



Fig. 215. *Opuntia robusta* Pfeiff. has a tree-like habit. (Picture by Gideon F. Smith)



Fig. 216. Fruits of *Opuntia robusta* Pfeiff. (Picture by Lesley Henderson)

Luther Burbank was a famous cactus breeder in California who used *O. robusta* from Mexico as the main parent for his spineless 'robusta' fodder cultivars. Several of these cultivars were introduced to South Africa during the 1920's and one of these cultivars, 'Robusta' was widely and successfully cultivated as an emergency drought fodder plant in the Karoo. Over time the plant has reverted to the original spiny form (Fig. 217) at a few localities, comparing well with the wild *O. robusta* in Mexico. The cultivated robusta blue-leaf opuntia has become a common sight in the drier parts of South Africa and it is often grown as an ornamental. Although the spineless *O. ficus-indica* is more widely cultivated as a fodder plant in other parts of the world, the 'robusta-blue-leaf', until recently, was the preferred species in South Africa because it is more drought-tolerant and is fairly resistant to the cactus cochineal, *Dactylopius opuntiae* (De Kock & Aucamp, 1970).

Although generally treated as a tall shrub or tree, as has been done here, some Mexican authors have applied this name to a low shrub, that is here treated as *Opuntia spinulifera* (Hunt, 2006). Both taxa have impressed areoles.

Opuntia robusta is not a declared weed in South Africa, but the spiny form has been proposed for classification as a category 2 invasive alien plant under NEMBA and CARA (Anonymous, 2009).



Fig. 217. *Opuntia robusta* Pfeiff. reverting to the spiny form.
(Picture by Helmuth G. Zimmermann)

10. *Opuntia salmiana* J.Parm. ex Pfeiff.

In: *Enumeratio Diagnostica Cactearum hucusque Cognitarum*: 172 (1837).

Low shrub 0.3–0.5 m or more, much branched; branch segments terete, up to 25 × 1 cm, not tuberculate, often tinged red. Spines absent or 3–5, bristle-like, up to 1.5 cm long, barbed. **Leaves** very small, 1–2 mm long, tinged purple, caducous. **Flowers** produced rather freely, 2–3.5 cm across, white or pale yellow. **Stamens** sensitive. **Fruit** oblong-ellipsoid, c. 1 cm wide, bright red, barren in cultivated plants, but proliferous (upper pericarpel areoles generate small, very spiny stem segments while still attached to parent plant). **Distribution**: SA. (Fig. 218)

References: Britton & Rose (1963), Anderson (2001), Hunt *et al.* (2006).

The disproportionately large, white flowers (Fig. 219) compared to the narrow, terete stems are diagnostic for this taxon, as are the vegetative propagules that are formed by the upper pericarpel areoles at the time of fruit ripening (Fig. 220). This species has long been enigmatic in *Opuntia*, and molecular data have been used to suggest that it should be recognised as a separate genus (Griffith & Porter, 2009).

Opuntia salmiana is associated with the Gran Chaco region in South America, from Bolivia, Paraguay and Argentina (Jujuy and Salta, south to Catamarca and Santiago del Estero, and San Luis to Entre Rios) (Hunt, 2006).

This is an emerging invader, currently known from one locality only, north of Brits, in the North-West Province in South Africa (Fig. 221). It can form dense thickets and the small bristle-spiny cladodes can adhere to any animal brushing past, spreading the cactus vegetatively over considerable distances. Attempts should be made to eradicate this newcomer that has not yet been declared, nor proposed, for invader classification in South Africa.

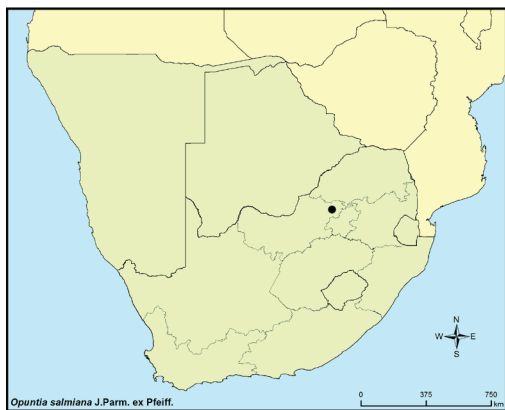


Fig. 218. Distribution map of *Opuntia salmiana* J.Parm. ex Pfeiff.



Fig. 219. Flowers of *Opuntia salmiana* J.Parm. ex Pfeiff.
(Picture by Helmut G. Zimmermann)



Fig. 220. Propagules developing from the top of the fruit in *Opuntia salmiana* J.Parm. ex Pfeiff. (Picture by Helmut G. Zimmermann)

Opuntia salmiana is a preferred host for the cactus moth, *Cactoblastis cactorum*. Feeding damage is conspicuous and is recognized by the white papery shells left behind after the larvae have eaten out the contents of the cladodes. Unfortunately this damage is not sufficient to prevent spread and densification. This species is attacked in its native distribution range by a unique cochineal insect (*Dactylopius salmianus*) that appears to be restricted to feeding on this species only, in some way supporting the uniqueness of this cactus and the proposal to regard it as a new genus.



Fig. 221. *Opuntia salmiana* J.Parm. ex Pfeiff. is an emerging invader.
(Picture by Helmuth G. Zimmermann)

11. *Opuntia spinulifera* Salm-Dyck

In: *Hortus Dyckensis ou Catalogue des Plantes*: 364 (1834).

=*Opuntia heliabravoana* Scheinvar

Common names: saucepan cactus (English); grootrondeblaarturksvy (Afrikaans).

Spiny shrub, much-branched, 1.7–2 × 3–6 m, not arborescent; cladodes flattened, orbicular, 20–40 cm in diameter, or up to 60 cm wide, mostly less than 2.5 cm thick, apex often truncate to emarginate, glaucous-green, glabrous; areoles sunken, dense (8–20 mm apart), sub-spirally arranged in 18–21 series. Spines 1–2(–6?), up to c. 2 cm long, thin, rigid, reflexed, whitish. **Flowers** from Nov. to Dec., yellow. **Fruits** widely barrel-shaped or globose, c. 3 cm in diameter, yellow. **Seeds** up to 90 per fruit, 2.5–3 mm in diameter. **Distribution:** SA. (Fig. 222)

References: Britton & Rose (1963), Obermeyer (1976), Henderson (2001), Scheinvar (2009).

This species is similar to *Opuntia robusta* in its wide cladodes (Fig. 223), though these are thinner in *O. spinulifera* and the areoles are much closer set, with more reflexed spines (usually absent in *O. robusta*). *O. robusta* furthermore has red fruits instead of yellow (Fig. 224). In the density of areoles this species resembles *O. leucotricha*, but has wider cladodes, and lacks the velvety stem epidermis, as well as the flexuose, filiform spines. The spines are thin, rigid, reflexed and whitish (Fig. 225) and the flowers are yellow (Fig. 226).

The classification of Britton & Rose (1963) is followed here in the application of this name. Hunt *et al.* (2006) consider *O. spinulifera* a name of uncertain status, as no type specimen is known (Britton & Rose, 1963). Because it was described from unsourced sterile material, and not known (presumably in the wild) by Britton & Rose, it is considered indeterminate (Hunt, 2006). Wild plants of what appears to be the same entity were described with the name *O. heliabravoana* Scheinvar, here treated as a synonym.

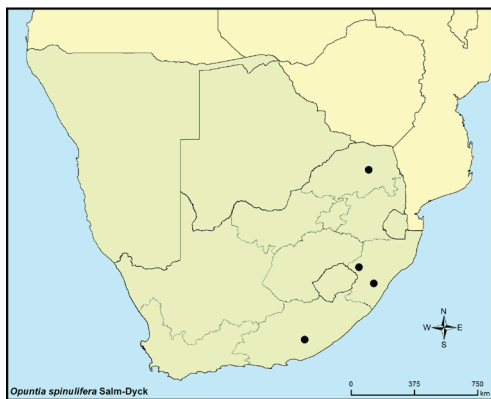


Fig. 222. Distribution map of *Opuntia spinulifera* Salm-Dyck.



Fig. 223. *Opuntia spinulifera* Salm-Dyck has wide cladodes.
(Picture by Pieter J.D. Winter)



Fig. 224. Fruits of *Opuntia spinulifera* Salm-Dyck. (Picture by Lesley Henderson)



Fig. 225. Reflexed spines of *Opuntia spinulifera* Salm-Dyck projecting from sunken areoles. (Picture by Pieter J.D. Winter)



Fig. 226. Flowers of *Opuntia spinulifera* Salm-Dyck. (Picture by Geoff R. Nichols)

The natural and perhaps partly naturalised range of *Opuntia spinulifera* is the Valley of Mexico (states of Hidalgo, Mexico, Puebla and Tlaxcala) (Scheinvar *et al.*, 2009, as *O. heliabravoana*).

The species is a declared weed, currently with the invasive status of potential transformer, since it invades savanna and grassland (Fig. 227). In South Africa it was previously well known from the Katrivier basin, and it has recently been recorded from the Bergville and Pietermaritzburg districts in Kwazulu-Natal, and as persisting individuals planted near Ga-Molepo, Limpopo.

It is not known if any of the introduced cactus-feeding insects feed on *Opuntia spinulifera*. The herbicides registered for other *Opuntia* invaders should be effective also on this species.



Fig. 227. *Opuntia spinulifera* Salm-Dyck invades grassland.
(Picture by Lesley Henderson)

12. *Opuntia stricta* (Haw.) Haw. var. *dillenii* (Ker Gawl.) L.D.Benson

In: *Cactus and Succulent Journal (US)* 41: 126 (1969).

=*Opuntia dillenii* (Ker Gawl.) Haw.

Spreading shrub, 0.5–1.3 (–2) m high, thicket-forming; cladodes broadly to narrowly obovate or oblong, 10–20 × 7.5–1.4 cm, blue-green, usually tuberculate (areoles prominent). Spines 4–7 (–11) on most areoles, not restricted to marginal areoles, stout, commonly curved, flattened, usually 1.5–4 cm long, yellow, often with brown bands. **Flowers** 5–6 × 5–6 cm, yellow. **Fruit** narrowly obovoid and stipitate, 4–6 × 2.5–3 cm, fleshy, red turning purple; pulp purple inside, sour. **Distribution:** B, N, S, SA. (Fig. 228).

References: Obermeyer (1976), Anderson (2001), Parfitt and Gibson (2003).

Opuntia stricta var. *dillenii* differs from var. *stricta* mainly by the number of spines per areole (4–7 and rarely up to 11) and their general dispersion among all areoles, whereas in var. *stricta* the few spines are more or less restricted to the cladode margin.

The variety occurs naturally from the Mexican east coast to the West Indies. Some authors, e.g. Telford (1984), claim that it occurs as far north as South Carolina in North America, while others consider it to be restricted to the Caribbean. It has been recorded in South Africa only from near Pietermaritzburg and the Nagle Dam (Kwazulu-Natal) (Obermeyer, 1976) (Fig. 229). It has become a serious invader in Ghana, Ethiopia and possibly Madagascar, as well as in Australia, where intermediates with var. *stricta* are reported (Telford, 1984). It is currently a declared invader by being listed as a synonym of *O. stricta*.

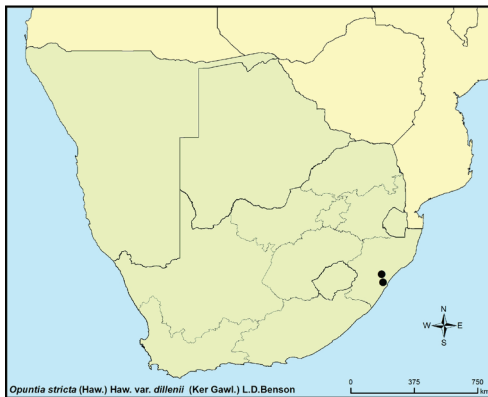


Fig. 228. Distribution map of *Opuntia stricta* (Haw.) Haw. var. *dillenii* (Ker Gawl.) L.D.Benson



Fig. 229. *Opuntia stricta* (Haw.) Haw. var. *dillenii* (Ker Gawl.) L.D.Benson.
(Picture by Helmuth G. Zimmermann)

13. *Opuntia stricta* (Haw.) Haw.

In: *Synopsis plantarum succulentarum*: 191 (1812) var. *stricta*.

Common names: Australian pest pear, sour prickly pear (English); suurturksvy (Afrikaans).

Spreading shrub, 0.5–1.3 (–2) m high, thicket-forming; cladodes broadly to narrowly obovate or oblong, 10–20 × 7.5–14 cm, blue-green, usually tuberculate (areoles prominent). Spines absent, or 1, then restricted to marginal areoles, usually stout, straight, flattened, 1.5–4 cm long, yellow. **Flowers** 5–6 × 5–6 cm, yellow. Pericarpel with 0–4(–8) areoles, smooth. **Fruit** narrowly obovoid and stipitate, 4–6 × 2.5–3 cm, fleshy, red turning purple; pulp purple inside, sour. **Distribution:** B, N, S, SA. (Fig. 230).

References: Britton & Rose (1963), Obermeyer (1976), Zimmerman (1983), Telford (1984), Parfitt & Gibson (2003), Anderson (2001), Henderson (2001), Hunt *et al.* (2006).

The relatively smooth pericarpel with 0–4(–8) areoles (Fig. 231) distinguishes this species from other naturalised species in South Africa. In addition, the yellow spines (unless absent) and obovate (more than 1.5 times longer than wide) cladodes (Fig. 232) characterise this species. The flowers are yellow (Fig. 233). In cases where cladodes are more orbicular, less tuberculate (evidenced by a smoother rim), fruits not narrowed toward the base, and glochidia conspicuous and longer than 4 mm, hybridization with *Opuntia engelmannii* (then known as *O. ×alta* Griffiths) can be suspected.

The natural range of *Opuntia stricta* var. *stricta* is considered (Howard & Touw, 1982; Anderson, 2001; Hunt, 2006) to be the southeastern USA (Florida, Mississippi, Alabama, southeast Virginia, Louisiana, Texas), eastern Mexico and Cuba in the West Indies.

It is naturalised in most provinces of South Africa, especially in the northeastern parts. *Opuntia stricta* var. *stricta* invades savanna (Fig. 234), as the seedlings seem to need the protection of shrubs or trees to establish (Mann, 1970). In southern Africa it has also been recorded as naturalised in Botswana, Namibia and Swaziland.

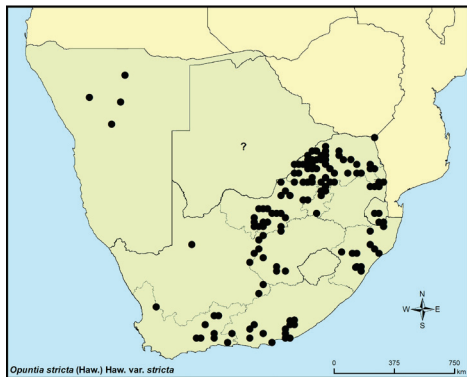


Fig. 230. Distribution map of *Opuntia stricta* (Haw.) Haw. var. *stricta*.

The species was severely invasive in Australia and was considered to be Australia's worst ever weed covering almost 24 million ha of Queensland and New South Wales under a mat that was up to 2 metres deep. *O. stricta* var. *stricta* has also become a serious invader in Angola, Madagascar, Ethiopia, Yemen and Saudi Arabia.

Except for its fruit, this invader is not utilised by stock or wild animals. Whereas numerous ungulates and elephants devour invasive (even spiny) *Opuntia ficus-indica* in the Addo Elephant National Park in South Africa, no feeding occurs on *O. stricta* var. *stricta* plants in the Kruger National Park (KNP) despite heavy feeding pressure during droughts. Baboons and elephants, however, eat the ripe fruit and contribute to the rapid spread and densification of this species in the KNP (Foxcroft & Rejmanek, 2007).

In South Africa *Opuntia stricta* var. *stricta* is a declared weed (category 1 invader) and has the status of a transformer (Henderson, 2001). A recommended herbicide for its chemical control is available in South Africa (Anonymous, 2004). It has been proposed to be classified as category 1b under NEMBA and CARA (Anonymous, 2009). An effective biological control programme using the cactus moth (*Cactoblastis cactorum*) and the host-specific biotype of the cochineal insect (*Dactylopius opuntiae*) has been responsible for its successful control in the KNP (Zimmerman *et al.*, 2009). Chemical control in the KNP is now limited to outlying isolated plants and small populations while the dense infestations are left or biological control (Foxcroft *et al.*, 2004).



Fig. 231. Stipitate fruits of *Opuntia stricta* (Haw.) Haw. var. *stricta*.
(Picture by Pieter J.D. Winter)



Fig. 232. Cladodes of *Opuntia stricta* (Haw.) Haw. var. *stricta* showing prominent tubercles. (Picture by Pieter J.D. Winter)



Fig. 233. Flower of *Opuntia stricta* (Haw.) Haw. var. *stricta*. (Picture by Pieter J.D. Winter)



Fig. 234. *Opuntia stricta* (Haw.) Haw. var. *stricta*. invades savanna.
(Picture by Pieter J.D. Winter)

***Peniocereus* (A.Berger) Britton & Rose**

Erect, prostrate or scandent shrubs; root thickened, tuberous, or turnip-shaped; branches with few articulations, slender, \pm cylindric, epidermis hairless or papillose-downy, often tinged purple or with white spots; ribs 9–15(–17). Spines conspicuous, white to brown. **Flowers** nocturnal; pericarpel areoles with bristles or spines; hypanthium long and slender, with soft spines. **Perianth** funnellform. **Fruit** narrowly ovoid to subglobose, tapered at apex, fleshy, red. **Fruit** bristles/spines more or less caducous. **Seed** broadly ovoid, 1.4–4.6 \times 1.2–3.3 mm, shiny or matt black-brown (virtually black), sides flat to low-conical, periphery undifferentiated or crested with larger cells, surface smooth.

References: Telford (1984), Anderson (2001), Hunt *et al.* (2006).

The genus comprises 20 species from USA (southern Arizona) extending southwards through Central America as far as Costa Rica (Hunt, 2006).

Some species in this genus appear similar to some species of *Echinopsis* or *Cleistocactus* in their columnar or arching stems that are only rarely branched above 0.5 m from base, in their usually 9–15 ribs with troughs between ridges obscured by radial spines extending over them and interlacing, and in the pericarpel with many bristles or hairs. It differs from *Echinopsis* by having thinner stems (less than 6 cm in diameter) that can grow taller, and by flowers appearing

over a considerable length of the stem, not only the top 10 cm. Both *Echinopsis schickendantzii* and *Cleistocactus samaipatanus* have a soft, dark, hair covering of the pericarpel and hypanthium, while *Peniocereus* has stiffer, white bristles on those parts. *Cleistocactus* has much smaller, red flowers, and stems no taller than 1.5 m.

***Peniocereus serpentinus* (Lag. & Rodr.) N.P.Taylor**

In: Hunt & Taylor in *Bradleya* 5: 93 (1987).

=*Nyctocereus serpentinus* (Lag. & Rodr.) Britton & Rose

Common names: Mexican night-blooming cereus, serpent cactus, snake cactus (English); slangkaktus (Afrikaans).

Shrub, stems erect or arching, up to 2(–3) m tall, branching from base; root more or less tuberous; branches (2.5–)3–5 cm in diameter, green; ribs 10–12(–17), slightly rounded, tubercles absent to ± prominent; areoles c. 1 cm apart. Spines soft, 10–14, unequal, white to brown, often tinged red or purplish when young; radial spines 10–13, needle- or bristle-like, (4–)10–15 mm long; central spine absent or single, stouter, up to 3 cm long. **Flowers** nocturnal, (12–)15–20(–25) × 8–10 (–15) cm, white, tinged red outside; tepals narrow, acute; outer tepals reflexed; pericarpel and hypanthium with white bristles. **Stamens** exserted; anthers yellow. **Style** exserted. **Fruit** ovoid to globose, up to 4 cm long, red; scales acute; areoles many, with whitish hairs. **Distribution:** SA. (Fig. 235).

References: Telford (1984), Anderson (2001), Hunt *et al.* (2006).

This species, with stems of similar diameter and rib and spine density (Fig. 236) to that of *Cleistocactus samaipatanus* in the tribe Trichocereae, has been recorded in South Africa in the Limpopo Province (in the Lekgalameetse Nature Reserve and near Rust de Winter), and in KwaZulu-Natal (Pietermaritzburg, Tugela valley and near Greytown).

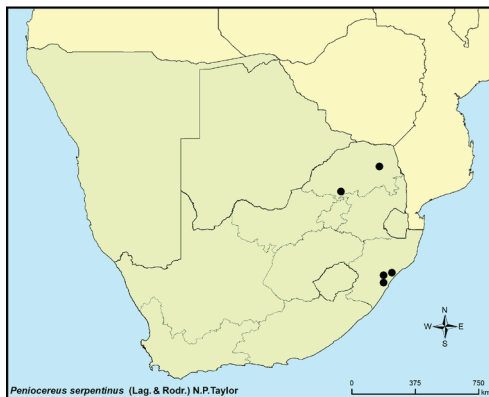


Fig. 235. Distribution map of *Peniocereus serpentinus* (Lag. & Rodr.) N.P.Taylor.

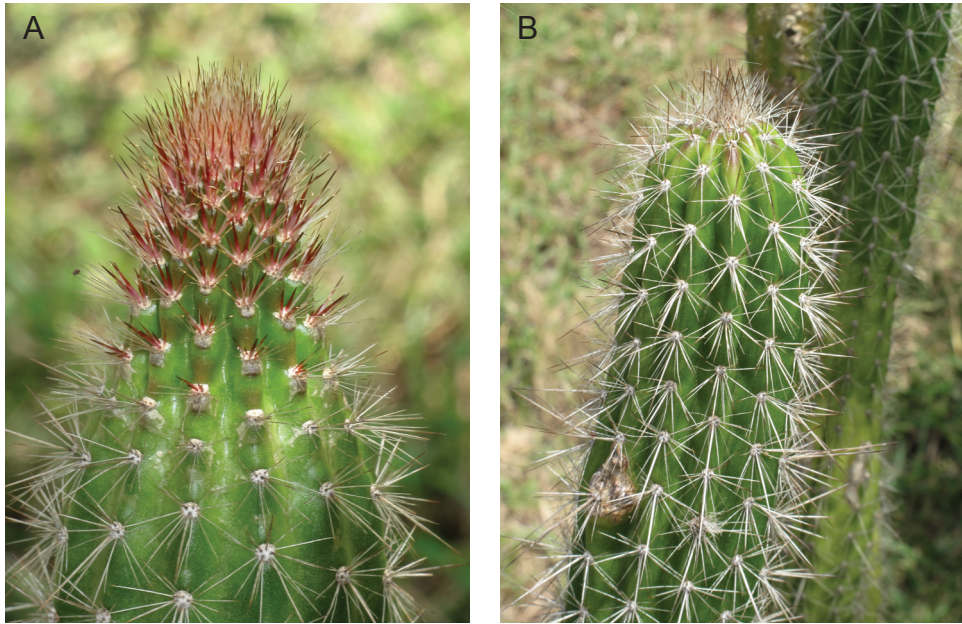


Fig. 236. *Peniocereus serpentinus* (Lag. & Rodr.) N.P.Taylor – A. Young stem; B. Older stem. (Pictures by Neil R. Crouch)

In the only plant seen dug up, the root does not appear to be tuberous. The columnar, erect stems (Fig. 237) are taller (2–3 m), than those of *Cleistocactus* (0.5–1.5 m). Spines on new growth of *C. samaipatanus* are pale yellow, not white or tinged purplish. Fruit is more than 1 cm in diameter, with pale bristles, compared to the smaller fruit with soft, dark hairs in *C. samaipatanus*. Tuberous roots, or specimens with mature fruit, are required to confirm the identification. A range of plants should be dug out to assess whether plants recruited from seed have a more tuberous root than those established through formation of adventitious roots from stem sections in contact with the soil. *Cleistocactus* species are commonly cultivated for their attractive, bright red, zygomorphic flowers, and may still emerge as naturalised populations in future.

Peniocereus serpentinus is a widely cultivated Mexican (Sinaloa to Querétaro, also Oaxaca) cactus of the tribe Echinocereae, popular due to its relatively large, white, nocturnal flowers. It has been recorded as naturalised in Australia (Telford, 1984).



Fig. 237. *Peniocereus serpentinus* (Lag. & Rodr.) N.P.Taylor has erect columnar stems.
(Picture by Neil R. Crouch)

***Pereskia* Mill.**

Shrubs or woody climbers; roots sometimes tuberous; branches not conspicuously succulent, cylindric, unsegmented, not ribbed or tubercled; glochidia absent. **Leaves** present, broad, flat, thin, not or only slightly succulent, deciduous or sub-persistent. Spines usually numerous. **Flowers** in paniculate inflorescences, or clustered, or solitary, pedicellate or sessile, diurnal. Pericarpel receptacle with few to many scales; areoles with wool, often hairs, and rarely spines; hypanthium absent. **Perianth** rotate, spreading or rarely erect, white. **Ovary** semi-inferior or inferior. **Fruit** baccate, sometimes with persistent scales; pericarpel juicy or tough, indehiscent, fruit pulp present or absent. **Seed** more or less circular or obovate to reniform; 1.7–7.5 mm long, black-brown (virtually black), shiny, relief flat.

References: Obermeyer (1976), Anderson (2001), Taylor & Zappi (2004), Hunt *et al.* (2006).

These plants are very unlike most other cacti in having more conventional, true leaves (Fig. 238), and an inflorescence that is not as congested and reduced (Fig. 239, 240).

There are 17 species in this genus, native to Central and South America. *Pereskia* is currently considered to be a paraphyletic group, with the Andean (including the widespread *P. aculeata* Mill.) and southern South American *Pereskia* clades more closely related to the core cacti than they are to the northern group of mainly Caribbean species (Edwards *et al.*, 2005).



Fig. 238. Leaves and spines of *Pereskia aculeata* Mill. (Picture by Gideon F. Smith)



Fig. 239. Young inflorescence of *Pereskia aculeata* Mill. (Picture by Neil R. Crouch)



Fig. 240. Inflorescence of *Pereskia aculeata* Mill. (Picture by Geoff R. Nichols)