

ASCLEPIADACEAE

CORONA LOBE VARIATION AND THE GENERIC POSITION OF *ASCLEPIAS MACRA*

INTRODUCTION

Generic concepts in parts of the tribe Asclepiadeae have in the past varied greatly. This was partly due to a lack of insight into the evolutionary trends underlying the variation seen in coronal morphology in the tribe.

Baillon (1890), unable to establish well circumscribed genera in the tribe Asclepiadeae, sank most of the African members into one large super-genus to which he applied the name *Asclepias*. N.E. Brown (1902, 1907–1909) had a better understanding of the variation he encountered and produced a workable classification that has served us well for over 80 years. He relied heavily on corona lobe morphology and genera were often separated from each other on single characteristics. In Brown's system *Asclepias* was distinguished from all other genera in the tribe solely on the possession of a corona lobe sinus. Recent work in *Asclepias* sensu N.E. Brown (Nicholas 1981) has highlighted the fact that distantly related groups have occasionally followed the same evolutionary pathways ending up with coronal characteristics that are analogous rather than homologous. Species with such analogues have in the

past been lumped together into genera that form more or less workable units but do not reflect underlying evolutionary realities or affinities. Three distinct evolutionary trends can be seen in corona lobe morphology: 1, reduction to a blob-like structure. Continuation of this trend leads to the eventual disappearance of the lobe; 2, ornamentation, namely increasing ornamentation by the production of wings and/or proximal, distal and sinal appendages (Figure 23). These can be produced singly, together or in various combinations; 3, saccation or the production of a corona lobe sinus, which may result from the development of wings and/or appendages (Figure 23).

In *Flora capensis* the genus *Pachycarpus* was distinguished from others in the tribe Asclepiadeae by its slipper-like corona lobes that may possess two parallel wings proximally on the upper surface of the keel. In addition, the distal end of the keel may become either extended or ornate.

The species long known as *Asclepias macra* Schltr. was originally described by R. Schlechter in 1895(a) under the name *Gomphocarpus suaveolens* Schltr. Later that same

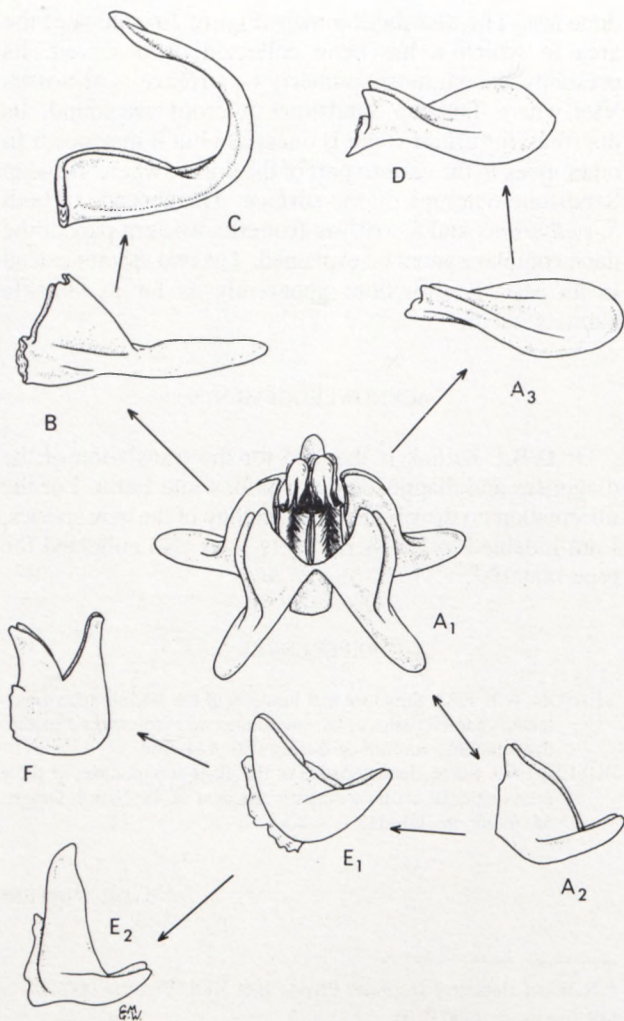


FIGURE 23.—Corona lobe variation in *Pachycarpus* section *Campanulati* showing trends towards both ornamentation and saccation. A1, A2, *P. campanulatus* var. *sutherlandii*, Gerrard 1298, (K). A1, gynostegial column; A2, corona lobe; A3, corona lobe of the type of *P. gerrardii*, now considered synonymous with *P. campanulatus* var. *sutherlandii*, Gerrard 1299, (K). B, *P. campanulatus* var. *campanulatus*, Sanderson s.n., (K). C–F, corona lobe: C, *P. linearis*, Baur 381, (K); D, *P. rostratus*, Haygarth ex Wood 7543, (K); E1, E2, *P. stelliceps*, Bolus 12117, (K); F, *P. suaveolens*, Schlechter 4109, (K). All drawings $\times 3$.

year he sank *Gomphocarpus* into synonymy under *Asclepias* (Schlechter 1895b) and transferred all the known species of *Gomphocarpus*, including *G. suaveolens*, to this genus (Schlechter 1896a). Having done this, Schlechter then noticed that the name *Asclepias suaveolens* had already been used by Leconte and cited by Decaisne in De Candolle's *Prodromus* (1844). He therefore proposed the new name *Asclepias macra* for the taxon (Schlechter 1896b). This latter name was adopted by N.E. Brown in *Flora capensis* and has been used in all subsequent literature. However, Leconte's name was never validly published and according to Decaisne (1844) is no more than an annotation on a herbarium sheet in the Muséum National d'Histoire Naturelle, Phanérogamie, Paris (P). As a result *Gomphocarpus suaveolens* is the correct basionym and *Asclepias macra* should be considered a synonym. Ongoing research into the tribe Asclepiadeae has highlighted the fact that the taxon originally described as *G. suaveolens* should be placed in the genus *Pachycarpus* E. Mey. section *Campanulati* (Schltr.) A. Nicholas & D.J. Goyder.

Brown (1907) excluded *Asclepias suaveolens* from the genus *Pachycarpus* because it possessed a distinct corona lobe sinus, although he did notice its similarity to this genus—'this remarkable species is so exceedingly like *Pachycarpus gerrardii*, N.E. Br., as to be easily mistaken for that plant until the corona is examined'. However, if one examines the corona lobe variation in *Pachycarpus* section *Campanulati*, the progression towards a corona lobe sinus can be clearly seen (Figure 23). *P. suaveolens* represents the end point of the evolutionary trend towards saccation by species in this section. If the plant is viewed in its entirety, there is little doubt that its affinities lie with this section and not with *Asclepias* sensu *Flora capensis* (Table 3). The trend towards sinus production has also occurred in section *Pachycarpus*, a fact hinted at by Bullock (1953), who included species like *P. lineolatus* (Decne.) Bullock and *P. schweinfurthii* (N.E.Br.) Bullock in the genus. These species were previously placed in *Asclepias* because they possess a corona lobe sinus.

Pachycarpus section *Campanulati* is distinguished from all other taxa within the tribe Asclepiadeae by the character combination of linear to narrowly lanceolate leaves with revolute margins, single erect stems that bear nodding inflorescences and campanulate flowers with a hairy ovary.

Obscure characters shared with section *Campanulati*, such as the beak-like shape of the anther wings and the unusual multicellular brown hairs which may sometimes be found on the ovary, also clearly establish the affinity of *P. suaveolens* with this section.

***Pachycarpus* E. Mey. Section *Campanulati* (Schltr.) A. Nicholas & D.J. Goyder, comb. nov.**

Asclepias L. Section *Campanulatae* Schltr. in Botanische Jahrbücher 21: 9 (1896a). *Pachycarpus* E. Mey. Section *Trichocodon* D.M.N. Smith: 300 (1983); Smith: 399–439 (1988). Type.—*Pachycarpus campanulatus* (Harv.) N.E. Br., chosen here.

***Pachycarpus suaveolens* (Schltr.) A. Nicholas & D.J. Goyder, comb. nov.**

Gomphocarpus suaveolens Schltr. in Botanische Jahrbücher 20: 38 (1895a). *Asclepias suaveolens* (Schltr.) Schltr.: 9 (1896a). *Asclepias macra* Schltr.: 456 (1896b); N.E. Br.: 670–671 (1907). Types.—Transvaal 2529 (Witbank): Olifants River (–CD), Schlechter 4109 (K), lecto., chosen here; BM, GRA, NH, PRE! isolecto.). 2530 (Lydenburg): Elandspruitberg (–AA), Schlechter 4006 (syn., not seen by the authors).

DESCRIPTION

Perennial herb. *Rootstock* not seen. *Stem* single, erect to suberect, 205–275(–400) mm high, bifariously strigose, younger parts pilose. *Leaves* erect or slightly spreading, linear to narrowly lanceolate, (45–)65–105 (–152) \times (1,8–)2,5–5,0 mm, apex acute, base minutely truncate (almost minutely auriculate) to attenuate, sparsely hairy, margins revolute; petiole 2,0–4,5 (–7,0) mm long. *Inflorescence* umbelliform, semipendulous to pendulous, terminal, rarely axillary, 1(–3) per plant, 5–10-flowered; peduncles 20–27(–67) mm long. *Flowers* 17–24 \times 9–15 mm; pedicel 15–20 mm long. *Sepals* lanceolate to ovate, (0,4–) 5,0–8,0 \times 1,8–2,8 mm, hirsute. *Corolla* subglobose campanulate, petals fused for $\frac{2}{3}$ their length, 11,5–16,0 \times 7,0–9,5 mm, occasionally with long multicellular brown hairs outside; lobes (3,5–)5,0–7,0 \times 7,0–9,5 mm, apices rounded and reflexed. *Gynostegial*

TABLE 3.—Morphological comparison of *Pachycarpus suaveolens* with *Asclepias sensu Flora capensis* and *Pachycarpus* section *Campanulati*

Characteristic	<i>Asclepias sensu Flora capensis</i>	<i>Pachycarpus suaveolens</i>	Section <i>Campanulati</i>
Stem number	Single to many	Single	Single
Stem orientation	Erect to decumbent	Erect	Erect
Leaf shape	Linear to ovate	Linear	Linear
Inflorescence	Erect to pendulous	Pendulous	Pendulous
Petals	Free almost to the base	Connate for most of their length	Connate for most of their length
Corolla	Cup-shaped or reflexed, never campanulate	Campanulate	Campanulate
Corona lobe sinus	Present	Present	Absent
Ovaries	Glabrous	Hairy	Hairy

stalk 0,5–0,8 mm. *Corona lobes* fused basally, lobes compressed cucullate, 3,2–4,0 × 4,8–5,2(–6,0) mm; appendages more or less level with style apex, proximals usually just over-topping it; proximal appendages broadly falcate, almost unguiform, 1,0–2,0 × 1,5–3,0 mm, distal appendage finger-like, bifid apically with ± 1,3 mm long cleft, 0,7–1,6(–2,4) × (0,8–)1,2–2,0 mm; keel rounded; sinus a central slit, puberulous inside, ± 1,8 mm deep. *Anthers*: anther wings beak-like, 0,6–1,0 × 1,5–2,1 mm; anther appendages tongue-like, 1,3–2,0 × 1,2–1,5 mm, decumbent on the style apex, apex rounded. *Style apex* truncate with a central depression and 5 crenulate, almost flanged outer lobes, whitish, 3,0–4,0 mm in diameter. *Pollinarium*: pollinia golf-club-shaped, 0,5–1,0 × 1,1–1,25 mm; translator arms minutely winged at junction with corpusculum, (0,4–)0,6–0,8 mm long; corpusculum fusiform, 0,14–0,2(–0,3) × 0,2–0,4(–0,6) mm. *Ovaries* covered in long, brown, multicellular hairs. *Fruit & seed* not seen. Figure 24.

TRANSVAAL.—2529 (Witbank): Olifants River (–CD), *Schlechter 4109* (BM, GRA, K, NH, PRE). 2628 (Johannesburg): Dersley Golf course near Geduld (–AB), *Flugge-de-Smit ex Moss 18178* (PRE). 2629 (Bethal): Spitskop, Ermelo (–BD), *Scheepers 15043* (PRE). 2630 (Carolina): near Bosses (–?), *Burt Davy 2956* (K).

The morphological affinities of *Pachycarpus suaveolens* lie most closely with *P. campanulatus* var. *sutherlandii* N.E. Br. However, it can be distinguished from this and all other taxa in section *Campanulati* by its distinct, centrally placed corona lobe sinus. The key published by Smith (1988) has been revised to include *P. suaveolens* and is presented below.

- 1a Style apex with margins extended laterally beyond or vertically above the anther appendages:

2a Style apex forming 5 lobes which extend horizontally past the anther appendages; appearing stellate from above *P. stelliceps*

2b Style apex extending vertically above the anther appendages, terminating in 5 small erect lobes; never appearing stellate from above *P. rostratus*
- 1b Style apex with margins never extended laterally beyond or vertically above the anther appendages:

3a Anther appendages 5,0–7,0 mm long *P. linearis*

3b Anther appendages 0,5–4,0 mm long:

4a Corona lobe saccate-cucullate without large proximal wings on the adaxial surface of the keel ... *P. suaveolens*

4b Corona lobe slipper-shaped with large proximal wings on the adaxial surface of the keel:

5a Corona lobes 3,0–8,5 mm long. Inflorescences 3–10-flowered *P. campanulatus* var. *sutherlandii*

5b Corona lobes 9,5–17,0 mm long. Inflorescences never more than 5-flowered *P. campanulatus* var. *campanulatus*

Pachycarpus suaveolens is a rarely collected southern Transvaal endemic (Figure 25). Like the other species in section *Campanulati*, this attractive plant is found in annually burnt or cut grasslands. It flowers between December and January and as such appears to have a rather short flowering period. Only the two specimens collected by Rudolf Schlechter have altitudes recorded—these being 2 040 m and 1 460 m. The rootstock, fruit and seeds have neither been recorded nor collected. Flower colour has not been recorded either and it is difficult to tell from the dried specimens what colour they would have been.



FIGURE 24.—*Pachycarpus suaveolens*, *Schlechter 4109*, (K): A, whole plant × 0,5; B, transverse section through leaf showing revolute margins × 3; C, flower with corolla splayed × 1,5; D, gynostegial column showing shape of corona lobes × 2; E, pollinarium × 7,5.

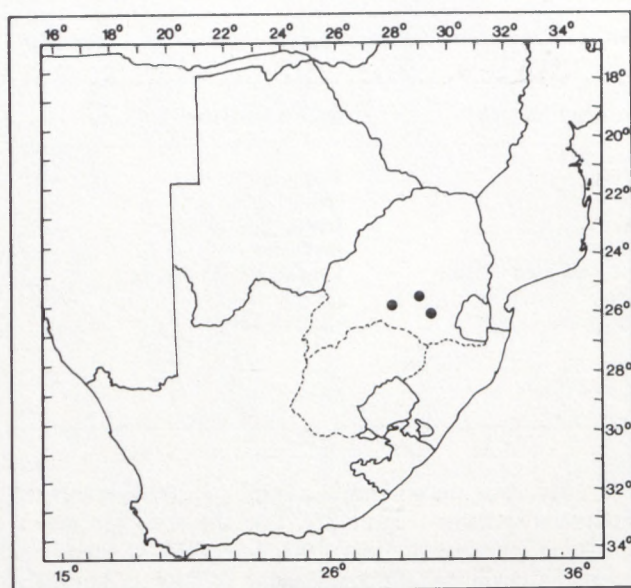


FIGURE 25. — Presently known distribution of *Pachycarpus suaveolens*. Map scale 4 mm = 100 km.

However, it is likely that they are brownish with a hint of green and purple. One dissected flower (*Flugge-de-Smit ex Moss 18178*) showed a pollinium (in situ) from which a mass of pollen tubes had started to germinate, probably

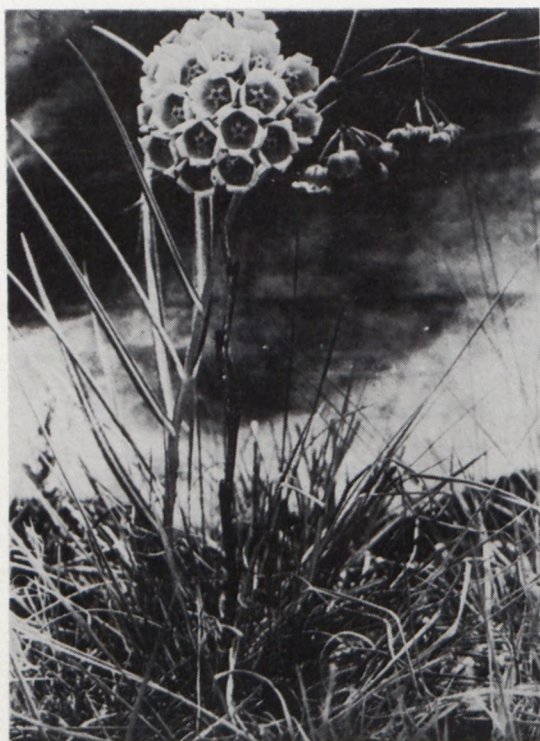


FIGURE 26. — Photograph of *Pachycarpus suaveolens* showing the habit of the plant. Note the single erect stem with its many-flowered, pendulous inflorescences. Photograph of *Flugge-de-Smit ex Moss 18178*, PRE.

evidence of an attempt at self pollination. Had the specimen not fallen prey to a plant press one wonders if this attempt would have been successful.

In the field *P. suaveolens* must look a fine sight with its single, almost erect stem bearing a collection of eight or more densely crowded campanulate flowers in a nodding inflorescence. Figure 26.

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