

A NEW SPECIES OF *SELENICEREUS* (CACTACEAE) FROM COSTA RICA

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ABSTRACT

Selenicereus haberi sp. nov. (Cactaceae) from Costa Rican is described and illustrated based on morphological data. The new species is compared to and distinguished from the similar *S. inermis* (Otto) Britton & Rose and *S. wercklei* (F.A.C. Weber) Britton & Rose (the latter closely sympatric with the new sp.), as well as to the quite different but also closely sympatric *S. costaricensis* (F.A.C. Weber) S. Arias & N. Korotkova ex Hammel.

RESUMEN

Selenicereus haberi sp. nov. (Cactaceae) de Costa Rica, se describe con base en datos morfológicos. La especie nueva se compara y se distingue de las similares *S. inermis* y *S. wercklei* (esta última cercanamente simpátrica con la sp. nueva), además se compara con la bastante diferente pero también cercanamente simpátrica *S. costaricensis*.

A cutting from a wild plant resembling *Selenicereus wercklei* found near Monteverde, provided some 20 years ago by Dr. William Haber, has prospered and finally flowered at the house of Hammel in Santo Domingo de Heredia. Although Haber has recently been unable to relocate the parent plant, in 2022 co-author Albertazzi discovered an additional locality for the new species, in Guanacaste just north of Liberia, along the road past Quebrada Grande, where we both visited in May of 2025. Based on all available material we here describe a new species of *Selenicereus*.

The genus comprises species that are usually hemiepiphytic climbers with stems more or less cylindrical and 3–12 angled or ribbed to 3–6-alate or (more often) 3(4)-angled or tricostate to 3(4)-alate, rarely the stems flattened (phyllodes). The stem areoles have 1–7 sort spines or (less often) are spineless, and the flowers are often relatively large (including the largest in the family) and are usually trumpet-shaped with white inner tepals. The pericarp and fruit of the former *Hylocereus* species are more or less covered with large bracteoles and lack spines, while in the rest of the species the bracteoles are vanishingly small, and the fruits are usually notoriously spiny.

Ongoing phylogenetic studies of the relationships among genera in the epiphytic and climbing Cactaceae tribe Hylocereeae (e.g., Korotkova et al. 2017; Plume et al. 2013) have shown *Selenicereus* paraphyletic with respect to an embedded *Hylocereus*, and gave rise to species of the latter being subsumed within *Selenicereus* (Hunt 2017). With that, the inclusion of a few species from several other genera, and including the new species described here, *Selenicereus* is presently considered to comprise 32 species distributed from the southeastern USA through Mexico and Central America to Bolivia, Venezuela, Trinidad and Tobago to N Argentina, and the Antilles and Bahamas. Eight species now known from Costa Rica (Hammel 2020).

Herbarium collections were prepared, deposited at CR, and measured. Photos of live plants were also taken and studied. Observations and measurements of vegetative and available reproductive structures were made to characterize the species and compare it with others. Except when otherwise indicated, all photos are by B. Hammel. In addition to those of the new species, all other specimens cited are deposited at CR.

SELENICEREUS HABERI Hammel, **sp. nov.** **TYPE: COSTA RICA.** **Heredia.** Cantón de Santo Domingo, Distr. Tures, ca. 700 m al sur de San Francisco de San Isidro, costado sur (del parqueo sur) de la escuela Golden Valley, casa de Hammel por el Río Tures (cult.), 20 Apr 2024 (fl), *B. Hammel & O. Hyams 28052* (holotype: CR; isotypes: 4, to be distributed). Figures 1, 2.

For its multi-ribbed and spineless stems *Selenicereus haberi* is similar to *S. inermis* and the closely sympatric *S. wercklei*, but differs from both by its larger flowers with the pericarpel bearing relatively conspicuous podaria and bracteoles, but the areoles with fewer and relatively inconspicuous spines, the fruiting areoles bearing bracteoles but lacking spines or bearing up to ca. 4 inconspicuous spines to ca. 2.5 mm. The fruit of the new species is rose red externally with slightly darker red pulp, vs. yellowish green externally with white, translucent pulp in both *S. inermis* and *S. wercklei*.

Root-climbing epiphytes; stems monomorphic, lacking spines, $\pm$ straight, sometimes pendulous, irregularly branched, the internodes from ca. 0.4 up to ca. 3 m long, 1–3 (in fresh material up to ca. 4.5) cm in diameter, $\pm$ cylindrical with ca. 5(–7) rounded ribs, the ribs subentire (in life often shallowly to notoriously crenate with a lobe near each areole); areoles 2.5–5.5 cm apart, spines lacking. **Leaves** scalelike, to ca. 0.1 cm, deltoid, acute, often hardened and persistent. **Flowers** born along branches, often near the base of a node, but also found distally, nocturnal, 25–30 cm, sub-actinomorphic (slightly bilaterally symmetrical with more stamens as well as the style and stigma held along the lower side of the mouth), funnel to almost trumpet-shaped, the pericarpel gray green with a reddish tinge, 2–3 cm, with ca. 5 or 6 series of low tubercles (podaria) bearing the areoles, the bracteoles green with a red margin, 2.5–4 $\times$ 2.5–3.5 mm, deltoid, succulent to coriaceous, mostly covering the dense felt and (in the distal areoles) with up to ca. 4, reddish brown spines 0.1–3 mm and no trichome-spines (hairs); receptacular tube gray green with a reddish tinge, 11–17 cm, funnel-shaped (the narrow portion of the tube up to ca. 10 $\times$ 1 cm, the wider portion up to ca. 6 $\times$ 6 cm), with numerous scattered bracteoles, 5–10 mm, the basal areoles (in the proximal 1/3 to 1/2 of the tube) with 1–8 reddish brown spines 2–8 mm, lacking trichome-spines; perianth with numerous, clearly differentiated tepals, up to 10–13 cm, the outer tepals greenish yellow, usually tinged pink basally and the very tip often marginally reddish, patent to slightly reflexed at full anthesis, ligulate, acute to acuminate, the inner tepals yellowish white to white, bright pink basally, ascending, oblanceolate, acute to acuminate; stamens numerous, 3–12 cm, attached in a single band from ca. 4 cm above the base of the tube to its mouth (the widest part), the filaments white, included (within the cup of the limb), the anthers 3–6 $\times$ ca. 1 mm; style pale yellow at base and towards apex, pale pink medially, 18.5–20 cm; stigma yellowish green, with ca. 18 simple lobes. **Mature fruit** rose red, ca. 8.75 $\times$ 6 cm, ovoid, smooth, each areole bearing a deltoid, succulent to coriaceous bracteole to 4 $\times$ 4 mm, lacking spines or with up to ca. 4 spines, to ca. 2.5 mm (mostly hidden by the bracteole); pulp dark rose red; seeds lustrous black, ca. 3 $\times$ 1.8 mm, curved-pyriform, slightly compressed laterally, shallowly pitted.

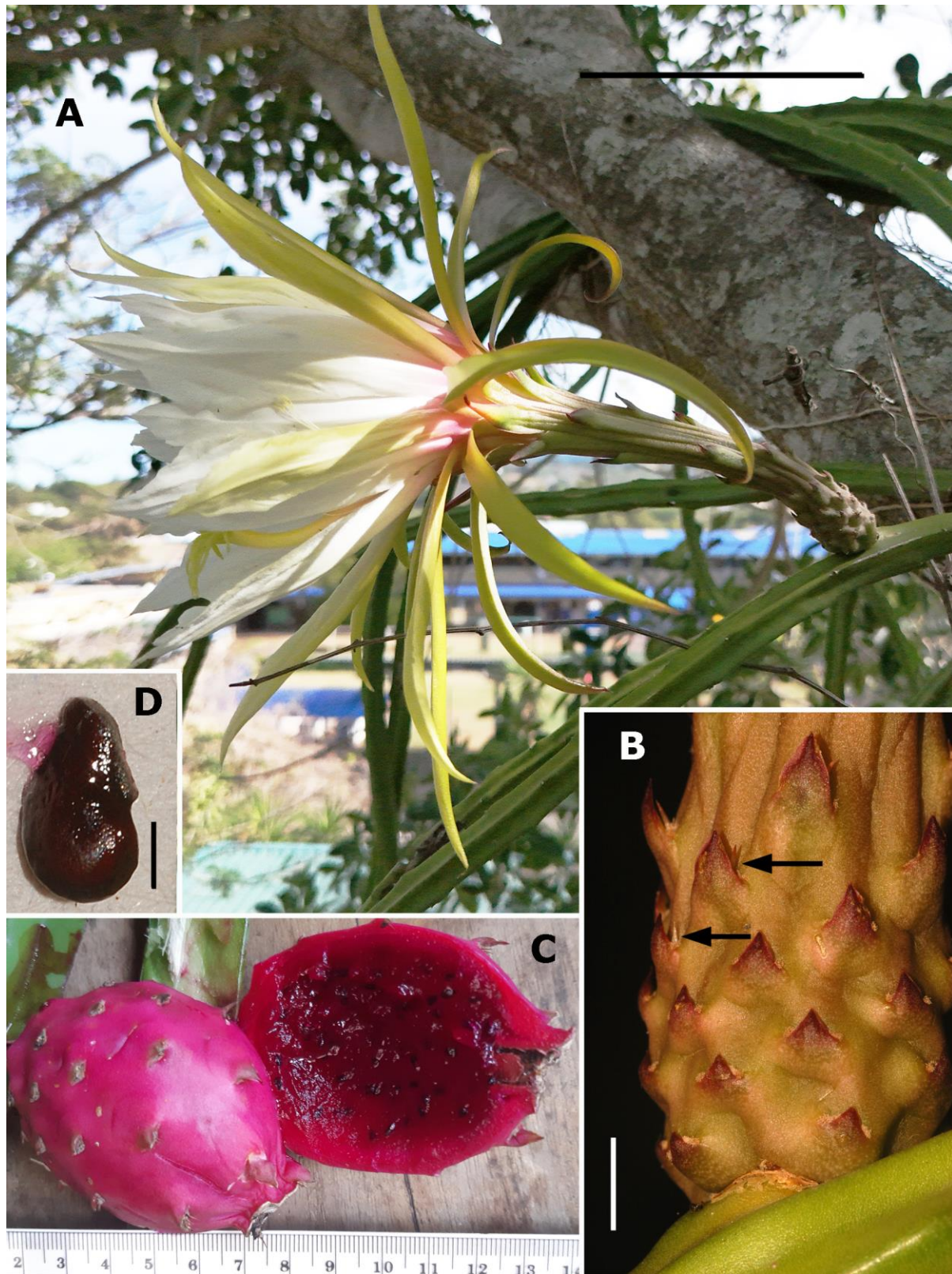


Figure 1. *Selenicereus haberi*. A. Habit with open flower, bar 10 cm. B. Flowering pericarpel (arrows indicate spines), bar 1 cm. C. Mature fruit cut longitudinally, bar in cm. D. Seed, bar 1 mm. Photos: A by A. Pérez; A and B from Hammel & Hyams 28052; B and C from Hammel 28065.



Figure 2. *Selenicereus haberi*. Artistic rendering by A. Ramírez of much enlarged photo by A. Pérez; from Hammel & Hyams 28052.

Additional specimens examined. **COSTA RICA.** **Heredia.** Cantón de Santo Domingo, Distr. Tures, ca. 700 m al sur de San Francisco de San Isidro, costado sur (del parqueo sur) de la escuela Golden Valley, casa de Hammel por el Río Tures (cult.), 4 Aug 2018 (old fl, fr), *Hammel* 27534 (CR), 28 Aug 2024 (fr) *Hammel* 28065 (CR), 29 Apr 2025 (fl), *Hammel* 28134 (CR). **Guanacaste.** Cantón de Liberia, Distr. Moraga, ca. 5.7 km este de Quebrada Grande, 22 Jun 2025 (st), *Hammel et al.* 28107 (CR); ca. 4.2 km este de Quebrada Grande, 22 Jun 2025 (st) *Hammel et al.* 28111 (CR).

Phenology, distribution and habitat. The species is known so far to have flowered in April and July, climbing in trees at 500–1200 m elevation. It is known to occur in the wild in Costa Rica in wet, montane forest on the Pacific slopes of the Guanacaste and Tilarán mountain ranges, near Quebrada Grande and in the Monteverde area. The fertile material on which this description is based is from a cultivated plant growing in the Santo Domingo area in wet forest of the upper Pacific slopes of the Central Valley, along the Cordillera Central.

Etymology. The epithet honors Dr. William (Bill) A. Haber of Monteverde, ecologist and entomologist, who for many years worked towards a botanical inventory of the Monteverde cloud forest with the Missouri Botanical Garden. Bill delivered a cutting of this species to Hammel some 20 years ago, insisting — although he had not seen it fertile — that it was something rare and “different” from *Selenicereus wercklei*, a species common in certain parts of the Monteverde area. Hammel has watched that cutting grow into the canopy of a fig tree in his yard (where it flowered unobtrusively in 2018 and then profusely in 2024 and 2025) and is glad to dedicate the species to his friend and colleague, Monteverde’s resident entomologist of the botanical persuasion.



Selenicereus haberi. Base of flower.
Photo by F. Albertazzi, later vouchered
with Hammel et al. 28107.

Discussion. Fertile material of *Selenicereus haberi* was first collected in 2018, when Hammel’s neighbors pointed out the bright red fruit clearly visible from their property. Hammel had not only missed seeing the flower but most likely wouldn’t have known about the fruit, but for his neighbors. This was approximately 18 years after Bill Haber had provided the cutting. The one fruit produced still had the dry remains of the flower attached, and the collection (Hammel 27534) was mentioned in notes under *Selenicereus* in Hammel’s treatment of the Cactaceae of Costa Rica (2020). Hammel has had similar experience with other species of *Selenicereus* not flowering until after many years “in captivity,” e.g., *S. calcaratus* (F.A.C. Weber) D.R. Hunt (as per herbarium label of Hammel 25012). The same plant flowered profusely in April of 2024 (producing only one fruit) and 2025 (with no fruit production seen). Seeds from the 2024 fruit were germinated and plants from those are growing vigorously. The plant discovered by Albertazzi in July of 2022 was on a fallen tree and bore only one rather mangled flower but sufficient to confirm its identity (Figure 3). No herbarium specimen was then made,

and the plant (now nearly lost, the fallen tree having mostly disintegrated) has not been found fertile since, but is vouchered by Hammel et al. 28107.

As summarized in the diagnosis, *Selenicereus haberi* is outwardly most similar to *S. inermis* and the Costa Rican endemic *S. wercklei* (sometimes treated as a synonym of the former, e.g., Bauer 2003). Other than for its larger flowers 25–30 cm (vs. 15–25 cm in *S. inermis* and *S. wercklei*) the new species differs markedly by its pericarpel with the areoles on notorious podaria (tubercles), vs. the pericarpel lacking tubercles, and for the pericarpel areoles bearing relatively conspicuous bracteoles (coriaceous, 2.5–4 × 2.5–3.5 mm, deltoid, vs. lacking or chartaceous, 1–2.5 × 0.5–1 mm, and lanceolate in *S. inermis* and *S. wercklei*), having only ca. 4 spines 0.1–3 mm, mostly hidden beneath the broad bracteoles (vs. up to ca. 8 spines 1–8 mm, fully exposed beyond the inconspicuous bracteoles), and for its red fruits with spineless areoles or the areoles with up to 4 spines, mostly hidden by the bracteoles (vs. yellowish green to yellow fruits, with up to 30 or more conspicuous spines/per areole, and the bracteoles lacking or very inconspicuous (Figure 4). It differs vegetatively by its stems of somewhat larger diameter (up to 3 cm, vs. 2 and 1–1.4 cm in *S. inermis* and *S. wercklei*, respectively. See also Table 1.

Certain features of the new species suggest that it could be of hybrid origin, with *Selenicereus costaricensis* and *S. wercklei* as the parent species. While the spineless, multiribbed stems of *S. haberi* (vs. [1–]3–7 spines per areole and triolate stems of *S. costaricensis*) are more like those of *S. wercklei*, its large flowers (25–30 cm) are more in the size range of those of *S. costaricensis* (26–30+ cm), its stem diameter and crenation of the ribs somewhat resemble those of *S. costaricensis*, the relatively more conspicuous (than those of *S. wercklei*) pericarpel bracteoles and likewise the red color of the fruits are remindful of the very conspicuous bracteoles (which completely cover the flowering pericarpel) and red fruits of *S. costaricensis* (see Figure 5 and Table 1). The two suspected parent species are both common in the areas where *S. haberi* has been found wild. In fact, at the site near Quebrada Grande, a suspected plant of *S. haberi* was found on a tree where *S. costaricensis* and *S. wercklei* were also present (Figure 6). As mentioned above, seeds of *S. haberi* are viable.

Character	<i>S. costaricensis</i>	<i>S. haberi</i>	<i>S. inermis</i>	<i>S. wercklei</i>
Stem diam. (cm)	3–7.5	1–3	ca. 2	1–1.4
No. of stem ribs or wings	3	5(–7)	3–6	6–12
Flower length (cm)	26–30+	25–30	15–25	15–20(–25)
Tepal color; outer	green to yellow	greenish yellow with pink at base	red to reddish	green to yellowish green and/or reddish green to pink
Tepal color, inner	cream colored to white	yellowish white to white with the base bright pink	white with the base pink to fuchsia	yellowish to white with the base pink to fuchsia
Pericarpel surface	markedly tuberculate (if visible) but mostly hidden by bracteoles	tuberculate, the surface not hidden by bracteoles nor spines	not tuberculate, but the surface mostly hidden by spiny areoles	not tuberculate, but the surface mostly hidden by spiny areoles
Pericarpel bracteoles (mm)	5–30 × 5–10	2.5–4 × 2.5–3.5	lacking or 1–2.5 × 0.5–1 mm	lacking or 1–2.5 × 0.5–1 mm
Pericarpel bracteoles, shape and texture	ovate-deltoid to lanceolate, coriaceous	deltoid, coriaceous	lanceolate, chartaceous	lanceolate, chartaceous
Pericarpel spines no., length (mm)	lacking	ca. 4, 0.1–3	to 8, 1.5–6	to 8, 1.5–8
Style color	pale yellow	pale yellow at base and towards apex, pale pink medially	red or fuchsia at base, distally pale yellow to white	fuchsia at base, distally white
Style length (cm)	to ca. 24	18.5–20	16–18	14–16
Stigma lobes	21–30	ca. 18	ca. 20	ca. 20
Fruit pulp, color	red to fuchsia, magenta to reddish magenta	rose red, dark rose red	yellow-green to yellow, white (translucid)	yellow-green to yellow, white (translucid)
Fruit surface	tuberculate, bracteoles conspicuous	nearly smooth, bracteoles visible	smooth, bracteoles lacking or inconspicuous	smooth, bracteoles lacking or inconspicuous
Fruit spines	spineless	spineless or with up to 4	15–25(–30+)	15–25(–30)

Table 1. Comparison of *Selenicereus haberi* to similar species and to the closely sympatric *S. costaricensis*.

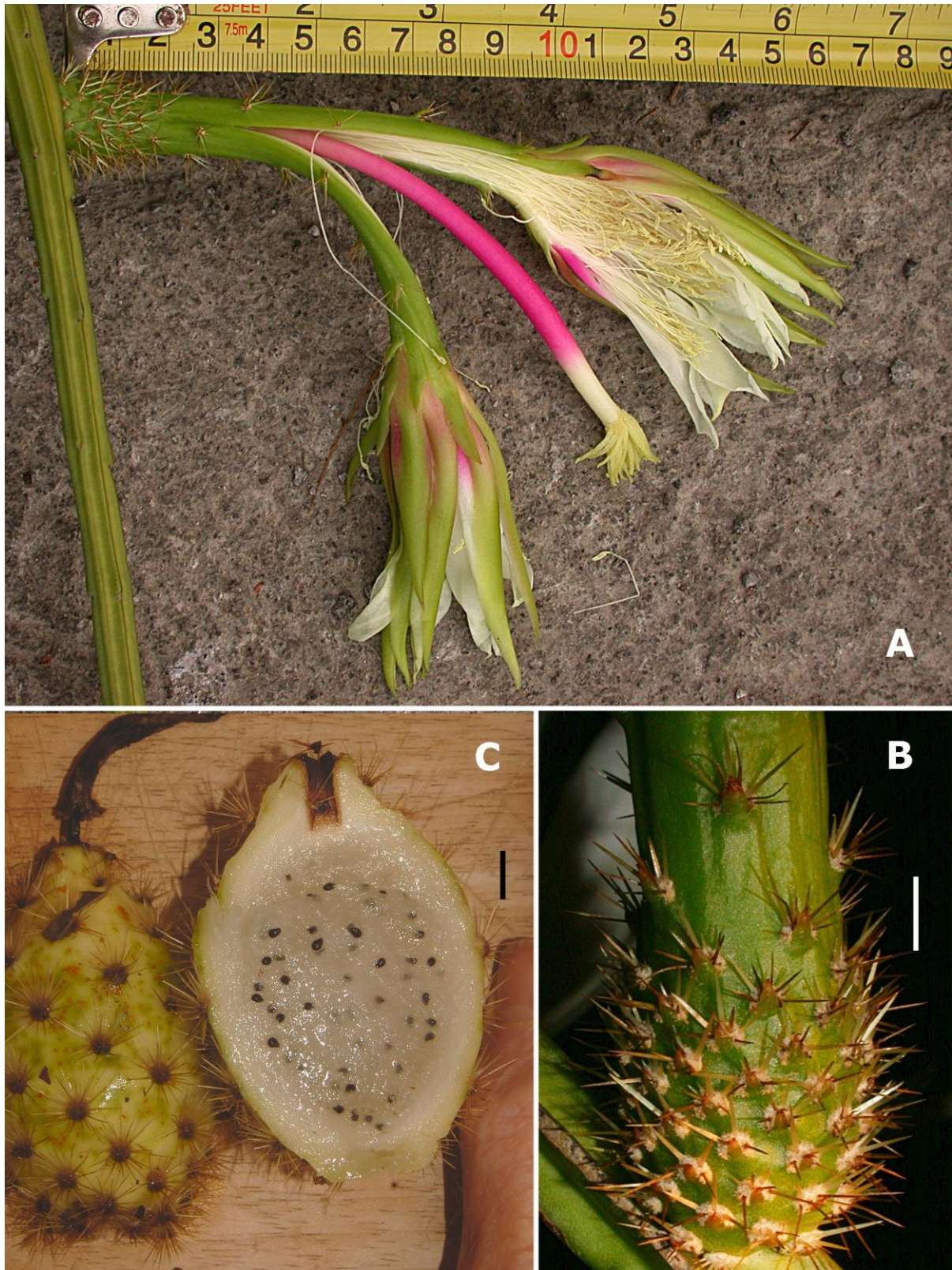


Figure 4. Similar species. A. *Selenicereus wercklei* flower. B. *S. inermis* flowering pericarpel. C. *S. wercklei* fruit. Photos: A from Hammel 24275; B from Hammel 24274; C from Hammel 25999. Bars 1 cm.

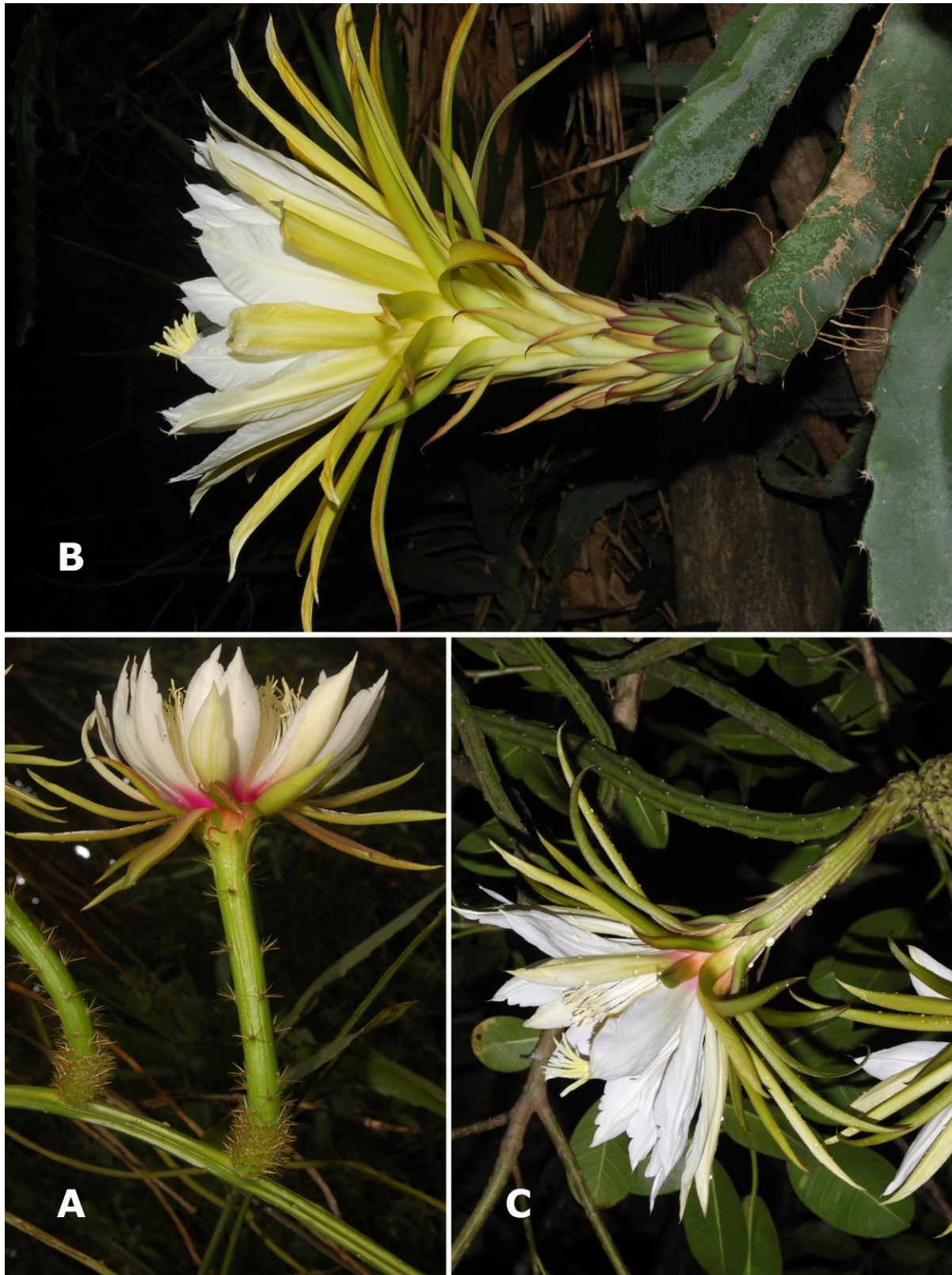


Figure 5. Parents and child of hybrid origin? A. *Selenicereus wercklei*. B. *S. costaricensis*. C. *S. haberi*. Photos: A from Hammel 28054; B from Hammel 22760; C. from Hammel & Hyams 28052.



Figure 6. In situ, in the wild, all on the same tree. Lower arrow, *Selenicereus costaricensis*. Upper arrow, *S. wercklei*. Inset, *S. haberi*.

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