

Subdivision of *Ficus* subg. *Urostigma* sect. *Galoglychia* (Moraceae)

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ABSTRACT

A subdivision of *Ficus* subg. *Urostigma* sect. *Galoglychia* is proposed and the following subdivisions established: subsect. *Caulocarpae* (Mildbr. & Burret) C.C. Berg, subsect. *Chlamydodora* (Mildbr. & Burret) C.C. Berg, subsect. *Crassicostae* (Mildbr. & Burret) C.C. Berg, subsect. *Cyathistipulae* (Mildbr. & Burret) C.C. Berg, subsect. *Galoglychia*, and subsect. *Platyphyllae* (Mildbr. & Burret) C.C. Berg.

The subdivision of sect. *Galoglychia* (= subg. *Bibracteatae*) as proposed by Mildbraed & Burret (1911) is mainly based on overall similarities in the morphological (and ecological) features of the species. The subdivision proposed by Hutchinson (1915, 1916) is mainly based on key characters, and disregard more or less morphological (and ecological) affinities. These subdivisions were discussed by Lebrun (1932), who proposed a subdivision of subg. *Bibracteatae* consisting of elements of both and two (invalidly published) sections *Chlamydocarpae* and *Furcatae*. The subdivision presently proposed is largely based on that of Mildbraed & Burret and is to adapt the ranks of the taxa to Corner's classification of *Ficus* (1965).

Within sect. *Galoglychia* 72 species can be recognized. The section is confined to the African flora region. It is characterized by a slit-shaped (or occasionally triradiate) ostiole with all ostiolar bracts descending, two basal bracts, and

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normal anthers. The two first characters are also found in sect. *Malvanthera* (Eastern Maleisia - Australasia), but the anthers in that section have only one theca.

Sect. *Galoglychia* is more diverse (in vegetative parts, dimensions and position of the syconia, fruitslets (cf. Berg, 1984) than the other sections of *Urostigma* (cf. Corner, 1965). The diversity is also reflexed in the number of genera of the Agaonidae involved in the pollination. Two of the subsections are clearly associated with distinct genera of pollinating waspes. For some of the subsections the situation with regard to the pollinators is not quite clear; although for one of the subsections the pollinators have not yet been published, some collections are available and the genera of pollinators are recorded in this paper.

Ficus subg. Urostigma (Gasparrini) Miquel sect. **Galoglychia** (Gasparrini) Endlicher. Lectotype species (here designated): *Galoglychia saussureana* (A.P. de Candolle) Gasparrini (= *F. saussureana* A.P. de Candolle).

– *Ficus* subg. *Bibracteatae* Mildbraed & Burret, Bot. Jahrb. 46: 175. 1911. Type species not designated.

1. Subsect. **Galoglychia**

Trees hemi-epiphytic or secondarily terrestrial, evergreen, bark not exfoliating, usually with conspicuous lenticels in longitudinal rows. Leafy twigs, stipules, leaves and figs, often pubescent to villous. Leaves large to medium-sized, oblong to lanceolate or to elliptic, coriaceous, tertiary venation (partly) scalariform; stipules relatively large, caducous. Figs in pairs in the leaf axils or more together and also just below the leaves, large to small, sessile, at maturity yellow to orange. Fruitlets with a pericarp becoming partly mucilaginous, endocarp body released and surrounded by a rather thin mucilaginous layer.

This subsection corresponds with the *Ficus lutea*-group, recognized as a provisional subdivision of sect. *Galoglychia* for the Flore du Gabon and the Flore du Cameroun (Berg, Hijman & Weerdenburg, 1984 and in press respectively).

Subsect. *Galoglychia* comprises 3 species in West and Central Africa; onl. *F. lutea* extends to East Africa, Madagascar and the Seychelles.

The subsection is associated with evergreen forest.

The pollinating fig wasps belong to the genus *Allotriozoon* (cf. Wiebes, 1974b: 137-143)

2. Subsect. **Platyphyllae** (Mildbraed & Burret) C.C. Berg, stat. et comb. nov. Based on *Ficus* subg. *Bibracteatae* sect. *Platyphyllae* Mildbraed & Burret Bot. Jahrb. 46: 176. 1911. Lectotype species (here designated): *F. platyphyllu* Lelile.

– *Ficus* subg. *Bibracteatae* series *Axillares* Hutchinson subseries *Caduae* Hutchinson, Kew Bull. 1915: 316. 1915 p.p.

Trees or shrubs, hemi-epiphytic, terrestrial or epilithic, often deciduous. Bark often exfoliating. Leafy twigs, stipules, leaves and figs often conspicuously hairy. Leaves often ovate, cordate or reniform, with several pairs of basal lateral veins, often longly petiolate, leaf margin sometimes repand to coarsely crenate, tertiary venation often \pm distinctly scalariform; stipules often rather long, caducous. Figs medium-sized to large, mostly pedunculate, wall at maturity often soft. Fruitlets with a dry pericarp, sometimes the inner layers becoming mucilaginous and then the endocarp body released and surrounded by a rather thin mucilaginous layer.

This subsection corresponds with the *Ficus trichopoda*-group, recognized as a provisional subdivision of sect. *Galoglychia* for the Flore du Gabon and the Flore du Cameroun (Berg, Hijman & Weerdenburg, 1984 and in press respectively).

Subsect. *Platyphyllae* comprises 18 species and shows a concentration of species in eastern Africa. It is represented by 5 species in Madagascar and neighbouring islands.

Most of the species of this subsection are associated with various types of savanna woodland, although in most cases growing in situations in some way protected against fire (gallery forest, rocky places, termite mounds). Only *F. recurvata* and *F. jansii* are apparently confined to rainforest conditions. *F. abutilifolia*, *F. glumosa*, *F. tettensis*, and probably *F. muelleriana* are often found on rocks. *F. abutilifolia* and *F. tettensis* are 'rock-splitters'. *F. trichopoda* is usually found in marshy areas. It forms 'pillar roots', apparently in connection with its habitat.

Subsect. *Platyphyllae* is more than the other subsections morphologically (occurrence of long petioles, mesophyllous leaves, cordate to reniform lamina, features of the bark) connected with relatively dry habitats.

The pollinating fig wasps belong to three different genera, viz., *Alfonsiella*, some species of which are also found in symbiosis with figs of subsect. *Chlamydodora* (cf. Wiebes, 1972; Bouček c.s., 1981: 164-169); a species-group of *Elisabethiella* (cf. Wiebes, 1974a: 30-31; 1975: 226-229; 1977: 209-211); and *Nigriella* (cf. Wiebes, 1974a: 31-42; 1975: 229-231).

3. Subsect. *Chlamydodora* (Mildbraed & Burret) C.C. Berg, stat. et comb. nov. Based on *Ficus* subg. *Bibracteatae* sect. *Chlamydodora* Mildbraed & Burret, Bot. Jahrb. 46: 178. 1911. Lectotype species (here designated): *F. natalensis* Hochstetter.

- *Ficus* subg. *Bibracteatae* series *Axillares* Hutchinson subseries *Caducae* Hutchinson, Kew Bull. 1915: 316. 1915 p.p.

Trees or shrubs, hemi-epiphytic or (secondarily) terrestrial, sometimes epilithic, bark not exfoliating. Leafy twigs, stipules, leaves and figs mostly glabrous or minutely puberulous, sometimes densely pubescent. Leaves oblong to lanceolate to elliptic or to obtriangular, sometimes ovate or cordiform,

shortly to longly petiolate, tertiary venation reticulate or tending to parallel to the lateral veins, margin entire; stipules small, mostly caducous. Figs small to medium-sized, in the leaf axils or just below the leaves, often initially in \pm well-developed calyprate buds, at maturity wall mostly soft and often reddish. Fruitlets with a dry pericarp, endocarp body not released.

This subsection corresponds with the *Ficus thonningii*-group, recognized as a provisional subdivision of sect. *Galoglychia* for the Flore du Gabon and the Flore du Cameroun (Berg, Hijman & Weerdenburg, 1984 and in press respectively).

Subsect. *Chlamydodora* comprises 13 species. It is in eastern Africa somewhat better represented than in other parts of Africa. Two species occur in Madagascar and neighbouring islands.

Some species are more or less distinctly associated with the rainforest (e.g., *F. calyprata* (= *F. mallotoides*), other species with savanna woodland (*F. fisheri* and *F. faulkneriana*). *F. fisheri* is distinct due to the flat-topped crown as common in savanna woodland trees. Some species occur in both types of habitat (*F. thonningii* and *F. natalensis*). *F. ilicina* is adapted to dry conditions found in South-West Africa.

The pollinating fig wasps belong to the genus *Alfonsiella* (see also under *Platyphyllae*) and *Elisabethiella* (a separate group of species, different from those of subsections *Platyphyllae* and *Crassicostae*).

4. Subsect. *Crassicostae* (Mildbraed & Burret) C.C. Berg, stat. et comb. nov. Based on *Ficus* subg. *Bibracteatae* sect. *Crassicostae* Mildbraed & Burret, Bot. Jahrb. **46**: 176. 1911. Lectotype species (here designated): *F. adolfi-friderici* Mildbraed.

Trees hemi-epiphytic, evergreen, bark not exfoliating. Leafy twigs, stipules, leaves and figs glabrous or inconspicuously hairy. Leaves usually rather small, oblong to elliptic or to lanceolate, coriaceous, shortly petiolate, tertiary venation reticulate to pronouncedly parallel to the lateral veins; stipules small, caducous. Figs in pairs in the leaf axils or several together on small spurs in the leaf axils and below the leaves, small or medium-sized, pedunculate (or sessile), at maturity red (or greenish?). Fruitlets with a dry pericarp, endocarp body not released.

This subsection corresponds with the *Ficus barteri*-group, recognized as a provisional subdivision of sect. *Galoglychia* for the Flore du Gabon and the Flore du Cameroun (Berg, Hijman & Weerdenburg, 1984 and in press respectively). *F. barteri* proved to belong to subsect. *Cyathistipulae*.

Subsect. *Crassicostae* comprises 8 species, all in Central and West Africa, except for the East-African *F. usambarensis*.

The subsection is distinctly associated with the rainforest habitat. In distribution and ecology the subsection shows strong similarities with subsect. *Cyathistipulae*.

The subsection comprises two groups of species:

- a. with small figs, several together borne on minute spurs, partly below the leaves (*F. adolfi-friderici*, *F. louisii*, *F. pseudo-mangifera*, and *F. usambarensis*);
- b. with somewhat larger figs in pairs in the leaf axils (*F. burretiana*, *F. elasticoides*, and *F. oreodryadum*).

The choice of *F. adolfi-friderici* as lectotype of the subsection (and not *F. crassicosta*, a species closely related to *F. wildemaniana* (a member of subsection *Cyathistipulae*) is to prevent the creation of a new name for a group of species of which the systematic position is not yet quite clear.

The pollinating wasps belong to the genera *Elisabethiella* (a special group of species) and to *Paragaon* (cf. Wiebes. 1976: 127).

5. Subsect. *Cyathistipulae* (Mildbraed & Burret) C.C. Berg, stat. et comb. nov. Based on *Ficus* subg. *Bibracteatae* sect. *Cyathistipulae* Mildbraed & Burret, Bot. Jahrb. 46: 176. 1911. Type species: *F. cyathistipula* Warburg.
– *Ficus* subg. *Bibracteatae* series *Axillares* Hutchinson subseries *Stipulares* Hutchinson, Kew Bull. 1915: 316. 1915.

Trees or shrubs, hemi-epiphytic (or secondarily terrestrial), evergreen, bark not exfoliating. Leafy twigs, stipules, leaves and figs glabrous or inconspicuously hairy. Leaves large to small, elliptic to oblong, often pandurate, coriaceous, tertiary venation reticulate; stipules often large and/or subpersistent. Figs in the leaf axils, large to medium-sized (or small), often sessile, at maturity wall rather soften, sometimes spongy, green, yellowish or purplish. Fruitlets with the upper part of the pericarp becoming mucilaginous, this part can swell considerably, endocarp body not released.

This subsection corresponds with the *Ficus conraui*-group, recognized as a provisional subdivision of sect. *Galoglychia* for the Flore du Gabon and the Flore du Cameroun (Berg, Hijman & Weerdenburg, 1984 and in press respectively).

^{1.} Subsect. *Cyathistipulae* comprises 19 species, most of them in West and Central Africa. *F. scassellatii* (= *F. kirkii*) is confined to East Africa.

The subsection is distinctly associated with the rainforest habitat.

The pollinating fig wasps belong to the genus *Agaon* (cf. Wiebes, 1974b: 133-137).

^{2.}

6. Subsect. *Caulocarpae* (Mildbraed & Burret) C.C. Berg, stat. et comb. not. Based on *Ficus* subg. *Bibracteatae* sect. *Caulocarpae* Mildbraed & Burret, Bot. Jahrb. 46: 176. 1911. Lectotype species (here designated): *F. sansibarica* Warburg.

– *Ficus* subg. *Bibracteatae* sect. *Fasciculatae* Mildbraed & Burret, Bot. Jahrb. 46: 176. 1911. Lectotype species (here designated): *F. tremula* Warburg.

– *Ficus* subg. *Bibracteatae* sect. *Elegantes*, Bot. Jahrb. 46: 176. 1911. Lectotype species (here designated): *F. artocarpoides* Warburg.

– *Ficus* subg. *Bibracteatae* series *Fasciculatae* Hutchinson, Kew Bull. 1915: 316. 1915.

Trees, shrubs or lianes, mostly hemi-epiphytic, mostly evergreen, bark smooth, not exfoliating. Leafy twigs, stipules, leaves and figs glabrous or minutely puberulous. Leaves coriaceous (to chartaceous), oblong to elliptic or ovate to cordiform, shortly or longly petiolate, margin entire; stipules mostly small and caducous. Figs medium-sized to large, in most species on spurs on the older wood, in most species pedunculate, wall at maturity often soft, mostly greenish. Fruitlets with the pericarp becoming partly mucilaginous, endocarp body released and surrounded by a mucilaginous layer which can swell considerably.

This subsection corresponds with the *Ficus artocarpoides*-group recognized as a provisional subdivision of sect. *Galoglychia* for the Flore du Gabon and the Flore du Cameroun (Berg, Hijman & Weerdenburg, 1984 and in press respectively).

Subsect. *Caulocarpae* comprises 11 species, of which a single species (*F. polita*) extends to Madagascar. It does not show a distinct concentration of species in one or another part of Africa.

Most species are associated with wet to rather dry evergreen forest. Only *F. sansibarica* occurs in woodland.

F. ovata, inserted in this subsection on the basis of similarities in the fruitlets, deviates in several features: the figs are not born on spurs on the older wood, but (often) sessile in the axils of the leaves and the leaves are often rather densely hairy beneath. The young figs are inclosed in conspicuous calyptrate buds.

The pollinating fig wasps belong to the genera *Agaon* (a separate group of this genus, cf. Wiebes, 1979: 392–397) and *Courtella* (cf. Michaloud c.s., 1985: 105–106).

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