

FLORA MALESIANA PRECURSOR FOR THE TREATMENT OF MORACEAE 6: FICUS SUBGENUS SYCOMORUS

C.C. BERG

The Norwegian Arboretum/Botanical Institute, University of Bergen,
N-5259 Hjellestad, Norway; Nationaal Herbarium Nederland, Universiteit Leiden branch,
P.O. Box 9514, 2300 RA Leiden, The Netherlands

SUMMARY

The sections of *Ficus* subg. *Sycomorus* are described and their Malesian species listed and keyed out. Six new species are described in the subgenus: *Ficus albomaculata*, *F. biakensis*, *F. boanensis*, *F. limosa*, *F. manuselensis*, *F. morobensis*, *F. remifolia*, *F. rubrosyce*, *F. scopulifera*; and one new subspecies: *F. botryocarpa* Miq. subsp. *hirtella* C.C. Berg. The new combinations *F. botryocarpa* Miq. subsp. *subalbitoramea* (Elmer) C.C. Berg, *F. porrecta* (Corner) C.C. Berg, *F. trichocerasa* Diels subsp. *pleioclada* (Diels) C.C. Berg are also made. The following new sections and subsection are proposed: Subg. *Sycomorus* sect. *Boscheria* (Teijsm. & de Vriese) C.C. Berg, sect. *Dammaropsis* (Warb.) C.C. Berg, sect. *Papuasyce* (Corner) C.C. Berg, and subsect. *Neomorphe* (King) C.C. Berg.

Key words: Moraceae, *Ficus* subg. *Sycomorus*, Malesia.

INTRODUCTION

Ficus subg. *Sycomorus* (Gasp.) Miq. is described and discussed in Flora Malesia precursor 1 (Berg, 2003). This contribution deals with the subdivision of this subgenus, the species currently recognised for the region, the new species and subspecies discovered, and provides a key to the Malesian species. The formal subdivision is limited to sections in which a number of informal groups of presumably related species are distinguished; the ranks of series and subseries are not applied. Most of the varieties recognised by Corner (1960a–d, 1961, 1962, 1965) are not maintained, some are recognized as species, some others transferred to other species, as indicated in the lists of Malesian species.

SUBDIVISIONS AND SPECIES

Proposing a subdivision of subg. *Sycomorus* is less easy than for the other subgenera. The majority of the species can be accommodated without doubt in the major sections *Adenosperma*, *Sycocarpus*, and *Sycomorus*, as well as in the smaller sections *Dammaropsis* and *Papuasyce*. An important differentiating floral character used is found in the perianth of the pistillate flower: the tepals are free or nearly so or the tepals are fused, entirely or largely so. In a few species this distinction is unclear. *Ficus auriculata* comprises individuals of which the tepals are entirely connate and others in which they are free. This has created some confusion with regard to the position of *F. oligodon*, currently included in *F. auriculata* (see Corner, 1960b: 39; 1962: 395;

1978: 383). The other problematical species is *F. indigofera* Rech. (from the Solomon Islands) showing a considerable variation in the degree of connation of the tepals (see Corner, 1967: 135).

Corner (1960a: 418; 1969: 321) placed *F. pseudopalma* in (his) section *Ficus* because of the free tepals of the pistillate flowers, but also the related species *F. rivularis*, in spite of the presence of connate tepals. Evident relatives of *F. pseudopalma*, currently accommodated in section *Dammaropsis*, have largely connate tepals.

Another problem is linked to several Melanesian species. *Ficus cynaroides* Corner, *F. immanis* Corner, and *F. lancibracteata* Corner, were placed by Corner (1960d: 38; 1967: 122) in subsect. *Auriculisperma* ser. *Cynaroides* (sect. *Sycocarpus*). These three species resemble species of sect. *Sycocarpus* subsect. *Sycocarpus* except in the shape of the fruits, and probably also in the absence of internal hairs and hairs on the styles, both usually present in subsect. *Sycocarpus*.

The situation with regard to *F. indigofera* and *F. vitiensis* Seem. (from Fiji) is similar. Corner (1960d: 38; 1967: 123) placed them in ser. *Vitiensis* of subsect. *Auriculisperma* (sect. *Sycocarpus*). In particular *F. indigofera* resembles even in the presence of *Terminalia*-branching species placed in sect. *Adenosperma*, but it differs in the presence of entirely connate tepals of pistillate flowers and probably also in the absence of internal hairs.

These two sets of species are distinct in having species of *Ceratosolen* subg. *Strepitus* as pollinators and not species the subg. *Rothropus*, found in the majority of the species of subsect. *Sycocarpus*, or of subg. *Ceratosolen*, found in all the species of sect. *Adenosperma* and some species of subsect. *Sycocarpus*. Species of subg. *Strepitus* are also involved in the pollination of species of the sections *Dammaropsis* and *Papuasyce* (Wiebes, 1994).

In spite of the morphological differences indicated and the different groups of pollinators involved, *F. cynaroides* and its relatives and *F. indigofera* and its relative are currently included in subsect. *Sycocarpus* and sect. *Adenosperma*, respectively.

The auriculiform to lenticular fruits without the prominent pseudohilum, characteristic of subsect. *Sycocarpus*, and without double keel characteristic of sect. *Adenosperma* are also found in the two rheophytic species included in subsect. *Macrostyla* (of sect. *Sycocarpus*).

It is curious that the various small groups of species are so diverse but share the same type of fruit and the same group of pollinators with the possible exception of the *Macrostyla* species for which the pollinators are not known.

The position of the three species placed in sect. *Hemicardia* and the two placed in sect. *Bosscheria* is somewhat problematical as is indicated below.

SURVEY OF THE SUBDIVISIONS

The numbers in parenthesis give the total numbers of species, followed by the numbers of Malesian species.

Subg. *Sycomorus* (c. 135 : 102)

Sect. *Sycomorus* (19 : 6)

Subsect. *Sycomorus* (13 : 1)

Subsect. *Neomorpha* (6 : 5)

- Sect. *Hemicardia* (3 : 1)
 Sect. *Adenosperma* (19 : 16)
 Sect. *Dammaropsis* (5 : 3)
 Sect. *Papuasyce* (3 : 2)
 Sect. *Boscheria* (2 : 2)
 Sect. *Sycocarpus* (86 : 73)
 Subsect. *Sycocarpus* (84 : 72)
 ‘Axillares’
 F. calcarata-group
 F. lepicarpa-group
 ‘Flagelliflorae’
 F. geocarpa-group
 F. ribes-group
 F. stolonifera-group
 F. subterranea-group
 ‘Cauliflorae’
 F. pachyrrhachis-group
 F. congesta-group
 Mixed
 F. cereicarpa-group
 Subsect. *Macrostyla* (2 : 1)

Ficus subg. **Sycomorus** (Gasp.) Miq. (1867b) 294 sect. **Sycomorus** (Gasp.) Miq. (1859) 319

Trees, monoecious or dioecious; internodes not distinctly different in length and leaves not tufted. *Leaves* spirally arranged and lamina symmetric or distichous and lamina asymmetric, lamina (sub)coriaceous to chartaceous; cystoliths only beneath; waxy glands in the axils of the basal lateral veins or additional ones elsewhere on the lamina beneath (or on the nodes of leafy twigs); petiole rather long. *Figs* cauliflorous, flagelliflorous (geocarpic) or axillary; basal bracts 3, verticillate; lateral bracts absent. *Staminate flowers* subtended by 2 bracteoles; stamens (1 or) 2 (or 3). *Tepals* of pistillate flowers (2–)3–6, free or connate, often irregular in shape, lacinate and/or narrow, glabrous; styles of long-styled flowers glabrous (or hairy). *Fruits* lenticular, slightly (simply) keeled, smooth or ± tuberculate, red-brown (or whitish).

Distribution — The section comprises 18 species and ranges from West Africa to Australia and the Solomon Islands.

Morphology — The section comprises both monoecious and dioecious species. The two groups of species do not differ conspicuously in other characters, neither of vegetative parts nor of flowers and fruits.

Subdivision — The dioecious and monoecious species are ranked in different subsections.

Note — *Covellia* Gasp. (1844) was based on *Ficus ulmifolia* Lam. (= *C. ulmifolia* (Lam.) Gasp.), a species of subg. *Sycidium* sect. *Sycidium* in the synonymy of which *Covellia* is to be included. In 1845, Gasparrini also included *F. oppositifolia* Willd. in *Covellia*, currently in the synonymy of *F. hispida* L.f. which is a species of subg. *Sycomorus* sect. *Sycocarpus*. The majority of the *Covellia* species described by Miquel

(1848) belong to subg. *Sycomorus*, in particular to sect. *Sycocarpus*, to which Corner (1960d) referred *Covellia*.

Ficus subg. **Sycomorus** sect. **Sycomorus** subsect. **Sycomorus**

Trees monoecious. *Nodal waxy glands* absent. *Figs* without internal hairs. *Styles* glabrous. *Fruits* smooth, brownish.

Distribution — Africa to Yemen, Madagascar (and adjacent islands) with 12 species, and *F. racemosa* from Sri Lanka to Australia.

Morphology — The section is rather diverse in the African region, as with regard to the size of the trees, the position and dimensions of the figs (see Berg & Wiebes, 1992, 73–84). *Ficus racemosa* is morphologically close to the widespread African *F. sur* Forssk.

The Malesian species of the subsection: 1) *F. racemosa* L.

Ficus subg. **Sycomorus** sect. **Sycomorus** subsect. **Neomorphe** (King) C.C. Berg

Based on: *Ficus* sect. *Neomorphe* King (1887) 2. — Type: *Ficus variegata* Blume.

Trees dioecious. *Nodal waxy glands* absent or present. *Figs* with or without internal hairs. *Styles* mostly without hairs. *Fruits* ± tuberculate, whitish to brown.

Distribution — From Pakistan to Australia and the Solomon Islands; with the exception of *F. hainanensis* Merr. & Chun, known from China, Indochina, and Thailand, all of them are found in Malasia.

Delimitation — The subsection comprises also *Tremotis* Raf. (1838) 58; *Ficus* sect. *Tremotis* (Raf.) Kuntze in Von Post & Kuntze (1904) 236; *Ficus* subg. *Ficus* sect. *Sycocarpus* subsect. *Pomifera* ser. *Pomiferae* Corner (1960d) 39, (1962) 395.

The Malesian species of the subsection: 2) *F. auriculata* Lour.; 3) *F. nodosa* Teijsm. & Binn.; 4) *F. robusta* Corner; 5) *F. semivestita* Corner; 6) *F. variegata* Blume.

Ficus subg. **Sycomorus** sect. **Hemicardia** C.C. Berg, *stat. & nom. nov.*

Based on: *Ficus* subg. *Sycidium* (Miq.) Mildbr. & Burret (1911) 174 sect. *Sycidium* Miq. (1848) 228 ser. *Prostratae* Corner, Gard. Bull. Singapore 17 (1960b) 444. — Type: *Ficus semicordata* Sm.

Trees, dioecious. *Leaves* distichous; lamina asymmetric or symmetric, waxy glands in the axils of the basal lateral veins, unilateral or bilateral; petiole short. *Figs* cauliflorous to flagelliflorous (geocarpic), with or without internal hairs. *Tepals* of pistillate flowers 3–5, (almost) free, linear to subobovate, glabrous. *Styles* of long-styled flowers glabrous.

Distribution — Three species in the Sino-Himalayan region; *F. semicordata* extends to the Malay Peninsula; *F. koutumensis* Corner and *F. prostrata* Miq. are confined to the region.

Notes — 1. Series *Prostratae* was described in sect. *Sycidium* (subg. *Sycidium*). Moreover, Corner (1965) linked this group to *Tremotis* Raf., reduced to *Ficus* sect. *Tremotis* by Kuntze in Von Post & Kuntze (1904). The name *Tremotis cordata* Raf. and elements of the description indicate that *Tremotis* is based on *F. auriculata* Lour., the species referred to by Kuntze.

2. The lamina varies from strongly asymmetric with waxy glands unilateral to almost symmetric when juvenile or also when adult, and with the waxy glands bilateral. The section differs from sect. *Sycomorus* in the occurrence of asymmetric laminas and in the short petiole and from sect. *Sycocarpus* in the occurrence of waxy glands in the axils of the basal lateral veins and the (largely) free tepals of the pistillate flowers of which the long-styled ones have glabrous styles. Placing this entity as another subsection in sect. *Sycomorus* could be considered, as it shows closer morphological affinities to the species of sect. *Sycomorus* than to those of the other sections.

The Malesian species of the subsection: 7) *F. semicordata* Sm.

Ficus subg. **Sycomorus** sect. **Adenosperma** Corner (1958) 43

Shrubs or trees, dioecious, the branches often with the proximal internodes long, becoming (gradually) shorter and the leaves terminally \pm tufted, the lower internodes only with stipules or with much reduced laminas *Terminalia*-branching. *Leaves* spirally arranged to subdistichous or distichous; lamina often slightly to distinctly asymmetric, coriaceous to chartaceous, margin entire; cystoliths above and beneath or only beneath; waxy glands usually present in the axils of one or of both basal lateral veins and also in the furcations of the lateral veins, rarely absent. *Figs* in all species in the leaf axils, and in some also on spurs below the leaves and/or in short and branched leafless branchlets on the trunk, mostly pedunculate; basal bracts often not distinctly verticillate or \pm scattered, lateral bracts often present; internal hairs mostly present. *Staminate flowers* subtended by 2 bracteoles; stamen 1. *Tepals* of pistillate flowers, 3–6, (almost) free, sometimes distinctly connate, glabrous (or ciliolate); styles glabrous. *Fruits* red-brown, compressed, usually double keeled (at the base), smooth.

Distribution — The section comprises 19 species; 16 are Malesian, of which two extend outside Malesia, to Australia, the Solomon Islands, and the New Hebrides. Two species are endemics of the Solomon Islands and one is an endemic of Fiji.

Delimitation — The section comprises also *Ficus* subg. *Ficus* sect. *Sycocarpus* Miq. subsect. *Auriculisperma* Corner ser. *Vitienses* Corner (1960d) 38.

Morphology — The majority of the species of this section exhibit *Terminalia*-branching. The lower internodes of the branches with long internodes, becoming \pm gradually shorter distally. Therefore, the leaves are more or less conspicuously tufted at the end of the branches. The lower nodes of the branches bear only stipules or leaves with a much reduced lamina. These features do not occur in the two species with distichous leaves (*F. endochaete* and *F. umbonata*) and neither in the two species with large leaves (*F. megalophylla* and *F. saccata*). This branch construction is most apparent in the frutescent species with spirally arranged small or medium-sized leaves (as *F. arbuscula*), less so in the arborescent ones, constituting the majority of the section.

Note — The relationships to *F. indigofera* and *F. vitiensis* are somewhat puzzling (see above). *Terminalia*-branching is not found in material of the later species, but it is clearly present in the non-problematical *F. verticillaris* Corner, endemic to the Solomon Islands.

The Malesian species of the section: 8) *F. adenosperma* Miq.; 9) *F. arbuscula* Lauterb. & K. Schum.; 10) *F. austrina* Corner; 11) *F. casearioides* King; 12) *F. comitis* King;

13) *F. endochaete* Summerh.; 14) *F. erythrosperma* Miq. (incl. *F. tenella* Corner); 15) *F. funiculosa* Corner; 16) *F. megalophylla* Corner; 17) *F. mollior* Benth. (incl. *F. ochrochlora* Ridl., *F. spadicea* Corner (1972) 429); 18) *F. pilulifera* Corner (incl. *F. servula* Corner (1970) 405 and *F. trichocerasa* Diels var. *glabristipula* Corner); 19) *F. saccata* Corner; 20) *F. subcuneata* Miq.; 21) *F. suffruticosa* Corner; 22) *F. trichocerasa* Diels, a) subsp. *trichocerasa* (incl. *F. lapidaria* Corner (1970) 405), b) subsp. *pleioclada* (Diels) C.C. Berg (see below); 23) *F. umbonata* Blume. — For other included synonyms and varieties see Corner's check-list (1965: 79–82).

Ficus subg. **Sycomorus** sect. **Dammaropsis** (Warb.) C.C. Berg, *stat. nov.*

Based on: *Dammaropsis* Warb., Bot. Jahrb. Syst. 13 (1891) 296. — *Ficus* subg. *Ficus* sect. *Sycocarpus* subsect. *Dammaropsis* (Warb.) Corner (1960d) 38. — Type: *Dammaropsis kingiana* Warb. (= *F. dammaropsis* Diels (1933) 32).

Trees or shrubs, monocaule or sparingly branched with pachycladous branches. *Nodal glands* absent. *Leaves* spirally arranged, ± tufted; lamina symmetric, coriaceous to chartaceous; margin lobate to entire; cystoliths on both sides or only beneath; waxy glands in the axils of the basal lateral veins, additional ones in axils of branches or furcations of lateral veins; stipules often subpersistent. *Figs* axillary and or cauliflorous or axillary; basal bracts 3 (or more), subverticillate to scattered or indistinct; lateral bracts present or absent; internal hairs absent. *Staminate flowers* subtended by 2 bracteoles; stamens 1 or 2. *Tepals* of the pistillate flowers connate (or free), glabrous; style glabrous. *Fruits* lenticular, simply keeled, smooth, whitish.

Distribution — From the Philippines to the Solomon Islands; 5 species of which 2 are Melanesian (*F. salomonensis* Rech. and *F. theophrastoides* Seem.).

Delimitation — The section comprises also *Ficus* subg. *Ficus* sect. *Ficus* subsect. *Ficus* ser. *Rivulares* Corner (1960a) 418 and ser. *Pseudopalmae* (Elmer) Corner (1960a) 418, and *Ficus* subg. *Ficus* sect. *Sycocarpus* Miq. subsect. *Auriculisperma* Corner ser. *Theophrastoides* Corner (1960d) 38.

Note — The small-leaved form *F. theophrastoides* var. *angustifolia* Corner (1972) 432 proves that the difference in leaf size as found between *F. pseudopalma* and *F. rivularis* can even be found within a species. The variation in the degree of fusion of the tepals of the pistillate flowers is mentioned above.

The Malesian species of the section: 24) *F. dammaropsis* Diels; 25) *F. pseudopalma* Blanco; 26) *F. rivularis* Merr.

Ficus subg. **Sycomorus** sect. **Papuasyce** (Corner) C.C. Berg, *stat. nov.*

Based on: *Ficus* subg. *Ficus* sect. *Sycocarpus* subsect. *Papuasyce* Corner, Gard. Bull. Singapore 19 (1962) 395. — Type: *Ficus itoana* Diels.

Trees, monoecious. *Nodal glands* absent. *Leaves* spirally arranged; lamina symmetric, coriaceous, margin entire; cystoliths only beneath; waxy glands in the axils of the basal lateral veins; stipules caducous. *Figs* cauliflorous; basal bracts 3, verticillate, persistent or caducous; lateral bracts absent; internal hairs absent. *Staminate flowers* subtended by 2 bracteoles; stamens 1 or 2 (or 3). *Tepals* of the pistillate flowers connate, glabrous; styles glabrous. *Fruits* (sub)lenticular, not or hardly keeled, smooth, whitish.

Distribution — New Guinea and Fiji; 3 species of which 2 Malesian; *F. pritchardii* Seem. is endemic to Fiji.

The Malesian species of the section: 27) *F. itoana* Diels; 28) *F. microdictya* Diels.

Ficus subg. **Sycomorus** sect. **Bosscheria** (Teijsm. & de Vriese) C.C. Berg, *stat. nov.*

Based on: *Bosscheria* Teijsm. & de Vriese, *Nat. Tijds. Ned.-Indië* 23 (1861) 212. — Type: *Bosscheria minahassae* Teijsm. & de Vriese (1861) 212 = *F. minahassae* (Teijsm. & de Vriese) Miq. (1867a) 231.

Trees dioecious. *Leaves* spirally arranged; lamina symmetric, chartaceous, margin denticulate; waxy glands in the axils of the lateral veins or additional ones elsewhere on the lamina beneath. *Figs* cauliflorous in clusters or globose heads on long leafless branchlets; basal bracts 3, verticillate; lateral bracts absent; internal hairs present. *Staminate flowers* not subtended by 2 bracteoles; stamen 1. *Tepals* of the pistillate flowers 3 or 4 free, oblong, glabrous; styles of long-styled flower hairy. *Fruits* whitish, without keel, with slightly prominent pseudohilum.

Distribution — From the Philippines to New Guinea; 2 species.

Delimitation — The section also comprises *Ficus* subg. *Ficus* sect. *Sycidium* subsect. *Sycidium* ser. *Pungentes* Corner (1960b) 444.

Note — These two species are distinct by the absence of bracteoles subtending the staminate flowers (possibly because of the small size of the figs). They show similarities to *F. calcarata* and *F. praestans* (species of sect. *Sycocarpus*) even in the position of the waxy glands, but they are clearly distinct in the free tepals of the pistillate flowers. The two species are pollinated by species of *Ceratosolen* subg. *Ceratosolen*, which could indicate closer affinity to sect. *Sycomorus* than to sect. *Sycocarpus*. Treating this group of two species as another subsection in sect. *Sycocarpus* could be considered because of the overall morphological similarities.

The Malesian species of the section: 29) *F. minahassae* Teijsm. & de Vriese; 30) *F. pungens* Blume (incl. *F. petrotica* Diels).

Lectotypification: *Ficus petrotica* Diels (1935) 217. — Type: *C.L. Ledermann* 8196 (B), Papua New Guinea, 'Hunstein-Spitze', 150 m, 10 Aug. 1912, a mixed collection comprising a branchlet with figs belonging to *F. pungens* and a leafy twig possibly belonging to *F. adelpha* Lauterb. & K. Schum.; the former element is designated as the lectotype here.

Ficus subg. **Sycomorus** sect. **Sycocarpus** Miq. (1844) 33, emend. Miq. (1859) 322

Trees or shrubs, dioecious; internodes usually not distinctly different in length and leaves not tufted. *Nodal glands* often present. *Leaves* spirally arranged, often partly (sub)opposite or (sub)distichous, often \pm asymmetric, mostly chartaceous (to subcoriaceous), margin mostly dentate (to denticulate); cystoliths present in the epidermis of the lower or also of the upper surface of the lamina; lateral veins (in medium-sized to large leaves) often branched or furcate far from the margin, basal pair usually not distinctly different from the other lateral veins, the lower lateral veins usually not distinctly loop-connected, tertiary venation usually scalariform; waxy glands often present

on the lower surface of the lamina, rarely in the axils of the basal pair of lateral veins, commonly in the axils of some of the lateral veins of the middle part of the lamina, and then often in slit-shaped extensions of the axils, often smaller ones in the furcations of lateral veins, or these glands absent on the lamina. *Figs* axillary, solitary or in pairs, or on spurs, (ramiflorous) on spurs on the lesser branches, or (cauliflorous) on spurs, woody tubercles, or often on elongate leafless branchlets (but with (sub)persistent or caducous stipules) on the main branches and/or the trunk and then mostly with short internodes, or only on the base of the trunk, and then mostly stolon-like, rooting, and with long internodes (flagelliflorous); figs mostly pedunculate, often with 3 verticillate basal bracts, lateral bracts rather common; internal hairs mostly present. *Staminate flowers* subtended by 2 bracteoles; stamens 1 (or 2). *Tepals* of pistillate flowers connate, saccate as common in short-styled flowers or reduced, cupular to annular at the base of the ovary as common in long-styled flowers, glabrous (or hairy), or perianth absent. *Style* of long-styled flowers often hairy. *Fruits* mostly brown to blackish, lenticular with a distinct margin (rim) and a \pm prominent pseudohilum.

Distribution — The section ranges from north-eastern India to northern Australia and the Solomon Islands and comprises c. 85 species.

Delimitation — *Ficus* subg. *Ficus* sect. *Sycocarpus* subsect. *Auriculisperma* ser. *Cynaroides* Corner (1960d: 38), subsect. *Macrostyla* Corner (1960d: 39), subsect. *Sycocarpus* Corner (1960d: 39) (with all series and subseries recognized by Corner (1960d: 40–41)), and subsect. *Lepidotus* Corner (1962: 396); also *Ficus* subg. *Ficus* sect. *Sycidium* ser. *Pungentes* Corner (1960b: 444); but not subsect. *Auriculisperma* Corner (1960d: 38), subsect. *Dammaropsis* (Warb.) Corner (1960d: 38), and subsect. *Pomifera* Corner (1960d: 39).

Morphology — The section is characterised by the predominant presence of the waxy glands in the axils of lateral veins in the middle (and upper) part of the lamina. They do not often occur in the axils of the basal lateral veins, the usual position in most subdivisions of *Ficus*; additional glands frequently occur on the nodes of leafy twigs.

Subdivision — The majority of the species are included in subsect. *Sycocarpus* and two truly rheophytic ones in subsect. *Macrostyla*.

Ficus* subg. *Sycomor* sect. *Sycocarpus* subsect. *Sycocarpus

Trees or shrubs, if rheophytic, then facultatively so. *Leaves* spirally arranged, (sub)-distichous or (sub)opposite; lamina symmetric or asymmetric; cystoliths only beneath or above and beneath; waxy glands in the axils of lateral veins in the middle (or upper part) of the lamina, also (or only) in the axils of the basal lateral veins, or additional ones in the axils of branches or furcations of lateral veins. *Figs* axillary, cauliflorous, or flagelliflorous (geocarpic); lateral bracts present or absent; internal hairs usually present. *Stamens* 1 (or 2). *Perianth* of pistillate flowers usually well developed, usually enclosing the ovary of short-styled flowers and at least the base of the ovary of long-styled flowers, rarely rudimentary; ovary glabrous. *Style* of long-styled flowers short (up to 3 mm long), mostly hairy, but the hairs not deflexed.

Distribution — The subsection ranges from north-eastern India to northern Australia and the Solomon Islands. It comprises 84 species of which 72 found in Malesia;

F. conglobata King and *F. griffithii* Miq. are elements of the Sino-Himalayan region and 10 species (see Corner 1967: 122, 137) are endemics of the Solomon Islands.

Delimitation — The subsection comprises the entities listed under the section except for subsect. *Macrostyla*.

Subdivision — It appears not to be possible to propose a satisfactory subdivision of subsect. *Sycocarpus* because of the lack of clear discontinuities in the variation. A practical grouping of the species is possible on the basis of the position of the figs on the tree: A) 'Axillares' with the figs only or predominantly axillary; B) 'Flagelliflorae', with the figs only or predominantly flagelliflorous (or geocarpic); and C) 'Cauliflorae', with the figs only cauliflorous or partly cauliflorous (in combination with flagelliflory and/or axillary position of the figs).

These groups partly comprise assemblages of related species, partly species which are more or less clearly related to those of other 'practical' categories. It is noteworthy that vegetative characters can often be used to key out the taxa in the groups A and B, whereas for keying out the taxa of group C characters of the figs are more often needed.

The following groups of probably related species can be distinguished:

In the 'Axillares':

1) the *Ficus calcarata*-group with the species numbered 40, 42, 46, 49, 62, 69, 70, and 84 centred in central Malesia, the setose-hairy species showing affinities to e.g. *F. praestans* (79), and also including the three Melanesian species formerly included in ser. *Cynaroides* (Corner, 1967: 122);

2) the *Ficus lepicarpa*-group with the species numbered 35, 61, 63, and 96, all showing affinities to *F. fistulosa* (22). *Ficus ternatana* (96) shows affinities to the cauliflorous *F. flagellaris* (52) and the predominantly cauliflorous *F. manuselensis* (66). *Ficus boanensis* (9) is probably more closely related to *F. hispida* (58) than to any of the other 'Axillares', and both *F. biakensis* (37) and *F. remifolia* (80) to *F. septica* (88).

In the 'Flagelliflorae':

3) the *Ficus stolonifera*-group with the species numbered 34, 55, 67, 90, and 99, and centred in northern Borneo;

4) the *Ficus geocarpa*-group with the species numbered 54, 56, 59, 94, and 101, in western and central Malesia;

5) the *Ficus ribes*-group with the species numbered 32, 47, 65, 77, 81, 86, and 89, widespread in Malesia and related to the cauliflorous *F. schwarzii* (85) and *F. scortechinii* (87); and

6) the *Ficus subterranea*-group with the species numbered 82, 93, and 95, in western Malesia, and showing affinities to *F. fistulosa* (51) and *F. ribes* (81).

In the 'Cauliflorae':

7) the *Ficus pachyrrhachis*-group with the species numbered 31, 36, 41, 48, 68, 72, 74, 75, 78, 79, and 92, centred in the eastern(most) part of the Malesian region, showing affinities to the flagelliflorous to cauliflorous *F. iodotricha* (60), and it may also comprise, as a subgroup, some western Malesian species (43, 64, 71, and 73);

8) the *Ficus congesta*-group with the species numbered 37, 39, 45, 50, 51, 58, 71, 76, 83, 88, 91, and 98, mainly in central and western Malesia.

A distinct group consisting of both cauliflorous and flagelliflorous species (*F. ce-reicarpa*-group) comprises 32, 44, 97, and 100, all confined to Borneo.

The Malesian species of the subsection currently recognized: 31) *F. adelpha* Lauterb. & K. Schum.; 32) *F. albomaculata* C.C. Berg (see below); 33) *F. arfakensis* King (incl. *F. macrothyrsa* var. *lancifolia* Corner (1967) 156); 34) *F. beccarii* King; 35) *F. benguetensis* Merr.; 36) *F. bernaysii* King; 37) *F. biakensis* C.C. Berg (see below); 38) *F. boanensis* C.C. Berg (see below); 39) *F. botryocarpa* Miq. (excl. var. *linearifolia*, see 65), a) subsp. *botryocarpa*, b) subsp. *hirtella* C.C. Berg (see below), c) subsp. *subalbidoramea* (Elmer) C.C. Berg (see below); 40) *F. calcarata* Corner; 41) *F. calopilina* Diels; 42) *F. carpenteriana* Elmer; 43) *F. cassidyana* Elmer; 44) *F. cereicarpa* Corner; 45) *F. congesta* Roxb.; 46) *F. cryptosyce* Corner; 47) *F. cuneata* (Miq.) Miq. (= *F. ribes* var. *cuneata* (Miq.) Corner), excl. *F. merrillii* Elmer 1908 and *F. olivacea* Elmer, see 65); 48) *F. d'albertisii* King; 49) *F. decipiens* Blume; 50) *F. dimorpha* King; 51) *F. fistulosa* Blume (incl. *F. condensa* King); 52) *F. flagellaris* Diels; 53) *F. francisci* H.J.P. Winkl.; 54) *F. geocarpa* Miq.; 55) *F. geocharis* Corner; 56) *F. gilapong* Miq. (excl. *F. hypogaea* King, see 30); 57) *F. hahliana* Diels; 58) *F. hispida* L.f. (incl. *F. hispidioides* S. Moore); 59) *F. hypogaea* King; 60) *F. iodotricha* Diels; 61) *F. ixoroides* Corner (incl. *F. pseudotarrenifolia* Kochummen, 1998); 62) *F. latimarginata* Corner; 63) *F. lepicalpa* Blume; 64) *F. limosa* C.C. Berg (see below); 65) *F. linearifolia* Elmer (= *F. botryocarpa* var. *linearifolia* (Elmer) Corner, incl. *F. cervina* Elmer, *F. merrillii* Elmer (1908), and *F. olivacea* Elmer); 66) *F. manuselensis* C.C. Berg (see below); 67) *F. megaleia* Corner; 68) *F. morobensis* C.C. Berg (see below); 69) *F. multistipularis* Merr.; 70) *F. nana* Corner; 71) *F. nota* (Blanco) Merr.; 72) *F. novahibernica* Corner (1970) 407; 73) *F. obpyramidata* King; 74) *F. pachyrrhachis* Lauterb. & K. Schum. (excl. var. *porrecta* Corner, see 78); 75) *F. papuana* Corner (incl. *F. neobritannica* Corner); 76) *F. parvibracteata* Corner; 77) *F. pleyteana* Corner; 78) *F. porrecta* (Corner) C.C. Berg (see below); 79) *F. praestans* Corner; 80) *F. remifolia* Corner ex C.C. Berg (see below); 81) *F. ribes* Blume (excl. var. *cuneata* and var. *serraria*, see 47 and 89); 82) *F. rubrosyce* C.C. Berg (see below); 83) *F. satterthwaitei* Elmer (incl. *F. moderata* Corner); 84) *F. saurauioides* Diels; 85) *F. schwarzii* Koord.; 86) *F. scopulifera* C.C. Berg (see below); 87) *F. scortechinii* King (excl. var. *lanceata* Corner, see 95); 88) *F. septica* Burm.f.; 89) *F. serraria* Miq. (= *F. ribes* Blume var. *serraria* (Miq.) Corner); 90) *F. stolonifera* King; 91) *F. subcongesta* Corner; 92) *F. sublimbata* Corner; 93) *F. subterranea* Corner; 94) *F. sulcata* Elmer; 95) *F. tarennifolia* Corner (incl. *F. scortechinii* var. *lanceata*); 96) *F. ternatana* (Miq.) Miq.; 97) *F. treubii* King; 98) *F. tunicata* Corner; 99) *F. uncinata* (King) Becc.; 100) *F. virescens* Corner; 101) *F. vrieseana* Miq. (excl. *F. sulcata* Elmer, see 65). — For other included synonyms and varieties see Corner's check-list (1965: 85–94).

Ficus subg. **Sycomorus**. sect. **Sycocarpus** subsect. **Macrostyla** Corner (1960d) 39; (1978) 400, t. 20

Shrubs, obligatory rheophytes with rooting stolon-like stems and ascending or erect leafy branches, with the lower internodes long and the upper ones short; the strig(ill)ose indumentum partly dark brown to blackish. *Leaves* spirally arranged or (sub)opposite; lamina symmetric; cystoliths only beneath; waxy glands in the axils of lateral veins in the middle of the lamina. *Figs* axillary, cauliflorous or flagelliflorous (geocarpic); basal bracts 3 and verticillate or scattered, or indistinct, lateral bracts present; internal hairs

absent or present and short and sparse. *Staminate flowers* subtended by 2 (connate) bracteoles; stamen 1. *Perianth* of pistillate flowers minute (or absent). *Style* of long-styled flowers long (8–15 mm long) with deflexed hairs; ovary and fruit laterally with deflexed hairs; ovary of the short-styled flower glabrous or unilaterally minutely hairy, the style short and glabrous. *Fruits* lenticular, slightly keeled, smooth, brownish.

Distribution — Two species, *F. macrostyla* in northern Borneo and *F. squamosa* Roxb. in the Sino-Himalayan region.

Note — The peculiar features of the long-styled flowers (very long persistent styles with deflexed stiff hairs and the deflexed stiff hairs on the ovary) can be regarded as adaptations to anchor the diaspores to the substrate.

The species of the section in Malesia: 102) *F. macrostyla* Corner.

NEW SPECIES, SUBSPECIES, AND COMBINATIONS

Ficus albomaculata C.C. Berg, *spec. nov.* — Fig. 1

Fici virescenti similis, ramis frondosis lamina infra stipulisque indumento albo-sericeo differt. Indumento *F. cereicarpa* similis, laminae basim cuneatae ad obtusae differt.
— *Typus*: Chew Wee-Lek 499 (holo SAR; iso L), Malaysia, Sarawak, Baram District, Kuala Melinau Paku, 29 June 1962.

Tree up to 8 m tall. *Leafy twigs* 3–4 mm thick, whitish to slightly brownish villous to sericeous, with small nodal glands; internodes hollow, up to 1 cm long; periderm persistent. *Leaves* spirally arranged, ± tufted; lamina oblong to subobovate to oblanceolate, 14–22 by 3.5–6.5 cm, almost symmetric, chartaceous, often drying pale brown beneath, apex acuminate, base cuneate to obtuse, margin (sub)entire; upper surface sparsely white villous on the midrib glabrescent or glabrous, smooth, lower surface white (sub)sericeous to appressed-puberulous on the veins, cystoliths only beneath, smooth; lateral veins 7–12 pairs, none of them branched or furcate far from the margin, tertiary venation scalariform; waxy glands absent (or obscure?); petiole (1.5–)2.7 cm long, whitish (sub)villous, the epidermis persistent; stipules 2–2.5 cm long, whitish villous to subsericeous, caducous or subpersistent. *Figs* cauliflorous on branched, stout, up to 7 cm long branchlets on the trunk; peduncle 0.8–1.2 cm, densely brown puberulous to tomentose, the epidermis flaking off; basal bracts 3, verticillate, 3–5 mm long; receptacle turbinate to obovoid to subglobose, 1–1.3 cm diam. when dry, brown puberulous, glabrescent or glabrous, with some conspicuous (whitish) lenticels, without lateral bracts, towards the apex 5- or 6-ribbed, yellow-brown at maturity, apex ± convex, ostiole c. 3 mm diam., surrounded by 5 or 6 raised and hairy apical bracts; internal hairs abundant, whitish to pale brown. *Style* densely hairy.

Distribution — Borneo (Sarawak, Central Kalimantan).

Habitat — Lowland streamside forest.

Notes — 1. Similarities in the shape of the lamina and its venation suggest that the new species is closely related to *F. virescens*. It differs clearly in the sericeous indumentum. The short internodes (up to 1 cm vs up to 3.5 cm long) might prove to be another consistent differentiating character. On the other hand, the indumentum and figs also show affinities to *F. cereicarpa*, from which it is clearly distinct in the base of the lamina (cuneate to obtuse vs (sub)cordate) and the absence of waxy glands in the axils of the basal lateral veins, where they occur in *F. cereicarpa*.

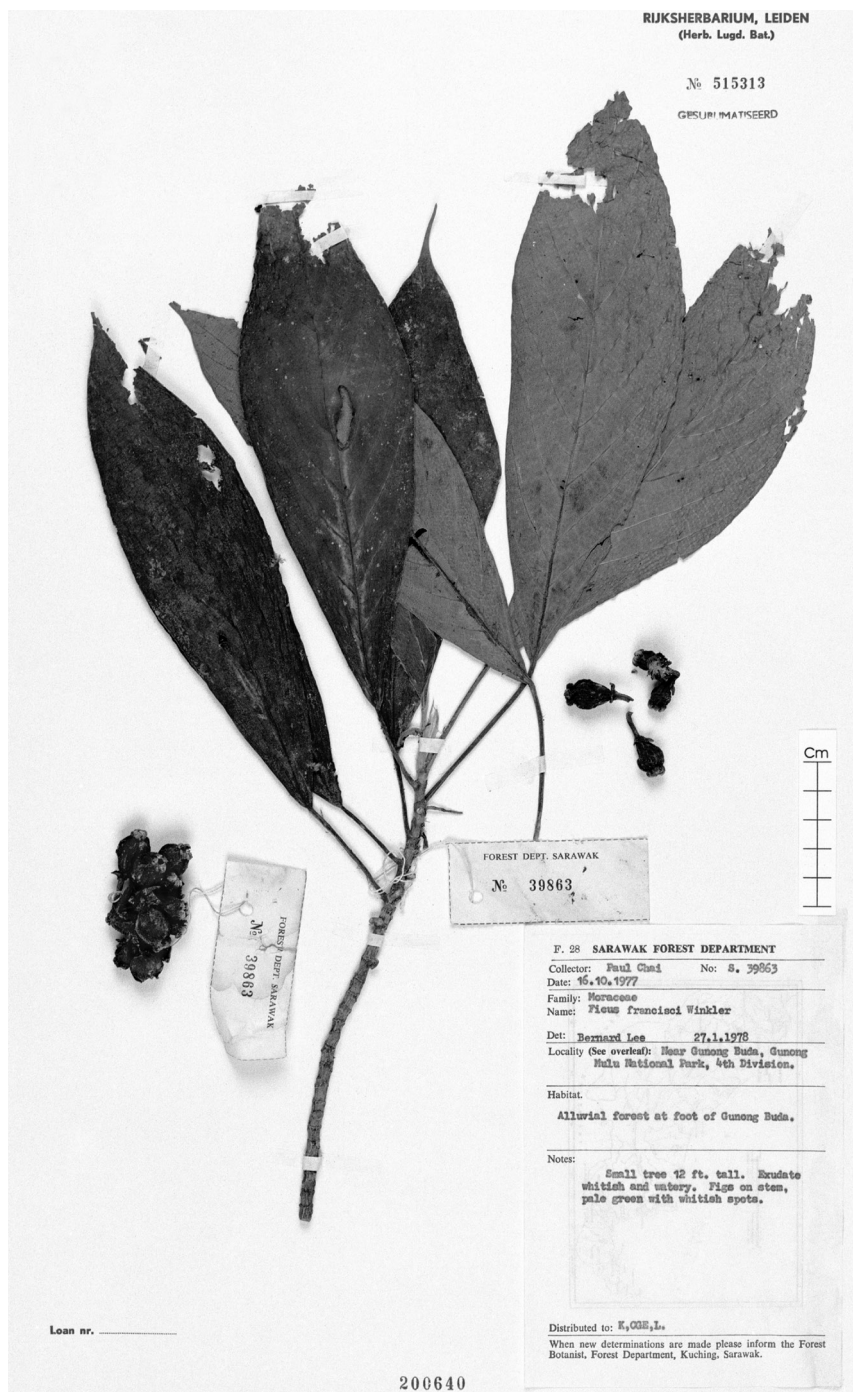


Fig. 1. *Ficus albomaculata* C.C. Berg. Leafy twig, fig-bearing branchlet, and figs (P. Chai S 39863, L), Malaysia, Sarawak, Gunong Mulu National Park, near Gunong Buda, 16 Oct. 1977.

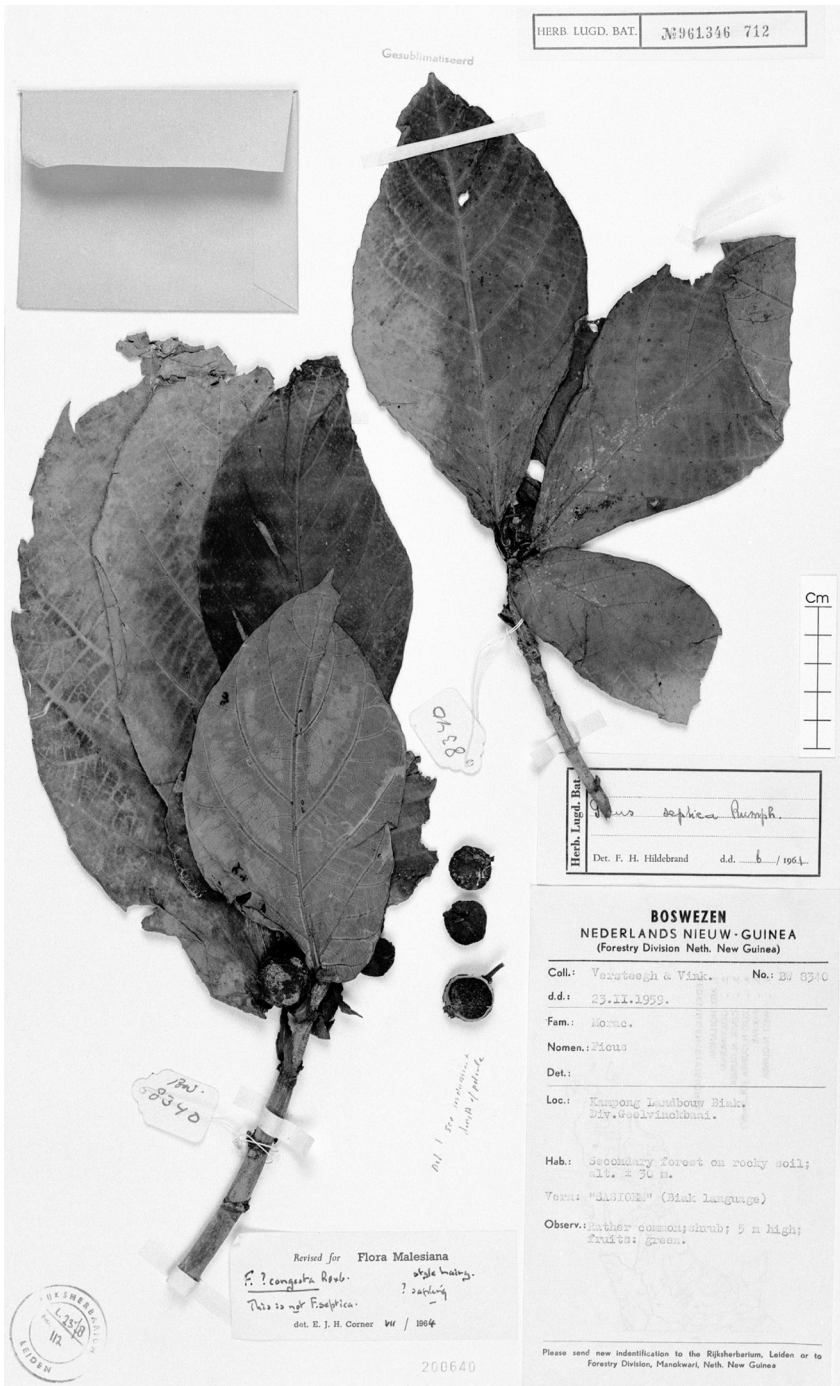


Fig. 2. *Ficus biakensis* C.C. Berg. Leafy twigs and figs (G.M. Versteegh & W. Vink BW 8340, L), Indonesia, Papua, Division Geelvinckbaai, Kampong Landbouw Biak, 23 Feb. 1959.

2. The description is also based on *P. Chai* S 39863, Malaysia, Sarawak, Gunong Mulu National Park, near Gunong Buda 16 Oct. 1977 (L); *J.P. Moge* & *W.J.J.O. de Wilde* 3639, Indonesia, Central Kalimantan, Bukit Raya, Upper Samba River, 60–80 km NNW of Tumbang Samba, 24 Nov. 1982 (L).

Ficus biakensis C.C. Berg, *spec. nov.* — Fig. 2

Indumenti absentia fortasse *F. septicae* affinis, que stipulis reflexis subpersistentibus, lamina supra glabra, inflorescentiis non caulifloris differt. — Typus: *G.M. Versteegh* & *W. Vink* BW 8340 (holo BO; iso L), Indonesia, Papua, Division Geelvinckbaai, Kampong Landbouw Biak, 23 Feb. 1959.

Shrub up to 5 m tall, sparingly branched. *Leafy twigs* 5–9 mm thick, (sub)glabrous, with nodal glands; internodes hollow; periderm flaking off. *Leaves* spirally arranged, ± tufted; lamina elliptic, 10–25 by 4.5–13 cm, (almost) symmetric, chartaceous to subcoriaceous, apex acuminate, base (sub)cordate, margin (sub)entire; upper surface very sparsely brownish strigillose, glabrescent, smooth, lower surface brown strigose to strigillose on the main veins, smooth, cystoliths only beneath; lateral veins 5–10 pairs, some of them furcate far from the margin, tertiary venation scalariform; waxy glands in the axils of some of the lateral veins in the middle of the lamina or also small ones in furcations of lateral veins or absent; petiole 0.3–1 cm long, glabrous, the epidermis flaking off; stipules 1–3 cm long, glabrous, (sub)persistent. *Figs* axillary, clustered on up to 0.5 cm long spurs, ± concealed by the stipules, subsessile or with a peduncle up to 0.8 cm long; basal bracts 3, subverticillate, 1.5–2.5 mm long; receptacle subglobose, 1.6–1.8 cm diam. when dry, glabrous, without lateral bracts, apex ± convex, ostiole c. 4 mm diam., including 5 erect apical bracts; internal hairs sparse. *Style* of the long-styled flower sparsely hairy.

Distribution — New Guinea (Bird's Head Peninsula).

Habitat — Young secondary forest on strongly humified limestone silt, at low altitudes.

Notes — 1. The absence of indumentum on various parts could indicate that this species is related to *F. septica*. It is clearly distinct in the very short petiole, the narrowly cordate base of the lamina, and the subpersistent stipules. In its habit, as the size of the plant and the ± tufted leaves, it resembles the group of species related to *F. calcarata*.

2. The description is also based on *Kostermans* & *Soegeng* 911B, Indonesia, Biak, road Biak-Parieri, 11 Sept. 1966 (L).

Ficus boanensis C.C. Berg, *spec. nov.* — Fig. 3

Fico hispidae similis, stipulis reflexis subpersistentibus, laminis supra glabris, inflorescentiis non caulifloris differt. — Typus: *K. Damas* & *P. Katik* LAE 74651 (holo LAE; iso L, according to the label also sent to A, BISH, BRI, CANB, E, K, QRS), Papua New Guinea, Morobe Province, Boana Subprovince, Mt Jasop, 29 Nov. 1969.

Tree c. 5 m tall. *Leafy twigs* 1–3 mm thick, sparsely whitish strigillose, without nodal waxy glands; internodes solid with ample pith; periderm flaking off. *Leaves* subdistichous or subopposite; lamina oblong, (3–)7–18 by (1.2–)3–7 cm, ± asymmetric, chartaceous, apex acuminate, base cuneate to rounded, margin subentire; upper surface

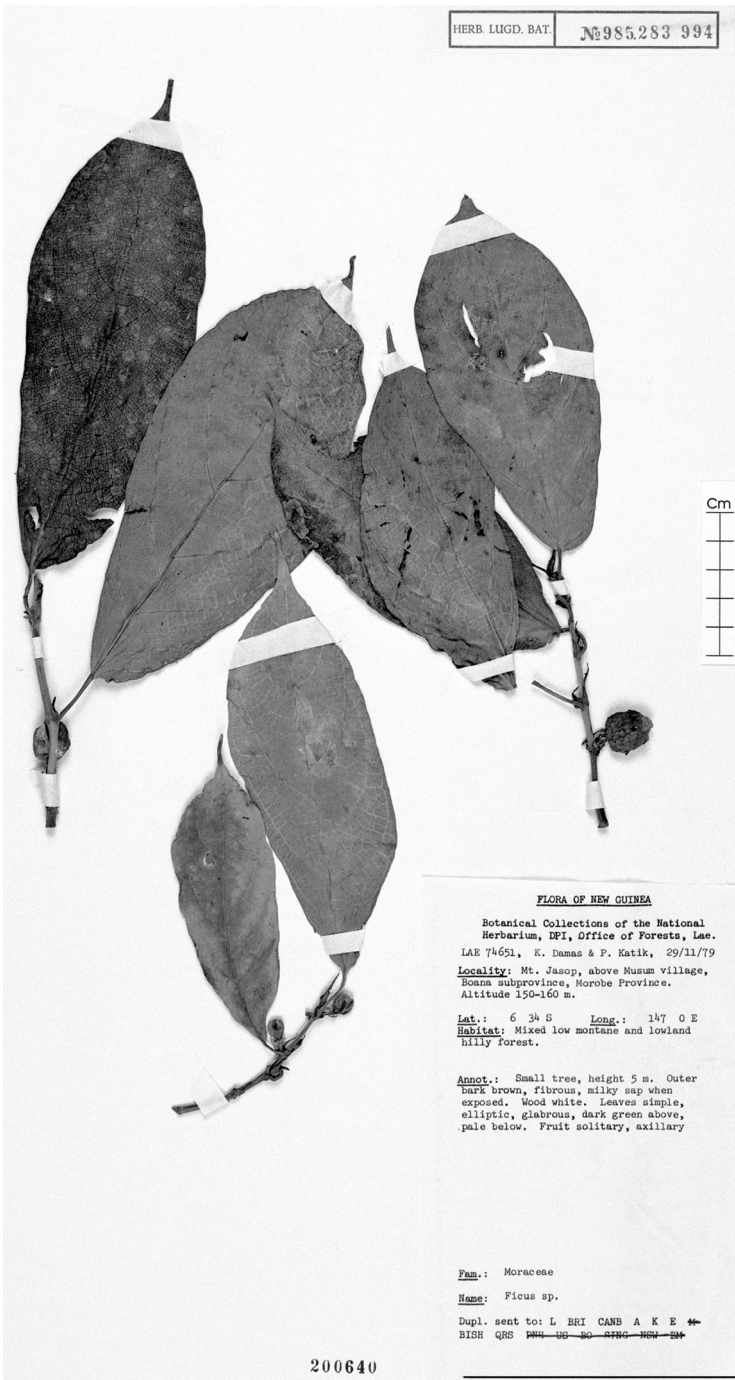


Fig. 3. *Ficus boanensis* C.C. Berg. Leafy twigs with figs (K. Damas & P. Katik, LAE 74651, L), Papua New Guinea, Morobe Province, Boana Subprovince, Mt Jasop, 29 Nov. 1979.

drying brown, sparsely white strigillose or glabrous, smooth, lower surface drying greenish, sparsely whitish strigillose or glabrous, smooth; cystoliths only beneath; lateral veins (4–)7–10 pairs, unbranched or in large leaves one or some furcate far from the margin, tertiary venation (sub)scalariform; waxy glands in the axils of two or more lateral veins in the middle to upper part of the lamina; petiole 0.5–2.5 cm long, sparsely whitish strigillose, the epidermis flaking off; stipules 0.5–1.5 cm long, sparsely (dark) brown strigillose at the base, subpersistent, reflexed. *Figs* axillary, solitary; peduncle 0.3–0.5 cm long; basal bracts 3, verticillate, 1–1.5 mm long; receptacle subglobose to depressed-globose or to ovoid, 1–1.3 cm diam. when dry, up to 0.8 cm long stipitate, glabrous, without lateral bracts, colour at maturity unknown, faintly ribbed, apex concave to flat, ostiole 2–2.5 mm diam.; internal hairs absent. *Style* of the long-styled flower hairy.

Distribution — New Guinea (Morobe, Southern Highland Provinces).

Habitat — Forest, at altitudes up to 800 m.

Notes — 1. This species might be related to *F. hispida*, from which it can be distinguished by the reflexed subpersistent stipules, the glabrous upper surface of the lamina, the short petiole, and the absence of cauliflory.

2. The description is also based on *T.G. Hartley 10845*, Papua New Guinea, Morobe Province, Busu River, 12 miles NW of Lae, 16 Oct. 1962 (L) and *R. Schodde 2434* (L), Southern Highland Province, Lake Kutubu, Soro R., 7 Oct. 1961.

Ficus botryocarpa Miq. (1867a: 233; 1867b, 296)

The rank for the three subdivisions which can be recognized within the species to acknowledge the constancy of the differences and the distinctness of the material from New Guinea is discussable. The differences are just too small to recognise the three entities as distinct at the level of species.

KEY TO THE SUBSPECIES

- 1a. Hairs on the leafy twigs and the lamina beneath whitish, appressed; fig receptacle 1–1.5(–2.2) cm diam. when dry, the ostiole 3–4(–5) mm diam. — Philippines, Sulawesi, Moluccas **c. subsp. subalbidoramea**
- b. Hairs on the leafy twigs and the lamina beneath whitish or brown(ish) and partly whitish, at least partly patent; fig receptacle 1.2–2.5 cm diam. when dry, the ostiole c. 3 or 5–6 cm diam. 2
- 2a. Hairs on the leafy twigs brown, intermixed with shorter white hairs; ostiole c. 3 mm diam. — Philippines, Sulawesi, Moluccas **a. subsp. botryocarpa**
- b. Hairs on the leafy twigs whitish (or brownish); ostiole 5–6 mm diam. — New Guinea **b. subsp. hirtella**

a. subsp. botryocarpa

Including: *Ficus barnesii* Merr. (1904) 12; *F. caulocarpa* Miq. (1867a) 235; *F. endothrix* Warb. (1905) 200; *F. miquelii* King (1886) 405; *F. sordidissima* Elmer (1911) 1268; *F. sosorogonensis* Elmer (1937) 3439.

Leafy twigs brown strigose to hirtellous, the longer stiff hairs intermixed with shorter and softer white hairs. *Lamina* drying brown (or greyish); upper surface rather densely to very sparsely whitish strigillose to subhispidulous, \pm scabrous to smooth, lower surface brownish strigose to hirtellous on the main veins, the longer stiff hairs intermixed with shorter and softer white hairs, white appressed to patent-puberulous on the smaller veins, smooth or scabridulous; lateral veins (4–)6–8 pairs, some or none branched or furcate far from the margin; waxy glands in slit-shaped extensions of the axils of 1 or 2 lateral veins in the middle part of the lamina or also in the axils of the basal lateral veins; petiole 0.4–1(–1.2) cm long, brown to whitish hirtellous (to substrigillose); stipules 1.2–2.5(–2.8) cm long, brown hirtellous or partly white appressed-puberulous. *Fig peduncle* 0.3–1.2(–1.7) cm long; basal bracts 3, verticillate, 2–2.5 mm long; receptacle subglobose to depressed-globose, 1.2–2.5 cm diam. when dry, 2–4 cm diam. when fresh, non-stipitate or sometimes up to 0.2 cm long stipitate, brownish puberulous to hirtellous, faintly (6–15-)ribbed, with or without conspicuous lenticels, ostiole c. 3 mm diam., flat.

Distribution — Philippines (Luzon, Mindoro, Samar, Leyte, Siargao, Mindanao), Sulawesi (Sangi and Talaud Islands, Minahassa), Moluccas (Ceram, Ternate).

Habitat — Forest, at low altitudes.

Note — This variety is rather variable. Most specimens from Sulawesi and the Moluccas are morphologically closer to the other varieties than to most of those from the Philippines and the Sangi and Talaud Islands.

b. subsp. *hirtella* C.C. Berg, *subsp. nov.*

Ab ambobus subspeciebus ceteris ramulorum foliosorum laminarumque parte inferiore indumento maxime patenti, ostiolo 5–6 mm lato differt. — Typus: *M. Jacobs 9146* (holo LAE; iso L), Papua New Guinea, 20 km SSW of Kutubu, near Waro Airstrip, 12 Oct. 1973.

Including: *Ficus conora* King (1888) 103, t. 131; *F. botryocarpa* var. *subalbidoramea* (Elmer) Corner forma *scabrida* Corner (1960d) 44.

Leafy twigs whitish (to brownish) partly puberulous to hirtellous, partly with appressed hairs of different length. *Lamina* drying greyish; upper surface (sub)glabrous, smooth, lower surface whitish to brownish hirtellous to puberulous on the veins, often with \pm retrorse hairs, smooth; lateral veins (4–)6–10 pairs, none of them branched or furcate far from the margin, tertiary venation scalariform; waxy glands in slit-shaped extensions of the axils of 1 or 2 lateral veins in the middle part of the lamina; petiole 0.4–1.5 cm long, whitish hirtellous; stipules 0.6–1.6 cm long, whitish to yellowish to brownish appressed-puberulous to subsericeous, caducous. *Fig peduncle* 0.8–1.8 cm long; basal bracts 3, verticillate (or scattered), 1–2.5 mm long; receptacle depressed-globose, (1–)1.5–2 cm diam. when dry, c. 2.5 cm diam. when fresh, non-stipitate or sometimes up to 0.3 cm long stipitate, sparsely whitish puberulous, without lateral bracts, finely, 15(–20-)ribbed, with conspicuous lenticels, ostiole 5–6 mm diam., \pm prominent.

Distribution — New Guinea (incl. New Britain).

Habitat — Forest, at altitudes up to 1000 m.

Notes — 1. This variety is quite uniform.

2. The description is also based on numerous other collections.

3. The name *F. conora*, is based on two collections made by Beccari: one from New Guinea, almost certainly representing subsp. *hirtella* and used to prepare the plate (t. 131), and the other from Ternate (Moluccas), probably representing one of the other subspecies. As the type material could not be examined, lectotypification could not be carried out properly and the epithet not used as basionym.

c. subsp. subalbidoramea (Elmer) C.C. Berg, *stat. nov.*

Based on: *Ficus subalbidoramea* Elmer (1914) 2389. — *Ficus botryocarpa* var. *albidoramea* (Elmer) Corner (1960d) 44. — Type: *A.D.E. Elmer 13991* (iso L), Philippines, Mindanao, Prov. Agusan, Cabadbaran (Mt Urdaneta), Oct. 1912.

Including: *Ficus mindorensis* Merr. (1904) 12; *F. trichantha* Warb. (1905) 201.

Leafy twigs whitish appressed-puberulous to strigillose, with hairs of different length. *Lamina* drying greyish; upper surface appressed-puberulous to strigillose to (sub-)glabrous, smooth, lower surface whitish appressed-puberulous to strigillose on the veins, smooth; lateral veins (3–)6–10 pairs, none of them branched or furcate far from the margin, tertiary venation scalariform; waxy glands in slit-shaped extensions of the axils of 1 or 2 lateral veins in the middle part of the lamina; petiole 0.5–2(–2.5) cm long, whitish appressed-puberulous to strigillose; stipules 0.6–2 cm long, whitish to yellowish to brownish appressed-puberulous to subsericeous, caducous (or subpersistent). *Fig peduncle* 0.4–2.5 cm long; basal bracts 3, verticillate (or scattered), 1–2 mm long; receptacle obovoid to subpyriform to subglobose or ± depressed-globose, 1–1.5(–2.2) cm diam. when dry, c. 2.5 cm diam. when fresh, finely, 15(–20)-ribbed, with or without conspicuous lenticels, ostiole 3–4(–5) mm diam., ± prominent.

Distribution — Philippines (Luzon, Mindoro, Palawan, Mindanao), Sulawesi, Moluccas (Ternate?, Ambon).

Habitat — Forest, at low altitudes.

Note — The material from Sulawesi and the Moluccas differs somewhat from that from the Philippines in the relatively large (c. 2 cm diam. when dry) and ± depressed-globose fig receptacle tending to have a wider ostiole and to be more conspicuously lenticellate, thus with fig characters approaching those of *F. botryocarpa* var. *hirtella*.

Ficus limosa C.C. Berg, *spec. nov.* — Fig. 4

Fico obpyramidatae et *F. hahlianae* similis, prima foliis comparate angustis, stipulis (sub-)persistentibus, secunda laminis (sub)integris, syconii receptaculo pubescenti conspicue lenticellato differt. — Typus: *Ashton S 22036* (holo SAR; iso L, according to the label also in A, CGE, K, SAN, SING), Malaysia, Sarawak, N Sepalau, Segan, 5 Nov. 1964.

Treelet up to 5 m tall. *Leafy twigs* 2–4 mm thick, dark brown hirtellous, with nodal waxy glands; internodes hollow; periderm persistent. *Leaves* spirally arranged to (sub-)opposite; lamina oblong to subobovate to oblanceolate, 5–16 by 1.8–5.5 cm, slightly asymmetric to symmetric, chartaceous, apex acuminate, base cuneate to obtuse (to rounded), margin (sub)entire; upper surface densely whitish appressed-puberulous to strigillose, the midrib brown hirtellous, (almost) smooth, lower surface brown hirtellous to strigillose on the main veins, on the smaller veins to white appressed-puberulous, smooth, cystoliths only beneath; lateral veins 6–10 pairs, none of them furcate far from



Fig. 4. *Ficus limosa* C.C. Berg. Leafy twigs and fig-bearing branchlet (*I. Paie* S 27025, L), Malaysia, Sarawak, Nanga Sepulau, Segan F.R., Bintulu, 4th Division, 16 Aug. 1968.

the margin, tertiary venation scalariform; waxy glands in the axils of some lateral veins in the middle part of the lamina; petiole 1–2 cm long, brown hirtellous, the epidermis persistent; stipules (1–)1.5–2.5 cm long, brown strigose to strigillose to appressed-puberulous, subsistent. *Figs* cauliflorous clustered on short (up to 2 cm long) woody tubercles or up to 2 cm long branched branchlets with (very) short internodes, on the older wood; peduncle 0.8–1.2 cm long; basal bracts 3, (sub)verticillate (or scattered), 1–1.5 mm long; receptacle subglobose to obovoid to subpyriform to depressed-globose, 1–2.5 cm diam. when dry, often 1–2 mm long stipitate, brown puberulous, conspicuously lenticellate, 5–15-ribbed, without lateral bracts, colour at maturity unknown, apex flat to ± concave, ostiole 3–5 mm diam., ± depressed, surrounded by 5 very short apical bracts; internal hairs sparse, brown. *Perianth* of both long-styled and short-styled flowers short (collar-shaped) *Style* of the long-styled flower hairy.

Distribution — Borneo (Sarawak).

Habitat — Alluvial riverbanks, at low altitudes.

Notes — 1. This species resembles both *F. obpyramidata* (Malay Peninsula) and *F. hahliana* (New Guinea). It can readily be distinguished from the former by the relatively narrow leaves and (sub)persistent stipules and from the latter by the (sub)entire lamina and the hairy and conspicuously lenticellate fig receptacles.

2. One of the labels indicates that the plant is a rheophytic shrub. On all specimens traces of silt are present.

3. The description is also based on *Ding Hou 420*, Malaysia, Sarawak: on way to Nanga Sapulow, Bintulu, 4th Division, 1 July 1966 (L); *B. Lee S 39842*, Sarawak, Sg. Bera-an, Belaga, 7th Division, 26 Aug. 1978 (L, according to the label also in CGE, E, K, KEP); *I. Paie S 27025*, Sarawak: Nanga Sepulau, Segan F.R., Bintulu, 4th Division, 16 Aug. 1968 (L, according to the label also in CGE, E, K, SING).

***Ficus manuselensis* C.C. Berg, spec. nov. — Fig. 5**

Fico ternatanae forma non cauliflorae similis, lamina supra glabra, syconio sessili receptaculo stipitato majore differt. — Typus: *M. Kato et al. C-7241* (holo BO; iso L), Indonesia, Moluccas, Ceram, Manusela National Park, southern slope of Manusela Ridge, Kecamatan (District) Tehoru, 17 Feb. 1985.

Tree, c. 10 m tall. *Leafy twigs* 2–3 mm thick, sparsely dark brown strigillose, without nodal waxy glands; internodes hollow; periderm persistent; nodes prominent by scars of the leaves and lenticels. *Leaves* spirally arranged to subdistichous; lamina oblong, 5–23 by 2–8.5 cm, slightly asymmetric, chartaceous, apex acuminate, base subcuneate to subtruncate, margin coarsely crenate-dentate; upper surface glabrous, smooth, lower surface sparsely dark brown to whitish strigillose, initially also whitish villose on the main veins, smooth, cystoliths only beneath; lateral veins 7–10 pairs, unbranched, tertiary venation (sub)scalariform; waxy glands small, in the axils of lateral veins in the middle part of the lamina, or absent; petiole (1–)1.5–4.5 cm long, sparsely dark brown to whitish strigillose, the epidermis persistent; stipules 0.8–1.2 cm long, whitish to brownish strigillose, caducous. *Figs* sometimes axillary, solitary, mostly cauliflorous on slender branchlets, up to 40 cm long on the older wood; figs sessile; basal bracts 3, verticillate, 2–2.5 mm long; receptacle subglobose to depressed-globose, c. 3 cm diam. when dry, up to 0.8 cm long stipitate, glabrous, without lateral bracts, colour at

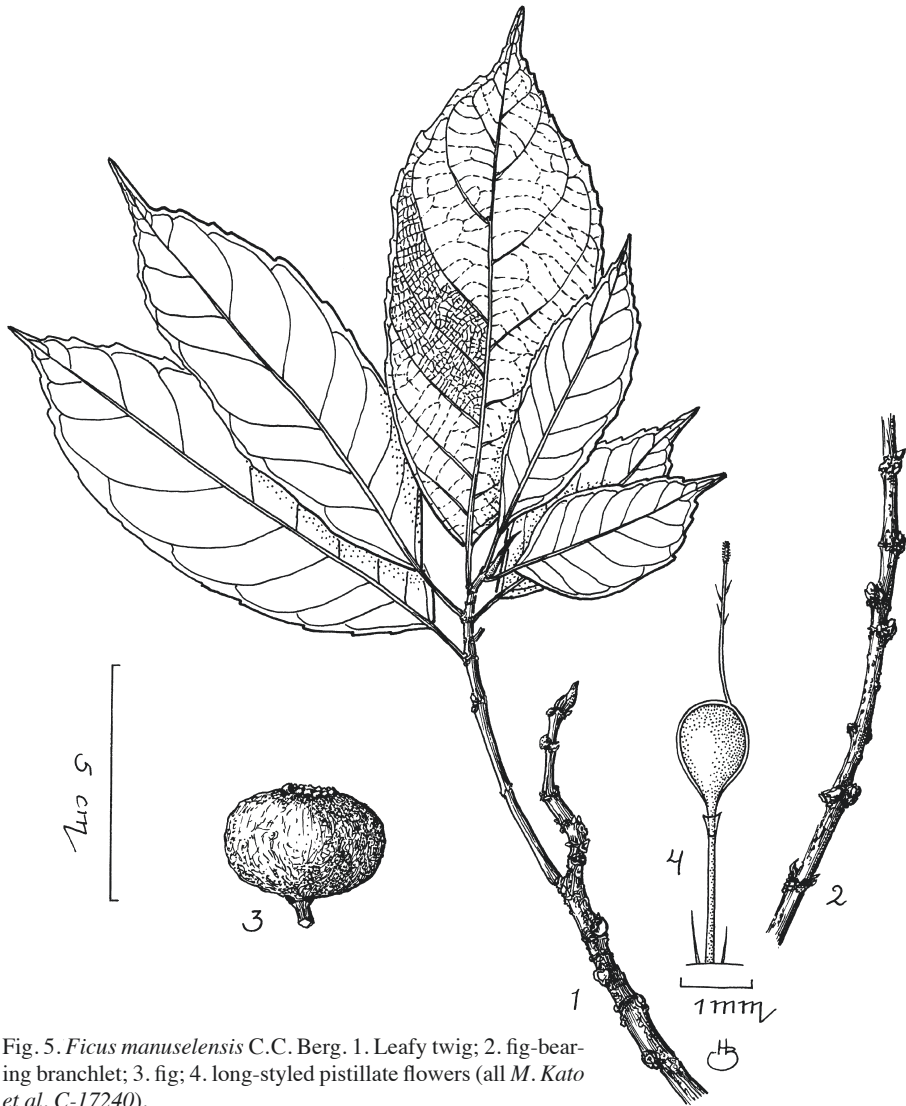


Fig. 5. *Ficus manuselensis* C.C. Berg. 1. Leafy twig; 2. fig-bearing branchlet; 3. fig; 4. long-styled pistillate flowers (all *M. Kato et al.* C-17240).

maturity unknown, apex concave to flat, ostiole c. 5 mm diam.; internal hairs absent. *Style* of the long-styled flower sparsely hairy.

Distribution — Moluccas (Ceram).

Habitat — Mossy forest on limestone, on rocky slope, c. 1200 m.

Notes — 1. This species is probably closely related to the non-cauliflorous (form of) *F. ternatana* from which it differs in the glabrous upper surface of the lamina and sessile fig with a stipitate receptacle, being larger, c. 3 cm in diameter.

2. The description is also based on *M. Kato et al.* C-7240, from the same locality.

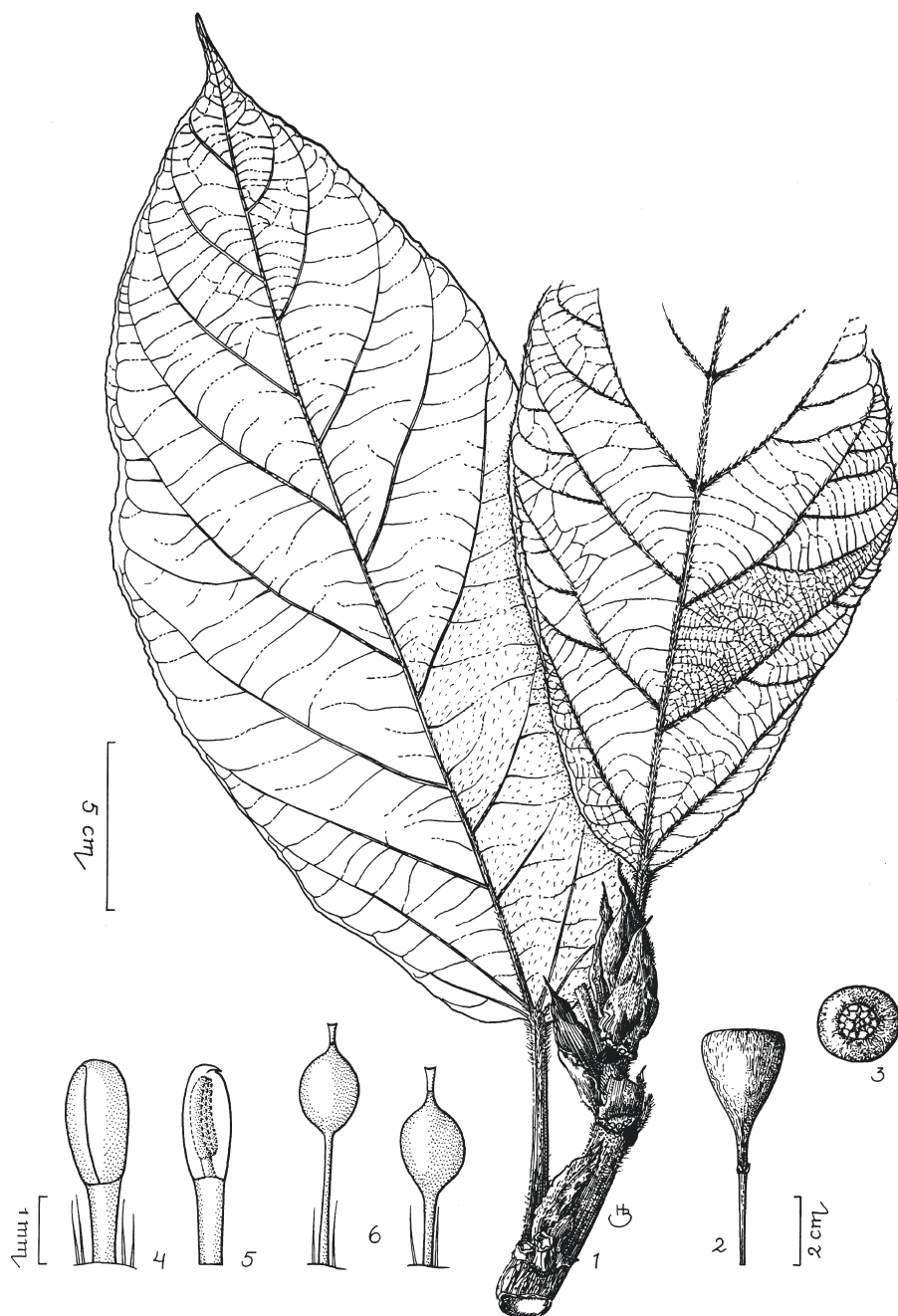


Fig. 6. *Ficus morobensis* C.C. Berg. 1. Leafy twig with nodal glands; 2. fig; 3. ostiole; 4. staminate flower enclosed by bracteoles, internal hairs around the pedicel; 5. staminate flower and stamen; 6. short-styled pistillate flowers (all *R.D. Hoogland* 9140).

Ficus morobensis C.C. Berg, *spec. nov.* — Fig. 6

Fico pachyrrhacidi similis, syconii basi stipitata apice convexo ad plano, bracteis basilibus brevibus differt. — Typus: *Hoogland 9140* (holo LAE; iso L, according to the label also in A, CANB, K, US), Papua New Guinea, Morobe Province, Huon Peninsula, Mt Rawlinson, Gang Creek, c. 1400 m, 12 June 1964.

Tree, c. 12 m tall. *Leafy twigs* 8–15 mm thick, brownish hirtellous to subhirsute, with large, sometimes almost band-shaped, nodal waxy glands; internodes hollow; some large lenticels just below the scars of the stipules; periderm flaking off. *Leaves* spirally arranged or subopposite; lamina oblong to subobovate to subrhombic, 24–38 by 11–17 cm, symmetric or slightly asymmetric, chartaceous, apex acuminate, base cordate to subcuneate, margin denticulate towards the apex dentate; upper surface hirtellous to hispidulous, scabrous, lower surface (rather) densely brownish hirtellous on the veins, smooth, cystoliths only beneath; lateral veins 7–9 pairs, often branched or furcate far from the margin, tertiary venation scalariform; waxy glands in the axils of lateral veins in the middle of the lamina and in furcations of lateral veins; petiole 3.5–7 cm long, hirtellous to subhirsute, the epidermis flaking off; stipules 3.5–4 cm long, brownish to whitish strigillose to strigose to subsericeous, subsistent. *Figs* cauliflorous “in large clumps (up to 30 cm diam.) or small clusters along the stem”; peduncle 3–6 cm long; basal bracts 3, (sub)verticillate, 2–3 mm long; receptacle subobovoid to pyriform, 2–2.5 cm diam. when dry, up to 4.5 cm diam. when fresh, up to c. 1 cm long stipitate, brown puberulous, without lateral bracts, ribbed, at maturity reddish brown with pale spots, apex ± convex to flat, ostiole 7–8 mm diam., including 5 or 6 hardly distinct short apical bracts; internal hairs rather abundant, brownish.

Distribution — New Guinea (Milne Bay and Morobe Provinces).

Habitat — Forest and secondary growth, at altitudes between 700 and 1600 m.

Notes — 1. This species is probably closely related to *F. pachyrrhachis*, from which it differs in the convex to flat apex and the stipitate base of the fig receptacle, the short basal bracts, and possibly also in the position of the figs on the tree, according to label data the figs occur on bunches of short branchlets rather than on up to 40 cm long elongate leafless branchlets.

2. The description is also based on *L.J. Brass 24727*, Papua New Guinea, Milne Bay Province, Goodenough Island, 1600 m, mossy oak forest, 8–15 Oct. 1953 (L); *P. Katik et al. LAE 70950*, Milne Bay Province, Misima Subprovince, Rossel Island, Mt Rossel, 700 m, 19 March 1979 (L: the leaf, but not the fig-bearing branchlets).

Ficus porrecta (Corner) C.C. Berg, *stat. nov.*

Based on: *Ficus pachyrrhachis* var. *porrecta* Corner, Gard. Bull. Singapore 18 (1960) 47. — Type: *Rappard BW 682* (holo L), Indonesia, Papua, Kroi, near Kaimana, 31 April 1955.

Treelet up to 5 m tall. *Leafy twigs* 8–12 mm thick, whitish strigillose, with nodal waxy glands; internodes hollow; periderm persistent. *Leaves* spirally arranged; lamina elliptic to subovate, 30–42 by 16–21 cm, (almost) symmetric, chartaceous, apex subacuminate, base cordate, margin denticulate; upper surface strigillose to hispidulous, scabrous, lower surface (rather) densely whitish hirtellous to puberulous and on the main veins whitish to brownish strigillose to strigose, the longer hairs intermixed with shorter and softer white hairs, smooth cystoliths only beneath; lateral veins 9–12 pairs, often

branched or furcate far from the margin, tertiary venation scalariform; waxy glands in (slit-shaped extensions of) the axils of some lateral veins in the middle part of the lamina and in furcations of lateral veins; petiole 7.5–13 cm long, strigillose, the epidermis persistent; stipules 3.5–4 cm long, whitish strig(ill)ose to subsericeous, subsistent. *Figs* cauliflorous on stout up to c. 30 cm long branchlets, with short internodes and prominent scars, and terminally with a cluster of short branchlets, on the base of the trunk (?); peduncle c. 1 cm long; basal bracts 3, verticillate, 5–6 mm long, lanceolate, stiff; receptacle turbinate to pyriform, when dry c. 2 cm diam., (sub)glabrous, with few narrow and stiff lateral bracts, faintly ribbed, colour at maturity unknown, apex slightly convex to flat, ostiole c. 4 mm diam., surrounded by a rosette of stiff apical bracts, pointing upwards; internal hairs abundant, pale brown. *Style* of long-styled flower hairy.

Distribution — New Guinea.

Habitat — Lowland forest.

Notes — 1. The single specimen described as var. *porrecta* of *F. pachyrrhachis* distinctly differs from material that certainly belongs to *F. pachyrrhachis* in some characters, such as in the persistent periderm of the leaf twigs and the persistent epidermis of the petioles, in the long petioles, in the design of apex of the fig and the texture of the basal, lateral and apical bracts, similar to those of *F. uncinata*. The nature of these differences is such that maintaining the variety cannot be justified.

2. *Ficus porrecta* is probably more closely related to *F. praestans* than to *F. pachyrrhachis*.

Ficus remifolia Corner ex C.C. Berg, *spec. nov.* — Fig. 7

Fico multistipulari similis, exempli gratia ramis foliosis et stipulis (sub)glabris, lamina basi cuneata ad rotundata, petiolis stipulisque 3 cm brevibus differt. — Typus: *Neth. Ind. For. Service Cel./V-287* (holo BO; iso L), Indonesia, Sulawesi, Malili, Kawata, 25 Sept. 1933.

Shrub (?). *Leafy twigs* 5–9 mm thick, (sub)glabrous, with nodal glands; internodes hollow; periderm persistent. *Leaves* spirally arranged, ± tufted; lamina elliptic, 18–28 by 7–13 cm, (almost) symmetric, chartaceous to subcoriaceous, apex acuminate, base (equilateral to ± inequilateral), cuneate to rounded, margin crenate-dentate to entire; upper surface glabrous, smooth, lower surface sparsely brownish strigillose on the main veins, smooth, cystoliths only beneath; lateral veins 9–11 pairs, most of them furcate far from the margin, tertiary venation scalariform; waxy glands in the axils of some (or none?) of the lateral veins in the middle part of the lamina or (also) small ones in furcations of lateral veins or absent; petiole 1–3 cm long, glabrous, the epidermis persistent; stipules 1–3 cm long, glabrous, (sub)persistent. *Figs* axillary, ± concealed by the stipules, sessile; basal bracts 3, verticillate, c. 3 mm long; receptacle depressed-globose, c. 1.5 cm diam. when dry, glabrous, without lateral bracts, apex slightly convex to slightly concave, ostiole 2.5–3 mm diam., including 5 erect apical bracts; internal hairs sparse. *Style* of the long-styled flower glabrous.

Distribution — Sulawesi (Menado, Malili).

Habitat — Forest, at altitudes between 200 and 1000 m.

Notes — 1. The species shows affinities to a group with axillary figs, including *F. multistipularis* Merr. and *F. boanensis* (see above). It differs from the former in the subglabrous leafy twigs and stipules, the cuneate to rounded base of the lamina, and

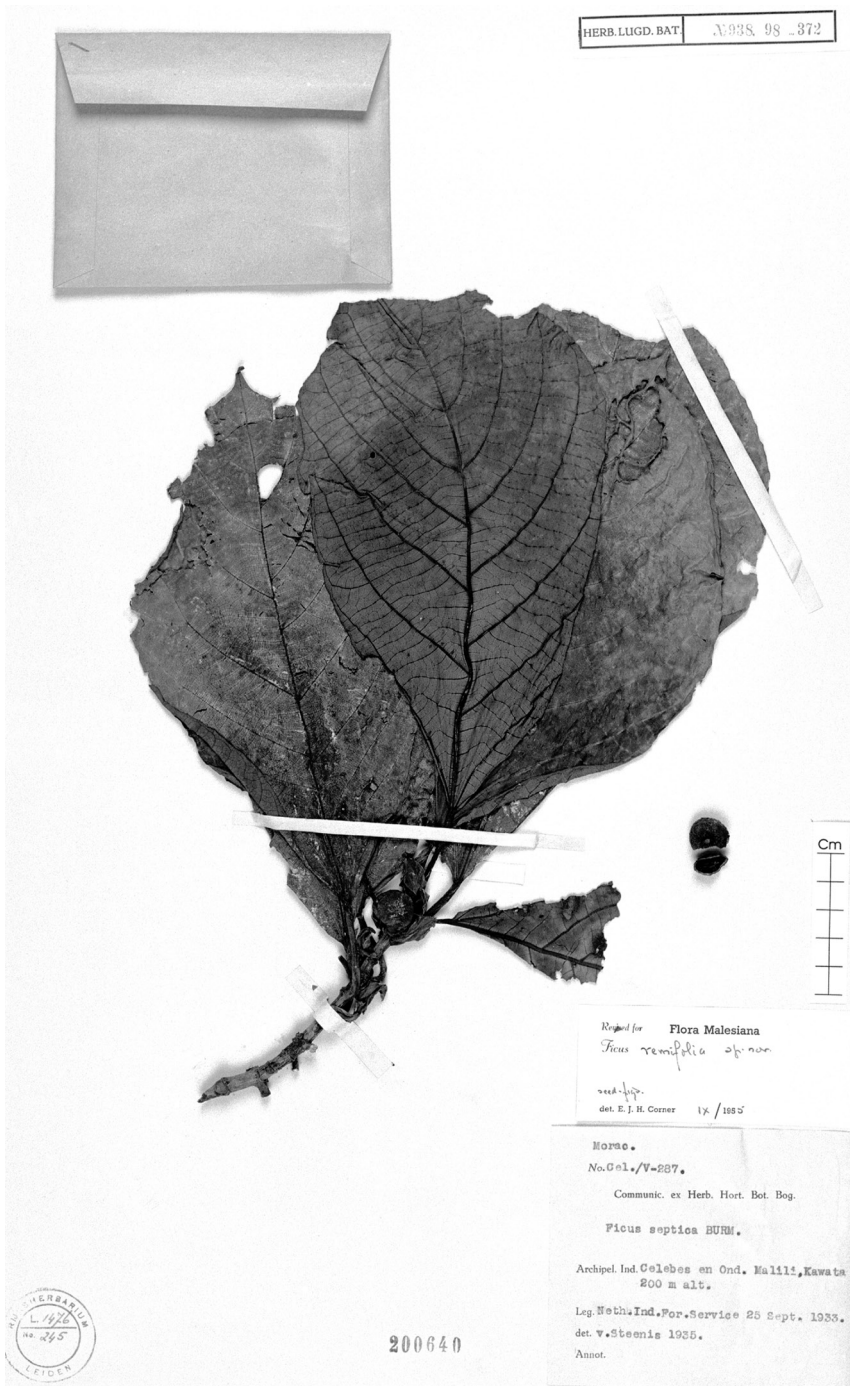


Fig. 7. *Ficus remifolia* C.C. Berg. Leafy twig with figs (*Neth. Ind. For. Service Cel./V-287, L*), Indonesia, Sulawesi, Malili, Kawata, 25 Sept. 1933.

the shorter petioles and stipules. It differs from the latter in the persistent epidermis of the longer petiole, and the cuneate to rounded base and dentate margin of the lamina.

2. The description is also based on *S. Bloembergen 4123* (L), Sulawesi, Menado, Palu, E of Landu Lake, slope of Gunung Ngilalaki, 1000 m, 11 July 1939.

***Ficus rubrosyce* C.C. Berg, *spec. nov.* — Fig. 8**

Fico subterraneae similis, foliis minoribus, ramulorum foliosorum peridermide et petioli epidermide exfoliosa, syconii receptaculo minore sine bracteis lateralibus, floris longistylosae stylo piloso differt. — Typus: *H. Nagamasu 3928* (holo BO; iso L ex KYO), Indonesia, Sumatra (West), Gunung Rasam, trail from Airdingin to summit, 6 km S of Danau Diatas, 1700–1800 m, 18 March 1989.

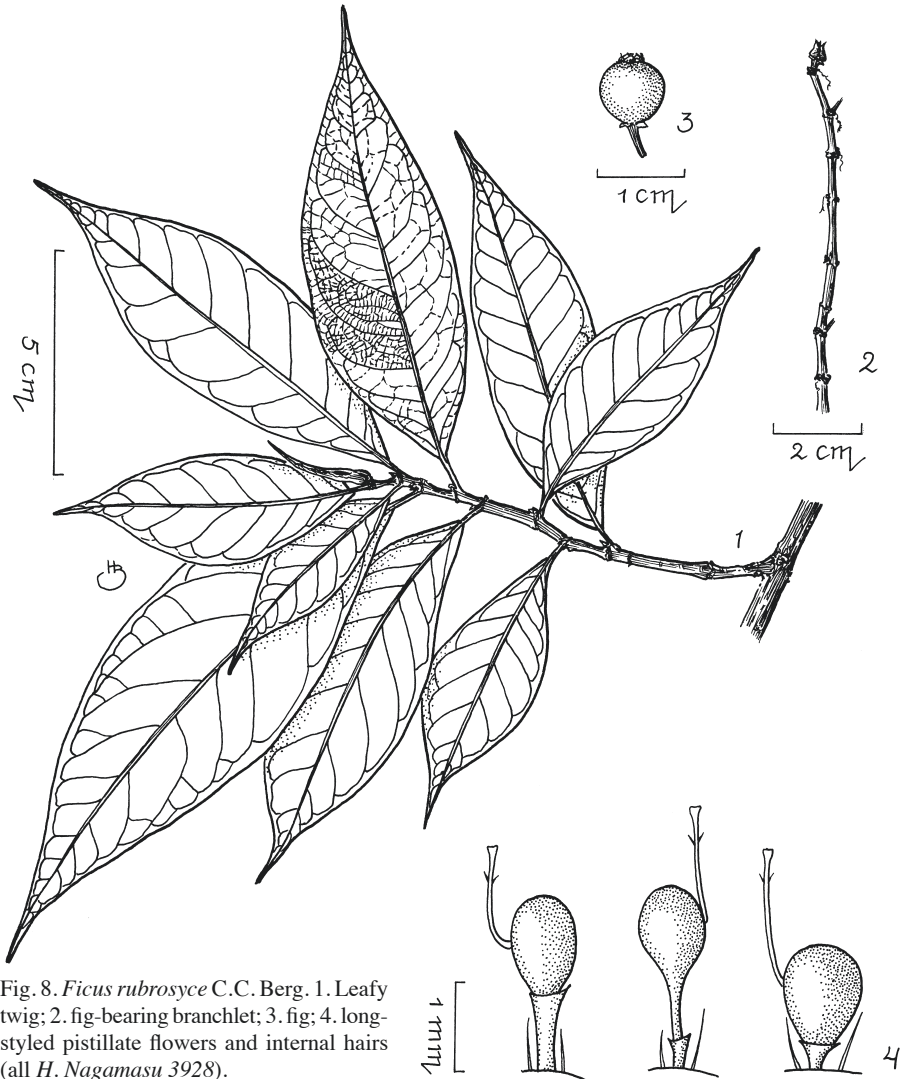


Fig. 8. *Ficus rubrosyce* C.C. Berg. 1. Leafy twig; 2. fig-bearing branchlet; 3. fig; 4. long-styled pistillate flowers and internal hairs (all *H. Nagamasu 3928*).

Tree. *Leafy twigs* 1–2 mm thick, white appressed-puberulous with hairs of different length to glabrous, with small nodal glands; with persistent minute conical ‘buds’ in the leaf axils; internodes hollow; periderm flaking off (often starting below the leaves). *Leaves* subdistichous or subopposite; lamina oblong, 4.5–12.5 by 1.5–4 cm, slightly asymmetric, subcoriaceous, apex acuminate, base (sub)cuneate, margin (sub)entire; upper surface glabrous, smooth, lower surface very sparsely appressed-puberulous on the midrib, smooth, cystoliths only beneath; lateral veins 7–10 pairs, some or none of them furcate far from the margin, tertiary venation subscalariform to subreticulate; waxy glands absent; petiole 0.3–0.8 cm long, white puberulous adaxially, the epidermis flaking off; stipules 1.5–2 cm long, glabrous, caducous. *Figs* flagelliflorous on branched stolons with up to 1.5 cm long internodes; peduncle 0.4–0.5 cm long; basal bracts 3, verticillate, 1–1.5 mm long; receptacle subglobose, 0.9–1.1 cm diam. when dry, glabrous, without lateral bracts, red at maturity, apex ± convex, ostiole 2–3 mm diam., prominent; internal hairs sparse, brownish. *Style* of the long-styled flower hairy.

Distribution — Sumatra.

Habitat — Montane forest, near streamlet, at 1700–1800 m.

Note — This species shows clear affinities to *F. subterranea* from which it differs in the smaller leaves, the exfoliating periderm of the leaf twigs and the epidermis of the petiole, the smaller fig receptacle without lateral bracts, and the hairy style of the long-styled flower. It also resembles *F. tarennifolia* from which it differs in the short petiole and the short peduncles.

Ficus scopulifera C.C. Berg, *spec. nov.* — Fig. 9

Fico limbata similis, laminis supra laevibus, fici receptaculo maiore bracteis basalibus longioribus, ostiolo latiore differt. — Typus: *L.A. Craven & R. Schodde 1325* (holo LAE; iso L, according to the label also in A, BRI, CANB), Papua New Guinea, Morobe Province, headwaters of Langimar River, Aseki Patrol Area, c. 1800 m, 16 April 1966.

Tree up to 15 m tall. *Leafy twigs* 2–5 mm thick, (very) sparsely whitish appressed-puberulous to brownish strigillose or glabrous, with rather large nodal waxy glands; internodes hollow or solid; periderm flaking off. *Leaves* (sub)distichous or subopposite; lamina subobovate to oblong (to elliptic), 7–24 by 2.5–7.5 cm, slightly asymmetric, subcoriaceous, apex acuminate, base obtuse to subcuneate, margin crenate-dentate towards the apex; upper surface subglabrous or white appressed-puberulous to substrigillose, smooth, lower surface (very) sparsely whitish or brownish strigillose to appressed-puberulous on the main veins, smooth, cystoliths only beneath; lateral veins (4–)6–9 pairs, some or none of them branched or furcate far from the margin, tertiary venation loosely scalariform; waxy glands absent in slit-shaped extensions of the axils of 1 or 2 lateral veins in the middle of the lamina beneath; petiole (1–)1.5–3.5 cm long, very sparsely whitish strigillose, the epidermis flaking off; stipules 1.5–2.5 cm long, glabrous or brownish strigillose at the base, subpersistent. *Figs* cauliflorous to flagelliflorous (geocarpic), often on broom-like branched branchlets on the lower part of the trunk, the ultimate branchlets slender and with short internodes and 0.2–0.3 cm long persistent stipules, or the fig-bearing branchlets becoming up to 1 m long stolons with up to 5.5 cm long internodes and up to 1.5 cm long subpersistent stipules and terminally normal leaves; peduncle 0.5–3.5 cm long; basal bracts 3, verticillate, 1–2 mm long;



Fig. 9. *Ficus scopulifera* C.C. Berg. Leafy twigs and fig-bearing branchlet with young figs (L.A. Craven & R. Schodde 1325, L), Papua New Guinea, Morobe Province, headwaters of Langimar River, Aseki Patrol Area, 16 April 1966.

receptacle subglobose to obovoid, 1–1.3 cm diam. when dry, (sub)glabrous, up to 0.4 cm long stipitate, (faintly) ribbed, without lateral bracts, colour at maturity unknown, apex flat to concave, ostiole c. 2 mm diam., surrounded by 5 (or 6) erect apical bracts; internal hairs absent. *Style* of the long-styled flower hairy or glabrous.

Distribution — New Guinea (Morobe Province).

Habitat — Montane forest, at altitudes between c. 1300 and 1800 m.

Notes — 1. This taxon is characterised by (sub)glabrous, relatively long subpersistent stipules. The broom-like branched fig-bearing branchlets appears to be another characteristic feature of this montane species. The species can be (come) flagelliflorous (*Stevens & Veldkamp LAE 54262*). The relatively glabrous collections from the Morobe Province have initially been referred to *F. arfakensis*, the others with some doubt to *F. congesta*. The closest relative could be *F. sublimbata*, from which the new species differs in the smooth surfaces of the lamina, the smaller fig receptacle (1–1.3 cm vs 1.3–2 cm diam. when dry), the shorter basal bract (1–2 vs 3–6 mm long), and the smaller ostiole (c. 2 vs 4–7 mm diam.).

2. The description is also based on *P.F. Stevens & J.F. Veldkamp LAE 54362* (L), Papua New Guinea, Milne Bay Province, Rabaraba Subprovince, track Maju2-Otukai, 1775 m, 2 July 1972; *J.F. Veldkamp 6759*, Papua New Guinea, W Sepik, Star Mts Sepik, 2250 m, 13 May 1975 (L); *J.S. Womersley NGF 11292*, Western Highlands, 12 miles N of Wabag, 2300–2600 m (L); *J.S. Womersley NGF 19315*, Morobe Province, Wagau, Herzog Ranges, c. 1300 m (L, according to the label also in BO, PNH, SING, SYD, UH), 13 June 1964.

***Ficus trichocerasa* Diels**

Ficus trichocerasa Diels (1935) 188. — Type: *C.L. Ledermann 12583* (holo B, missing), Papua New Guinea, 'Felsspitze', 1400–1500 m, 4 and 5 Aug. 1913; *Ledermann 12632* (para B), same locality and collecting date.

Tree up to 25 m tall. *Leafy twigs* 2–5 m thick, pale brown puberulous to tomentellous and pale to rusty brown hirtellous to subhirsute, occasionally with minute nodal glands; internodes hollow or solid; periderm persistent or flaking off (at least below the leaves). *Leaves* spirally arranged to subdistichous; lamina elliptic to oblong to (sub)obovate, (5–)8–25 by (1.5–)4–12 cm, (almost) symmetric or somewhat asymmetric, subcoriaceous (to chartaceous), apex acuminate (to subcaudate), base cuneate to obtuse to rounded or to subcordate (or emarginate), margin entire, flat or ± revolute, at least towards the base; upper surface (or only the midrib, always?) initially subarachnoid villous, soon glabrous, lower surface densely pale brown (sub)tomentose, all veins or the smaller veins sparsely hairy to glabrous and the main veins pale brown subsericeous or pale to rusty brown (sub)hirsute; cystoliths only beneath; lateral veins 9–15 pairs, one, some, or none of them furcate far from the margin, the basal pairs often ± distinct, often running ± distinctly parallel to the margin, tertiary venation scalariform, ± prominent beneath; waxy glands in the axils of one or both of the basal lateral veins and often also smaller ones in the furcations of the lateral veins; petiole 1–3.5 cm long, pale brown tomentose or puberulous to tomentellous and pale to rusty brown hirtellous or (sub)hirsute, the epidermis flaking off; stipules (0.5–)1–2.7 cm long, often only partly (only on and along the keel) rusty-brown to pale brown hirtellous to (sub)tomentose to subhirsute or to subsericeous, or almost glabrous, caducous (or

subpersistent). *Figs* axillary, solitary (or in pairs) or (also?) ramiflorous on tuberculate spurs on previous season's growth, or cauliflorous on up to c. 20 cm long, branched leafless branchlets on the trunk, with a peduncle 0.2–0.5 cm long or sessile; basal bracts 3 (or 4), (sub)verticillate or \pm scattered, 1.5–3 mm long; receptacle subglobose, 0.8–1.5 cm diam. when dry, 1.5–2 cm diam. when fresh, densely rusty-brown to yellowish subtomentose to puberulous, the indumentum (sooner or later) flaking off or persistent, often with one or some lateral bracts, mainly towards the base and towards the apex, at maturity red (or brownish or greenish?), apex convex to flat, ostiole 2–3 mm diam., surrounded by c. 5 often \pm scattered apical bracts or not; internal hairs rather sparse to abundant, yellowish or whitish.

Distribution — New Guinea.

Habitat — Forest; at altitudes up to c. 2600 m.

Note — The species is quite variable. Two subspecies are recognized here. The differences between them may be less clear at altitudes between 1200 and 1500 m, i.e., near the lower limits of one of the entities and near the upper limits of the other.

a. subsp. **trichocerasa**

Including: *Ficus incompta* Diels (1935) 229; *F. lapidaria* Corner (1970) 405.

Stiff hairs on the leafy twig and the petiole relatively short – this part of the indumentum hirtellous rather than hirsute –, those on the lamina beneath, mainly on the midrib, appressed. *Lamina* mostly oblong to subobovate, the margin flat or sometimes slightly revolute towards the base; petiole relatively short, mostly 1–1.5 cm long; stipules usually \pm extensively hairy. *Fig receptacle* usually with persistent indumentum.

Distribution — New Guinea.

Habitat & Ecology — Forest, usually along streams, sometimes as shrubs in river beds; at altitudes up to 1400 m (or up to 2150 m).

Notes — 1. The majority of the specimens have oblong to subobovate leaves, mostly 10–20 cm long. Most of them were collected at altitudes up to 1400 m. A few specimens have elliptic leaves, in shape similar to most of the specimens of subsp. *pleioclada*, and were collected at altitudes between 1300 and 1500 m.

2. Another set of collections is distinct in the size of the lamina, less than 10 cm long, and somewhat in the shape, oblong to lanceolate. These collections have been made at altitudes between (1300–)1700–2150 m.

b. subsp. **pleioclada** (Diels) C.C. Berg, *comb. & stat. nov.*

Based on: *Ficus pleioclada* Diels, Bot. Jahrb. Syst. 67 (1935) 216. — Type: *C.L. Ledermann 12654* (holo B), Papua New Guinea, Sepik, 'Felsspitze', 1400 m, 6 Aug. 1913.

Stiff hairs on the leafy twigs and the petiole relatively long – this part of the indumentum hirsute rather than hirtellous –, those on the lamina beneath, usually also on the lateral veins, \pm patent. *Lamina* mostly elliptic, the margin revolute, at least towards the base; petiole relatively long, mostly 1.5–2.5 cm long; stipules often only hairy at the base or on the keel, to subglabrous. *Fig receptacle* usually with early disappearing indumentum.

Distribution — New Guinea.

Habitat — Forest; at altitudes between (1200–)1500 and 2600 m.

KEY TO THE SECTIONS AND SUBSECTIONS

- 1a. Leaves (sub)opposite 2
 b. Leaves spirally arranged or distichous 3
- 2a. Rheophytic shrub with stolon-like rooting stems; perianth of pistillate flowers rudimentary to absent; styles of long-styled flowers 0.8–1.5 cm long Subject. **Macrostyla** (*Key II*)
 b. Tree or shrub, if rheophytic then facultatively; perianth of pistillate flowers usually well developed, sometimes rudimentary in long-styled flowers; styles of long-styled flowers up to 3 mm long Subject. **Sycocarpus** p.p. (*Key II*)
- 3a. Leaves (sub)distichous 4
 b. Leaves spirally arranged 6
- 4a. Lamina glabrous and the margin entire Sect. **Dammaropsis** p.p. (*F. rivularis*) (*Key I*)
 b. Lamina hairy and/or the margin dentate to denticulate 5
- 5a. Tepals of pistillate flowers entirely or largely connate; waxy glands mostly in the axils of lateral veins in the middle of the lamina Subject. **Sycocarpus** p.p. (*Key II*)
 b. Tepals of pistillate flowers (almost) free; waxy glands mostly in the axils of the basal lateral veins at one side of the lamina Sect. **Adenosperma** p.p. (*F. endochaete*, *F. umbonata*) and Sect. **Hemicardia** (*Key I*)
- 6a. Rheophytic shrub with stolon-like rooting stems; perianth of pistillate flowers rudimentary to absent; styles of long-styled flowers 0.8–1.5 cm long Subject. **Macrostyla** (*Key II*)
 b. Tree or shrub, if rheophytic then facultatively; perianth of pistillate flowers usually well developed, sometimes rudimentary in long-styled flowers; styles of long-styled flowers up to 3 mm long 7
- 7a. Tree or shrub with *Terminalia*-branching (the proximal internodes of branches much longer than the distal ones) Sect. **Adenosperma** p.p. (*Key I*)
 b. Tree or shrub without *Terminalia*-branching 8
- 8a. Tree; figs small, cauliflorous, in globose heads or clustered on the fig-bearing branchlets; tepals of pistillate flowers free Sect. **Boscheria** (*Key II*)
 b. Tree or shrub; figs large to small, or if cauliflorous, then not in distinct clusters or heads; tepals of the pistillate flowers entirely or largely connate 9
- 9a. Tree monoecious; figs containing staminate flowers and pistillate flowers with different style-lengths 10
 b. Tree or shrub dioecious; figs either with staminate flowers and short-styled pistillate flowers or only with long-styled pistillate flowers 11
- 10a. Tepals of pistillate flowers free; fruits brownish Subject. **Sycomor** (*Key I*)
 b. Tepals of pistillate flowers connate; fruits whitish Sect. **Papuasyce** (*Key I*)
- 11a. Tree or shrub monocaule or sparingly branched, most parts glabrous or with inconspicuous indumentum and waxy glands present in the axils of the basal lateral veins Sect. **Dammaropsis** p.p. (*Key I*)
 b. Tree or shrub usually well branched, or if monocaule to sparingly branched, then conspicuously hairy and/or waxy glands absent in the axils of the basal lateral veins 12

- 12a. Lamina symmetric, with waxy glands at least present in slit-shaped extensions of the axils of the basal lateral veins beneath; tepals of pistillate flowers mostly free Subsect. **Neomorphe** (*Key I*)
- b. Lamina often asymmetric, with waxy glands rarely present in the axils of the basal lateral veins beneath, or if present, then not in slit-shaped extensions of these axils, usually present in the axils of lateral veins in the middle of the lamina; tepals of pistillate flowers (entirely) connate (or absent) Subsect. **Sycocarpus** p.p. (*Key II*)

KEY I: TO THE SPECIES OF SECTIONS ADENOSPERMA, DAMMAROPSIS,
HEMICARDIA, PAPUASYCE, AND SYCOMORUS

- 1a. Leaves (sub)distichous 2
- b. Leaves spirally arranged 5
- 2a. Shrub; lamina glabrous. — Philippines **26. F. rivularis**
- b. Tree or shrub; lamina hairy 3
- 3a. Base of the lamina at the broad side cordate; tertiary venation scalariform. — Malay Peninsula **7. F. semicordata**
- b. Base of the lamina subcuneate or at the broad side rounded 4
- 4a. Lamina scabrous above. — New Guinea, Moluccas **23. F. umbonata**
- b. Lamina smooth above. — New Guinea **13. F. endochaete**
- 5a. Margin of lamina sublobate to coarsely dentate or to sinuate; trees monocaule or sparingly branched with thick branches 6
- b. Margin of the lamina entire, or if dentate, then well-branched trees 7
- 6a. Lateral veins 20–24 pairs. — Philippines **25. F. pseudopalma**
- b. Lateral veins 8–12 pairs. — New Guinea **24. F. dammaropsis**
- 7a. Basal lateral veins distinct, running up to at least 1/5 the length of the lamina; fig receptacle without internal hairs; trees without *Terminalia*-branching 8
- b. Basal lateral veins hardly or not distinct; fig receptacle mostly with internal hairs; trees with *Terminalia*-branching (the proximal internodes of branches much longer than the distal ones) 16
- 8a. Lamina ± scabrous above. — New Guinea **4. F. robusta**
- b. Lamina smooth above 9
- 9a. Lamina ± densely hairy beneath, also on the smaller veins; stipules hairy . . 10
- b. Lamina glabrous or ± sparsely (minutely) puberulous on the main veins beneath; stipules glabrous or hairy 12
- 10a. Basal bracts 4–7 mm long, persistent; ostiole (4–)6–10(–12) mm diam. — Malay Peninsula **2. F. auriculata**
- b. Basal bracts 2–4 mm long, caducous or persistent, ostiole 2–4 mm diam. . . 11
- 11a. Stipules brownish (sub)sericeous, 0.8–1.5 cm long; lamina beneath densely tomentose on the veins; small nodal waxy glands absent. — New Guinea **5. F. semivestita**
- b. Stipules whitish (to yellowish) (sub)sericeous, mostly 1.5–2.5 cm long; lamina beneath sparsely to rather densely puberulous on the veins or glabrous. — Moluccas, New Guinea **3. F. nodosa**

- 12a. Basal lateral veins unbranched (or faintly branched); plants monoecious (styles in the same fig different in length) 13
- b. Basal lateral veins branched; plants dioecious (styles in the same fig of equal length) 15
- 13a. Stipules hairy outside, densely to sparsely, or at least with the margin ciliate, often subsistent; ostiole c. 3 mm diam. — Widespread **1. F. racemosa**
- b. Stipules entirely glabrous; ostiole 4–6 mm diam. — New Guinea 14
- 14a. Basal lateral veins up to 1/6–1/4 the length of the lamina; peduncle 1.5–3.5 cm long. — New Guinea **27. F. itoana**
- b. Basal lateral veins 1/4–1/3(–1/2) the length of the lamina; peduncle 0.3–1.5 cm long. — New Guinea **28. F. microdictya**
- 15a. Stipules white (to yellowish) (sub)sericeous, usually 1.5–2.5 cm long; usually with small nodal waxy glands. — Moluccas, New Guinea **3. F. nodosa**
- b. Stipules glabrous or, if hairy, then yellowish and often only at the base and/or the apex; nodal waxy glands absent. — Widespread **6. F. variegata**
- 16a. Stipules (1–)1.5–6 cm long, coriaceous, persistent; lamina 25–50 cm long . 17
- b. Stipules 0.5–3 cm long, usually caducous, sometimes subsistent; lamina shorter than 25 cm 18
- 17a. Lamina distinctly puberulous to hirtellous in the main veins beneath. — New Guinea **16. F. megalophylla**
- b. Lamina subglabrous beneath, only with minute brown pluricellular trichomes. — New Guinea **19. F. saccata**
- 18a. Midrib of lamina hairy above; basal bracts caducous 19
- b. Midrib of lamina (becoming) glabrous above; basal bracts persistent 20
- 19a. Shrub up to 1 m tall; fig receptacle c. 0.8 cm diam. when dry. — New Guinea **21. F. suffruticosa**
- b. Tree; fig receptacle 1.8–2.5(–3) cm diam. when dry. — New Guinea **20. F. subcuneata**
- 20a. Shrub with the leaves conspicuously tufted; leafy twig and lamina (sub)glabrous. — Moluccas, New Guinea **9. F. arbuscula**
- b. Tree, or if a shrub, then the leafy twigs and lamina distinctly hairy 21
- 21a. Lamina above and beneath minutely pustulate by cystoliths 22
- b. Lamina only beneath minutely pustulate by cystoliths 24
- 22a. Tertiary venation of lamina reticulate or at most subscalariform with at most 4 (rarely 5) intercostals. — Sulawesi, Moluccas, New Guinea **8. F. adenosperma**
- b. Tertiary venation of lamina distinctly scalariform with at least 6 intercostals 23
- 23a. Leafy twigs glabrous; apex of lamina abruptly acuminate. — New Guinea **12. F. comitis**
- b. Leafy twigs hairy; apex of lamina gradually acuminate. — New Guinea **17. F. mollior**
- 24a. Leafy twigs, lamina and stipules glabrous or at most appressed-puberulous . 25
- b. Leafy twigs, lamina and often also the stipules conspicuously hairy 26
- 25a. Stipules 2–4.5 cm long. — Moluccas, New Guinea **10. F. austrina**
- b. Stipules 1–2 cm long. — Moluccas, New Guinea **11. F. casearioides**
- 26a. Midrib of lamina beneath with appressed hairs of about equal length; indumentum of lamina beneath usually confined to the midrib and lateral veins; base of lamina cuneate to obtuse. — Sulawesi, Moluccas, New Guinea . **14. F. erythroperma**

- b. Midrib of lamina beneath with short (crinkled or straight) hairs \pm covered by much longer straight hairs; indumentum of the lamina beneath also on the smaller veins, if not so, then the base of the lamina subcordate to emarginate 27
- 27a. Midrib of lamina beneath minutely whitish puberulous and with much longer appressed whitish hairs; the smaller veins (sub)glabrous; stipules often subglabrous. — New Guinea **18. F. pilulifera**
- b. Midrib of lamina beneath with whitish to brownish short crinkled hairs and longer brownish hairs; indumentum of lamina beneath usually also on the smaller veins; stipules mostly at least partly hairy 28
- 28a. Lamina above initially hairy, at least on the midrib, this indumentum soon disappearing; figs receptacle 0.8–1.5 cm diam. when dry. — New Guinea **22. F. trichocerasa**
- b. Lamina above also initially entirely glabrous; fig receptacle 1.8–3 cm diam. when dry. — Moluccas, New Guinea **15. F. funiculosa**

KEY II: TO THE SPECIES OF SECTIONS BOSSCHERIA AND SYCOCARPUS

- 1a. Rheophytic shrubs with stolon-like rooting stems; perianth of pistillate flowers rudimentary to absent; styles of long-styled flowers 0.8–1.5 cm long **102. F. macrostyla**
- b. Tree or shrub, if rheophytic, then facultatively; perianth of pistillate flowers usually well developed, sometimes rudimentary in long-styled flowers; styles of long-styled flowers up to 3 mm long 2
- 2a. Figs in clusters or heads on spurs on long leafless branches; receptacle small 0.4–0.6(–0.8) cm diam. when dry; tepals of pistillate flowers free; waxy glands in the axils of the basal lateral veins (or also small ones on the nodes of leafy twigs) 3
- b. Figs not arranged as above, or if in clusters, then the receptacle usually larger than 0.6 cm diam. when dry; tepals of pistillate flowers connate; waxy glands often not present in the axils of the basal lateral veins, but only in the axils of lateral veins in or above the middle of the lamina or often also on the nodes of leafy twigs 4
- 3a. Figs in heads. — N Borneo, Philippines, Sulawesi **29. F. minahassae**
- b. Figs in clusters. — Sulawesi, Moluccas, New Guinea **30. F. pungens**
- 4a. Figs predominantly axillary *Key A*
- b. Figs predominantly on leafless branchlets on the older wood 5
- 5a. Figs predominantly flagelliflorous (geocarpic), on stolons departing from the base of the trunk *Key B*
- b. Figs predominantly cauliflorous, on leafless branchlets or tubercles on the older wood *Key C*

KEY A: SUBSECTION SYCOCARPUS – FOR SPECIES WITH AXILLARY FIGS

Key to species with axillary figs (solitary, in pairs or on spurs), only axillary or also below the leaves, down to the trunk for individual trees or for the species.

- 1a. Stipules (sub)persistent 2
- b. Stipules caducous 16

- 2a. Lamina scabrous above 3
 b. Lamina smooth above 8
- 3a. Lamina pandurate, dentate to partly lobate-dentate 4
 b. Lamina not more or less distinctly constricted below the middle 5
- 4a. Margin of lamina with large teeth, almost lobes, (mainly) in the upper part of the lamina. — Sulawesi **49. F. decipiens**
 b. Margin of lamina with large teeth, almost lobes, in the basal part of the lamina. — New Guinea **84. F. saurauoides**
- 5a. Stipules 4–6 cm long. — New Guinea **70. F. nana**
 b. Stipules 1.5–4 cm long 6
- 6a. Lamina elliptic to obovate (or oblong to subobovate); figs (usually) with some lateral bracts. — Sulawesi?, Moluccas **40. F. calcarata**
 b. Lamina oblong to lanceolate; figs without lateral bracts 7
- 7a. Fig receptacle c. 2 cm diam. when dry; basal bracts 5–15 mm long. — Sulawesi **62. F. latimarginata**
 b. Figs receptacle 1–1.3 mm diam. when dry; basal bracts 2.5–4 mm long. — New Guinea **84. F. saurauoides**
- 8a. Petioles glabrous, up to 1 cm long; figs clustered on up to 0.5 cm long axillary spurs, the receptacle 1.6–1.8 cm diam. when dry; waxy glands absent in the axils of the basal lateral veins. — New Guinea (Biak) **37. F. biakensis**
 b. Petioles hairy, (0.5–)1–3.5(–7) cm long; figs mostly in pairs or solitary in the leaf axils, or if on spurs, then the spurs minute (in the Philippines) or waxy glands present in the axils of the basal lateral veins and the fig receptacle 0.7–0.9 cm diam. when dry 9
- 9a. Periderm of leafy twig and epidermis of petiole flaking off 10
 b. Periderm of leafy twig and epidermis of petiole persistent 12
- 10a. Figs (sub)sessile or up to 0.2 cm long pedunculate; basal bracts not deflexed; receptacle often with some lateral bracts (or displaced apical bracts). — Widespread **63. F. lepicarpa**
 b. Figs pedunculate, peduncle 0.2–1.2 cm long; receptacle without lateral bracts 11
- 11a. Basal bracts 2–3(–5) mm long, ± deflexed; margin of the lamina mostly (sub)entire. — Philippines **35. F. benguetensis**
 b. Basal bracts 1–2 mm long, not deflexed; margin of the lamina crenate-dentate. — Moluccas **96. F. ternatana**
- 12a. Hairs on leafy twig and lamina beneath patent. — Philippines **42. F. carpenteriana**
 b. Hairs on leafy twig and lamina beneath appressed 13
- 13a. Waxy glands present in the axils of the basal lateral veins; figs in clusters on spurs, the receptacle 0.7–0.9 cm diam. when dry. — New Guinea **46. F. cryptosyce**
 b. Waxy glands absent in the axils of the basal lateral veins; figs in pairs or solitary, the receptacle 1–2 cm diam. when dry 14
- 14a. Stipules glabrous. — Sulawesi **80. F. remifolia**
 b. Stipules hairy 15
- 15a. Stipules 1.5–4 cm long. — Philippines **69. F. multistipularis**
 b. Stipules 0.5–1.5 cm long. — New Guinea **38. F. boanensis**
- 16a. Lamina ± scabrous above 17
 b. Lamina smooth above 18

- 17a. Periderm of leafy twig and epidermis of petiole flaking off; most leaves (sub)opposite; waxy glands usually present in the axils of the basal lateral veins beneath. — Widespread **58. *F. hispida***
- b. Periderm of leafy twig and epidermis of petiole persistent; most leaves not (sub)opposite; waxy glands absent in the axils of the basal lateral veins beneath. — New Guinea **41. *F. calopilina***
- 18a. Lamina glabrous; tertiary venation reticulate. — Borneo **61. *F. ixoroides***
- b. Lamina hairy; tertiary venation (partly) scalariform 19
- 19a. Periderm of leafy twig and epidermis of petiole persistent 20
- b. Periderm of leafy twig and epidermis of petiole flaking off 21
- 20a. Cystoliths in the epidermis of the lamina above and beneath (in dry material visible as minute pustules above and as minute points or pustules beneath); fig receptacle 0.5–1.5 cm diam. when dry. — Sumatra, Malay Peninsula, Java . . . **81. *F. ribes***
- b. Cystoliths in the epidermis of the lamina only beneath (in dry material visible as minute points or pustules); fig receptacle 1.5–2 cm diam. when dry. — Moluccas **96. *F. ternatana***
- 21a. Figs sessile or subsessile (up to 0.2 mm long pedunculate); receptacle with lateral bracts. — Widespread **63. *F. lepigarpa***
- b. Figs distinctly pedunculate; receptacle without lateral bracts 22
- 22a. Fig receptacle usually distinctly longer than broad; basal bracts 2–3(–5) mm long, ± reflexed. — Philippines **35. *F. benguetensis***
- b. Figs mostly about as long as broad to much broader than long; basal bracts 0.5–1.5 mm long, or if longer, then not reflexed 23
- 23a. Lamina mostly elliptic, glabrous (or hairy on the midrib beneath), often narrowed at the base (subattenuate); fig receptacle mostly depressed-globose, 1.5–2(–2.5) cm diam. when dry. — Widespread **88. *F. septica***
- b. Lamina mostly oblong, often not entirely glabrous, not narrowed at the base; fig receptacle subglobose to depressed-globose, 0.6–1.5 cm diam. when dry. — Widespread **51. *F. fistulosa***

KEY B: SUBSECTION SYCOCARPUS –
FOR SPECIES WITH FLAGELLIFLOUS FIGS

Key to flagelliflorous (geocarpic) species, bearing the figs on slender and rooting branches with long internodes departing from the base of the trunk – obligatory or facultatively (in combination with cauliflory). Also included are species with figs on short (up to c. 50 cm long) stout (non-rooting) branches with short internodes, departing from the base of the trunk and ending in the soil.

- 1a. Stipules subpersistent and glabrous or only hairy at the base 2
- b. Stipules caducous, or if subpersistent, then distinctly hairy 4
- 2a. Stipules usually 1.5–2.5 cm long. — E New Guinea **86. *F. scopulifera***
- b. Stipules usually 0.5–1.5 cm long 3
- 3a. Fig receptacle brown hairy. — Sumatra **89. *F. serraria***
- b. Fig receptacle (sub)glabrous. — Sumatra, Malay Peninsula, Java . . . **81. *F. ribes***
- 4a. Petiole (1–)3–9 cm long 5
- b. Petiole 0.3–2(–3) cm long 13
- 5a. Periderm of leafy twig and epidermis of petiole flaking off 6
- b. Periderm of leafy twig and epidermis of petiole persistent 7

- 6a. Most leaves (sub)opposite; fig receptacle 1.5–2.5 cm diam. when dry, usually with some lateral bracts. — Widespread **58. *F. hispida***
 b. Most leaves alternate; fig receptacle 0.8–1.5 cm diam. when dry, without lateral bracts. — E New Guinea **91. *F. subcongesta***
- 7a. Lamina (7–)13–30 cm broad; petiole (1–)3–9 cm long 8
 b. Lamina 3.5–12 cm broad; petiole 1–5 cm long 11
- 8a. Stipules 0.8–1.2 cm long. — Sumatra, Malay Peninsula **56. *F. gilapong***
 b. Stipules (1.5–)2.5–3 cm long 9
- 9a. Lamina scabridulous beneath or also above; leafy twigs and petioles hirtellous to strigose; fig receptacle 0.8–1.5 cm diam. when dry, basal bracts c. 2 mm long. — Sumatra **59. *F. hypogaea***
 b. Lamina smooth above and beneath; leafy twigs and petioles villous to hirsute; fig receptacle 1.5–5 cm diam. when dry; basal bracts 2–12 cm long. — Borneo 10
- 10a. Fig receptacle with lateral bracts; basal bracts (3–)5–12 mm long; ostiole (5–)8–12 mm diam. — Borneo **44. *F. cereicarpa***
 b. Fig receptacle without lateral bracts; basal bracts 2–5 mm long; ostiole 4–5 mm diam. — Borneo **53. *F. francisci***
- 11a. Stipules subsistent. — Philippines **94. *F. sulcata***
 b. Stipules caducous 12
- 12a. Basal bracts 1–2 mm long. — Philippines **94. *F. sulcata***
 b. Basal bracts 3–6 mm long. — New Guinea **60. *F. iodotricha***
- 13a. Lamina ± scabrous above; lateral veins often branched or furcate far from the margin (and often with small waxy glands in the furcations) 14
 b. Lamina smooth above; lateral veins usually not branched or furcate far from the margin 25
- 14a. Periderm of leafy twig and epidermis of petiole flaking off 15
 b. Periderm of leafy twig and epidermis of petiole persistent; leaves mostly alternate 16
- 15a. Most leaves (sub)opposite; fig receptacle 1.5–2.5 cm diam. when dry, usually with some lateral bracts. — Widespread **58. *F. hispida***
 b. Most leaves alternate; fig receptacle 0.8–1.5 cm diam. when dry, without lateral bracts. — New Guinea **91. *F. subcongesta***
- 16a. Lamina ± scabrous above and beneath 17
 b. Lamina only scabrous above 18
- 17a. Petiole 0.5–1.2 cm long. — Borneo **90. *F. stolonifera***
 b. Petiole 1–5 cm long. — New Guinea **60. *F. iodotricha***
- 18a. Base of lamina deeply cordate, lobe of the broad side covering the petiole; lamina 40–100 cm long. — Borneo **67. *F. megaleia***
 b. Base of lamina cuneate to deeply cordate, if deeply cordate, then the lobe at the broad side not covering the petiole; lamina 5–40 cm long 19
- 19a. Cystoliths in epidermis of lamina above and beneath (in dry material visible as minute pustules above and as points or minute pustules beneath). 20
 b. Cystoliths in epidermis of lamina only beneath (in dry material visible as minute points or pustules) 21
- 20a. Fig receptacle 0.4–0.8 cm diam. when dry; basal bracts c. 1 mm long; ostiole 2.5–3 mm diam. — Sumatra **89. *F. serraria***

- b. Fig receptacle 0.8–1.2 cm diam. when dry; basal bracts 2–4 mm long; ostiole 5–8 mm diam. — Sumatra, Malay Peninsula?, Java **101. F. vrieseana**
- 21a. Stipules 1.5–4(–5.5) cm long; apex of lamina acuminate to (sub)caudate and (only) the acumen serrate-dentate or waxy glands present in the axils of the basal lateral veins beneath 22
- b. Stipules 0.5–1.5(–2.5) cm long, apex acuminate and the whole margin denticulate, waxy glands lacking in the axils of the basal lateral veins beneath 24
- 22a. Peduncle 0.5–1.5 cm long; basal bracts c. 3 mm long. — Java?, Sulawesi **54. F. geocarpa**
- b. Peduncle 0–0.7 cm long; basal bracts 3–7 cm long 23
- 23a. Margin of lamina (sub)entire to obscurely dentate; lateral veins not branched or furcate. — Borneo **55. F. geocharis**
- b. Margin of lamina distinctly dentate to denticulate in the acumen; lateral veins in the broad side of the lamina often branched or furcate far from the margin. — Sumatra?, Borneo **99. F. uncinata**
- 24a. Fig receptacle 0.8–1.2 cm diam. when dry and peduncle 0.2–0.8 cm long. — Sumatra, Malay Peninsula?, Java **101. F. vrieseana**
- b. Fig receptacle 1.5–3 cm diam. when dry and peduncle 0.5–2.3 cm long. — New Guinea **60. F. iodotricha**
- 25a. Stipules subsistent 26
- b. Stipules caducous 32
- 26a. Fig receptacle (usually) with lateral bracts. — Borneo 27
- b. Fig receptacle without lateral bracts 29
- 27a. Base of lamina at the broad side auriculate. — Borneo **55. F. geocharis**
- b. Base of lamina cuneate to subcordate (to cordate) 28
- 28a. Stipules 2–4 cm long; basal bracts 3–4 mm long. — Borneo **34. F. beccarii**
- b. Stipules 0.8–1.7 cm long; basal bracts 1–2 mm long. — Borneo **97. F. treubii**
- 29a. Cystoliths in epidermis of lamina above and beneath (in dry material visible as minute pustules above and as points or minute pustules beneath). — Sumatra, Malay Peninsula, Java **81. F. ribes**
- b. Cystoliths in epidermis of lamina only beneath (in dry material visible as minute points or pustules) 30
- 30a. Petiole 0.3–0.5 cm long; basal bracts 3–5 mm long. — Moluccas **77. F. pleyteana**
- b. Petiole 0.4–2 cm long; basal bracts 1–2 mm long 31
- 31a. Stipules glabrous. — Borneo **95. F. tarennifolia**
- b. Stipules hairy 44
- 32a. Periderm of leafy twig and epidermis of petiole flaking off 33
- b. Periderm of leafy twig and epidermis of petiole persistent 35
- 33a. Stipules glabrous; petiole 0.3–0.8 cm long; most leaves alternate; peduncle 0.4–0.5 cm long. — Sumatra **82. F. rubrosyce**
- b. Stipules hairy; petiole 1–10(–14) cm long; peduncle usually 0.5–1.5 cm long 34
- 34a. Most leaves (sub)opposite; fig receptacle 1.5–2.5 cm diam. when dry. — Widespread **58. F. hispida**
- b. Most leaves alternate; fig receptacle 0.8–1.5 cm diam. when dry. — E New Guinea **91. F. subcongesta**

- 35a. Lamina (sub)glabrous. — Borneo **95. F. tarennifolia**
 b. Lamina hairy, at least appressed-puberulous on the midrib of the lamina beneath 36
- 36a. Lateral veins usually branched or furcate far from the margin (in the broad side of the lamina) 37
 b. Lateral veins mostly unbranched or not furcate far from the margin 38
- 37a. Lamina strongly asymmetric, ± scabrous above. — Sumatra?, Borneo
 **99. F. uncinata**
 b. Lamina slightly asymmetric, smooth above. — Borneo **97. F. treubii**
- 38a. Stipules 1.5–3 cm long; hairs on all parts sparse and minute. — Borneo
 **93. F. subterranea**
 b. Stipules 0.5–1.5(–2.5) cm long; hairs mostly clearly present 39
- 39a. Cystoliths in epidermis of lamina above and beneath (in dry material visible as minute pustules above and as points or minute pustules beneath) 40
 b. Cystoliths in epidermis of lamina only beneath (in dry material visible as minute points or pustules) 42
- 40a. Hairs on leafy twigs and lamina beneath brown and appressed; fig receptacle (sub)glabrous. — Sumatra, Malay Peninsula, Java **81. F. ribes**
 b. Hairs on leafy twigs and lamina beneath whitish or brownish, appressed or ± patent; fig receptacle hairy 41
- 41a. Hairs whitish, appressed; figs whitish appressed-puberulous. — Philippines
 **47. F. cuneata**
 b. Hairs brownish or whitish, appressed or ± patent; figs brown (sub)puberulous to (sub)hirtellous. — Philippines **65. F. linearifolia**
- 42a. Petiole 0.3–0.5 cm long; basal bracts 3–5 mm long. — Moluccas
 **77. F. pleyteana**
 b. Petiole 0.4–1.2(–2) cm long; basal bracts 1–2 mm long 43
- 43a. Apex of lamina (sub)caudate; the margin (usually) revolute. — Borneo
 **97. F. treubii**
 b. Apex of lamina acuminate; the margin flat 44
- 44a. Epidermis of petiole usually flaking off; stipules only sometimes subpersistent. — Moluccas (Aru Islands), New Guinea **33. F. arfakensis**
 b. Epidermis of petiole persistent or only sometimes flaking off; stipules mostly subpersistent. — Malay Peninsula **87. F. scortechinii**

KEY C: SUBSECTION SYCOCARPUS –
 FOR SPECIES WITH CAULIFLOROUS FIGS

Key to the cauliflorous non-geocarpic species; figs on various types of leafless branchlets on the (main) branches, the trunk or only at the base of the trunks, varying from very short tuberculate, rather short to up to 50 cm long much-branched, stout sparingly branched with short internodes or slender up to 1 m or more long (these sometimes extending to the soil or litter).

- 1a. Lamina scabrous or scabridulous above 2
 b. Lamina smooth above (but sometimes scabrous or scabridulous beneath) . . . 34
- 2a. Stipules (sub)persistent 3
 b. Stipules caducous 15

- 3a. Periderm of leafy twig and epidermis of petiole persistent 4
 b. Periderm of leafy twig and epidermis of petiole flaking off 11
- 4a. Stipules 3.5–4 cm long. — New Guinea **78. F. porrecta**
 b. Stipules 0.5–2.5 cm long 5
- 5a. Peduncle 3–8 cm long. — New Guinea **36. F. bernaysii**
 b. Peduncle up to 2.5 cm long 6
- 6a. Stipules 1.5–2.5(–2.8) cm long 7
 b. Stipules 0.5–1.5 cm long 8
- 7a. Indumentum of the leafy twigs and lamina consisting of only brown hairs; figs on short \pm tuberculate branchlets; ostiole 2–3 mm diam. — New Guinea **57. F. hahliana**
 b. Indumentum of the leafy twigs and the lamina consisting of brown and (shorter) white hairs or of only white hairs; figs on up to 1 m long branchlets; ostiole usually 3–6 mm diam. — Philippines, Sulawesi, Moluccas, New Guinea **39. F. botryocarpa**
- 8a. Hairs of the lower surface of the lamina appressed, brown to whitish 9
 b. Hairs of the lower surface of the lamina patent, brown or white, distinctly different in length 10
- 9a. Peduncle 0.1–0.4 cm long; lamina symmetric. — Sulawesi **76. F. parvibracteata**
 b. Peduncle 0.4–2.5 cm long; lamina \pm asymmetric. — Philippines, Sulawesi, Moluccas, New Guinea **39. F. botryocarpa**
- 10a. Fig receptacle 0.6–0.8 cm diam. when dry; basal bracts c. 1 mm long. — Sumatra **89. F. serraria**
 b. Fig receptacle 1–2.5 cm diam. when dry; basal bracts 1–2.5 mm long. — Philippines, Sulawesi, Moluccas, New Guinea **39. F. botryocarpa**
- 11a. Hairs on the leafy twigs and the lamina beneath appressed (or absent on the leafy twig); basal bracts 3–6 mm long. — New Guinea **92. F. sublimbata**
 b. Hairs on the leafy twigs and the lamina beneath (\pm) patent (or if almost appressed, then distinctly different in length and colour); basal bracts verticillate and up to 3 mm or 6–10 mm long, or non-verticillate and 2–5 cm long 12
- 12a. Basal bracts 1–2 mm long; stipules 1–2.5 cm long; lamina mostly asymmetric. — E New Guinea **91. F. subcongesta**
 b. Basal bracts at least 2 mm long; stipules often longer than 2.5 cm; lamina symmetric or slightly asymmetric 13
- 13a. Basal bracts 2–3 mm long. — New Guinea **68. F. morobensis**
 b. Basal bracts verticillate and 6–10 mm long or non-verticillate and 2–5 cm long. — New Guinea 14
- 14a. Nodal waxy glands absent; basal bracts non-verticillate, 1 or 2, 2–5 cm long. — New Guinea (New Britain) **79. F. praestans**
 b. Nodal waxy glands present; basal bracts verticillate, 3, 6–10 mm long. — New Guinea **74. F. pachyrrhachis**
- 15a. Most of the leaves (sub)opposite. — Widespread **58. F. hispida**
 b. Most of the leaves alternate 16
- 16a. Cystoliths in epidermis of lamina above and beneath (in dry material visible as minute pustules above and as points or minute pustules beneath) 17

- b. Cystoliths in epidermis of lamina only beneath (in dry material visible as minute points or pustules) 19
- 17a. Base of the lamina (sub)cordate; fig receptacle 3.5–5 cm diam. when dry. — Philippines **43. F. cassidyana**
- b. Base of the lamina cuneate to obtuse (to rounded) 18
- 18a. Fig receptacle 0.6–0.8 cm diam. when dry. — Sumatra **89. F. serraria**
- b. Fig receptacle 1.5–2.5 cm diam. when dry. — Philippines, Sulawesi, Moluccas, New Guinea **39. F. botryocarpa**
- 19a. Laminas (at least some) strongly asymmetric, base at the broad side deeply cordate with the lobe covering the petiole; fig receptacle 2–4 cm diam. when dry. — New Guinea **75. F. papuana**
- b. Laminas \pm asymmetric or symmetric, base cuneate to subcordate, if cordate, then without a lobe covering the petiole 20
- 20a. Periderm of leafy twig and epidermis of petiole flaking off 21
- b. Periderm of leafy twig and epidermis of petiole persistent 27
- 21a. Most leaves (sub)opposite. — Widespread **58. F. hispida**
- b. Most leaves alternate 22
- 22a. Lower surface of lamina \pm scabrous; basal bracts 0.5–1 mm long 23
- b. Lower surface of lamina mostly smooth; basal bracts 1–6 mm long 24
- 23a. Hairs on the veins of the lamina beneath patent; peduncle (0.4–)1–2.5 cm long. — Sumatra **50. F. dimorpha**
- b. Hairs on the veins of the lamina beneath appressed; peduncle 0.2–0.4 cm long. — Moluccas **98. F. tunicata**
- 24a. Basal bracts 1–2 mm long; receptacle 1–2.5 cm diam. when dry 25
- b. Basal bracts 2–6 mm long; receptacle 2–4 cm diam. when dry 26
- 25a. Ostiole c. 2 mm diam. — E New Guinea **91. F. subcongesta**
- b. Ostiole 4–9 mm diam. — Borneo, Philippines **71. F. nota**
- 26a. Hairs on the leafy twigs appressed; base of lamina cuneate to subcordate. — Malay Peninsula **73. F. obpyramidata**
- b. Hairs on the leafy twigs patent; base of lamina cordate to obtuse. — New Guinea **41. F. calopilina**
- 27a. Cystoliths in epidermis of lamina above and beneath (in dry material visible as minute pustules above and as points or minute pustules beneath) 28
- b. Cystoliths in epidermis of lamina only beneath (in dry material visible as minute points or pustules) 30
- 28a. Petiole 2–8(–11) cm long; base of lamina (sub)cordate. — Philippines **43. F. cassidyana**
- b. Petiole 0.4–2(–2.5) cm long; base of lamina cuneate to rounded 29
- 29a. Fig receptacle 0.6–0.8 cm diam. when dry. — Sumatra **89. F. serraria**
- b. Fig receptacle 1–2.5 cm diam. when dry. — Philippines, Sulawesi, Moluccas, New Guinea **39. F. botryocarpa**
- 30a. Laminas (at least some) strongly asymmetric, base at the broad side deeply cordate with the lobe covering the petiole; fig receptacle 2–4 cm diam. when dry. — New Guinea **75. F. papuana**
- b. Laminas \pm asymmetric, base acute to subcordate; fig receptacle 0.8–1.8 cm diam. when dry 31
- 31a. Peduncle 3–8 cm long. — New Guinea **36. F. bernaysii**

- b. Peduncle 0.7–2.5 cm long. — New Guinea 32
- 32a. Basal bracts 3–6 mm long; ostiole 5–9 mm diam. — New Guinea (mostly above 1500 m) **60. F. iodotricha**
- b. Basal bracts 1.5–2 mm long; ostiole 3–4 mm diam. — New Guinea (at altitudes up to c. 1350 m) 33
- 33a. Stipules 0.5–1.8 cm long. — New Guinea **31. F. adelpha**
- b. Stipules 2–3 cm long. — New Guinea **48. F. d'albertisii**
- 34a. Stipules (sub)persistent 35
- b. Stipules caducous 46
- 35a. Cystoliths in epidermis of lamina above and beneath (in dry material visible as minute pustules above and as points or minute pustules beneath) 36
- b. Cystoliths in epidermis of lamina only beneath (in dry material visible as minute points or pustules) 37
- 36a. Ostiole 3–4(–5) mm diam. — Philippines, Sulawesi, Moluccas **39. F. botryocarpa**
- b. Ostiole 2–3 mm diam. — Sumatra, Malay Peninsula, Java **81. F. ribes**
- 37a. Stipules glabrous; leafy twigs, lamina, and petioles glabrous or very sparsely hairy 38
- b. Stipules hairy or, if sparsely so, only hairy at the base, then leafy twigs and/or at least the midrib of the lamina beneath hairy 39
- 38a. Lateral veins of the lamina 6–10(–12) pairs; peduncle 0.5–1.2 cm long. — Borneo **95. F. tarennifolia**
- b. Lateral veins of the lamina (4 or) 5 or 6 pairs; peduncle 0.3–0.4 cm long. — New Guinea **52. F. flagellaris**
- 39a. Stipules 0.4–1.5 cm long 40
- b. Stipules (1–)1.5–4 cm long 42
- 40a. Epidermis of petiole only sometimes flaking off; stipules mostly subpersistent. — Malay Peninsula **87. F. scortechinii**
- b. Epidermis of petiole usually flaking off. — New Guinea 41
- 41a. Base of lamina cuneate to obtuse; petiole 0.4–1.2(–2) cm long. — Moluccas (Aru Islands), New Guinea **33. F. arfakensis**
- b. Base of lamina cordate to subcordate (to rounded); petiole (1–)2–4.5 cm long. — E New Guinea **91. F. subcongesta**
- 42a. Petiole (1–)5–13 cm long 43
- b. Petiole 1–3.5 cm long 44
- 43a. Fig receptacle with lateral bracts; basal bracts (3–)5–12 mm long; ostiole (5–)8–12 mm diam. — Borneo **44. F. cereicarpa**
- b. Fig receptacle without lateral bracts; basal bracts 2–5 mm long; ostiole 4–5 mm diam. — Borneo **53. F. francisci**
- 44a. Peduncle 0–0.7 cm long, the receptacle with white hairs. — Philippines **42. F. carpenteriana**
- b. Peduncle 0.8–3.5 cm long, the receptacle with brown hairs or subglabrous 45
- 45a. Fig receptacle with brown hairs and conspicuously lenticellate, the ostiole 3–5 mm diam. — Borneo **64. F. limosa**
- b. Fig receptacle subglabrous, inconspicuously lenticellate, the ostiole c. 2 mm diam. — E New Guinea **86. F. scopulifera**

- 46a. Periderm of leafy twig and epidermis of petiole flaking off 47
 b. Periderm of leafy twig and epidermis of petiole persistent 60
- 47a. Most leaves (sub)opposite. — Widespread **58. F. hispida**
 b. Most leaves not (sub)opposite 48
- 48a. Lamina glabrous above and beneath 49
 b. Lamina beneath or also above hairy (although possibly sparsely) 52
- 49a. Base of lamina cordate; petiole 5–14 cm long. — New Guinea (New Ireland) **72. F. novahibernica**
 b. Base of lamina cuneate to rounded (to truncate); petiole mostly up to 5 cm long 50
- 50a. Margin of lamina entire; stipules up to 6 cm long; basal bracts 1–2 mm long entire. — Widespread **88. F. septica**
 b. Margin of lamina dentate or if entire, then the stipules up to 1.2–2.5 cm long and the basal bracts 0.5–1 or 2–3(–5) mm long 51
- 51a. Basal bracts 0.5–1 mm long; nodal waxy glands present. — Widespread **51. F. fistulosa**
 b. Basal bracts 2–3(–5) mm long; nodal waxy glands usually absent. — Philippines **35. F. benguetensis**
- 52a. Ostiole 2–3 mm diam. 53
 b. Ostiole 3–10 mm diam. 55
- 53a. Basal bracts 2–3 mm long; twigs with prominent scars of stipules and figs. — Philippines **35. F. benguetensis**
 b. Basal bracts 1–2 mm long; twigs without prominent scars of leaves and figs 54
- 54a. Stipules (1.2–)1.5–2.5 cm long; petiole (1–)2–4.5 cm long. — E New Guinea **91. F. subcongesta**
 b. Stipules 0.4–1.2 cm long; petiole 0.4–1.2(–2) cm long. — Malay Peninsula **87. F. scortechinii**
- 55a. Epidermis of fig receptacle flaking off (only when dry?). — Sumatra, Malay Peninsula, Borneo **85. F. schwarzii**
 b. Epidermis of fig receptacle persistent 56
- 56a. Stipules 0.5–1 cm long; basal bracts 1.5–2.5 mm long. — Sulawesi, Moluccas, New Guinea **45. F. congesta**
 b. Stipules 1–3 cm long, or if shorter than 1 cm, then the basal bracts 0.5–1 mm long 57
- 57a. Base of lamina cuneate to rounded (or sometimes subcordate at one side). — N Borneo, Philippines **83. F. satterthwaitei**
 b. Base of lamina cordate to subcordate, at least at one side 58
- 58a. Stipules hairy. — N Borneo, Philippines **71. F. nota**
 b. Stipules glabrous 59
- 59a. Lateral veins 7–10 pairs; peduncle 0.7–1.7 cm long, the receptacle 1.5–2 cm diam. when dry. — New Guinea (New Ireland) **72. F. novahibernica**
 b. Lateral veins (4 or) 5 or 6 pairs; peduncle 0.2–0.4 cm long, the receptacle 0.8–1.5 cm diam. when dry. — New Guinea **52. F. flagellaris**
- 60a. Cystoliths in epidermis of lamina above and beneath (in dry material visible as minute pustules above and as points or minute pustules beneath) 61

- b. Cystoliths in epidermis of lamina only beneath (in dry material visible as minute points or pustules) 68
- 61a. Hairs on the midrib beneath (partly) patent 62
- b. Hairs on the midrib beneath (all) appressed 64
- 62a. Fig receptacle 1–2.5 cm diam. when dry. — Philippines, Sulawesi, Moluccas, New Guinea **39. F. botryocarpa**
- b. Fig receptacle 0.5–1 cm diam. when dry. 63
- 63a. Basal bracts c. 1 mm long. — Sumatra **89. F. serraria**
- b. Basal bracts 2–2.5 mm long. — Philippines. **65. F. linearifolia**
- 64a. Fig receptacle 0.5–1 cm diam. when dry. 65
- b. Fig receptacle 1–1.5(–2.2) cm diam. when dry 67
- 65a. Basal bracts c. 1 mm long. — Philippines. **47. F. cuneata**
- b. Basal bracts 1–2.5 mm long 66
- 66a. Fig receptacle (sub)glabrous; epidermis of petiole persistent. — Sumatra, Malay Peninsula, Java **81. F. ribes**
- b. Fig receptacle brown puberulous; epidermis of petiole mostly flaking off. — Philippines. **65. F. linearifolia**
- 67a. Ostiole 3–5 mm diam. — Philippines, Sulawesi, Moluccas **39. F. botryocarpa**
- b. Ostiole 2–3 mm diam. — Sumatra, Malay Peninsula, Java **81. F. ribes**
- 68a. Petiole 0.3–2 cm long 69
- b. Petiole (1–)2–18 cm long 73
- 69a. Stipules glabrous. — Borneo **95. F. tarennifolia**
- b. Stipules hairy, at least on the keel 70
- 70a. Fig receptacle 1.5–2 or c. 3 cm diam. when dry 71
- b. Fig receptacle 0.5–1.3 cm diam. when dry 72
- 71a. Fig receptacle 1.5–2 cm diam. when dry; upper surface of lamina (sparsely) hairy. — Moluccas **96. F. ternatana**
- b. Fig receptacle c. 3 cm diam. when dry; upper surface of lamina glabrous. — Moluccas (Ceram) **66. F. manuselensis**
- 72a. Lamina symmetric to slightly asymmetric. — Malay Peninsula **87. F. scortechinii**
- b. Lamina distinctly to slightly asymmetric. — Moluccas (Aru Islands), New Guinea **33. F. arfakensis**
- 73a. Lamina ovate. — Moluccas **98. F. tunicata**
- b. Lamina (usually) broadest in or above the middle 74
- 74a. Stipules 0.8–1.5 cm long; leafy twigs brown strigillose (hairs short). — Borneo **100. F. virescens**
- b. Stipules 1.5–5 cm long; leafy twigs villous, subhirsute or sericeous (hairs long) 75
- 75a. Stipules (1.5–)2.5–5 cm long; fig receptacle with lateral bracts. — Borneo **44. F. cereicarpa**
- b. Stipules 1.5–2.5 cm long; fig receptacle without lateral bracts 76
- 76a. Stipules whitish hairy; peduncle 0.8–1.2 cm long, the receptacle 1–1.3 cm diam. when dry. — Borneo **32. F. albomaculata**
- b. Stipules at least partly brown hairy; peduncle 0.2–0.5 cm long, the receptacle 1.5–2.5 cm diam. when dry. — Borneo **53. F. francisci**

ACKNOWLEDGEMENTS

The Flora Malesiana Foundation supports the preparation of the treatment of Moraceae for Flora Malesiana. Dr. J.F. Veldkamp (Leiden) translated the diagnoses into Latin. Hendrieke Berg (Voss, Norway) prepared the drawings.

REFERENCES

- Berg, C.C. 2003. Flora Malesiana precursor for the treatment of Moraceae 1: the main subdivisions of Ficus: the subgenera. *Blumea* 48: 168–178.
- Berg, C.C. & J.T. Wiebes. 1992. African fig trees and fig wasps. *Verh. Kon. Ned. Akad. Wet., afd. Natk.*, 2de reeks, 89: 1–298.
- Corner, E.J.H. 1958. An introduction to the distribution of Ficus. *Reinwardtia* 4, 3: 15–45.
- Corner, E.J.H. 1960a. Taxonomic notes on Ficus Linn., Asia and Australasia. III. Subgen. Ficus and sect. Ficus. *Gard. Bull. Singapore* 17: 416–441.
- Corner, E.J.H. 1960b. Taxonomic notes on Ficus Linn., Asia and Australasia. IV. Subgen. Ficus and sect. Sycidium. *Gard. Bull. Singapore* 17: 442–484.
- Corner, E.J.H. 1960c. Taxonomic notes on Ficus Linn., Asia and Australasia. V. Subg. Ficus sect. Rhizocladus, Kalosyce, Sinosycidium, Adenosperma, and Neomorpha. *Gard. Bull. Singapore* 18: 1–35.
- Corner, E.J.H. 1960d. Taxonomic notes on Ficus Linn., Asia and Australasia. VI. Subgen. Ficus and sect. Sycocarpus. *Gard. Bull. Singapore* 18: 36–69.
- Corner, E.J.H. 1961. Taxonomic notes on Ficus L., Asia and Australasia. Addendum. *Gard. Bull. Singapore* 18: 83–401.
- Corner, E.J.H. 1962. Taxonomic notes on Ficus L., Asia and Australasia. Addendum II. *Gard. Bull. Singapore* 19: 385–401.
- Corner, E.J.H. 1965. Check-list of Ficus in Asia and Australasia with keys to identification. *Gard. Bull. Singapore* 21: 1–186.
- Corner, E.J.H. 1967. Ficus in the Solomon Islands and its bearing on the Post-Jurassic history of Melanesia. *Philos. Trans., Ser. B*, 253: 23–159.
- Corner, E.J.H. 1969. Ficus sect. Adenosperma. *Philos. Trans., Ser. B*, 256: 319–355.
- Corner, E.J.H. 1970. New species of *Streblus* and *Ficus* (Moraceae). *Blumea* 18: 393–411.
- Corner, E.J.H. 1972. New taxa of Ficus (Moraceae). *Blumea* 20: 427–432.
- Corner, E.J.H. 1978. Ficus dammaropsis and the multibracteate species of Ficus sect. Sycocarpus. *Philos. Trans., Ser. B*, 281: 373–406.
- Diels, L. 1933. Über ungewöhnliche Abwandlungen der Ficus-Rezeptakulums. *Flora* 128: 28–33, t. 2.
- Diels, L. 1935. Die Moraceen von Papuasien. In: C. Lauterbach, Beiträge zur Flora von Papuasien, XXI. *Bot. Jahrb. Syst.* 67: 171–235.
- Elmer, A.D.E. 1908. A fascicle of South Negros figs. *Leafl. Philipp. Bot.* 2: 531–551.
- Elmer, A.D.E. 1911. A fascicle of Davao figs. *Leafl. Philipp. Bot.* 4: 1231–1270.
- Elmer, A.D.E. 1914. A fascicle of North Agusan figs. *Leafl. Philipp. Bot.* 7: 2359–2415.
- Elmer, A.D.E. 1937. A fascicle of Sorsogon figs. *Leafl. Philipp. Bot.* 9: 3397–3487.
- Gasparini, G. 1844. Nova genera, quae supper nonnullis Fici specibus struebat. *Napoli*.
- Gasparini, G. 1845. Ricerche sulla natura del Caprifio, e del Ficus e sulla caprificazione. *Napoli*.
- King, G. 1886. New species of Ficus from New Guinea. *J. Asiat. Soc. Bengal, Pt. 2*, 4: 394–411.
- King, G. 1887. The species of Ficus of the Indo-Malayan and Chinese countries. *Ann. Roy. Bot. Gard. (Calcutta)* 1, 1: 1–66, t. 1–87.
- King, G. 1888. The species of Ficus of the Indo-Malayan and Chinese countries. *Ann. Roy. Bot. Gard. (Calcutta)* 1, 2: 67–185, t. 88–232.
- Kochummen, K.M. 1998. New species and varieties of Moraceae from Malaysia. *Gard. Bull. Singapore* 50: 197–219.
- Merrill, E.D. 1904. New and noteworthy Philippine plants, II. *Publ. Gov. Lab. Philipp.* 17: 5–47.

- Mildbraed, J. & M. Burret. 1911. Die Afrikanischen Arten der Gattung *Ficus* Linn. Bot. Jahrb. Syst. 46: 163–269.
- Miquel, F.A.W. 1844. Fragmenta Phytogeographica. Ann. Sci. Nat. Bot., Sér. 3: 31–41.
- Miquel, F.A.W. 1848. Prodrômus monographiae Ficuûm. London J. Bot. 7: 64–78, 109–116, 221–236, 425–471.
- Miquel, F.A.W. 1859. Fl. Ind. Bat. 1, 2. Amsterdam.
- Miquel, F.A.W. 1867a. Artocarpeae. Ann. Mus. Bot. Lugd.-Bat. 3: 210–235.
- Miquel, F.A.W. 1867b. Annotationes de *Ficus* speciebus. Ann. Mus. Bot. Lugd.-Bat. 3: 260–315.
- Rafinesque, C.S. 1838. Sylv. Tellur. Philadelphia.
- Von Post, T. & O. Kuntze. 1904. Lex. Gen. Phan. Stuttgart.
- Warburg, O. 1891. Beiträge zur Kenntnis der papuanischen Flora. Moraceae. Bot. Jahrb. Syst. 13: 294–297.
- Warburg, O. 1905. *Ficus*. In: J. Perkins, Fragm. Fl. Philipp. 3: 194–202.
- Wiebes, J.T. 1994. The Indo-Australian Agaoninae (pollinators of figs). Verh. Kon. Ned. Akad. Wet., afd. Natk., 2de reeks, 92: 1–208.