
Oliniaceae

Oliniaceae Arn. ex Sonder, Fl. Cap. (Harvey & Sonder) 2:503 (1862).

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Shrubs or trees up to 25 m high; stem often fluted and buttressed; young branches quadrangular. Leaves opposite or often ternate, petiolate, simple, entire, pinnately veined, obovate, elliptic or lanceolate, often acuminate, glabrous, coriaceous; stipules rudimentary. Inflorescence terminal and/or axillary, paniculate with branches ending in 3-flowered cymules; bracts opposite, often caducous. Flowers pedicellate, bisexual, actinomorphic, (4)5-merous, obhaplostemonous, epigynous; hypanthium tubular, ending in (4)5 minute teeth (sometimes interpreted as epicalyx); sepals inserted on hypanthium rim, alternating with hypanthium teeth, conspicuous, petal-like, lingulate, white or pinkish, usually pubescent adaxially towards the base; calyx aestivation apert (at least in older developmental stages); petals inserted on adaxial side of hypanthium rim, alternating with and much shorter than sepals, scale-like, usually pink, pubescent, incurved and closing the hypanthium tube in bud, at anthesis spreading and more or less upright, exposing the floral centre; corolla aestivation valvate; stamens as many as and opposite petals, inserted below petals on adaxial side of hypanthium rim, strongly incurved in bud, less so but still incurved at anthesis; filaments short; anthers bithecate, tetrasporangiate, dorsifixed, longitudinally dehiscent, with thickened connective; disc structures lacking; pistil (3-)5-carpellate, syncarpous; ovary inferior, (3-)5-locular; style terete, not exserted; stigma capitate, papillate; ovules (2)3 per locule, pendulous, superposed on axile placenta, campylotropous, bitegmic, crassinucellate; fruit drupaceous, thinly fleshy (pericarp), globose or ovoid, pink to bright red when ripe, with a circular scar left by the caducous hypanthium; endocarp woody. Seeds usually 1 per locule, often only 1 per fruit, ovoid or ellipsoid, with thick testa; endosperm absent.

A single genus with about 8 species found in montane and coastal forests of eastern and southern Africa.

VEGETATIVE MORPHOLOGY AND ANATOMY. All species in the family are woody, evergreen shrubs or mainly trees with an often fluted and buttressed stem. The bark is more or less rectangularly fissured and scaly, sometimes with a reddish or yellowish pigment. The inner bark (and also leaves, when crushed) usually has a strong almond scent (Dahlgren and Van Wyk 1988). The leaves are stipulate but the stipules are small, little more than 1 mm long (Weberling 1963). Such rudimentary stipules are present in a number of other myrtalean families, including the closely related Crypteroniaceae, Alzateaceae, Rhynchocalycaceae and Penaeaceae (Dahlgren and Thorne 1984). Leaf anatomy was studied by Mújica and Cutler (1974) and Keating (1984). The leaf margin is slightly recurved and consists of a multilayered, hypoderm-like tissue. Stomata are present on the abaxial leaf surface only, and they are paracytic or anomocytic. Hairs are absent or few. The midrib is level adaxially and slightly rounded abaxially. The midvein is semicircular and bicollateral. Terminal sclereids seem to be present in the leaves of all species. The midvein of the leaf lamina terminates in a "glandular" swelling or mucro, present also in Rhynchocalycaceae and some Penaeaceae (Dahlgren and Van Wyk 1984).

van Vliet and Baas (1984) reported the wood of Oliniaceae to be characterized by diffuse vessels with simple perforations and alternating intervessel pits. The fibres are septate and libriform, and the parenchyma is scanty paratracheal. The rays are 3-seriate. In an earlier study, van Vliet and Baas (1975) mentioned the wood anatomy of Oliniaceae to be more or less identical to that of Rhynchocalycaceae.

INFLORESCENCES. The inflorescences are described as monothelic (the main axis ending with a terminal flower) and (thyrsoid-)paniculate (Weberling 1988). The panicles are usually conical or globose. In some species, terminal as well as axillary panicles are present (Fig. 91B).

FLORAL MORPHOLOGY AND ANATOMY. The flowers are bisexual, actinomorphic, usually pentamerous, and epigynous. The interpretation of floral organization has been a matter of debate because there are apparently three whorls of perianth organs. Two hypotheses had been proposed for the homology of the three whorls: the first interprets the flowers as being haplostemonous, i.e. the outermost organs are interpreted as a reduced calyx, the middle whorl as a corolla, and the innermost organs, which are opposite the stamens, either as scales of unspecified nature (e.g. Verdcourt 1975), or as staminodes (e.g. Cronquist 1981), or as stipules of the petals (e.g. Rao and Dahlgren 1969). The second hypothesis describes the flowers as being obhaplostemonous, i.e. the organs of the outermost whorl are interpreted as teeth of unspecified nature or epicalyx, the middle whorl as calyx, and the in-

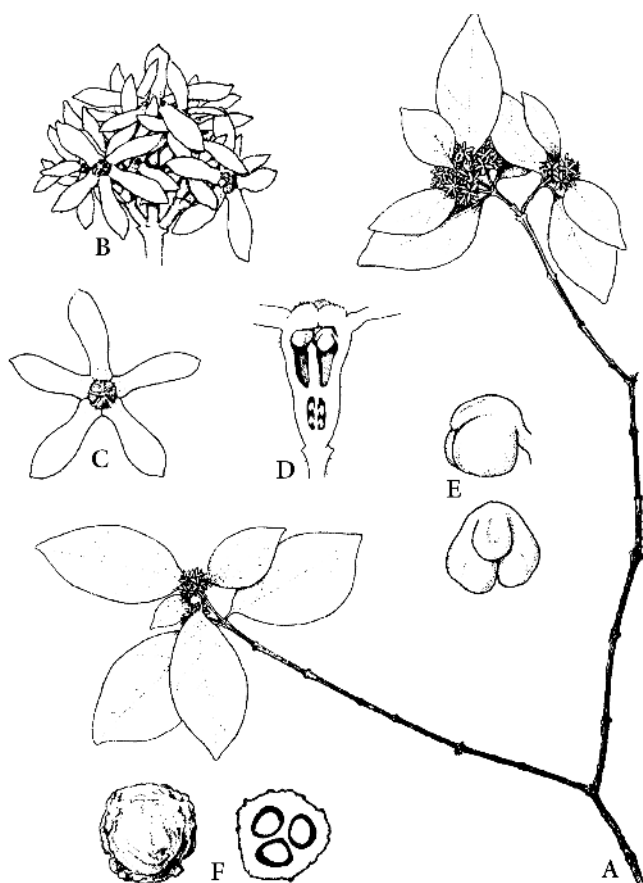


Fig. 91. Oliniaceae. *Olinia aequipetala*. **A** Flowering branch. **B** Panicle. **C** Flower bud with large sepals and scale-like petals. **D** Longitudinal section of flower bud showing inferior ovary. **E** Stamens, lateral and adaxial view. **F** Drupaceous fruit, whole and transverse section. (Dahlgren and Thorne 1984)

nermost whorl as corolla (e.g. Gilg 1894; Dahlgren and Van Wyk 1988). In a recent study including Oliniaceae and the closely related Penaeaceae and Rhynchocalycaceae, both a comparative morphological analysis and the reconstruction of character evolution clearly supported an obhaplostemonous interpretation of the flowers of Oliniaceae (Schönnenberger and Conti 2003). The exact nature of the outermost whorl of small, tooth-like appendages is still unclear. Their lack of vascularization, their small size, and their late appearance during floral development make it likely that they are only simple outgrowths of the hypanthium rim. Similar structures are also present in other taxa of Myrtales, for instance, in many Lythraceae where they are generally referred to as epicalyx (Mayr 1969). The sepals are broadly attached on the adaxial side of the hypanthium rim, and each is supplied by three main vascular bundles. The petals alternate with the sepals and are narrowly attached on the adaxial side of the hypanthium rim. Each petal is supplied by a single vascular bundle. Stamens are produced opposite, i.e. immediately below, the petals on the adaxial side of the hypanthium. In bud, the stamens are strongly incurved, with their pollen sacs directed towards the hypanthium (Fig. 91E). When the flowers open, the stamens recurve to a certain degree, but never become fully erect (J.S., pers. obs. for flowers of *Olinia emarginata* and *O. ventosa*). The carpels alternate with the stamens, and the style ends in a capitate stigma with secretory papillae. Each of the five ovary locules contains two to three pendulous ovules (Fig. 91D). Scattered cells with oxalate druses are present in all floral organs, except for the style. Further details on floral anatomy are reported by Rao and Dahlgren (1969).

EMBRYOLOGY. A special feature of the anthers of Oliniaceae is that the microsporogenous tissue may be divided into two packets by a band of tapetal cells (Tobe and Raven 1984). Prior to maturation, the anther wall comprises four layers: an epidermis, an endothecium, a middle layer, and a tapetum. The tapetum is glandular, and its cells become two-nucleate before degenerating. Before maturation, both the middle cell layer and the endothecium become disorganized and collapse (ephemeral endothecium) while the cells of the epidermis enlarge. At anthesis, the anther walls consist solely of the epidermal cells. Anther dehiscence is longitudinal. Meiosis in the microspore mother cells is accompanied by simultaneous cytokinesis, and the resulting