins; tertiaries, prominent, reticulate; intramarginal veins 1-2 mm from margin, looped, outer intramarginal veins present; petiole 0.5-1 cm long, $\frac{1}{8}$ - $\frac{1}{16}$ of blade length, 1-2 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Axillary on leafless twig, rarely on leafy twig, 2-4 cm long, paniculate, first to second order branching, flowers many, 27 to 53; axes 1.7-3.7 cm long; bracts and bracteoles persistent, triangular.

Flowers

Sessile, reddish or yellowish (*in vivo*), hypanthium not glaucous, not fibrous, 2-2.5 × 2.5-3 mm, obconic, flattish, pseudostalk distinct, short, 1-1.5 mm long; sepals 4, free, 1 × 1-1.5 mm, triangular; petals 4, free, 1.7-2 × 2 mm, orbicular; outer stamens 3-4 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 1.5 mm long, ovules 9-12 per locule, irregularly radiating.

Fruit

Globose, 0.5-1 × 0.5-1 cm, surface smooth, calyx ring with persistent sepal lobes, seed intercotyledonary intrusion absent.

NOTE

There are four herbarium sheets in K that are available for the lectotypification of *Eugenia polyantha*. The first two sheets are annotated 'Mergui, Griffith', the third sheet is annotated '19 Hb. Moulmein', and the fourth sheet is from *Herbarium Griffith and East India Company (E.I.C.) No. 2394* (with a note bearing number 19 and a short description in Wight's

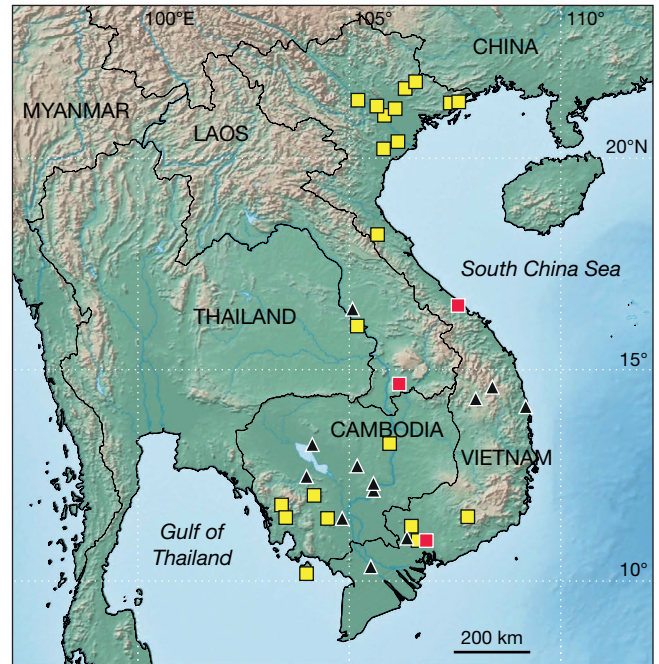


FIG. 35. — Distribution of *Syzygium pachysarcum* (Gagnep.) Merr. & L.M.Perry (▲), *Syzygium pierrei* (Gagnep.) Merr. & L.M.Perry (■) and *Syzygium polyanthum* (Wight) Walp. (■) in Indochina.

handwriting and the locality 'Mergui' added by an anonymous hand). None of the specimens are from Wight's herbarium and none of the localities are written in his handwriting. Therefore, the fourth sheet with a note bearing Wight's own description is chosen as lectotype.

44. *Syzygium praecox* (Roxb.) Rathkr. & N.C. Nair

Journal of Economic and Taxonomic Botany 4: 288. 1983. — *Eugenia praecox* Roxb., *Flora indica* 2 [ed. 2, ed. W. Carey]: 488 (1832). — *Strongylocalyx praecox* (Roxb.) Blume, *Museum Botanicum Lugduno-Batavum* 1: 89 (1850). — *Jambosa praecox* (Roxb.) A.M.Cowan & Cowan, *The Trees of Northern Bengal*: 67 (1929). — *Syzygium praecoxum* (Roxb.) Harid. & R.R. Rao, *Forest Flora of Meghalaya*: 401, fig. 25 (1985), *nom. illeg.* — Type: *Icones Roxburghianae* no. 2500 (lecto-, K!, here designated; isolecto-, CAL n.v.).

Eugenia lanceifolia Roxb., *Flora indica* 2 [ed. 2, ed. W. Carey]: 494 (1832). — *Strongylocalyx lanceifolius* (Roxb.) Blume, *Museum Botanicum Lugduno-Batavum* 1: 89 (1850). — *Syzygium roxburghianum* Raizada, *The Indian Forester* 74: 336 (1948). — Type: *Icones Roxburghianae* no. 2261 (lecto-, K!, here designated; isolecto-, CAL n.v.).

Eugenia wallichii Wight, *Illustrations of Indian Botany* 2: 17 (1841), in *Icones Plantarum Indiae Orientalis* 2: t. 536 (1842). — *Syzygium wallichii* (Wight) Walp., *Repertorium Botanices Systematicae* 2: 180 (1843). — Type: Bangladesh, Silhet, *F. de Silva s.n.* in *Wallich Numer. List 3606* (1831) (lecto-, K-W!, here designated; isolecto-, E! [3 sheets], P!).

Syzygium cathayense Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 232 (1938). — Type: China, Kwangtung, Fang Cheng, *Wu* 104 (S.Y.U 67797) (holo-, SYS n.v.; iso-, A! [frag., A00071308]), *syn. nov.* (see Note).

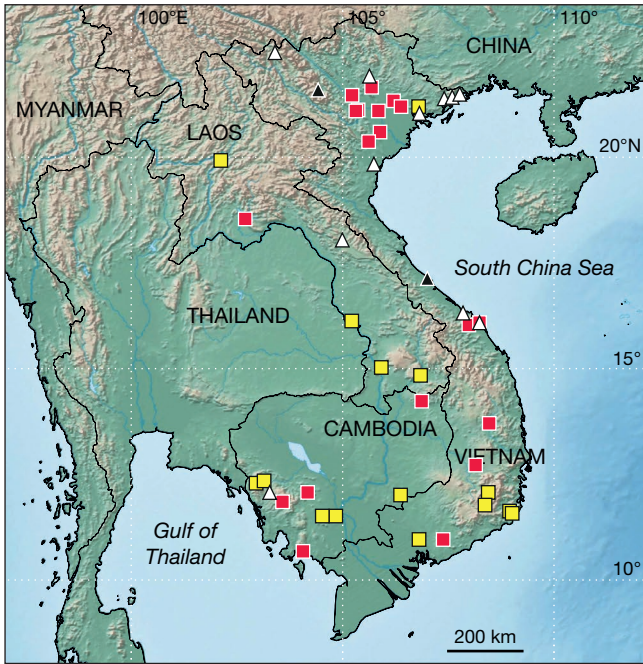


FIG. 36. — Distribution of *Syzygium praecox* (Roxb.) Rathkr. & N.C. (▲), *Syzygium ripicola* (Craib) Merr. & L.M.Perry (■), *Syzygium siamense* (Craib) P.Chantar. & J.Parn. (●) and *Syzygium sterrophyllum* Merr. & L.M.Perry (▲) in Indochina.

ADDITIONAL MATERIAL EXAMINED. — **Vietnam.** Lam Dong: *Schmid s.n.* (P). — Ninh Binh: Nho Quan, Cuc Phuong National Park, 13.III.1971, *Anon. D 132* (CPNP); *idem*, 15.III.1971, *K.Dao D 02* (HN). — Quang Ninh: Tien Yen, Kau Nga Shan and vicinity, 9.I.1937, *W.T.Tsang 27481* (E, K, P); Tien Yen, Ho Yung Shan and vicinity, 13.X.1940, *W.T.Tsang 30757* (A, E, K, L, P). — Quang Tri: Vinh Linh, 6.XII.2003, *N.Q.Binh & D.D.Cuong VN 1236* (HN). — Yen Bai: Tram Tau, 9.III.2001, *N.Q.Binh, D.D.Cuong & Schmitzler VN 816* (HN).

DISTRIBUTION. — Widespread from Nepal to Indochina and South China (Guangdong and Yunnan) (Fig. 36).

ECOLOGY OR HABITAT. — Secondary forest.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — *Flowering*: October, November, December, January. *Fruiting*: not documented.

DESCRIPTION

Tree to 9 m tall. Glabrous.

Twig

Angular (4-angled) and winged, 2-3 mm diameter, stout, surface smooth, whitish, contrasting to leaf colour.

Leaves

Opposite, chartaceous, dark brownish to blackish, shiny above, contrasting to twig colour, 11-15(-18.5) × 4.5-5.5 cm, 2 to 3 times as long as wide, elliptic or oblong-elliptic, base cuneate, apex acuminate, acumen to 1.5 cm long, *c.* 1/3 of blade length; midrib sunken above, raised below; secondary veins

stout, 8-12 per side, widely spaced, 8-10 mm apart, 60-70 degrees ascending from midrib, prominent and raised on both surfaces; tertiaries prominent, reticulate; intramarginal veins 2-3 mm from leaf margin, scalloped, prominent, outer intramarginal veins present, often the first pair of basal secondary veins arcuate, forming the outer intramarginal veins extending to the leaf apex; petiole 1-1.2 cm long, 1/2-1/2 of blade length, 0.8-1.5 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Axillary on leafy twig, rarely terminal, 4.5-5.5 cm long, paniculate, first order branching, flowers few, 17 to 33, spreading; axes 4-5 cm long; bracts and bracteoles caducous.

Flowers

Whitish (*in vivo*), fragrant, sessile, hypanthium 5-6 × 3 mm, pyriform, pseudostalk distinct, *c.* 3 mm long; sepals 4, free, 1-1.3 × 1.5 mm, semiorbicular; petals 4, free, 2.8-3.3 × 3-3.5 mm, suborbicular; outer stamens 9-10 mm long, anther sacs parallel, connective gland conspicuous; style 9-10 mm long, ovules 8-10 per locule, irregularly radiating.

Fruit

Obloid, 1 × 0.5 cm, surface smooth, calyx ring with undulating rim, seed intercotyledonary intrusion absent.

NOTE

We have examined isotype fragment (A) and herbarium materials identified by Merrill as *S. cathayense* (*W.T.Tsang 27481* [E, K, P(P04884304)] & *W.T.Tsang 30757* [A, E, K, L, P(P04884303)]). The description in the protologue and the herbarium materials strongly suggests that they are conspecific with *S. praecox* in having a distinct whitish winged twig, axillary and short inflorescences borne on leafy twigs and leaves dark brownish with prominent outer intramarginal veins. *Syzygium praecox* is a new record for Vietnam.

45. *Syzygium ripicola* (Craib) Merr. & L.M.Perry (Fig. 37)

Brittonia 4: 127 (1941); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 56, fig. 3755 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 908 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — *Eugenia ripicola* Craib, *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)* 1915: 428 (1915). — Type: Thailand, Nakhon Sawan, Keng Soi, 16.III.1913, *Kerr 2944* (lecto-, ABD designated by Chantaranothai & Parnell (1994: 104); isolecto-, BM *n.v.*, E![E00284095], K![K000800078]).

Eugenia cochinchinensis Gagnep., *Notulae Systematicae* 3: 322 (1917); Gagnep. *in* Lecomte, *Flore générale de l'Indochine* 2: 814 (1920). — *Syzygium cochinchinense* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 107 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 50, fig. 3735 (1992); P.Dy Phon, *Plant Use in Cambodia*: 378 (2000). — Type: Cambodia, Kompong Speu, Samraong Tong, fr., IV.1870, *Pierre 527* (lecto-, P![P00589286] with a drawing by Delpy dated XII.1899 attached,



FIG. 37. — Inflorescence of *Syzygium ripicola* (Craib) Merr. & L.M.Perry. Photo courtesy of Pranom Chantaranothai. Scale bar: 1 cm.

here designated; isolecto-, P![3 sheets, [P00589287](#), [P00589288](#) & [P00589350](#)]. — Remaining former syntypes: Laos, Attopeu, Bolaven plateau [Attopeu plateau], II.1877, fl., *Pierre 3194* (*Harmant 1170*) (P!, K![[K00276201](#)]); Thailand, Ubon Ratchathani, Kemmarat, fl., *Thorel s.n.* (P!); Thailand, Ubon Ratchathani, Ubon, fl., *Thorel s.n.* (P![2 sheets]); Vietnam [Cochinchina], Dong Nai, Bien Hoa, fl., V.1868, fl., *Pierre s.n.* (P![[P00589349](#)]).

Eugenia eburnea Gagnep., *Notulae Systematicae* 3: 324 (1917); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 816, fig. 88 (1920). — *Syzygium eburneum* (Gagnep.) Merr. & L.M.Perry (1938: 107); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 903 (2003). — Type: Cambodia, plain of Pen-lovier, fl., V.1870, *Pierre 991* (lecto-, P![[P00589209](#)] with a drawing by Delpy dated III.1900 attached, here designated; isolecto-, P![2 sheets, [P00589210](#) & [P00589211](#)], K![[K000276209](#)], E!). **syn. nov.** (see Note).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kandal: Phnom Penh, 10.VII.1938, *Béjaud 556* (P). — Pursat: Peam Prus, 26.XII.1968, *Martin 1379* (P); Veal Veng, 15.II.2000, *K.Eanghourt 27* (TCD). **Laos.** Route between Luang Prabang and Viangchan, IV.1912, *d'Alleizette s.n.* (L).

Vietnam. Annam: VI.1901, *d'Alleizette s.n.* (L). — Lam Dong: bank of Daa Uaii?, 27.IV.1955, *Schmid s.n.* (P); Mt. Lang Bian, 26.IV.1919, *Chevalier 40287* (P); Dalat, between Lang Ang and Lieng Khan, 12.II.1954, *Schmid s.n.* (P); Thac Lien Khuong, 22.III.1967,

Vu Van Cuong 278 (P). — Ninh Thuan: Krong Pha-Pham Rang, 25.VI.1955, *Schmid s.n.* (P); Tour Cham-Krong Pha, 24.IV.1964, *Schmid s.n.* (P). — Quang Duc-Lam Dong: 2.III.1954, *Schmid s.n.* (P). — Route between Ho Chi Minh and Dalat, 133 km, 14.IV.1953, *Sigaldy de & Dau 70 /TS* (P).

DISTRIBUTION. — Endemic to Continental Southeast Asia. Found in Burma, Thailand, Cambodia, Laos and Vietnam (Fig. 36).

ECOLOGY OR HABITAT. — Secondary or primary forest, often along rivers on rocky terrain, 100 to 900 m.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: February, March, April, June, December. Fruiting: April, June.

VERNACULAR NAMES. — Cambodia: Pring chom (Kandal), Pring khmum, Pring tuk (Pursat). Vietnam: Tram (South Vietnam), Tram nam bo, Tram nga, Tram suoi.

USES. — The fruit is edible and the wood used in carpentry.

DESCRIPTION

Shrub or tree, 3-15 m tall, to 20 cm dbh. Glabrous.

Twig

Terete, 1-2 mm diameter, slender, surface smooth, whitish, contrasting to leaf colour.

Leaves

Opposite to subopposite, chartaceous, pale greenish, 6.5-11.5 × 2-3 cm, 2.5 to 6 times as long as wide, lanceolate, base cuneate to attenuate, apex acute, without acumen; midrib sunken above, raised below; secondary veins slender, 20-30 per side, narrowly spaced, 1-2(-3) mm apart, 60 degrees ascending from midrib, prominent or faint, raised above, prominent and raised below; tertiaries faint, reticulate; intramarginal veins 0.5-1 mm from leaf margin, straight; petiole 1-1.7 cm long, 1/4-1/10(-1/20) of blade length, *c.* 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig, 3-7 cm long, paniculate, first order branching, flowers many, to 30, in head of *c.* 9 flowers; axes *c.* 3-7 cm long; bracts and bracteoles caducous.

Flowers

Whitish (*in vivo*), sessile, hypanthium 3-4 × 2-2.5 mm, obconical, pseudostalk very short, 1-1.5 mm long; sepals 4, free, 1-1.5 × 1-1.5 mm, triangular; petals 4, coherent, 1-2 × 1-2 mm, orbicular; outer stamens 5-6 mm long, anther sacs parallel, connective gland conspicuous; style 4-5 mm long, ovules 9-12 per locule, irregularly radiating.

Fruit

Subglobose, 1-1.3 × 0.7-0.9 cm, surface smooth, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTE

This is a rheophytic species. Gagnepain (1920) recognised *Eugenia cochinchinense* and *Eugenia eburnea* as distinct species on the basis of the twig colour; greyish or reddish vs whitish. We consider both of these species as conspecific with *Syzygium ripicola*, having the same leaf venation and inflorescence type.

46. *Syzygium samarangense* (Blume) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 115 (1938); P.Dy Phon, *Plant Use in Cambodia*: 580 (2000); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 908 (2003). — *Myrtus samarangensis* Blume, *Bijdragen tot de Flora van Nederlandsch-Indië* 17: 1084 (1826). — *Jambosa samarangensis* (Blume) DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 286 (1828). — *Eugenia samarangensis* (Blume) O. Berg in Martius, *Flora Brasiliensis* 14, 1: 646 (1859), *nom. inval.*, in *synon.* — Type: Indonesia, Java, cultivated, *Herb. Blume s.n.* (lecto-; L![sheet no. 898.203-406], here designated).

Myrtus obtusissima Blume, *Bijdragen tot de Flora van Nederlandsch-Indië* 17: 1086 (1826). — *Jambosa ? obtusissima* (Blume) DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 3: 287 (1828). — *Jambosa samarangensis* (Blume) DC. var. *obtusissima* (Blume) Blume, *Museum Botanicum Lugduno-Batavum* 1: 95 (page 81-96: VII.1849). — Type: Indonesia, Java, Lingajati, *Herb. Blume 1558* (holo-, L![sheet no. 898.203-411]).

Eugenia alba Roxb., *Flora indica* 2 [ed. 2, ed. W. Carey]: 493 (1832). — *Jambosa alba* (Roxb.) G. Don, *A General History of the Dichlamydeous Plants* 2: 868 (1832). — Type: *Icones Roxburghianae no. 1069* (lecto-, K! here designated; isolecto-, CAL n.v.).

Jambosa samarangensis (Blume) DC. var. *microcarpa* Hassk. ex (Blume) Hassk., *Catalogus Plantarum in Horto Botanico Bogoriensi Cultarum Alter.* 361 (1844). — Type: Borneo?, 'Archipelagi indici', *Korthals s.n.* (lecto-, L![sheet no. 898.203-423], here designated).

Myrtus timorensis Zipp. ex Span., *Linnaea* 15: 204 (1841), *nom. inval.*, *pro syn.* — *Jambosa timorensis* Blume, *Museum Botanicum Lugduno-Batavum* 1: 97 (page 97-111: VIII.1849). Type: Indonesia, Timor, *Zippelius s.n.* (lecto-, L![sheet no. 893.203-425], here designated; isolecto-, L![sheet no. 898.203-424]).

Jambosa ambigua Blume, *Museum Botanicum Lugduno-Batavum* 1: 96 (page 81-96: 1849). — Type: Indonesia, Java. *Korthals s.n.* (lecto-, L![sheet no. 898.203-402], here designated; isolecto-, K!).

Jambosa timorensis Blume var. *laxiflora* Blume, *Museum Botanicum Lugduno-Batavum* 1: 98. (page 97-111: 1849). — Type: Indonesia, Timor, Kupang. *Anon. s.n.* (holo-, L![sheet no. 898.203-421]).

Eugenia mindanaensis C.B. Rob., *Philippine Journal of Science (Section C, Botany)* 4: 363. 1909. — Type: Philippines, Mindanao, district of Davao, Santa Cruz, *Williams 2752* (holo-, P†; iso-, US![00118057]).

Eugenia javanica Lam. var. *parviflora* Craib, *Florae Siamensis Enumeratio* 1: 647 (1931). — *Syzygium samarangense* var. *parviflorum* (Craib) Chantar. & J.Parn., *Kew Bulletin* 48: 609 (1993). — Type: Thailand, Khao Kalakiri, *Kerr 7798* (lecto-, BK!; iso-, ABD n.v., BM n.v., E n.v., K!, TCD! designated by Chantaranthai & Parnell [1993: 609]).

[*Eugenia javanica* auct. non Lam. (1789): Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 837 (1920), *excl.* var. *balansae* = *Syzygium siamense* (Craib) Chantar. & J.Parn.].

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kandal: Phnom Penh, 6.III.1914, *Chevalier 31706* (P); Kien Svay village, 7.I.2010, *Leti & P.Toeng CL1254* (P), *CL1255* (P), *CL1257* (P), *1258* (P); Phnom Penh, 20.I.2010, *Leti & P.Toeng CL1259* (P), *CL1260* (P), *CL1261* (P).

Vietnam. Ninh Binh: Nho Quan, Cuc Phuong National Park, 25.V.1999, *N.M.Cuong 149* (GH); *idem*, 16.V.1971, *CPNP 3987* (CPNP); *idem*, 16.V.1970, *CPNP 3986* (CPNP). — Thua Thien-Hue: Hue, 28.VI.1916, *Eberhardt 3300* (P). — *sin. loc.*, VI.1927, *Pételot s.n.* (P).

DISTRIBUTION. — Widely cultivated in the tropics, including Cambodia, Laos and Vietnam.

ECOLOGY OR HABITAT. — Low land.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

VERNACULAR NAMES. — Wax apple (general). Cambodia: Champuu, Kanlan reh. Vietnam: Man, Roi.

USES. — An important fruit crop.

DESCRIPTION

Tree to 9 m tall, to 20 cm dbh. Bark smooth or flaky, greenish to brownish. Glabrous.

Twig

Terete, 2.5-4 mm diameter, stout, surface smooth, pale brownish, not contrasting to leaf colour.

Leaves

Opposite, chartaceous, brownish to greenish, 12–20 × 5–13.5 cm, 2 times as long as wide, elliptic, oblong-elliptic, ovate to obovate, base rounded to slightly cordate, apex acute or acuminate; midrib sunken above, raised below; secondary veins 10–12 per side, broadly distanced, 10–20 mm apart, *c.* 45 degrees ascending from midrib, prominent and raised above, prominent below, sometimes a pairs of basal secondary veins arcuate and extending to form outer intramarginal veins; tertiaries prominent, reticulate; intramarginal 3–6 mm from leaf margin, straightly or slightly looped, outer intramarginal veins present; petiole 4–8 mm long, $\frac{1}{30}$ – $\frac{1}{60}$ of blade length, 1.5–2 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy or leafless twig, to 8 cm long, racemose, flowers few, 3 to 7; axes to 5 cm long; bracts and bracteoles caducous.

Flowers

Whitish to yellowish (*in vivo*), big, pedicellate, pedicel 1–2 cm, hypanthium greenish (*in vivo*), not glaucous, not fibrous, 15–20 × 10–15 mm, pyriform, apex broad, tapering gradually to pseudostalk, pseudostalk *c.* 5 mm long; sepals reddish-green (*in vivo*), 4, free, semiorbicular, 3.5–4 × 6–8 mm; petals 4, free, ovate to orbicular, 10–13 × 10–15 mm; outer stamens 15–20 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 20–30 mm long, ovules 28–30 per locule, irregularly radiating.

Fruit

Pyriform to subglobose, whitish, greenish to reddish (*in vivo*), 4.5–6 × 4–6 cm, surface smooth, shiny, calyx ring with persistent, inflexed and fleshy sepal lobes, seed intercotyledonary intrusion absent.

NOTE

Many cultivars of *Syzygium samarangense* are clones which differ in fruit colour and taste.

47. *Syzygium siamense* (Craib) Chantar. & J.Parn.
(Fig. 38)

Kew Bulletin 48: 609 (1993). — *Eugenia siamensis* Craib, *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)* 1912: 153 (1912); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 843 (1920). — Type: Thailand, Chonburi, Sriracha, Nawng Kai Plai, 26.IX.1911, *Kerr 2118* (lecto-, K! designated by Chantaranothai & Parnell (1993: 609); iso-, BM *n.v.*).

Eugenia jambos var. *sylvatica* Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 834 (1920). — *Syzygium jambos* var. *sylvaticum* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 114 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Cây cỏ Việt Nam)* 2: 45, fig. 3719 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 906 (2003). — Type: Vietnam [Cochinchina], Dong Nai, Bien Hoa, Mt. Chua Chan [Nui-chua-chuang], fl., 10.I.1914, *Chevalier 29923 (Fleury)*

(lecto-, P![P00589334], here designated; isolecto-, P! [2 sheets, P00589245 & P00589248]. — Remaining former syntypes: Cambodia, Kampong Speu, Samroang Tong, Phnum Chreav [Mt. Chereev], fl., IV.1870, *Pierre 994* (BM!, K!, P![P00589253, P00589341, P00589342]); Cambodia, Mekong river, fl., IX.1878, *Pierre 1923 (Harmand s.n.)* (P![P00589337]); Vietnam, Hanoi, Ninh Thai, 14.XII.1886, fl., *Bon 3312* (P![2 sheets, P00589246 & P00589247]). (See note)

Eugenia javanica var. *balansae* Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 838 (1920). — Type: Vietnam [Tonkin], forest at the base of Mt. Bavi, X.1886, *Balansa 2864* (lecto-, P!; isolecto-, K!), *syn. nov.* — Remaining former syntypes: Vietnam [Tonkin], Mt. Bavi, 11.IX.1886, *Balansa 2863* (P!).

Eugenia rubida Ridl., *Journal of the Federated Malay States Museums* 10: 90 (1920). — Type: Thailand, Tasan, III.1919, *Boden-Kloss & Robinson 6906* (lecto-, K![K000276218], here designated).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Kampong Speo: Phnum Aural, 16.II.2001, *Boyce, K.Eanghourt, M.Sophal & S.Kosal MoE Herb. Cat. 507* (K); *idem*, 3.III.2001, *K.Eanghourt, M.Sophal & S.Kosal MoE Herb. Cat. 595* (K). — Kampot: Mt. Bokor, Popok Vil waterfall, 7.XII.1968, *Martin 1212* (P). — Koh Kong: , Mt. Trok, 4.III.1966, *Martin 293* (P); Phn Rodam?, 23.II.1966, *Martin 350* (P). — Ratanikiriri: Virachey National Park, Ho Chi Minh trail, 17.XII.2005, *P.Thomas, K.Teah, K., K.Sokhon, S.Teng, S.Sokhon & Y.Bounsoeung 91* (E).

Laos. Viangchan: Nam Ngum reservoir, 23.X.1974, *Vidal 6022* (P). **Vietnam.** Bac Giang: III.1925, *Pételot 1832* (P). — Cochinchina: VII.1870, *Pierre s.n.* (P). — Da Nang: Ba Na National Park, 5.VII.2002, *Phuong 11916* (HN); Tourane and vicinity, 13.VI.1927, *J. & M.S. Clemens 3509* (P). — Dac Lak: Chu Bloe, *Schmid 996* (P). — Dac Lak: Buon Ko Tam, 12.III.1956, *Schmid s.n.* (P). — Ha Nam: Lat Son, VIII.1887, *Bon 3489* (P). — Ha Tay: Mt. Ba Vi, 11.IX.1886, *Balansa 2863* (P); Mt. Ba Vi, X.1886, *Balansa 2864* (P). — Hai Duong: Chi Linh, Hoang Hoa Tham, 6.XI.1996, *T.N.Ninh & Bastien, D. VN 189* (HN). — Hanoi City: Ninh Thai?, 15.V.1889, *Bon 4191* (P); Khanh Thuong, 26.III.1881, *Bon 359* (P). — Ninh Binh: Nho Quan, Cuc Phuong National Park, 8.I.2000, *P.K.Loc PKL 10369* (CPNP). — Phu Tho: Trung Giap forest reserve, 4.VI.1918, *Chevalier 37551* (P). — Thai Nguyen: Luk Xa, III.1933, *Pételot s.n.* (P).

DISTRIBUTION. — Burma, Thailand, Cambodia, Laos, Vietnam and Peninsular Malaysia (Fig. 36).

ECOLOGY OR HABITAT. — Primary forest, sometimes along rivers on sandstone.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering and fruiting all year round.

VERNACULAR NAMES. — Cambodia: Kanlung rung (Koh Kong), Phlang phnom (Koh Kong). Laos: Va yong (Viangchan). Vietnam: Cay roi (Hanoi City), Gioi (Phu Tho), Tram do.

USES. — The fruit is edible.

DESCRIPTION

Tree to 14 m tall, to 20 cm dbh. Bark greyish brown. Glabrous.

Twig

Terete or subangular, 1.5–3 mm diameter, stout, surface smooth to slightly fissured, pale brownish, not contrasting to leaf colour.

Leaves

Opposite, subcoriaceous to chartaceous, greenish, 12.5–17.5 × 3–5.6 cm, 2.5 to 4 times as long as wide, elliptic to oblong, base rounded to cuneate, apex usually acuminate or sometimes acute, acumen when present 1–2 cm long, 1/6–1/10 of blade length; midrib sunken above, raised below; secondary veins 6–10 per side, broadly distanced, 10–20 mm apart, 50–60 degrees ascending from midrib, faint and raised above, prominent below; tertiaries prominent, reticulate; intramarginal *c.* 3–5 mm from leaf margin, looped; petiole 3–6 cm long, (1/20–)1/30–1/45 of blade length, 1.5–2 mm diameter, stout, dark brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 3–5 cm long, racemose, flowers few, 3 to 7; axes 1.5–3.5 cm long; bracts and bracteoles caducous.

Flowers

Big, pedicellate, pedicel 0.4–0.7 cm, hypanthium reddish-green (*in vivo*), not glaucous, not fibrous, 10–15 × 8–10 mm, pyriform, pseudostalk distinct, 5–7 mm long; sepals reddish-green (*in vivo*), 4, free, semiorbicular, unequal, outer lobes 3.5–4 × 7 mm, inner lobes 5–7 × 10 mm, semiorbicular; petals whitish, 4, coherent, orbicular, 2 × 2 mm; outer stamens 2.5–3 cm long, yellowish, anther parallel, connective gland conspicuous; style *c.* 30–40 mm long, ovules 9–12 per locule, irregularly radiating.

Fruit

Globose to ovoid, *c.* 5 × 5 cm, surface smooth, calyx ring with persistent sepal lobes, seed intercotyledonary intrusion absent.

NOTE

Syzygium siamense is morphologically similar to *S. jambos* but differs in its reddish-green receptacle and rounded to cordate leaf base (vs receptacle greenish and leaf base attenuate in *S. jambos*). Gagnepain (1920) regarded the current species as a variety of *S. jambos* placing it under var. *sylvatica*. In the *Flore générale de l'Indochine*, Gagnepain (1920) did not include *S. siamense* in the species key because at the time it was represented only by the type specimen. Gagnepain (1920) and Merrill & Perry (1938b) reported var. *sylvatica* in Hongkong and Guangdong respectively. Merrill & Perry (1938b) concurred with Gagnepain (1920) in differentiating var. *sylvatica* from var. *jambos* by its slightly cordate or rounded leaf base: We were unable to verify this because we have not examined the original material from Hongkong and Guangdong.

48. *Syzygium sterrophyllum* Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 103 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 57, fig. 3758 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 908 (2003). — Type: China, Kwangtung, Shi-wan-da-shan, VII.1933, *Tso* 23377 (holo-, A![71321]). Paratypes: Vietnam, Quang Yen, 12.IX.1885, *Balansa* 1149 (K!, P![P00589438]) and China (Tonkin), Long Tcheou, *Simond s.n.* (P!).

[*Eugenia fluviatilis* auct. non Hemsl. (1887): Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 810 (1920)].

ADDITIONAL MATERIAL EXAMINED. — **Cambodia**. Pursat: Veal Veng, 20.V.1999, *Bansok* 92 (BKF, K).

Laos. Khammouan: Nakai plateau, Nam Theun river, 8.I.1998, *Whitmore* 3717 (E).

Vietnam. 7.III.1980, *Thai & Thuan* 488 (HN). — Da Nang: Tourane and vicinity, V.1927, *J. & M.S. Clemens* 3254 (K); Tourane and vicinity, V–VII.1927, *J. & M.S. Clemens* 3254 (K). — Quang Ninh: Ha Coi, Tsai Wong Mo Shan and vicinity, X.1936, *W.T.Tsang* 27099 (E, K, P); Tien Yen, Ho Yung Shan and vicinity, X.1940, *W.T.Tsang* 29930 (P); Dam Ha, Sai Vong Mo Leng, 18.V.1940, *W.T.Tsang* 30139 (A, E, K, P); *idem*, 18.IX.1940, *W.T.Tsang* 30189 (E, K, P); Van Yen, 19.X.1891, *Balansa* 4488 (K). — Thanh Hoa: Mieu Thon, 15.XII.1977, *Pham Van Dung* 19 A (VFU). — Thua Thien-Hue: Phu Loc, 1.IX.1980, *N.T.Nhan* 868 (HN); Phu Loc, 17.VIII.1979, *L.S.Tran* 89 (HN).

DISTRIBUTION. — China (Guangxi, Hainan and Yunnan), Laos, Vietnam and Cambodia (Fig. 36).

ECOLOGY OR HABITAT. — A rheophytic shrub growing in streambeds on rocky terrain.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: May, June, July, September. Fruiting: October.

VERNACULAR NAME. — Tram la cung (Vietnam).

DESCRIPTION

Shrub to 3 m tall, to 4 cm diameter. Glabrous.

Twig

Angular (4-angled) and slightly winged, older twig terete, 1.5–2 mm diameter, stout, smooth or flaky, brownish, not contrasting to leaf colour.

Leaves

Opposite, coriaceous, dark greenish, 5.5–8 × 0.8–1.6 cm, 5 to 8 times as long as wide, lanceolate, base attenuate, margin entire, recurved below, apex acute and blunt or rounded with no distinct acumen; midrib sunken above, raised below; secondary veins 20–25 per side, 1–2 mm apart, 30–35 degrees ascending from midrib, slender, faint and raised to flattish above, faint below; tertiaries faint, reticulate; intramarginal veins *c.* 0.5 mm from leaf margin, straight; petiole 2–7 mm long, 1/10–1/16 of blade length, to 1 mm diameter, slender, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig, 1–3 cm long, paniculate, first order branching, flowers few, 7–17; axes 0.5–2.5 cm long; bracts and bracteoles persistent, triangular.

Flowers

Whitish (*in vivo*), small, sessile or pedicellate, pedicel 1–3 mm, hypanthium not glaucous, not fibrous, 3–4.5 × 2 mm, obconic, pseudostalk indistinct, subsessile, to *c.* 1 mm long; sepals 4, free, 0.2–0.5 × 2 mm, triangular, undulate on rim; petals coherent,



FIG. 38. — Inflorescence of *Syzygium siamense* (Craib) P.Chantar. & J.Parn. Photo courtesy of Pranom Chantaranothai. Scale bar: 5 cm.

2-2.5 × 2-2.5 mm, orbicular; outer stamens 4.5-5 mm long, anther sacs parallel, connective gland conspicuous; style 5-8 mm long, ovules 7-10 per locule, irregularly arranged, radiating.

Fruit

Obloid, 0.4-0.5 × 0.35-0.4 cm, surface smooth, blackish, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTE

Initially Gagnepain (1920) had referred the Indochinese species to *E. fluviatilis*. Merrill & Perry (1938b), in addition to Chinese specimens, considered *E. fluviatilis* as a new species, *Syzygium sterrophyllum*. Merrill & Perry (1938b) differentiated *S. sterrophyllum* from *S. fluviatile* by its tetragonous twig, obtusely acuminate and dark greenish leaf and sessile or subsessile flowers. *Syzygium fluviatile* is confined to Hainan and it is characterized in having terete twigs, leaves yellowish brown and linear-oblong with a rounded tip and pedicellate flower. Both of these species are rheophytic shrubs. In their recent treatment of Myrtaceae in the *Flora of China*, Chen & Craven (2007) found that the distribution of *S. fluviatile* and *S. sterrophyllum* overlap in Guangxi and Hainan.

49. *Syzygium syzygioides* (Miq.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 109 (1938), *Memoirs of the American Academy of Arts and Sciences* 18: 171 (1939); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 58, fig. 3760 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 908 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 245 (2007). — [*Calyptranthus caryophyllifolia* sensu Blume, *Bi-jdragen tot de Flora van Nederlandsch-Indië* 17: 1089 (1826), *non* Willd. (1796).]. — *Jambosa syzygioides* Miq., *Flora van Nederlandsch Indië* 1(1): 431 (1855), *nom. nov.* — *Eugenia syzygioides* (Miq.) M.R.Hend., *The Gardens' Bulletin Singapore* 12: 154, figs. 30b &c (1949). — Type: Indonesia, Java, *Anon. s.n.*, (lecto-, L![sheet no. 908.151-622, annotated by Blume as '*Syzygium caryophyllifolium*' and by Miquel as '*Jambosa syzygioides*', here designated; isolecto-, L![sheet no. 898.203-378, annotated by Blume as '*Calyptranthes caryophyllifolia*']).

Eugenia pseudosyzygioides M.R.Hend., *The Gardens' Bulletin Singapore* 11: 315, fig. 9 (1947). — Type: Peninsular Malaysia, Trengganu, Bukit Kajang, *SFN 30451* (*Corner*) (holo-, SING *n.v.*; iso-, K![K000786947, K000786948], L!)

[*Syzygium caudatum* Wall., *Wallich Numer. List 3591* (1831) (K-W!, L!, P!), *nom. nud.*].

[*Syzygium vimineum* Wall ex P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 61, fig. 3768 (1992). — *Eugenia viminea* Wall., *Wallich Numer. List 3593B* (1831) (K-W!, L!), *nom. nud.*].

[*Eugenia cymosa* auct non Lam. (1789): Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 823 (1920).] (*vide* type of *Eugenia cymosa* Lam.: Commerson s.n. in *Herb. Lamarck*, P-LA!^[P00412456]).

ADDITIONAL MATERIAL EXAMINED. — **Cambodia**. Kandal: Phnom Penh, 5.IV.1933, *Béjaud* 561 (P); *idem*, *Pierre* s.n. (BM, K); — Koh Kong: Che Ko, 15.II.1965, *T.Kira*, *K.Hozumi*, *K.Yoda* & *S.Kokawa* 874 (BKF).

Laos. Louang Phabang, *de Rouw* 316 (CMU n.v.). (*vide* Newman *et al.* 2007).

Vietnam. Ba Ria-Vung Tau: Ba Ria, IV.1866, *Pierre* s.n. (P). — Cochinchina: *Pierre* s.n. (BM, K). — Dac Lak: *Schmid* VN 998 (P). — Dong Nai: Bien Hoa, V.1866, *Pierre* s.n. (P); Bien Hoa, VI.1909, *d'Alleizette* s.n. (L). — Ho Chi Minh City: Thu Duc, IV.1867, *Pierre* s.n. (P). — Ken Giang: Phu Quoc Is., 15.I.1874, *Pierre* s.n. (P).

DISTRIBUTION. — Widespread from India to Java. In Indochina the species occurs in Cambodia, Laos and Vietnam (Fig. 39).

ECOLOGY OR HABITAT. — Primary forest.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: April, May, June. Fruiting: February.

VERNACULAR NAMES. — Pring Khmum (Cambodia: Kandal), Tram kien kien (Vietnam: Ken Giang).

USES. — The wood is used for house building (Lemmens *et al.* 1995).

DESCRIPTION

Tree to 20 m tall. Glabrous.

Twig

Terete, 1.5-2 mm diameter, slender, surface smooth, whitish to brownish, sometimes contrasting to leaf colour.

Leaves

Opposite, subcoriaceous to chartaceous, greenish brown, 5-7 × 2-3.5 cm, 2 to 3 times as long as wide, elliptic to ovate, base cuneate, *c.* 45 degrees ascending from midrib, margin flat, apex acuminate, with distinct acumen, 0.5-1 cm long, 1/6-1/4 of blade length; midrib sunken above, raised below; secondary veins fine and slender, 25-45 per side, narrowly spaced, 1-2 mm apart, *c.* 60 degrees from midrib, faint above, prominent below; tertiaries faint, reticulate; intramarginal 0.5-1 mm from leaf margin, straight; petiole 3-5 cm long, 1/10-1/14 of blade length, 1.5-2 mm diameter, stout, brownish.

Inflorescence

Terminal or axillary on leafy twig near twig-end, to 4 cm long, paniculate, to second degrees branching, spreading, flowers many, to 32; axes slender, to *c.* 4 cm long; bracts and bracteoles persistent, triangular.

Flowers

Sessile, hypanthium not glaucous, not fibrous, 3 × 2 mm, obconic, pseudostalk distinct, *c.* 1 mm long; sepals 4, free, triangular, 0.8-1 × 1-1.5 mm; petals 4, free, orbicular, 2-3 × 2-3 mm; outer stamens 3.5-4 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 5 mm long, ovules 10-14 per locule, irregularly radiating.

Fruit

Globose to depressed globose, 7 × 7-8 cm, surface smooth, calyx ring with smooth to undulating rim, seed intercotyledonary intrusion absent.

NOTE

Blume (1826) misidentified specimens from Java (see types of *Syzygium syzygioides*) as *Calypttranthes caryophyllifolia* Willd. These specimens were later renamed by Miquel (1855) as *Jambosa syzygioides*.

50. *Syzygium tetragonum* (Wight) Wall. ex Walp.

Repertorium Botanices Systematicae 2: 179 (1843); D.D.Soejarto *et al.*, *Seed Plants of Cuc Phuong National Park*: 429 (2004) [misidentified as *S. cinereum*]. — *Eugenia tetragona* Wight, *Illustrations of Indian Botany* 2: 16 (1841). — Type: Bangladesh, Silhet, *F. de Silva* s.n. in *Wallich Numer. List 3550* (1831) (holo-, K-W!¹; iso-, E!, BM!, M!, P[P00589407!]). (*vide* Noltie [2005: 362]).

Eugenia subviridis Craib, *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)* 1929: 117 (1929). — Type: Thailand, Chiangmai, Doi Sutep, *Kerr 3503* (lecto-, ABD n.v., designated by Chantaranothai & Parnell (1994: 113); isolecto-, BM!, K!).

Syzygium nienkui Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 228 (1938). — Type: China, Dai Land, Dung Ka, 23.IX.1932, *Chun & Tso 43905* (holo-, A![A00071314]; iso-, NY![405592], US![US00118278]).

[*Syzygium ficifolium* Wall., *Wallich Numer. List 3558* (1831) (K-W!¹), *nom. nud.*].

[*Syzygium rameum* Wall., *Wallich Numer. List 3595* (1831) (K-W!¹), *nom. nud.*].

ADDITIONAL MATERIAL EXAMINED. — **Vietnam**. Lam Dong: Da Chay, 19.III.1997, *Averyanov*, *N.Q.Binh*, *P.K.Loc* VH 2934 (P). — Lao Cai: Chapa, 23.I.1964, *Schmid* 4 (P). — Ninh Binh: Nho Quan, Cuc Phuong National Park, 1.IX.2003, *N.M.Cuong*, *M.V.Xinh* & *N.H.Quang* MC 78 (CPNP); *idem*, 22.V.2000, *Soejarto* & *N.M.Cuong* 11541 (CPNP), 11579 (CPNP) and 11589 (CPNP); *idem*, 18.XI.1999, *Soejarto*, *N.M.Cuong*, *N.Q.Binh*, *N.T.Hiep* & *M.V.Xinh* 11035 (CPNP); *idem*, 23.X.2000, *N.M.Cuong*, *M.V.Xinh* & *D.T.Kien* NMC 1121 (CPNP). — Vinh Phuc: Mt. Tam Dao, 3.III.1938, *Pételot* 6303 (A); Mt. Tam Dao, 20.II.1940, *Pételot* 5303 (P).

DISTRIBUTION. — Bhutan, Nepal, India, Bangladesh, Burma, Thailand, Vietnam and South China. In Indochina, documented in Vietnam only but may be present in Cambodia and Laos (Fig. 39).

ECOLOGY OR HABITAT. — In primary or secondary forest, along rivers to 1450 m.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: January, March, May, November. Fruiting: February.

DESCRIPTION

Tree 6-8 m tall. Glabrous.

Twig

Angular (4-angled) and winged, 2.5-3 mm diameter, stout, surface smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite, chartaceous to subcoriaceous, greenish, 11.5-16.5(-2.7) × 4.5-7 cm, 2.5 to 3 times as long as wide, obovate to elliptic, base strongly attenuate, 30-35 degrees ascending from midrib, margin flat, apex usually acuminate, sometimes mucronate, obtuse or rounded, acumen when present 0.5-1 cm long, 1/23-1/30 of blade length; midrib sunken above, raised below; secondary veins, stout, 10-15 per side, 5-15 mm apart, 45-60 degrees ascending from midrib, prominent to faint, sunken above, prominent below; tertiaries prominent to faint, reticulate; intramarginal veins 1-2 mm from leaf margin, straight to slightly looped, outer intramarginal veins present; petiole 1.5-2 cm long, 1/12-1/16 of blade length, 1.5-2 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Axillary on leafless twig, 3.5-4.5 cm long, paniculate, first to second degrees branching, flowers many, to 37; axes stout, 3-4 cm long; bracts and bracteoles caducous, triangular.

Flowers

Sessile, hypanthium not glaucous, not fibrous, 2.5-4 × 2-3 mm, pyriform to obconic, pseudostalk distinct, *c.* 1 mm long; sepals 4, free, triangular, *c.* 0.5 × 1.5 mm; petals 4, coherent, orbicular, 1.5 × 1.5 mm; outer stamens 3.5-4 mm long, anther sacs parallel, connective gland inconspicuous; style *c.* 1.5 mm long, ovules *c.* 10 per locule, irregularly radiating.

Fruit

Globose, 0.1-1 × 0.5-1 cm, surface smooth, calyx ring with smooth to undulating rim, seed intercotyledonary intrusion absent.

NOTE

Although this is a widespread species, it was not collected in Indochina until 1938. This species is distinctive in having a winged and quadrangular twig, attenuate leaf base and axillary inflorescences borne on leafless twig.

51. *Syzygium thorelii* (Gagnep.) Merr. & L.M.Perry
(Fig. 40)

Journal of the Arnold Arboretum 19: 107 (1938). — *Eugenia thorelii* Gagnep., *Notulae Systematicae* 3: 333 (1917); Gagnep., in Lecomte, *Flore générale de l'Indochine* 2: 816, (1920). — Type: Thailand, Kemmarat, fl., *Thorel* 3010 (lecto-, P![P00589178], here designated; isolecto-, P!, *Thorel* s.n. [3010] [P00589179], K![K000276196]). — Remaining former syntypes: Laos, between Xieng-Kuang and Pak-lay, fl., *Thorel* s.n. (P![P00589265]); Laos, Viangchan [Vien-Chang], fl., *Thorel* 3010 (P![P00589264]) (see Note 1).

Eugenia cambodiana Gagnep., *Notulae Systematicae* 3: 319 (1917); Gagnep. in Lecomte, *Gén. Indo-Chine* 2: 810 (1920). — *Syzygium cambodianum* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 105 (1938). — Type: Cambodia, *sin. loc.*, fl., 1874, *Jullien* s.n. (lecto-, P![P00589294], here designated; isolecto-, P![2 sheets, P00589295 & P00589296], K![K000276185]), *syn. nov.* (see Note 2).

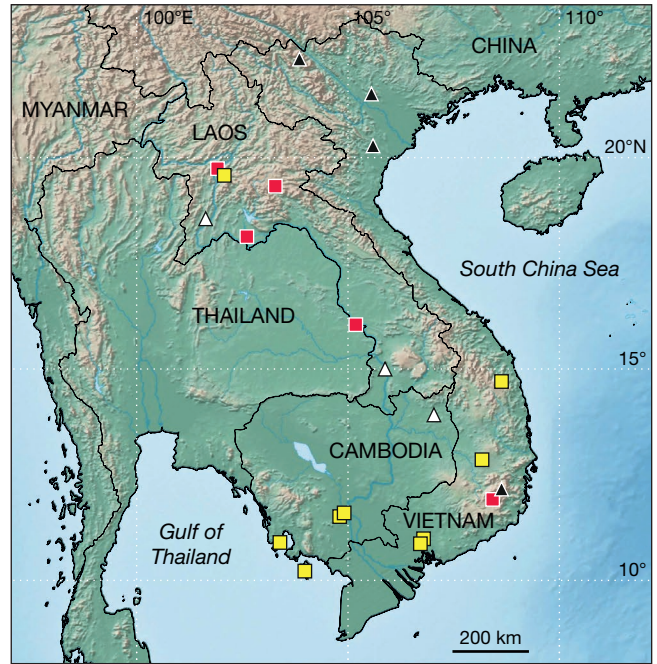


FIG. 39. — Distribution of *Syzygium syzygioides* (Miq.) Merr. & L.M.Perry (■), *Syzygium tetragonum* (Wight) Wall. ex Walp. (▲), *Syzygium thorelii* (Gagnep.) Merr. & L.M.Perry (■) and *Syzygium thumra* (Roxb.) Merr. & L.M.Perry (△) in Indochina.

ADDITIONAL MATERIAL EXAMINED. — Laos. Louang Phabang: IV.1954, *Vidal* 2786 (P); Ban Song, 29.XII.1953, *Vidal* 2520 (P). — Viangchan: 26.XII.1952, *Vidal* 2101 (P). Vietnam. Lam Dong: Col de Prenn, 22.III.1957, *Tixier* 08 (P).

DISTRIBUTION. — Endemic to Continental Southeast Asia, found in Cambodia, Laos, Thailand and Vietnam (Fig. 39).

ECOLOGY OR HABITAT. — In forest along rivers on boulders.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Vulnerable (VU B1ab[i, iii]).

PHENOLOGY. — Flowering: March, June, December. Fruiting: April.

VERNACULAR NAMES. — Laos: Kam (Louang Phabang), Kok kam (Viangchan), Va nam (Louang Phabang).

USES. — The fruit is edible and used as medicine.

DESCRIPTION

Shrub 1-2 m tall. Glabrous.

Twig

Terete, 1-2 mm diameter, slender, surface smooth, brownish, not contrasting to leaf colour.

Leaves

Opposite, subopposite or alternate, blade chartaceous, dark brownish, (3.5-)5-6(-9) × (1-)1.5-2.5 cm, 2 to 5 times as long as wide, mostly obovate to oblong-obovate, sometimes lanceolate, base attenuate with unequal base, apex rounded, acute or obtuse, acumen absent; midrib sunken above, raised below; secondary veins slender, 7-12 per side, narrowly spaced, 2-3 mm apart, 20 to 30 degrees ascending from midrib,

faint and raised above, prominent below; tertiaries slender, prominent, reticulate; intramarginal veins prominent, distance from margin *c.* 1 mm, straight; petiole 5-8 mm long, 1/7-1/10 of blade length, *c.* 1 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leaf twig near twig-end, 3-6 cm long, paniculate, second order branching, flowers many, 39-90, the first order branches branched out from the main stalk at almost the same point, umbel-like, the second order branch is relatively short (*c.* 1 mm) and flowers in heads of 7 to 13 flowers; axes 2.5-5.5 cm long; bracts and bracteoles persistent, triangular.

Flowers

Sessile, hypanthium not glaucous, not fibrous, 4-4.5 × 2.5-3 mm, obconic, pseudostalk distinct, 1-1.5 mm long; sepals 4, free, triangular, *c.* 0.5 × 1 mm, undulating on hypanthium rim; petals 4, coherent, orbicular, 3 × 3 mm, *c.* 4 glands per petal; outer stamens 5 mm long, anther sacs parallel, connective gland conspicuous, large; style *c.* 4 mm long, ovules *c.* 10 per locule, irregularly radiating.

Fruit

Subglobose, 0.6 × 0.5 cm, surface smooth, calyx ring with smooth to undulating rim, seed intercotyledonary intrusion absent.

NOTES

1. There was typographical error in the protologue, the types cited as *Pierre 3010* should be *Thorel 3010*.

2. Gagnepain (1920) noted that *Syzygium cambodianum* is almost similar to *S. thorelii*, but he considered both as different species in that the leaves of *S. cambodianum* are opposite as opposed to alternate, with more pustulations below the leaf surface and the head of the inflorescence is two times larger than in *S. thorelii*. We consider *S. cambodianum* conspecific with *S. thorelii*, having the same leaf venation type, leaf shape (apex without distinct acumen and base unequal-attenuate) and inflorescence type (in head size and umbel-like). The leaf arrangement in *S. thorelii* is variable, ranging from opposite to alternate with the possibility of both occurring in the same specimen (for example *Vidal 2520* & *Vidal 2786*).

52. *Syzygium thumra* (Roxb.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 20: 103 (1939); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 242 (2007). — *Eugenia thumra* Roxb. [*Hortus Bengalensis*: 92 (1814), *nom. nud.*] *Flora indica* 2 [ed. 2, ed. W. Carey]: 495 (1832). — Type: *Icones Roxburghianae no. 2507* (lecto-, K!, here designated; isolecto-, CAL n.v.).

Eugenia ferruginea Wight, *Icones Plantarum Indiae Orientalis* 2 (3): 4, t. 554 (1842) *nom. illeg., non* Poir. (1813). — Type: Wight, *Icones Plantarum Indiae Orientalis* 2: t. 554 (1842).

Eugenia thumra Roxb. var. *penangiana* King, *Journal of the Asiatic Society of Bengal* 70: 92 (1901); M.R.Henderson, *The Gardens' Bulletin Singapore* 12: 260 (1949). — *Syzygium thumra* (Roxb.) Merr. & L.M.Perry var. *penangianum* (King) I.M. Turner, *Journal of the Singapore National Academy of Science* 22-24: 25 (1996). — Type: Peninsular Malaysia, Penang, Waterfall, V.1890, *Curtis 2410* (holo-, K!, iso-, SING!) (see Note 1).

Eugenia sphaerantha Gagnep., *Notulae Systematicae* 3: 333 (1918); Gagnep., in Lecomte, *Flore générale de l'Indochine* 2: 830 (1920). — *Syzygium sphaeranthum* (Gagnep.) Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 113 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Vietnam)* 2: 57, fig. 3756 (1992). — Type: Laos, Attopeu, Bolaven plateau [Attopeu plateau], fl., *Pierre 3192* (*Harmand s.n.*) (lecto-, P![P00589180] with Delpy's drawing dated XII.1899 attached, here designated; isolecto-, P![3 sheets, P00589181, P00589182 & P00589183], K![K000276191]), *syn. nov.* (see Note 2).

Eugenia punctifolia Ridl., *Journal of the Federated Malay States Museums* 10: 91 (1920). — *Eugenia thumra* subsp. *punctifolium* (Ridl.) Chantaranothai & J.Parn., *Kew Bulletin* 48: 610 (1993). — Type: Thailand, Mamu, *Boden-Kloss 6704* (lecto-, K!).

[*Syzygium speciosum* Wall., *Wallich Numer. List 3568* (1831) (K-W!), *nom. nud.*]

[*Eugenia laosensis* Gagnep., *Notulae Systematicae* (Paris) 3: 326 (1918), *quoad spec. Thorel s.n.* (Nong Kay).]

ADDITIONAL MATERIAL EXAMINED. — **Cambodia.** Ratanakiri: Ban Long, 11.I.1969, *Martin 1452* (P).

Laos. Xaignabouli: Nong Kai, 1866-1868, *Thorel s.n.* (P).

DISTRIBUTION. — India (Bengalia), Burma, Cambodia, Laos, Thailand, Peninsular Malaysia and South China (Hong Kong and Guangdong) (Fig. 39). Perhaps not yet collected in Vietnam.

ECOLOGY OR HABITAT. — Primary or secondary forest.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Data Deficient (DD).

VERNACULAR NAME. — Prin Mret (Cambodia: Ratanakiri).

USES. — The wood is used for construction.

DESCRIPTION

Tree to 20 m tall. Glabrous.

Twig

Terete, *c.* 3 mm diameter, stout, surface smooth, whitish, contrasting to leaf colour.

Leaves

Opposite, subcoriaceous, dark brownish to blackish, 10-13.5 × 3.5-4.5 cm, 3 times as long as wide, elliptic to oblong, base strongly attenuate, apex acute, with no distinct acumen; midrib sunken above, raised below; secondary veins 10-15 per side, widely spaced, 5-10 mm apart, 60-70 degrees from midrib, prominent and raised on both surfaces; tertiaries faint, reticulate; intramarginal veins *c.* 1 mm from leaf margin, straight; petiole 1-1.5 cm long, 1/7-1/11 of blade length, *c.* 1.5 mm diameter, slender, dark brownish, not contrasting blade colour.



FIG. 40. — Lectotype of *Syzygium cambodianum* (Gagnep.) Merr. & L.M.Perry, Jullien s.n. (P00589294); detail, close-up of inflorescence. Scale bar: 0.5 cm.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 5-7 cm long, paniculate, third to fourth order branching, spreading, flowers many, *c.* 300; axes 5-7 cm long; bracts and bracteoles caducous.

Flowers

Sessile, bud globose, hypanthium not glaucous, not fibrous, 4.5 × 3.5 mm, obconic, pseudostalk distinct, 2.5-3 mm long; sepals 4, free, semiorbicular, unequal, outer lobes *c.* 2 × 2.5 mm, inner lobes *c.* 2 × 3 mm, semiorbicular; petals 4, free, orbicular, *c.* 2.5 × 3 mm; outer stamens *c.* 5 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 5 mm long, ovules 20-25 per locule, irregularly radiating.

Fruit

Not seen.

NOTES

1. Two infraspecific groups are formally recognised: var. *penangianum* from Peninsular Malaysia and subsp. *punctifolium* from Thailand. According to King (1901), in comparison with var. *thumra*, the leaves of var. *penangianum* are narrower with a lower number of secondary veins and the inflorescence is shorter with acutely angular branches. In subsp. *punctifolium*, the upper leaf surface is pustulate at the apex as opposed to the typical punctilate surface found in most *Syzygium* species. The foregoing vegetative characters are rather plastic characters in *Syzygium* and so we are hesitant to use them as indicators of significant infraspecific variation.

2. Gagnepain (1920) differentiated *Syzygium sphaeranthum* from *S. thumra* by its leaves (but without any elaboration in the protologue), the terete twig and the cymose inflorescence. In comparison with *Syzygium thumra* from other regions (India, Burma, Peninsular Malaysia and Thailand), we do not see any differences between these two species in their leaf venation and inflorescence. *Syzygium thumra* when dried is distinctive in having dark brownish and shiny leaves that are contrasting in colour to the whitish twig, and has a highly branched paniculate inflorescence (third to fourth order).

53. *Syzygium tonkinense* (Gagnep.) Merr. & L.M.Perry (Fig. 41)

Journal of the Arnold Arboretum 19: 105 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 59, fig. 3764 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 909 (2003). — *Eugenia tonkinense* Gagnep., *Notulae Systematicae* 3: 334 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 811 (1920). — Type: Vietnam, Hanoi, Vo-xa, fl., 1.VII.1885, *Bon* 2968 (cited as *Bon* 298 in the protologue) (lecto-, P![P00589175], here designated; isolecto-, P![P00589176]).

Syzygium touranense Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 111 (1938). — Type: Vietnam [Annam], Tourane, J. & M.S. Clemens 4300 (holo-, A![A00071339]; iso-, CAS![CAS0005449], K![K0000276197], NY![405598], US1 [US00118296]), *syn. nov.*

ADDITIONAL MATERIAL EXAMINED. — Vietnam. Da Nang: Ba Na National Park, 4.VII.2002, *Phuong* 4844 (HN). — Thua Thien-Hue: Bach Ma National Park, 8.V.2003, *N.T.Hiep*, *Averyanov* & *N.T.Vinh* HLF 1691 (HN).

DISTRIBUTION. — Endemic to Vietnam (Fig. 42).

ECOLOGY OR HABITAT. — Primary forest.

CONSERVATION STATUS. — IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: March to July. Fruiting: not documented.

VERNACULAR NAMES. — Vietnam: Tram bac, Tram bacbo.

DESCRIPTION

Tree to 25 m tall. Glabrous.

Twig

Terete, *c.* 2 mm diameter, slender, surface smooth to slightly flaky, pale brownish, not contrasting to leaf colour.

Leaves

Opposite, chartaceous, shiny, dark brownish, 5.5-11 × 2.5-6 cm, 2 to 2.5 times as long as wide, elliptic, slightly obovate, base cuneate, slightly attenuate, margin flat, apex acuminate, with distinct acumen, 0.5-1 cm long, acumen 1/4-1/5 of blade length; midrib sunken above, raised below; secondary veins slender, 8-9 per side, widely spaced, 5-8 mm apart, to 70 degrees ascending from midrib, faint and raised on upper surface, faint on lower surface; tertiaries faint, reticulate; intramarginal veins 1-2 mm from leaf margin, looped, outer intramarginal veins present; petiole *c.* 0.5 cm long, 1/11-1/15 of blade length, *c.* 1 mm diameter, slender, dark brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 3-5 cm long, paniculate, second to third order branching, flowers many, to 63 flowers, in heads of 9 to 12 flowers, the last branch order is short, *c.* 1 mm or less; axes *c.* 3 cm long; bracts and bracteoles caducous.

Flowers

Whitish (*in vivo*), globular, sessile, hypanthium not glaucous, not fibrous, *c.* 3 × 2.5 mm, obconic, pseudostalk distinct, *c.* 1.5 mm long; sepals 4, free, 0.3-0.5 × 0.8 mm, triangular, undulate on rim; petals 4, coherent, 1.8-2 × 2 mm, orbicular; outer stamens to 5 mm long, anther sacs parallel, connective gland conspicuous; style *c.* 3 mm long, ovules *c.* 10 per locule, irregularly radiating.

Fruit

Unknown.

NOTE

Syzygium tonkinense is distinguished from other *Syzygium* species by its shiny and dark brownish leaves, globular flowers and glomerulate inflorescence.



FIG. 41. — Lectotype of *Syzygium tonkinense* (Gagnep.) Merr. & L.M.Perry, Bon 2968 (P00589175); detail, close-up of inflorescence. Scale bar: 0.5 cm.

54. *Syzygium tsoongii* (Merr.) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 112 (1938); Merr. & L.M.Perry, *Journal of the Arnold Arboretum* 19: 224 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việtnam)* 2: 60, fig. 3766 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 909 (2003). — *Eugenia tsoongii* Merr., *Philippine Journal of Science* 21: 504 (1922). — Type: China, Kwangtung, Tung Sing, 22.VI.1918, *Tsoong 1867* (C.C.C. 3748), (holo-, PNH†; A![69413]).

Eugenia leucocarpa Gagnep., *Notulae Systematicae* 3: 327 (1918), *nom. illeg., non* Merr. (1916). — Type: Vietnam [Annam], Than-hoa, near Cua Bang, *Bon 5578* (lecto-, P![P00589197], here designated; isolecto-, P![2 sheets, P00589198 & P00589199]). Remaining former syntypes: Vietnam [Annam], Along bay, Biches island, VIII.1911, *Lecomte & Finet 798* (P!); Vietnam [Cochinchina], *Thorel s.n.* (P, n.v.).

ADDITIONAL MATERIAL EXAMINED. — **China**. Guangdong: 2 Sept 1981, *G.H.Yip 467* (BM). — Hainan: Chung Kon, VI-VII.1935, *J.L.Gressitt 1034* (E); Xian, 5.XII.2000, *MO-IBSC 396 & 395* (BM); Dung Ka to Wen Fa Shi, 1932-1933, *C.L.Tso & N.K.Chun 43688* (P); 26.VII.1933, *C.Wang 33342* (P).

Vietnam. Da Nang: Tourane and vicinity, VI.1927, *J. & M.S. Clemens 3380* (BM, K). — Ha Tinh: Huong Son, 8.X.1998, *Frank & N.T.Hiep 445* (HN). — Nghe An: Que Phong, 21.XII.2002, *N.Q.Binh & D.D.Cuong VN 1045* (HN). — Quang Binh: Bien Trien village, VII.1930, *Pételot 4676* (P); 12.V.1964, *L.N.Hiep 5915* (HN). — Thua Thien-Hue: Phu Loc, 3.VIII.1979, *Thai & Thuan 04* (HN). — Tonkin: Ouoongi, 2.XI.1885, *Balansa 1148* (P).

DISTRIBUTION. — China (Guangxi, Hainan and Hunan) and Vietnam (Fig. 42).

ECOLOGY OR HABITAT. — A rheophytic shrub growing on streambeds, on boulders and gravels, growing in swift-running water.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: June, July, August, November. Fruiting: May, August, October, November, December.

VERNACULAR NAMES. — Vietnam: Tram chôi (Quang Binh), Tram qua trang, Tram trait trang.

DESCRIPTION

Shrub to 1.5 m tall. Glabrous.

Twig

Angular (4-angled) and winged when young, terete when old, 1-1.5 mm diameter, slender, surface smooth, whitish to pale brownish, sometimes contrasting to leaf colour.

Leaves

Opposite, coriaceous, pale greenish to yellowish brown, 3.5-6 × 0.5-1 cm, 3.5 to 5 times as long as wide, lanceolate, base acute, apex rounded, obtuse or acute; midrib sunken above, raised below; secondary veins slender, 10-15 per side, narrowly spaced, 2-3 mm apart, 20 to 30 degrees ascending from midrib, faint on both surfaces; tertiaries faint, reticulate; intramarginal veins 0.5-1 mm from leaf margin, straight; petiole *c.* 2 mm long, $\frac{1}{15}$ - $\frac{1}{30}$ of blade length, *c.* 1 mm diameter, stout, dark brownish to blackish, contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, 3.5-4 cm long, paniculate, first order branching, flowers many, to 33; axes 3-3.5 cm long; bracts and bracteoles caducous.

Flowers

Whitish (*in vivo*), sessile, hypanthium *c.* 7 × 2 mm, corrugated, glaucous, not fibrous, clavate, pseudostalk distinct, *c.* 2 mm long; sepals 4-5, free, *c.* 0.5 × 1 mm, triangular; petals 4-5, coherent, 2 × 2 mm, orbicular; outer stamens *c.* 0.6 cm long, anther sacs parallel, connective gland conspicuous; style *c.* 6 mm long, ovules *c.* 10 per locule, in 2 longitudinal rows.

Fruit

Whitish, globose, 0.5 × 0.5 cm, surface smooth, calyx ring with persistent sepal lobes, seed intercotyledonary intrusion absent.

NOTE

This species is allied to *Syzygium antisepticum* in subg. *Sequestratum*.

55. *Syzygium vestitum* Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 110 (1938); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việtnam)* 2: 60, fig. 3767 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 909 (2003). — Type: Vietnam [Annam], Mt. Bana, V-VII.1927, *J. & M.S. Clemens 3296* (holo-, A![A00071340]; iso-, BM!), CAS![CAS0005450], K![K000276194], MICH![MICH1109589], NY![405599], US![US00118301]).

ADDITIONAL MATERIAL EXAMINED. — **Laos**. Viangchan: Phou Kha-okhoay, 29.X.1971, *Vidal 5696* (P).

Vietnam. Lao Cai: Chapa, VII.1930, *Pételot 6145* (A, SING); Sa Pa, 11.XII.1964, *K.Doan & Q.Truong VN 2870* (HN). — Quang Nam-Da Nang: Mt. Ba Na, V.1927, *J. & M.S. Clemens 4453* (K). — Son La: Thuan Chau, 16.X.2005, *N.Q.Binh & D.D.Cuong VN 1587* (HN). — Vinh Phuc: Mt. Tam Dao, 15.VIII.1997, *Phengkhlai 10604* (BKF); Mt. Tam Dao, 1965, *Doan Dieu & Viet Trung VN 4513* (HN). — *sin. loc.* 25.VII.1976, *Tam et al. LX-VN 181* (HN).

DISTRIBUTION. — South China (Yunnan), Laos and Vietnam (Fig. 42).

ECOLOGY OR HABITAT. — Primary forest to 1500 m.

CONSERVATION STATUS. — IUCN Global Status: Data Deficient (DD); IUCN Regional (Indochina) Status: Data Deficient (DD).

PHENOLOGY. — Flowering: July, August. Fruiting: Not documented.

VERNACULAR NAME. — Tram phu (Vietnam).

DESCRIPTION

Tree to 10 m tall. Hairy on twig, leaves and inflorescence.

Twig

Terete, 2-3 mm diameter, stout, brownish, not contrasting to leaf colour.

Leaves

Opposite, chartaceous to subcoriaceous, dark brownish, 11-20 × 4-7 cm, 2.5 to 3 times as long as wide, elliptic, oblong or

obovate, base cuneate to slightly rounded, apex cuspidate or shortly and abruptly acuminate, acumen 0.5–1.5 cm long, $\frac{1}{11}$ – $\frac{1}{25}$ of blade length; midrib sunken above, raised below; secondary veins stout, 10–25 per side, widely spaced, 5–15 mm apart, 50–60 degrees ascending from midrib, prominent and sunken above, prominent below; tertiaries prominent, subscalariform; intramarginal veins 2–3 mm from leaf margin, straight, prominent; petiole 0.5–1 cm long, $\frac{1}{20}$ – $\frac{1}{30}$ of blade length, c. 2 mm diameter, stout, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, to 14 cm long, paniculate, first order branching, flowers many, to 63; axes c. 13 cm long, stout; bracts and bracteoles caducous, lanceolate.

Flowers

Whitish (*in vivo*), sessile, hypanthium 4–6 × 2–4 mm, obconic, pseudostalk distinct, 2–3 mm long; sepals 4, free, semiorbicular, 1 × 2.5 mm; petals 4, coherent, orbicular, c. 2.5 × 2.5 mm; outer stamens c. 1.5 mm long, anther sacs parallel, connective gland conspicuous; style 4–5 mm long, ovules c. 7 per locule, irregularly radiating.

Fruit

Globose to depressed globose, 2 × 1.5–2 cm, surface rugose to smooth, calyx ring with smooth rim, seed intercotyledonary intrusion absent.

NOTE

In Indochina, *Syzygium vestitum* is the only species with pubescent leaves. The other hairy species is *S. levinei* but its indumentum is confined to its inflorescence.

56. *Syzygium zimmermannii* (Warb. ex Craib) Merr. & L.M.Perry

Journal of the Arnold Arboretum 19: 114 (1938); P.H.Hô, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 62, fig. 3772 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 910 (2003); M.F.Newman *et al.*, *A Checklist of the Vascular Plants of Lao PDR*: 246 (2007). — *Eugenia zimmermannii* Warb. ex Craib, *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)* 1914: 124 (1914); Gagnep., *Notulae Systematicae* 3: 335 (1918); Gagnep. in Lecomte, *Flore générale de l'Indochine* 2: 835 (1920). — Type: Thailand, Bangkok, 1899, *Zimmermann 160* (lecto-, K!, isolecto-, L!, P[P00589256]!). Remaining former syntype: Thailand, Chiang Mai, 15.VI.1911, *Kerr 1855* (K!, TCD!).

ADDITIONAL MATERIAL EXAMINED. — Laos. Louang Phabang: Ban Song, 29.XII.1953, *Vidal 2521* (P); Muong You, XII.1903, *Spire 419* (P); Muong You, *Spire 1519* (P). — Viangchan: 1866–1868, *Thorel s.n.* (P).

Vietnam. Quang Nam-Da Nang: Mt. Bana, V.1927, *J. & M.S. Clemens 3110* (A, K); Son La: between Van Yen and Van Bu, Black River, III.1927, *Pételot 4037* (P).

Thailand. Chiang Mai: *Kerr 20018* (K, TCD).

DISTRIBUTION. — Laos, Thailand and Vietnam (Fig. 42).

ECOLOGY OR HABITAT. — In primary forest along rivers.



FIG. 42. — Distribution of *Syzygium tonkinense* (Gagnep.) Merr. & L.M.Perry (■), *Syzygium tsoongii* (Merr.) Merr. & L.M.Perry (▲), *Syzygium vestitum* Merr. & L.M.Perry (△) and *Syzygium zimmermannii* (Warb. ex Craib) Merr. & L.M.Perry (●) in Indochina.

CONSERVATION STATUS. — IUCN Global Status: Least Concern (LC); IUCN Regional (Indochina) Status: Least Concern (LC).

PHENOLOGY. — Flowering: May–July. Fruiting: not documented.

VERNACULAR NAMES. — Laos: Kai va (Louang Phabang), Va poum pa (Louang Phabang).

USES. — The flowers are used to treat fever.

DESCRIPTION

Tree to 20 m. Glabrous.

Twig

Terete, subangular, 2–3 mm diameter, stout, smooth, whitish, contrasting to leaf colour.

Leaves

Opposite, chartaceous, dark greenish, 8.5–12.5 × 2.2–3.2 cm, 3 to 4 times as long as wide, elliptic, oblong-elliptic or oblong-obovate, base slightly unequal, attenuate, apex mostly acute and obtuse, sometimes rounded, acumen absent; midrib flat above, raised below; secondary veins 6–10 per side, widely spaced, 7–10 mm apart, c. 50 degrees from midrib, prominent to faint, flattish above, prominent below, 1–3 pairs of basal secondary veins arcuate, extending from base to half way or near leaf apex, forming outer intramarginal veins; tertiaries prominent, reticulate; intramarginal veins extend above the leaf base (after basal secondary veins) to leaf apex, looped, c. 2 mm from leaf margin, outer intramarginal veins present; petiole 0.5–1 cm long, $\frac{1}{25}$ – $\frac{1}{50}$ of blade length, 1–2 mm diameter, slender, brownish, not contrasting to blade colour.

Inflorescence

Terminal or axillary on leafy twig near twig-end, to 10 cm long, paniculate, first order branching, flowers 9 to 15; axes to 8 cm long; bracts and bracteoles caducous, ovate.

Flowers

Pedicellate, pedicel 0.3-0.5 cm, hypanthium not glaucous, not fibrous, 6-6.5 × 5-5.5 mm, pyriform, pseudostalk distinct, 2.5-3 mm long; sepals 4, free, suborbicular, *c.* 3.5 × 4 mm; petals 4, free, suborbicular, 5-6.5 × 5.5-7 mm; outer stamens 10-11 mm long, anther sacs parallel, connective gland conspicuous; style 7-8 mm long, ovules 16-18 per locule, irregularly radiating.

Fruit

Unknown.

INCOMPLETELY KNOWN SPECIES

Syzygium sp. aff. *Syzygium rubicundum* Wight & Arn.

Prodrromus Florae Peninsulae Indiae Orientalis: 330 (1834); P.H.Hò, *An Illustrated Flora of Vietnam (Câyco Việt Nam)* 2: 57, fig. 3756 (1992); K.D.Nguyen, (*Myrtaceae*) *Checklist of Plant Species of Vietnam* 2: 908 (2003). — Voucher: Vietnam, *sin. loc.*, 28.VIII.1986, *Anon. LX-VN 3467* (HN!).

NOTES

This taxon is represented by one specimen in a premature flowering state. It is similar to *Syzygium rubicundum* but differs from the type (*Herb. Wight Prop. No. 1072*, E!) in having broader leaves. More specimens are needed to confirm the status of this taxon.

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APPENDIX

APPENDIX 1. — List of species names for indexing. Bold names are accepted names. Italic names are synonyms, illegitimate names and names without species description.

- Acmena acuminatissima* (Blume) Merr. & L.M.Perry
Acmena bracteolata (Wight) Walp.
Acmena championii Benth
Acmena claviflora (Roxb.) Walp.
Acmena dielsii Merr. & L.M.Perry
Acmena grata (Wight) Walp.
Acmena laevifolia (Ridl.) Merr. & L.M.Perry
Acmena oblata (Roxb.) Walp.
Acmena polyantha (K.Schum. & Lauterb.) Merr. & L.M.Perry
Acmenosperma claviflorum (Roxb.) Kausel
Acronychia laurifolia Blume
Calyptranthes aromatica Blume
Calyptranthes capitellata Buch.-Ham. ex Wall.
Calyptranthes caryophyllifolia (Lam.) Willd.
Calyptranthes costata Buch.-Ham. ex Wall.
Calyptranthes cumini (L.) Pers.
Calyptranthes cuneata Buch.-Ham. ex Wall.
Calyptranthes fastigiata Bl.
Calyptranthes grandis Buch.-Ham. ex Wall.
Calyptranthes jambolana (Lam.) Willd.
Calyptranthes makal Blanco
Calyptranthes mangiferifolia Hance ex Walp.
Calyptranthes oneillii Lundell
Calyptranthes tatna Buch.-Ham. ex Wall.
Calyptranthes tenuis Buch.-Ham. ex Wall.
Calyptranthes zuzygium Blanco
Calyptranthus floribunda Bl.
Caryophyllus antisepticus Blume
Caryophyllus aromaticus L.
Caryophyllus fastigiatus (Bl.) DC.
Caryophyllus floribundus (Bl.) DC.
Caryophyllus malaccensis (L.) Stokes
Cerocarpus aqueus (Burm. f.) Hassk.
Clavimyrtes claviflora (Roxb.) Blume
Clavimyrtes latifolia Blume
Clavimyrtes lineata (DC.) Blume
Clavimyrtes lineata (DC.) Blume var. *membranacea* Blume
Clavimyrtes lineata (DC.) Blume var. *procera* Blume
Clavimyrtes lineata (DC.) Blume var. *varingifolia* Blume
Clavimyrtes symphytocarpa Blume
Cleistocalyx cerasoides (Roxb.) I.M.Turner
Cleistocalyx cerasoides var. *paniala* (Roxb.) I.M.Turner
Cleistocalyx circumscissa (Gagnep.) P.H.Hô
Cleistocalyx nervosum (A.Cunn. ex DC.) P.H.Hô
Cleistocalyx nervosus (A.Cunn. ex DC.) Kosterm.
Cleistocalyx nervosus var. *paniala* (Roxb.) J.Parn. & Chantaranonthai
Cleistocalyx nigrans (Gagnep.) Merr. & L.M.Perry
Cleistocalyx operculatus (Roxb.) Merr. & L.M.Perry
Cleistocalyx operculatus var. *paniala* (Roxb.) Chantaranonthai & J.Parn.
E. microcalyx Duthie var. *irregularis* (Craib) M.R.Hend.
Eugenia abortiva Gagnep.
Eugenia acuminatissima (Blume) Kurz
Eugenia alba Roxb.
Eugenia angkae Craib
Eugenia antiseptica (Blume) Kuntze
Eugenia aquea Burm. f.
Eugenia atropunctata C.B.Rob.
Eugenia attenuata (Miq.) Koord. & Valeton
Eugenia attenuata var. *montana* M.R. Hend.
Eugenia attenuata var. *ophirensis* M.R. Hend.
Eugenia attenuatifolia Merr.
Eugenia attopeuensis Gagnep.
Eugenia balsamea var. *angustifolia* Duthie
Eugenia barringtonii Hole ex Chalk & Chattaway
Eugenia baviensis Gagnep.
Eugenia bibracteata Greves
Eugenia boisiana Gagnep.
Eugenia bonii Gagnep.
Eugenia borneensis Miq.
Eugenia brachiata Roxb.
Eugenia bracteolata Wight
Eugenia brantiana M.R.Hend.
Eugenia bullockii Hance
Eugenia calyptrata Roxb. ex Wight & Arn.
Eugenia cambodiana Gagnep.
Eugenia campylocarpa Gagnep.
Eugenia caryophyllifolia Lam.
Eugenia cerasoides Roxb.
Eugenia championii (Benth.) Hemsl.
Eugenia chanlos Gagnep.
Eugenia cinerea Kurz
Eugenia circumscissa Gagnep.
Eugenia clausa C.B.Rob.
Eugenia clavata (Korth.) Merr.
Eugenia claviflora Roxb.
Eugenia claviflora var. *excavata* King
Eugenia claviflora var. *glandulosa* King
Eugenia claviflora Roxb. var. *leptalea* (Craib) M.R.Hend.
Eugenia claviflora Roxb. var. *leptantha*
Eugenia claviflora var. *maingayi* (Duthie) King
Eugenia claviflora var. *montana* M.R.Hend.
Eugenia claviflora var. *riparia* M.R.Hend.
Eugenia cochinchinensis Gagnep.
Eugenia collinsae Craib
Eugenia comosa Wall.
Eugenia compongensis Gagnep.
Eugenia confertiflora Koord. & Valeton
Eugenia corticosa Lour.
Eugenia corymbosa Wall.
Eugenia cumingiana D. Vidal
Eugenia cumini (L.) Druce
Eugenia cuprea Koord. & Valeton

- Eugenia cuspidato-obovata* Hayata
Eugenia deckeri Gagnep.
Eugenia divaricatocymosa Hayata
Eugenia eburnea Gagnep.
Eugenia elmeri Merr.
Eugenia eucaudata Elmer
Eugenia fastigiata (Bl.) Koord. & Valetton
Eugenia ferruginea Wight
Eugenia finetii Gagnep.
Eugenia firma Wall.
Eugenia formosa Wall.
Eugenia formosa Wall. var. *ternifolia* (Roxb.) Duthie
Eugenia fraseri Ridl.
Eugenia frondosa Wall.
Eugenia fruticosa (DC.) Roxb.
Eugenia glaucicalyx Merr.
Eugenia glomerulata Gagnep.
Eugenia grandis Wight
Eugenia grata Wight
Eugenia grata Wight var. *nervosum* Craib
Eugenia harmandii Gagnep.
Eugenia hemispherica Wight
Eugenia henryi Hance
Eugenia holmanii Elmer
Eugenia holtziana F.Muell.
Eugenia irregularis Craib
Eugenia ixoroides Elmer
Eugenia jambolana Lam.
Eugenia jambolana var. *caryophyllifolia* (Lam.) Duthie
Eugenia jambolana var. *obtusifolia* (Roxb.) Duthie
Eugenia jambos L.
Eugenia jambos var. *sylvatica* Gagnep.
Eugenia javanica Lam.
Eugenia javanica var. *balansae* Gagnep.
Eugenia javanica var. *parviflora* Craib
Eugenia laevicaulis Duthie
Eugenia laevifolia Ridl.
Eugenia lambii Elmer
Eugenia lanceifolia Roxb.
Eugenia laosensis Gagnep.
Eugenia laosensis var. *quocensis* Gagnep.
Eugenia latilimba Merr.
Eugenia laxiuscula Ridl.
Eugenia leptalea Craib
Eugenia leptantha Wight
Eugenia leucocarpa Gagnep.
Eugenia levinei Merr.
Eugenia limnoea Ridl.
Eugenia limnaea Ridl. var. *gracilior* Craib
Eugenia lineata (Blume) Duthie
Eugenia litseifolia Merr.
Eugenia longicalyx Ridl.
Eugenia longiflora (K.Presl) Fern.-Villar
Eugenia lucidula Miq.
Eugenia maclurei Merr.
Eugenia macrocarpa Roxb.
Eugenia macrophylla Lam.
Eugenia maingayi Duthie
Eugenia malaccensis Blanco
Eugenia malaccensis L.
Eugenia malaccensis var. *purpurea* Duthie
Eugenia malayana Gagnep.
Eugenia marivelesensis Merr.
Eugenia megacarpa Craib
Eugenia mekongensis Gagnep.
Eugenia microbotrya Miq.
Eugenia microcalyx Duthie
Eugenia microphylla Abel
Eugenia millettiana Hemsl. ex F.B.Forbes & Hemsl.
Eugenia mindanaensis C.B. Rob.,
Eugenia minutiflora Hance
Eugenia miquelii Elmer
Eugenia monantha Merr.
Eugenia montana Wight
Eugenia myrtillus Stapf
Eugenia ngawunensis Parkins
Eugenia nigrans Gagnep.
Eugenia nitida Duthie
Eugenia oblata Roxb.
Eugenia oblongifolia var. *robusta* King
Eugenia obovata Poir.
Eugenia obtusifolia Roxb.
Eugenia obversa Miq.
Eugenia odorata (Lour.) Wight
Eugenia operculata Roxb.
Eugenia operculata var. *avicennifolia* Craib
Eugenia operculata var. *obovata* Kurz
Eugenia operculatus var. *paniala* (Roxb.) Duthie
Eugenia pachysarca Gagnep.
Eugenia pamtensis Miq.
Eugenia paniala Roxb.
Eugenia penangiana Duthie
Eugenia perakensis King
Eugenia pierrei Gagnep.
Eugenia polyantha Wight
Eugenia polyantha var. *sessilis* M.R.Hend.
Eugenia praecox Roxb.
Eugenia pseudosubtilis King
Eugenia pseudosubtilis var. *orientalis* Craib
Eugenia pseudosubtilis var. *platyphylla*
Eugenia pseudosubtilis var. *subacuminata*
Eugenia pseudosyzygioides M.R.Hend.
Eugenia pulchella Roxb.
Eugenia punctifolia Ridl.
Eugenia purpurea Roxb.
Eugenia purpuricarpa Elmer
Eugenia resinosa Gagnep.
Eugenia rhamphiphylla Craib
Eugenia rhododendrifolia Miq.
Eugenia rhododendrifolia forma *longifolia* Miq.
Eugenia ripicola Craib
Eugenia rubicunda Gagnep.
Eugenia rubida Ridl.
Eugenia rubricaulis (Miq.) Duthie

- Eugenia ruminata* Koord. & Valeton
Eugenia sablanensis Elmer
Eugenia samarangensis (Blume) O. Berg
Eugenia scabrida Wall.
Eugenia siamensis Craib
Eugenia sinensis Hemsl. ex F.B. Forbes & Hemsl.
Eugenia somai Hayata
Eugenia sphaerantha Gagnep.
Eugenia spissa Craib
Eugenia suavis Ridl.
Eugenia subdecurrens (Miq.) Merr. & Chun
Eugenia subviridis Craib
Eugenia syzygioides (Miq.) M.R.Hend.
Eugenia tenuis Wall ex Duthie in Hooker
Eugenia ternifolia Roxb.
Eugenia tetragona Wight
Eugenia teysmannii (Miq.) Koord. & Valeton
Eugenia thorelii Gagnep.
Eugenia thumra Roxb.
Eugenia thumra Roxb. var. *penangiana* King,
Eugenia tinctoria Gagnep.
Eugenia tonkinense Gagnep.
Eugenia tramnion Gagnep.
Eugenia tsoi Merr. & Chun
Eugenia tsoongii Merr.,
Eugenia viminea Wall.
Eugenia viridifolia Elmer
Eugenia vulgaris (DC.) Baill.
Eugenia wallichii Wight,
Eugenia wightiana Wight
Eugenia zimmermannii Warb. ex Craib
Jambolana Rumph.
Jambolifera chinensis Spreng.
Jambolifera coromandelica Houtt.
Jambosa ? aquea (Burm. f.) DC.
Jambosa ? obtusissima (Blume) DC.
Jambosa acuminatissima (Blume) Hassk.
Jambosa alba (Roxb.) G.Don
Jambosa ambigua Blume
Jambosa aquea Rumph.
Jambosa aromatica Miq.
Jambosa borneensis Miq.
Jambosa clavata Korth.
Jambosa coarctata Blume
Jambosa confusa Bl.
Jambosa diospyrifolia (Wall. ex Duthie) C.E.C.Fisch.
Jambosa domestica DC.
Jambosa domestica var. *purpurea* (Roxb.) Blume
Jambosa firma Wall. ex Blume
Jambosa formosa (Wall.) G.Don
Jambosa formosa Wight
Jambosa grandis (Wight) Blume
Jambosa hemisphaerica (Wight) Walp.
Jambosa jambos (L.) Millsp.
Jambosa javanica (Lam.) K. Schum. & Lauterb.
Jambosa lanceolata Korth. ex Miq.
Jambosa lineata DC.
Jambosa macrocarpa Blume
Jambosa macrophylla (Lam.) DC.
Jambosa madagascariensis Blume
Jambosa malaccensis (L.) DC.
Jambosa mappacea Korth.
Jambosa melanocarpa Miq.
Jambosa palembanica Blume
Jambosa praecox (Roxb.) A.M.Cowan & Cowan
Jambosa pulchella (Roxb.) Miq.
Jambosa purpurascens DC.
Jambosa purpurea (Roxb.) Wight & Arn.
Jambosa rubricaula Miq.
Jambosa samarangensis (Blume) DC.
Jambosa samarangensis (Blume) DC. var. *microcarpa* Hassk. ex (Blume) Hassk.
Jambosa samarangensis (Blume) DC. var. *obtusissima* (Blume) Blume
Jambosa symphytocarpa Korth.
Jambosa syzygioides Miq.
Jambosa ternifolia (Roxb.) Walp.
Jambosa teysmannii Miq.
Jambosa timorensis Blume
Jambosa timorensis Blume var. *laxiflora* Blume
Jambosa vulgaris DC.
Malidra aquea (Burm. f.) Raf.
Memecylon floribundum Wall.
Myrtus acuminatissima Blume
Myrtus corticosa (Lour.) Spreng.
Myrtus cumini L.
Myrtus jambos (L.) Kunth
Myrtus javanica (Lam.) Spreng.
Myrtus lineata Blume
Myrtus macrophylla (Lam.) Spreng.
Myrtus malaccensis (L.) Spreng.
Myrtus obovata (Poir.) Spreng.
Myrtus obtusissima Blume
Myrtus quadrangularis Buch.-Ham. ex Duthie
Myrtus samarangensis Blume
Myrtus timorensis Zipp. ex Span.
Opa odorata Lour.
Plinia jambos (L.) M.Gómez
S. cumini (L.) Druce
Strongylocalyx hemisphaericus (Wight) Blume
Strongylocalyx lanceifolius (Roxb.) Blume
Strongylocalyx oblatum (Roxb.) Blume
Strongylocalyx praecox (Roxb.) Blume
Syllisium buxifolium Meyen & Schauer
Syzygium abortivum (Gagnep.) Merr. & L.M.Perry
Syzygium acuminatissimum (Blume) DC.
Syzygium altissimum Wall.
Syzygium angkae (Craib) Chantar. & J.Parn.
Syzygium angkae subsp. *spissum* (Craib) Chantar. & J.Parn.
Syzygium antisepticum (Blume) Merr. & L.M.Perry
Syzygium aqueum (Burm. f.) Alston
Syzygium araiocladum Merr. & L. M. Perry
Syzygium aromaticum (L.) Merr. & L.M.Perry
Syzygium attenuatum (Miq.) Masam.

- Syzygium attenuatum* (Miq.) Merr. & L.M.Perry
Syzygium attenuatum subsp. *circumscissum* (Gagnep.) Chant-
 tar. & J.Parn.
Syzygium attenuatum var. *montanum* (M.R. Hend.) Chan-
 tar. & J.Parn.
Syzygium attenuatum var. *ophirens* (M.R. Hend.) I.M.Turner
Syzygium attopuense (Gagnep.) Merr. & L.M.Perry
Syzygium austrosinense (Merr. & L.M.Perry) H.T.Chang &
 R.H.Miao
Syzygium balsameum (Wight) Walp.
Syzygium balsameum Wall.
Syzygium baviense (Gagnep.) Merr. & L.M.Perry
Syzygium bibracteatum (Greves) Merr. & L.M.Perry
Syzygium boisianum (Gagnep.) Merr. & L.M.Perry
Syzygium boisianum longiflorum Chantar. & J.Parn.
Syzygium bokorens W.K.Soh & J.Parn.
Syzygium bonii (Gagnep.) Merr. & L.M.Perry
Syzygium borneense (Miq.) Miq.
Syzygium borneense var. *myrtilus* P.Chantaranonthai & J.Parn.
Syzygium bracteolatum (Wight) Masam.
Syzygium bullockii (Hance) Merr. & L.M.Perry
Syzygium buxifolium Hook. & Arn.
Syzygium buxifolium var. *astrosinense* Merr. & L.M.Perry
Syzygium buxifolium var. *verticillatum* C.Chen
Syzygium cambodianum (Gagnep.) Merr. & L.M.Perry
Syzygium campylocarpum (Gagnep.) Merr. & L.M.Perry
Syzygium caryophyllifolium (Lam.) DC.
Syzygium cathayense Merr. & L.M.Perry
Syzygium caudatum Wall.
Syzygium cerasoides (Roxb.) Raizada
Syzygium championii (Benth) Merr. & L.M.Perry
Syzygium chanlos (Gagnep.) Merr. & L.M.Perry
Syzygium chantaranothaianum W.K.Soh & J.Parn.
Syzygium cinereum (Kurz) Chantar. & J.Parn.
Syzygium cinereum Wall.
Syzygium circumscissum (Gagnep.) Craven
Syzygium clavatum (Korth.) Merr. & L.M.Perry
Syzygium claviflorum (Roxb.) Wall ex Steudel
Syzygium claviflorum var. *excavatum* (King) Turner
Syzygium claviflorum var. *glandulosum* (King) Chantar. & J.Parn.
Syzygium claviflorum var. *maingayi* (Duthie) Chantar. & J.Parn.
Syzygium claviflorum var. *montanum* (M.R.Hend.) Turner
Syzygium claviflorum var. *riparium* (M.R.Hend.) Turner
Syzygium cochinchinense (Gagnep.) Merr. & L.M.Perry
Syzygium compongense (Gagnep.) Merr. & L.M.Perry
Syzygium corticosum (Lour.) Merr. & L.M.Perry
Syzygium crassiflorum Merr. & L.M.Perry
Syzygium cucphuongense W.K.Soh & J.Parn.
Syzygium cumingianum (D.Vidal) Gibbs
Syzygium cumingianum (D.Vidal) Gibbs
Syzygium cumini (L.) Skeels
Syzygium cumini var. *caryophyllifolium* (Lam.) K.K.Khanna
Syzygium cumini var. *obtusifolium* (Roxb.) K.K.Khanna
Syzygium cumini var. *tsai* (Merr. & Chun) Hung T.Chang &
 R.H.Miao
Syzygium cuspidato-obovatum (Hayata) Mori
Syzygium cymosum Korth.
Syzygium diospyrifolium (Wall. ex Duthie) K.N. Bahadur &
 R.C. Gaur
Syzygium diospyrifolium (Wall. ex Duthie) S.N.Mitra
Syzygium eburneum (Gagnep.) Merr. & L.M.Perry
Syzygium elmeri (Merr.) Masam.
Syzygium endertii Merr. & L.M.Perry
Syzygium excavatum Wall.
Syzygium fastigiatum (Bl.) Merr. & L.M.Perry
Syzygium ficifolium Wall.
Syzygium finetii (Gagnep.) Merr. & L.M.Perry
Syzygium firmum (Blume) Thwaites & Hook.f.
Syzygium formosum (Wall.) Masam.
Syzygium fraseri (Ridl.) Masam.
Syzygium fruticosum DC.
Syzygium gadgilii M.R.Almeida
Syzygium glaucicalyx (Merr.) Merr.
Syzygium globiflorum (Craib) Chantaran. & J.Parn.
Syzygium glomerulatum (Gagnep.) Merr. & L.M.Perry
Syzygium grande (Wight) Walp.
Syzygium grande var. *parviflorum* Chantar. & J.Parn.
Syzygium gratum Wall.
Syzygium gratum (Wight) S.N.Mitra
Syzygium gratum var. *confertum* Chantar. & J.Parn.
Syzygium hancei Merr. & L.M.Perry
Syzygium harmandii (Gagnep.) Merr. & L.M.Perry
Syzygium hemisphericum (Wight) Alston
Syzygium imitans Merr. & L.M.Perry
Syzygium irregulare (Craib) Merr. & L.M.Perry
Syzygium jambolanum (Lam.) DC.
Syzygium jambos (L.) Alston
Syzygium jambos var. *linearilimbus* Hung T.Chang & R.H.Miao
Syzygium jambos var. *sylvaticum* (Gagnep.) Merr. & L.M.Perry
Syzygium javanicum (Lam.) Miq. ex Masam.
Syzygium laevicaule (Duthie) Masam.
Syzygium laosense (Gagnep.) Merr. & L.M.Perry
Syzygium laosense var. *quocense* (Gagnep.) Hung T.Chang &
 R.H.Miao
Syzygium latilimbus (Merr.) Merr. & L.M.Perry
Syzygium leptanthum (Wight) Nied.
Syzygium levinei (Merr.) Merr. & L.M.Perry
Syzygium lineatum (DC.) Merr. & L.M.Perry
Syzygium litseifolium (Merr.) Merr. & L.M.Perry
Syzygium longicalyx (Ridl.) Masam.
Syzygium longiflorum K.Presl
Syzygium longiflorum Wall.
Syzygium macrocarpum (Roxb.) N.P.
Syzygium malaccense (L.) Merr. & L.M.Perry
Syzygium malayanum (Gagnep.) I.M.Turner
Syzygium mappaceum (Korth.) Merr. & L.M.Perry
Syzygium megacarpum (Craib) Rathakr. & N.C.Nair
Syzygium megalophyllum Merr. & L.M.Perry
Syzygium mekongense (Gagnep.) Merr. & L.M.Perry
Syzygium melanophyllum Hung T.Chang & R.H.Miao
Syzygium merrillii Masam.
Syzygium micranthum Blume ex Miq.
Syzygium microbotryum (Miq.) Masam.
Syzygium monanthum (Merr.) Merr. & L.M.Perry

- Syzygium montanum* Thwaites & Hook.f.
Syzygium nervosum A.Cunn. ex DC.
Syzygium nervosum var. *obovatum* (Kurz) A.Kumar
Syzygium nienkui Merr. & L.M.Perry
Syzygium nigrans (Gagnep.) Craven & Biffin
Syzygium nodosum Miq.
Syzygium oblatum (Roxb.) Wall. ex Steudel
Syzygium oblatum var. *laevicaule* (Duthie) Chantar. & J.Parn.
Syzygium oblatum Wall.
Syzygium obovatum (Poir.) DC.
Syzygium obovatum Wall.
Syzygium obtusifolium (Roxb.) Kostel.
Syzygium obversum (Miq.) Masam.
Syzygium odoratum (Lour.) DC.
Syzygium operculatum (Roxb.) Nied. in Engl. & Prantl.
Syzygium ovatifolium Merr. & L.M.Perry
Syzygium pachysarcum (Gagnep.) Merr. & L.M.Perry
Syzygium pamatense (Miq.) Masam.
Syzygium panealla Wall.
Syzygium perakense (King) I.M. Turner
Syzygium petelotii Merr. & L.M.Perry
Syzygium pierrei (Gagnep.) Merr. & L.M.Perry
Syzygium polyanthum (Wight) Walp.
Syzygium polyanthum var. *sessile* (M.R.Hend.) I.M. Turner
Syzygium praecox (Roxb.) Rathkr. & N.C. Nair
Syzygium praecoxum (Roxb.) Harid. & R.R. Rao
Syzygium pseudojambolana Miq.
Syzygium pulchellum (Roxb.) Wall. ex Govaerts
Syzygium pulchellum Wall.
Syzygium rameum Wall.
Syzygium rhamphiphyllum (Craib) C.E.C. Fisch.
Syzygium rhododendrifolium (Miq.) Masam.
Syzygium ribesoides Wall.
Syzygium ripicola (Craib) Merr. & L.M.Perry
Syzygium roxburghianum Raizada
Syzygium rubicundum Wight & Arn.
Syzygium ruminatum (Koord. & Valetton) Amshoff
Syzygium samarangense (Blume) Merr. & L.M.Perry
Syzygium samarangense var. *parviflorum* (Craib) Chantar. & J.Parn.
Syzygium siamense (Craib) Chantar. & J.Parn.
Syzygium speciosum Wall.
Syzygium sphaeranthum (Gagnep.) Merr. & L.M.Perry
Syzygium sterrophyllum Merr. & L.M.Perry
Syzygium stictanthum Merr. & L.M.Perry
Syzygium suavissimum Wall.
Syzygium subdecurrens Miq.
Syzygium syzygioides (Miq.) Merr. & L.M.Perry
Syzygium szemaoense Merr. & L.M.Perry
Syzygium tamilnadensis Rathkr. & V.Chithra
Syzygium tenue (Duthie) N.P.Balacr.
Syzygium ternifolium (Roxb.) P.H.Hô
Syzygium tetragonum (Wight) Wall. ex Walp.
Syzygium teysmannii (Miq.) Masam.
Syzygium thorelii (Gagnep.) Merr. & L.M.Perry
Syzygium thumra (Roxb.) Merr. & L.M.Perry
Syzygium thumra (Roxb.) Merr. & L.M.Perry var. *penangianum* (King) I.M. Turner
Syzygium tinctorium (Gagnep.) Merr. & L.M.Perry
Syzygium tonkinense (Gagnep.) Merr. & L.M.Perry
Syzygium touranense Merr. & L.M.Perry
Syzygium tramnion (Gagnep.) Merr. & L.M.Perry
Syzygium tsoongii (Merr.) Merr. & L.M.Perry
Syzygium vestitum Merr. & L.M.Perry
Syzygium vimineum Wall ex P.H.Hô,
Syzygium viridifolium (Elmer) Merr. & L.M.Perry
Syzygium wallichianum K.Presl
Syzygium wallichii (Wight) Walp.
Syzygium wightianum Wall. ex Wight & Arn.
Syzygium zeylanicum (L.) DC.
Syzygium zimmermannii (Warb. ex Craib) Merr. & L.M.Perry
Xenodendron polyanthum K.Schum. & Lauterb.

