

MIMOSACEAE (LEGUMINOSAE – MIMOSOIDEAE)¹(I.C. Nielsen², Aarhus, Denmark; H.C. Fortune Hopkins³, Chatham-Maritime, U.K.)

Trees, shrubs or lianas, very rarely herbs (*Neptunia* and *Mimosa* p.p.); branches unarmed or armed with stipular thorns (rarely axillary thorns) or scattered prickles on the internodes. Stipules rarely absent, usually caducous. *Leaves* alternate, usually bipinnate (unipinnate in *Inga*, transformed into phyllodes in *Acacia* subg. *Phyllodineae*), usually provided with extrafloral nectaries on rachis and pinnae. *Inflorescences* bracteate, simple or compound, racemose; inflorescence units usually consisting of pedunculate glomerules, spikes or spike-like racemes, which are aggregated into axillary or terminal panicles. Pedicels usually short or absent. *Flowers* actinomorphic, bisexual, unisexual, or rarely neuter, usually small and white, greenish or yellow. Disk, when present, intrastaminal. *Stamens* few to numerous, free or united into a tube, the latter sometimes united with the corolla-tube at the base. Anthers dorsifixed, \pm quadrangular in outline, sometimes with a small, caducous gland at the apex. Ovary(-ies) solitary (to several and free), superior, 1-celled; style filiform; stigma small, tubular(-infundibular), terminal. Ovules anatropous, parietal. *Fruit* a pod, dehiscent or indehiscent, sometimes breaking into 1-seeded segments. *Seeds* usually in two rows from the single placenta, inserted transversely, obliquely or longitudinally, mostly ovate-orbicular in outline, often compressed; funicle rarely developed into an aril (*Acacia* p.p., *Pithecellobium*); the testa osseous, coriaceous or chartaceous usually with a \pm peripheral furrow, the pleurogram.

Distribution — About 60 genera and some 3000 species, mainly in the tropics and the subtropics, but some genera (e.g. *Acacia* and *Albizia*) extending into the warm-temperate zone; in *Malesia*: 19 genera, of which 15 native, with 1 endemic, viz. *Wallacedendron* in N Celebes and the Philippines. Among the remaining 14 native genera, 5 are pantropical (*Acacia*, *Albizia*, *Entada*, *Neptunia*, *Parkia*), 3 are shared with continental S Asia and tropical N Australia (*Adenantha*, *Archidendron*, *Cathormion*), 2 with Melanesia and the west Pacific (*Schleinitzia*, *Serianthes*), 2 with Australia (*Pararchidendron*, *Paraserianthes*), 1 with New Caledonia, the Solomon Islands and Australia (*Archidendropsis*), and 1 with India and tropical Africa/Madagascar (*Dichrostachys*). The total number of native and naturalized species is c. 150. Furthermore, an enumeration of c. 45 cultivated species is given at the end of this revision (p. 205). In both Keys to the genera 7 commonly cultivated genera are included.

In the family *Mimosaceae* tropical Asia and Australia have close affinities, a number of species being common to E Malesia and tropical (to subtropical) Australia. The links be-

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3) Revision of the genus *Parkia*.

tween Asia and Africa are weak, although a few species (*Acacia nilotica*, *Dichrostachys cinerea*, *Entada rheedii*) and a part of the very diversified genus *Calliandra* are common to both continents. Other links between Asia and Africa are *Xylia* from India / Burma to Thailand/Indochina and the rest of the species in Africa / Madagascar and the genera of the *Adenantha* group, *Adenantha* being endemic to Asia – Australia and *Tetrapleura* and *Amblygonocarpus* to tropical Africa. The only generic tie between Asia and tropical America is the not yet fully understood *Havardia*: 3 species in mainland Asia, the remaining c. 20 in Central and N tropical South America (Nielsen 1981). More distantly related 'sister groups' are *Archidendron*, which is related to the tropical American genus *Cajuput* (Nielsen et al. 1984), and *Schleinitzia* with the American genus *Leucaena* (Lewis & Elias 1982). Africa and America share only 2 non-pantropical genera, 12 genera being endemic to Africa/Madagascar and 27 to America. *Indopiptadenia* is the only genus endemic to mainland Asia.

A few species-rich genera as *Acacia* (more than 1300 species), *Calliandra* (c. 200), *Inga* (c. 350), and *Mimosa* (c. 400) account for the major part of the diversity, a fact that cannot be explained by differences in generic concepts alone; it is a testimony that adaptive radiations have taken place in Australia (*Acacia*) and in South America (*Calliandra*, *Inga*, *Mimosa*). The number of monotypic genera is low; in Malesia: *Wallaceodendron*; in Malesia/Australia: *Pararchidendron*; in India: *Indopiptadenia*; in Africa/Madagascar 5, and in America 6 genera.

The family, with five pantropical genera, thus displays a complicated distribution pattern of widely distributed genera and narrowly distributed relictual ones. The first genera evolved are probably those of the tribe *Mimoseae*, the centre of origin being Africa/America, and the tribe *Parkieae*. Then *Acacia* developed in the everwet tropics from ancestors like subg. *Aculeiferum*, being followed by the evolution of *Acacia* subg. *Acacia* and subg. *Phyllodineae* in the arid areas of the tropics and subtropics. Tribe *Ingeae* has two centres of evolution, both in the everwet tropics, one in tropical Central/South America and one in tropical Asia/W Pacific.

References: Lewis, G.P. & T.S. Elias, in R.M. Polhill & P.H. Raven (eds.), *Advances in Legume Systematics I*, Roy. Bot. Gard. Kew (1981) 167. — Nielsen, I., in Polhill & Raven (eds.), l.c. (1981) 184. — Nielsen, I., T. Baretta-Kuipers & Ph. Guinet, *Opera Bot.* 76 (1984) 5–120.

Habitat & Ecology — Members of the subfamily occur in a fairly high diversity of habitats, though upper montane and alpine species are absent except for *Paraserianthes lophantha* subsp. *montana* var. *montana*, which is recorded from sites up to 3265 m on the Javanese volcanoes. Quite a few genera have species that are adapted to arid conditions; here they are prominent members of the savanna and woodland associations (e.g. *Acacia* p.p. in Asia, Africa and Australia, *Dichrostachys* and *Prosopis* in America and Africa, and in subtropical W Asia *Albizia* p.p., the extreme case being *Elephantorrhiza* of southern Africa, where some of the species develop annual aerial shoots from a woody subterranean stem). The only truly aquatic member of the subfamily is *Neptunia oleracea*. Most of the species of the *Mimosaceae* are sun-loving and found in open habitats such as deciduous forests, woodlands, and savannas. Almost all species of tribe *Ingeae* are found in lowland evergreen forests. They are often found in clearings and in gallery

forest along rivers (many species of *Inga* and *Zygia* in the Amazonian rain forests), although some species, e.g. *Archidendron fagifolium* and *A. jiringa*, are understory trees. Some species occur in as tall emergent rain forest trees (e.g. *Adenanthera* p.p., *Parkia* p.p., the South American *Cedrelinga* and *Inga* p.p., and in Malesia *Albizia rosulata*, *A. pedicellata* and *A. splendens*).

Habit. The majority of the Malesian genera are shrubs or small to large trees. Herbs are represented by the genera *Neptunia* and *Mimosa* p.p. Climbers are found in *Acacia* subg. *Aculeiferum*, in 3 species of the genus *Albizia*, *A. corniculata*, *A. myriophylla*, and *A. rufa*, and in *Entada*. Oldeman (1989) gave an account on the biological implications of leguminous tree architecture. *Acacia auriculiformis* as studied in Indonesia by Edelin (1984) has as a young tree a monopodial, orthotropic trunk. When having reached a certain developmental stage (which may vary considerably according to age and size of the trees), the original model is reiterated at the place of certain branches, the apical meristems of which begin to function accordingly. When the tree grows still higher, the extremity of the original trunk bends over, height growth is taken over by one of the branched models somewhere on the curved trunk, and this process continues (Oldeman l.c.). It is concluded that the complex and flexible architecture of leguminous trees allows them to survive in complex and unstable environments. An example of a species that remains unbranched throughout its lifetime is *Archidendron glabrum* (Hallé et al. 1978, sub *Pithecellobium hansemannii*).

Dominance. Almost all species occur scattered in their habitats. An exception is *Neptunia oleracea*, which may form large floating islands in rivers and ponds. The naturalized species of *Mimosa* are very common weeds along roads, on waste places, etc., and the ligneous *Leucaena leucocephala* may show weedy tendencies as well. *Paraserianthes lophantha* subsp. *montana* var. *montana* forms monospecific stands in the montane forest on the Javanese volcanoes, the germination of the seeds being stimulated by fires or acids from the solfataras (Van Steenis 1972). Tall tree specimens of *Parkia speciosa* and *P. timoriana* can be seen in the fields in the Malay Peninsula as old forest remnants. Some of the water-dispersed species (*Schleinitzia insularum*, *Serianthes grandiflora*) are often found in coastal associations (not in mangrove). In the Malay Peninsula *Adenanthera pavonina* is found in similar habitats. Some species (e.g. those of *Archidendron* ser. *Stipulatae*) are probably genuinely rare.

Nodulation and mycorrhizas. Root nodules with nitrogen fixating *Rhizobium* bacteria are frequent in the *Mimosaceae* (Corby 1981), where the astragaloid type of nodule is common. Also Sprent et al. (1989) found that the *Mimosaceae* on nodule characters are rather uniform, although *Parkia* was found to be aberrant. In the same volume Alexander (1989) gave a review on the occurrence of ectomycorrhizas. These are associated with woody species and have been reported from *Acacia*, *Inga* and *Mimosa*. Many other genera were reported to have vesicular-arbuscular (V-A) mycorrhizas. The data have been obtained from studies on American, African and Australian species.

Flower biology. The flowers of the *Mimosaceae* are usually placed in dense, many-flowered inflorescences such as heads, glomerules, spikes, or racemes, which are aggregated into axillary or terminal synflorescences. Some of the rain forest species are cauliflorous (American *Zygia* and *Inga* p.p. and Malesian *Archidendron*). The inflorescences