
Surianaceae

Surianaceae Arn. in Wight & Arn., Prodr. Fl. Ind. Orient. 1:360 (1834), nom. cons.

Stylobasiaceae J. Agardh (1858).

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Trees or shrubs; trichomes simple or glandular, or plants glabrous. Leaves alternate, simple or compound and with alate rachis, petiolate or almost sessile, subcoriaceous to fleshy, rarely with nectaries on petiole or midrib (*Cadellia*); venation pinnate-reticulate; stipules present or not. Inflorescences axillary or terminal, sometimes borne on the branches, few- to many-flowered panicles or cymes, or flowers solitary in leaf axils; bracts and prophylls generally present; pedicels articulated or not. Flowers actinomorphic, perfect or polygamous; sepals 5(–7), quincuncially imbricate, distinct or united at base, generally persistent; petals 5 or (*Stylobasium*) 0, imbricate, unguiculate or not, yellow, orange, cream or white, caducous; stamens obdiplostemonous, 10 or 5 + 5 staminodes, the staminodial whorl often reduced in number; filaments free, the antesepalous ones generally longer than the antepetalous ones, sometimes articulated, caducous or persistent, glabrous or basally pilose; anthers tetrasporangiate, basifixed or dorsifixed, versatile, introrse (rarely latrorse), opening by longitudinal slits; ovary superior, apocarpous, carpels 1–5, inserting on the \pm flat receptacle or on a gynophore (*Recchia*), glabrous or pilose; placentation basal, ovules 2 per carpel, collateral; stylodia gynobasic; stigmas capitate or peltate. Fruit a berry, drupe or nutlet, 1-seeded, mesocarp hard or fleshy (and sometimes fibrous), endocarp usually hard, bony; endosperm 0 or rarely (*Stylobasium*) sparse; embryo curved, conduplicate, transversally induplicate or globose, cotyledons fleshy (thin in *Cadellia*), oily or starchy.

Five genera with eight species, *Cadellia*, *Guilfoylia*, *Stylobasium* endemic to Australia, *Recchia* from humid and dry forests of Mexico, and *Suriana* pantropical along sea coasts, except in West Africa.

VEGETATIVE MORPHOLOGY. Surianaceae are medium-sized trees (occasionally to 28 m high) to small shrubs with acrotonic or basitonic

branching. The vegetative shoots of *Suriana* show monopodial growth whereas the generative parts have a sympodial structure (Gutzwiller 1961). The leaves are simple, except in two species of *Recchia* which have compound leaves with an alate rachis. Leaf disposition is alternate and generally distichous but *Suriana* has a 2/5 phyllotaxis. Leaves of *Suriana* appear apically crowded, leaving conspicuous scars after shedding. Leaf succulence is apparent in *Suriana*, whereas the leaves of the other genera are \pm coriaceous. The venation is pinnate-reticulate. Stipules are present in *Cadellia*, *Guilfoylia*, *Recchia* and *Stylobasium* (Weberling et al. 1980). The indumentum may be conspicuous, with simple and glandular trichomes covering most of the vegetative and generative parts, as in *Suriana*, or the plants are glabrous; in *Stylobasium*, only the youngest plants exhibit trichomes (Prance 1965). Extrafloral nectaries are known only from the petiole or midrib of *Cadellia* (Gutzwiller 1961).

VEGETATIVE ANATOMY. The leaves are bifacial, with the stomata confined to the abaxial surface (*Cadellia*, *Guilfoylia*, *Recchia*), or aequifacial (*Stylobasium*, *Suriana*), with the stomata equally distributed on both surfaces. The stomata are anomocytic or anisocytic (Jadin 1901; Gutzwiller 1961; Nooteboom 1966). The epidermis of *Suriana* contains mucilage. The palisade parenchyma consists of 1 or 3 layers beneath the adaxial epidermis or, in *Suriana*, beneath both epidermal layers (Jadin 1901). Spongy tissue is found in the centre and near the veins (Prance 1965). In *Stylobasium*, the lateral veins are not surrounded by a ring of sclerenchyma (Prance 1965). Crystals of calcium oxalate (solitary or druses) are abundant in the mesophyll (*Cadellia*, *Recchia*, *Suriana*) and the epidermis (*Guilfoylia*, *Recchia*) but are lacking in *Stylobasium* (Loesener and Solereder 1905; Prance 1965). The epicuticular sculpture is mostly bare of crystalloids but sometimes wax scales are observed (Fehrenbach and Barthlott 1988). The simple trichomes are uni-

cellular, the glands consisting of a uniseriate stalk of 5–7 cells and a head of 15–20 cells (Gutzwiller 1961). The nodes are unilacunar (*Suriana*; Jadin 1901) or trilacunar (*Cadellia*, *Stylobasium*).

The stem anatomy of Surianaceae is uniform. The cortex shows a more or less continuous ring of sclerenchyma or single groups of fibres. Solitary crystals and druses are common in the cortex of *Cadellia* and *Recchia* (Loesener and Solereder 1905; Weberling et al. 1980). Cork develops in the inner part of the primary cortex or in a subepidermal layer (Loesener and Solereder 1905). The wood exhibits growth rings, sometimes poorly defined. Pores are moderately present to very numerous (16–66 m²), mostly somewhat angular and in multiples of 2–9 and clusters of 3–5, some solitary and elliptic, mostly small to very small (diameter 14–89 µm) but sometimes rather large (in *Recchia*, to 240 µm; Loesener and Solereder 1905). Vessel elements are cylindrical to irregular in shape, very short to long (58–685 µm), often containing reddish to brownish gum. Perforation plates are horizontal or oblique, the perforations simple. Intervascular pit-pairs are bordered with included apertures, the pitting is alternate. Ray-vessel and parenchyma-vessel pitting is half-bordered or, in *Guilfoylia*, often unilaterally compound. Vested pits are present in *Recchia* (Loesener and Solereder 1905), absent in *Suriana* (Jansen et al. 2001). Rays are uniseriate, rarely biseriate, and frequently storied. Uniseriate rays are extremely low (1–36 cells), extremely fine to very fine (8–20 µm wide), the cells mostly upright, moderately thick-walled, often filled with reddish gum. The wood parenchyma is generally scanty, vasicentric or paratracheal, diffuse, and crystalliferous strands are observed in all genera except for *Stylobasium* (Jadin 1901; Loesener and Solereder 1905; Webber 1936; Chattaway 1956; Prance 1965; Weberling et al. 1980; Carlquist 1985). Libriform wood fibres and fibre tracheids are cylindrical and in a central position, tapering gradually or abruptly at first to smooth or occasionally forked or saw-toothed ends, 400–1,140 µm long, 8–38 µm in diameter, or sometimes wide-lumened in *Recchia* (Loesener and Solereder 1905), sometimes septate in *Recchia*, *Stylobasium* and *Suriana*. The walls show few to rather numerous minute pits, the pits oblique, those of the fibre tracheids with vestigial borders. Usually, they are filled with gummy contents (Webber 1936; Prance 1965). The sieve-element plastids are of the P-type (*Stylobasium*) or S-type (*Suriana*) (Behnke et al. 1996).

INFLORESCENCES. Inflorescences are terminal or axillary. The general type is a few- to many-flowered panicle but single flowers in leaf axils are also observed. Gutzwiller (1961) describes the inflorescence of *Suriana* as clearly separated from the vegetative parts, and as a panicle with terminal dichasia of scorpioid shape. For *Cadellia* and *Guilfoylia*, accessory buds are reported (Gutzwiller 1961). Bracts and a pair of prophylls are present but often early caducous. The pedicel is articulated in *Cadellia* and *Guilfoylia* (*Stylobasium*?).

FLOWER. The flowers are basically actinomorphic, pentamerous and perfect. However, *Stylobasium* is polygamous with some perfect flowers, and functionally male and female flowers with abortive ovaries and staminodes respectively. The sepals and petals are quincuncial. The sepals are distinct or basally united; the petals are generally early caducous or even wanting, and in *Suriana* and *Recchia* they are unguiculate. The epidermis of the petals of *Suriana* is rugose to smooth and longitudinally striate, and the abaxial pattern is tabular (see the classification of Christensen and Hansen 1998). The androecium is obdiplostemonous; the outer whorl may be staminodial and reduced in number (Tschunko and Nickerson 1976). The anthers have a papillate epidermis, and the dehiscence line extends over the lower and upper shoulders of a theca. A single vascular bundle serves each anther (Endress and Stumpf 1991). In bud, the sepals and the inner whorl of stamens originate before the petals and the outer staminal whorl (*Suriana*; Gutzwiller 1961). The gynoecium is apocarpous with 1–5 carpels, each with a ventrobasal stylodium (Fig. 159F). *Guilfoylia* has usually a single carpel, the second being rudimentary or wanting. In *Recchia*, the carpels are borne on a short gynophore but, in the other genera, they are inserted centrally or marginally on the more or less flat receptacle. The carpels are basally ascidiate whereas the stylodia form the plicate zone. The multilayered transmission tissue is of the closed type (Ramp 1988). The cavity of the ovary is entirely filled with mucilage (*Suriana*; Gutzwiller 1961), which may mediate between the transmission tissue and the micropyle (Ramp 1988). The ventral margins of the carpels are free in bud but later shortly fused and leaving an inner channel (*Suriana*). In *Suriana* and *Cadellia*, the carpels approach each other at a geniculate part of the stylodia. They may agglutinate, although there is apparently no