

Asclepiadaceae

Shrubs, woody or herbaceous left-twining climbers, perennials with deciduous herbaceous above-ground parts or stem succulents, with watery or milky sap; **L** decussate, rarely whorled, simple and entire (rarely lobed or divided), sometimes much-reduced, absent or spinescent (in stem succulents); **Inf** cymose (terminal thyrses), rarely racemose; **Fl** actinomorphic, bisexual; **Sep** 5, basally connate; **Pet** 5, usually connate; **Cl** occasionally forming outgrowths on the upper face (→ petaloid corona, Fig. 1A); **St** 5, alternating with the **Pet**; **Fil** free, basally fused with the **Cl**, **Anth** coherent (→ *Periplocoideae*) or all **St** postgenitally fused with the **Sty** head into a column (= gynostegium, **Gy**) (→ *Secamonoideae*, *Asclepiadoideae*); **Gy** mostly with a simple (staminal) or double (staminal plus inter-staminal) corona (**Cn**, Fig. 2A); **Anth** 4-locular (→ *Periplocoideae*, *Secamonoideae*) or 2-locular (→ *Asclepiadoideae*), pollen in tetrads and freely presented on pollen-carriers (translators, Fig. 1B) (→ *Periplocoideae*) or pollen grains of each pollen sac coherent into a pollinium (**Poll**) and adjacent **Poll** united into a pollinarium by means of a translator (→ *Secamonoideae*, *Asclepiadoideae*) (Fig. 2B); gynoeceum of 2 apically connate **Ca**, which are united by means of the 5-angular **Sty** head; **Fr** paired or single follicles, with few to many **Se**, not fleshy, slender to inflated; **Se** usually flattened, with or without wing, with a terminal silky tuft of **Ha** (coma).

Distribution: Worldwide, esp. subtropics and tropics.

Literature: Liede & Albers (1994); Sennblad & Bremer (1996); Swarupnandan & al. (1996); Liede (1997); Endress & Bruyns (2000).

The family consists of some 240 genera with 3400 species. Of these, 61 genera can be referred to as succulents in the widest sense.

In the present account, the *Asclepiadaceae* are treated as a family, which according to Schumann (1895), Bruyns & Forster (1991) and Liede & Albers (1994) is subdivided into the 3 subfamilies *Periplocoideae*, *Secamonoideae* and *Asclepiadoideae*. This conservative taxonomic view has been taken, since this is the system still widely accepted among scientists and amateurs alike. However, as has already been implied by earlier morphological studies, progress in molecular research suggests to include all 3 subfamilies into the *Apocynaceae* and to abandon the *Asclepiadaceae*, see Olmstead & al. (1993) or Sennblad & Bremer (1996). This concept has been formally transformed into taxonomy by Endress & Bruyns (2000).

The widely accepted suprageneric system of the *Asclepiadaceae* by Bruyns & Forster (1991), which

largely relies on morphological data, is based on the classification of Brown (1810) and Schumann (1895), to which the newly described tribe *Fockeeae* by Kunze & al. (1994) has to be added. The inclusion of the tribes *Marsdenieae* into the *Stapeliaceae* by Swarupnandan & al. (1996) and *Gonolobeae* into the *Asclepiadeae* by Liede (1997) still needs to be corroborated and are not adopted here. The technical terms used in the keys and descriptions that follow are explained in the longitudinal flower sections and detail illustrations presented in Fig. 1 and Fig. 2.

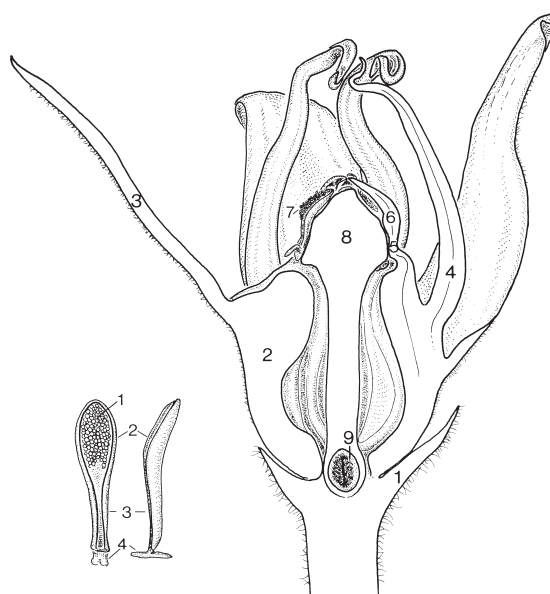


Fig. 1: *Raphionacme madiense*. – **Right:** Longitudinal section through a flower (1 sepal (**Sep**); 2 corolla tube; 3 corolla lobe; 4 (petaloid) corona; 5 filament (**Fil**); 6 anther (**Anth**); 7 translator; 8 style head; 9 ovary). **Left:** Translator, left in top-view, right in side-view (1 heaps of pollen tetrads; 2 scutellum; 3 stipes [= stalk]; 4 adhesive disc [= viscidium])

The *Asclepiadaceae* constitute a derived family showing complex floral structures, which are dedicated to the service of a highly specialized pollination biology (→ Figs. 1 and 2). The presence of fascinating floral structures and colours in connection with facilities fostering deceit, trapping and attachment as well as the possession of pollen-masses (pollinia) warrant the *Asclepiadaceae* to be seen as the 'orchids' among the dicotyledons. This, combined with numerous forms of succulence, has made members of this family attractive objects for the plant lover – in particular ceropegias and stapeliads with their pitfall and carrion flowers. Notwithstanding, they are often fairly difficult to cultivate in comparison to cacti, which may occasionally diminish the pleasure taken in them. The question of suc-

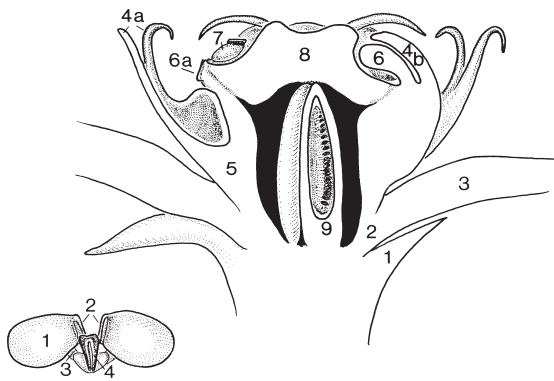


Fig. 2: *Caralluma adscendens*: – **Right:** Longitudinal section through a flower (1 sepal (**Sep**); 2 corolla tube; 3 corolla lobe; 4a interstaminal corona (**Ci**); 4b staminal corona (**Cs**); 5 filament tube; 6 anther (**Anth**); 6a guide rail; 7 pollinium (**Poll**); 8 style head; 9 ovary). **Left:** Pollinarium (1 pollinium (**Poll**); 2 germination crest; 3 caudicle; 4 corpuscle)

culence is one of definition on the one hand (e.g. whether root succulence constitutes genuine succulence or not). On the other hand, in particular cases it may prove difficult to delimitate succulents against other xerophytic life forms. The term succulence is used here in a very broad sense, not least to allow the inclusion of all taxa being worthy of cultivation or actually encountered in cultivation. Nevertheless, as a rule all taxa treated have at least one fleshy-thickened organ, be it root, stem or leaves. Thus, some 1000 succulent species, subspecies etc. of 61 genera from all tribes of the *Asclepiadaceae* (excl. *Secamoneae*) are included. Except for a few species of the genera *Asclepias*, *Marsdenia* and *Matelea*, succulence in this family is confined to the Old World. In the subfamily *Periplocoideae*, succulence occurs almost exclusively in Africa and usually in the shape of huge storage tubers (e.g. *Raphionacme*). Succulence is likewise made up by usually subterranean storage organs in the tribes *Fockeeae*, *Asclepiadeae* and *Gonolobeae* of the subfamily *Asclepiadoideae*. In contrast, the tribe *Marsdenieae* is characterized by the large number of leaf succulent members of the generally epiphytic genera *Dischidia* and *Hoya* from Australasia. Finally, most succulents, esp. stem succulents, belong to the tribe *Ceropegieae* with 34 genera of almost exclusively African origin.

Apart from their use as ornamentals and of the seed-hairs as poor-quality floss, the family has no economically important taxa. A few species are utilized as natural remedies owing to their content of alkaloids, cardenolides, pregnane esterglycosides (Hegnauer 1989).

Key to the subfamilies and tribes with succulents

- 1 **Anth** 4-locular, pollen tetrads loosely on a shovel-shaped translator, translator basally with an adhesive disc (viscidium): 2 (*Periplocoideae*)
 - **Anth** 2-locular, pollen coherent in masses (pollinia, **Poll**), translator with a corpuscle: 4 (*Asclepiadoideae*)
- 2 **Cl** rotate with very short **Cl** tube, **St** arising from the base of the **Cl**:
 - Periplocoideae** – **Periploceae**
 - **Cl** with conspicuous cylindrical to campanulate **Cl** tube, **St** arising from within the **Cl** tube: 3
 - 3 **St** and **Cn** originating from the upper margin of the **Cl** tube: **Periplocoideae** – **Gymnanthereae**
 - **St** originating from the base to the middle of the **Cl** tube, **Cn** arising from the base to the margin of the **Cl** tube:
 - Periplocoideae** – **Cryptolepideae** (**Stomatostemma**)
- 4 **Poll** with a asymmetrical marginal zone that is not serving as germination zone for the pollen:
 - Asclepiadoideae** – **Gonolobeae** (**Matelea**)
 - **Poll** without conspicuous marginal zone or with symmetrical marginal zone serving for the germination of pollen (germination crest): 5
 - 5 **Poll** pendent: **Asclepiadoideae** – **Asclepiadeae**
 - **Poll** erect: 6
 - 6 **Anth** without sterile (connective) appendage:
 - Asclepiadoideae** – **Ceropegieae**
 - **Anth** with sterile (connective) appendage: 7
 - 7 **Poll** attached to the corpuscle by means of a translator arm: **Asclepiadoideae** – **Marsdenieae**
 - **Poll** directly attached upon the corpuscle:
 - Asclepiadoideae** – **Fockeeae**

Key to the succulent genera of the *Periplocoideae*

Tribe *Periploceae*

- 1 Robust lianas with huge caudex, **Cl** lobes widely spreading, 12 - 15 mm long: **Petopentia**
 - Shrubs, partly epiphytic, with several ovoid tubers, **Cl** lobes ascending, overlapping, 5 mm long: **Sarcorrhiza**

Tribe *Gymnanthereae*

- 1 Shrubs with many small tubers, **L** (seemingly) 3-partite, linear, **Cn** basally fused to the **Fil**:
 - Ischnolepis**
 - Herbaceous perennials or lianas, (usually) with 1 tuber only, **Cn** only fused with the **Cl**: 2
- 2 **Fl** robust, pollen loosely on the translator:
 - Raphionacme**
 - **Fl** delicate, short-lived, pollen in 2 pollen-masses (**Poll**) on each translator/**Anth**: **Schlechterella**

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