

The genus *Hesperaloe* (*Agavaceae*)

Fritz Hochstätter

An introduction to *Hesperaloe*, a small group of stemless plants found in the arid regions of Mexico and USA, comprising five species and two subspecies, one of which, *Hesperaloe parviflora* ssp. *bechtoldii*, is newly described.

The hesperaloes are relatives of *Agave* and *Yucca*, but with a diversity of floral syndromes. The name *Hesperaloe* comes from its superficial resemblance to an aloe, while the first part indicates its western occurrence in North America, from the Greek name *Hesperos* for the Evening Star.

They are little known to collectors, but their cold-hardiness makes them very suitable subjects for the cold greenhouse, and, with suitable protection from excessive rain, outdoors in most parts of Britain and Europe.

Hesperaloe Engelm. in S Watson, *Report of the geological exploration of the Fortieth Parallel* 5 Botany. Appendix. *Synopses of genera*: 497. 1871.



Fig. 1 *Hesperaloe campanulata* cultivated at the Boyce Thompson Museum, Arizona (Photo: Peter Breslin)

Etymology: From the Greek adjective, *hesperios*, western, and the substantive *aloe*. Western aloe.

Type species: *Aloe yuccifolia* A.Gray *nom. illeg.* (Art. 52.1) = *Hesperaloe parviflora* (Torrey) J.M.Coulter.

Stem acaulescent, with rosulate leaves and a short to long rhizomatous root system. **Leaf** variable, thin to thick, narrow to broad, curved to straight, erect, grouped closely together or spreading, with white, grey or brown fibres, canaliculate, forming short to wide, grass-like clumps. **Inflorescence** paniculate or racemose, 4–5m long, with flexible, variable branches from the uppermost half, flowering from the main stalk or its side branches. **Flower** green, white, purplish-

brown to red, pink, salmon-coloured, rarely yellow, tubular to campanulate, with stamens shorter or longer than the petals. **Fruit** a woody capsule, ovoid, 2–4cm long and wide. **Seed** black, flattened, thin, 5–12mm long and wide, resembling those of *Agave*.

Flowering period: March to October. *H. tenuifolia* and *nocturna* are night-flowering.

The following eight taxa are recognised here: *Hesperaloe campanulata*, *Hesperaloe chiangii*, *Hesperaloe engelmannii*, *Hesperaloe funifera*, *Hesperaloe nocturna*, *Hesperaloe parviflora* ssp. *parviflora*, *Hesperaloe parviflora* ssp. *bechtoldii*, and *Hesperaloe tenuifolia*.

Key to the recognised taxa

- A** Style exerted*H. parviflora* ssp. *bechtoldii*
- AA** Style exerted**B**
- B** Tepals white with greenish-purple midstripe, reflexed at anthesis.....**C**
- C** Leaves spreading to arching, 1–1.5m long, maximum width 1–2cm, marginal fibres fine.....*H. nocturna*
- CC** Leaves stiff and erect, 1–2m long, maximum width 2–6cm, marginal fibres coarse**D**
- D** Rhizomes short <30cm, leaves >1.5cm thick at base, marginal fibres 2–3mm diam. From Coahuila and Nuevo León*H. funifera*
- DD** Rhizomes long >30cm, leaves >1.5cm thick at base, marginal fibres 2–3mm diam. From San Luis Potosí...*H. chiangii*
- BB** Tepals pink, red or coral, reflexed or straight, forming a tube**E**
- E** Leaves thin and flexible, spreading, 0.5–1.0m long, maximum width 5–8mm wide, flowers rotate, tepals pinkish-red, reflexed to 13mm long, fruits globose, beakless or with beak <1mm long.....*H. tenuifolia*
- EE** Leaves stiff, upright to spreading, >8mm wide, flowers tubular to campanulate, tepals >15mm long, fruits with >4mm long beak**F**
- F** Leaves medium green, erect to spreading, not deeply canaliculate, 60–105cm long, 15–26mm wide, flowers tubular-campanulate to campanulate, seeds 6–9mm long, 5mm wide.....*H. campanulata*
- FF** Leaves dark green, recurved and twisting, deeply canaliculate, 30–60(–120)cm long, <15mm broad, flowers tubular, seeds 9–10mm long, 6–7mm wide.....**G**
- G** Leaves 30–60(–120)cm long, style 3–5 times longer than the ovary proper*H. parviflora* ssp. *parviflora*
- GG** Leaves 100–150cm long, style 1–2(–3) times as long as the ovary proper*H. engelmannii*

Hesperaloe campanulata G.D.Starr, Madroño **44**(3): 285–286. 1997. (Figs. 1–2)

Common name: Bell Flower Hesperaloe.

Type: Mexico, Nuevo León, Sabinas Hidalgo, 26°13'N, 100°7'30"W, 550m; 11 Nov 1989, *G D STARR 93-001*; ARIZ (holo), isotypes: MEXU, MO, TEX.

Distribution: in Mexico, Nuevo León region, Chihuahuan Desert, at 100–600m altitude, associated with *Yucca rostrata* and others.

Stem acaulescent, forming clumps to 60–120cm diameter. **Leaves** erect, stiff, slightly spreading, green, canaliculate, linear, 60–110cm long, with finely filiferous margins. **Inflorescence** to 3m long, usually



Fig. 2 *Hesperaloe campanulata* fh0642 inflorescence (Photo: Fritz Hochstätter)

branched in the upper half, paniculate. **Flowers** tubular-campanulate, 20–25mm long, inside white, exterior pink with white margins. **Capsules** woody when ripe, spherical to oblong, 20–30mm long and wide. **Seeds** black, 6–8mm long, 5–6mm wide.

Hesperaloe campanulata, with its bell-shaped flowers, occurs only in a small area in central Nuevo León. It is similar to *Hesperaloe funifera*, although it has pink flowers in contrast to the greenish-white flowers of *Hesperaloe funifera*. *H. campanulata* is differentiated from *H. parviflora* through the form of the flowers and leaves.

Hesperaloe chiangii (G.D.Starr) B.L.Turner, *Lundellia* **5**: 39. 2002. (Fig. 3)

Syn: *Hesperaloe funifera* ssp. *chiangii* G.D.Starr, Madroño **44**(3): 289–291. 1997.

Common name: Narrow Leaf Hesperaloe. San Luis Potosí Hesperaloe.

Type: Mexico, San Luis Potosí, between Matehuala and San Luis Potosí; *E. GARCIA MOYA* s.n. (DES).

Distribution: Mexico, San Luis Potosí region, in grassland, on flat plateaux or hills, at 1500m altitude. Associated with *Yucca carnerosana*, *Yucca filifera*, *Agave scabra* and others.

Stem acaulescent, rhizomatous, forming wide clumps to more than 2m diameter. **Leaves** erect, stiff, dark green, deeply canaliculate, lanceolate, 100–150cm long, 5–6cm wide from the base to the middle,

margins white to grey, coarse, with flexible fibres 2–3mm long. **Inflorescence** 2–4m long, with long branches in the upper half, paniculate. **Flowers** tubular, 30mm long, 25mm wide, inside white, exterior pinkish-red, opening nocturnally. **Capsules** woody when ripe, ovoid to rounded, 25–30mm long and 25mm wide.

Subspecies *chiangii* occurs as a few populations restricted to a limited area. It is geographically separated from ssp. *funifera*. When in bloom, it has a very short, open flower that cannot be confused with any other *Hesperaloe*. The very long, thin leaves have finely textured, very curly marginal fibers that make it resemble a yucca and are characteristic of this taxon.

Hesperaloe engelmannii Krauskopf, *Notice to botanists*. [unpaged]. 1878. (Figs. 4–5)

Synonym: *Hesperaloe parviflora* var. *engelmannii* (Krauskopf) Trel., *Ann. Missouri Bot. Gard.* **13**: 33. 1902.

Common name: Engelmann's False Yucca.

Type: Not cited.

Neotype: USA, Texas, Edwards County, c.25 road miles SW of Rocksprings along Highway 674, c.1 mile S of Two Mile Canyon in rocky limestone soils along the western branch of the Nueces River, 23 May 1999, *B L TURNER 99-367* (TEX).



Fig. 3 *Hesperaloe chiangii* fh0641 (Photo: Fritz Hochstätter)



Fig. 4 *Hesperaloe engelmannii* fh427.30 Texas, San Saba Co (Photo: Fritz Hochstätter)

Distribution: USA, Texas, Edwards Plateau, in a restricted area. San Saba County, Edwards County, Mills County. Usually found beneath oaks, associated shrubs and other trees.

Stem forming clumps to 50–120cm diameter. **Leaves** curved, variable, dark green, 1–1.5m long, longer than *H. parviflora* and relatively narrower, somewhat flatter, darker green, the margins showing little tendency to form markedly arcuate, frilly fibres. **Inflorescence** (adult plants) 2–2.5m long, usually branched in the upper half, paniculate. **Flowers** tubular, 30–40mm long, pink or salmon, inner tepals tending to have white, flaring apices, while those of *H. parviflora* are only weakly flaring and only marginally white, if at all. The style is mostly 1–2(–3) times as long as the ovary proper, and more thickened at the base in contrast to *H. parviflora*, with its style 3–5 times as long as the ovary proper.

Flowering period: May–June.

H. engelmannii is distinguished from the closely related *H. parviflora* by its longer anthers and shorter, thicker (not filiform)

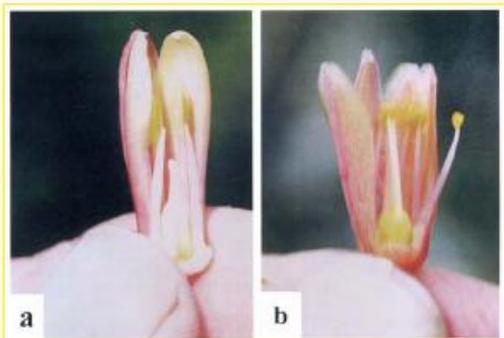


Fig. 5a Immature ovary and style of *Hesperaloe engelmannii*;
5b ovary and style of *H. parviflora* (Photos: Billie I. Turner)

style, as well as by its habit and vegetative features. It is a much larger plant (up to 2.5m high), with longer and darker green leaves and a narrower and more flattened blade. This taxon is rare in its native Texas. Hybrids of *H. parviflora* × *H. engelmannii* are known in US and European cultivation, although they are not found in the wild. These two taxa are allopatric.



Fig. 6 *Hesperaloe funifera*. Coahuila, Sierra Mojada. With Wolfgang Metorn (Photo: Michael Bechtold)



Fig. 7 *Hesperaloe funifera*. Coahuila, Sierra Mojada (Photo: Michael Bechtold)

Hesperaloe funifera (K.Koch) Trel., *Rep. (Annual) Missouri Bot. Gard.* 13: 36. 1902. (Figs. 6–9)

Basionym: *Yucca funifera* K.Koch, *Belg. Hort.* 12: 132. 1862.

Common name: Giant Hesperaloe.



Fig. 8 *Hesperaloe funifera* fh0640 flowers (Photo: Fritz Hochstätter)



Fig. 9 *Hesperaloe funifera*: seeds, capsules & leaves
(Photo: Gerhard Koehres)

Type: Mexico; imported by the nursery of Jean Verschaffelt and first exhibited by them at Gand, 2 Mar 1862. Neotype: Mexico, Coahuila, 4 miles E of Esmeralda Mine, along road to Cuatro Ciénegas; 8 May 1973, R G ENGARD and H S GENTRY 23241 (ARIZ).

Distribution: Mexico, Coahuila, Nuevo León, San Luis Potosí, and in USA in Val Verde County, Texas on rocky slopes at 500–1000m altitude, associated with *Agave lechuguilla*, *Opuntia leptocaulis*, etc.

Stem caespitose, forming clumps to 1.5m diameter. Leaves stiff, erect, light green or yellow-green, canalicate, linear-lanceolate or lanceolate, 1–2m long, 3–4cm wide (when flattened) from the base to middle, margins brown, with 1mm thick, white or grey, loosely coiled fibres, with apical thorn. **Inflorescence** 2–4m long, paniculate, usually branched in the upper half. **Flowers** rotate-campanulate, white to green, with brown to purple midstripes, 15–20mm long. **Capsules** woody, globose or broadly oblong, 25–35mm long and wide. **Seeds** black, 7–9mm long, 5–7mm wide, 0.5mm thick.

The Giant Hesperaloe is the largest of the hesperaloes. It has very long, large, bright green, stiff leaves, in contrast to *H. parviflora* which has darker green leaves that are rolled. On first inspection it looks like *Yucca faxoniana*. Typically the ssp. *chiangii* has broader clumps and a more extensive, rhizomatous root system. The flowering period is from April to September. The flowers open in the morning and close in the evening. Hybrids between *H. funifera* and *H. parviflora* are known in cultivation (Fig. 10). This species is frost-hardy in Europe (Germany) to -15deg C.



Fig. 10 *Hesperaloe funifera* × *H. parviflora* cultivated at the Boyce Thompson Museum, Arizona (Photo: Peter Breslin)



Fig. 11 *Hesperaloe nocturna* cultivated at the Boyce Thompson Museum, Arizona (Photo: Peter Breslin)

Hesperaloe nocturna Gentry, *Madroño* 19: 74–78. 1967. (Fig. 11)

Common name: Night-blooming Hesperaloe.

Type: Mexico, Sonora, 15 miles SE of Magdalena along road to Cucurpe, 3200–3500ft; 21 May 1963, Howard S GENTRY & R S FELGER 19988 (US).

Distribution: Mexico, Sonora State in a limited area at 900–1150m altitude, associated with *Fouquieria splendens*, and *Yucca* spp.

Stem acaulescent, rhizomatous, forming dense clumps, 1–2m diameter. **Leaves** variable, flexible, erect, arching, linear-lanceolate, 100–150cm long, 1–2cm wide at the base, long attenuate at the apex, margins narrow, brown, finely filiferous, with white curly fibres. **Inflorescence** 1–4m long, with 2–3 long branches in the upper half, paniculate. **Flowers** campanulate-rotate, 30mm wide, 15–25mm long, interior white, outside pinkish-red, opening nocturnally. **Capsules** woody when ripe, ovoid to rounded, 25–40mm long and 25–30mm wide.

The flowering period is from April to July. This species is easy to recognise, with its long, narrow, grass-like

leaves and nocturnal flowers. In contrast, the similar *H. parviflora* has shorter leaves which are not so numerous. Also the inflorescence shape differs. When not in bloom, this plant is easily confused with the Clumping Bear Grass, *Nolina microcarpa*. However the latter has sharp marginal teeth on the leaves by which it can be distinguished. Hybrids are known of *H. nocturna* and *Hesperaloe parviflora*. It is frost-hardy in Europe (Germany) to -14°C.

Hesperaloe parviflora (Torr.) J. M.Coult., *Contrib. U. S. Natl. Herb.* 2: 436. 1894.

Basionym: *Yucca parviflora* Torr., Botany of the boundary, in Emory, *United States and Mexican boundary survey* 2(1): 221. 1859.

Common names: Red Hesperaloe, Red Yucca.

Syntypes: USA, Texas, gravelly hills near the mouth of the Pecos; J. M. BIGELOW s.n. & USA, Texas, stony hills W of Nueces; Charles WRIGHT 1908 (GH, hololecto; NY, isolecto).

Synonym: *Aloe yuccifolia* A.Gray, *Proc. Amer. Acad. Sc.* 7: 390. 1867. [based on same type as *Y. parviflora* Torr.].



Fig. 12 *Hesperaloe parviflora* flowers, in cultivation in Arizona (Photo: Fritz Hochstätter)

Hesperaloe parviflora (Torr.) J. M. Coult. ssp. *parviflora* (Figs. 12–13)

Distribution: Mexico, NW Coahuila; USA, central Texas, Edwards Plateau area at 500–2000m altitude in desert, oak and chaparral zones.

Stem caespitose, forming clumps to 30–120cm diameter. **Leaves** curved, variable, flexible, green, fine canaliculate, linear, 30–120cm long, marginal fibres variable, coarse. **Inflorescence** 1–3m long, usually branched in the upper half, paniculate, flowers tubular to oblong-campanulate, 25–35mm long, pink to salmon-coloured, yellow and cream-coloured in cultivation. **Capsules** woody when ripe, ovate to oblong, 30–40mm long, 25–30mm wide. **Seeds** black 9–10mm long, 6–8mm wide, 1mm thick.

The caespitose Red Hesperaloe, *H. parviflora* ssp. *parviflora*, has the greatest distribution range in the genus. The flowering period extends, as for *H. campanulata*, from April to October. This is in contrast to ssp. *bechtoldii*, which only flowers from April to May. The flowers are smaller, although the plants are larger in all other respects. In central Europe (Germany) it is frost-hardy to -18°C , as is ssp. *bechtoldii*. Natural hybrids with *Hesperaloe junifera* and *H. nocturna* are reported by Starr (1997: 295–296).

Hesperaloe parviflora (Torr.) J. M. Coult. ssp. *bechtoldii* (Fig. 14)

Hesperaloe parviflora (Torr.) J. M. Coult. ssp. *bechtoldii* Hochstätter subsp. nov. Differt haec subspecies a ssp. *parviflora* et aliis *Hesperaloeis* statura minori, floribus diurnibus longioribus salmoneis, non apertionibus latis, cum stylis exsertis, et florescentibus non nisi in Aprili vel Maio.

Type: Mexico, Coahuila, Sierra El Burro, Canyon El Colorado, alt. 662m; 14 Apr 1996, Michael BECHTOLD 733 (HEID, holo.).



Fig. 13 *Hesperaloe parviflora*. Yellow flowered form, in cultivation in Colorado (Photo: Jeff Thompson)

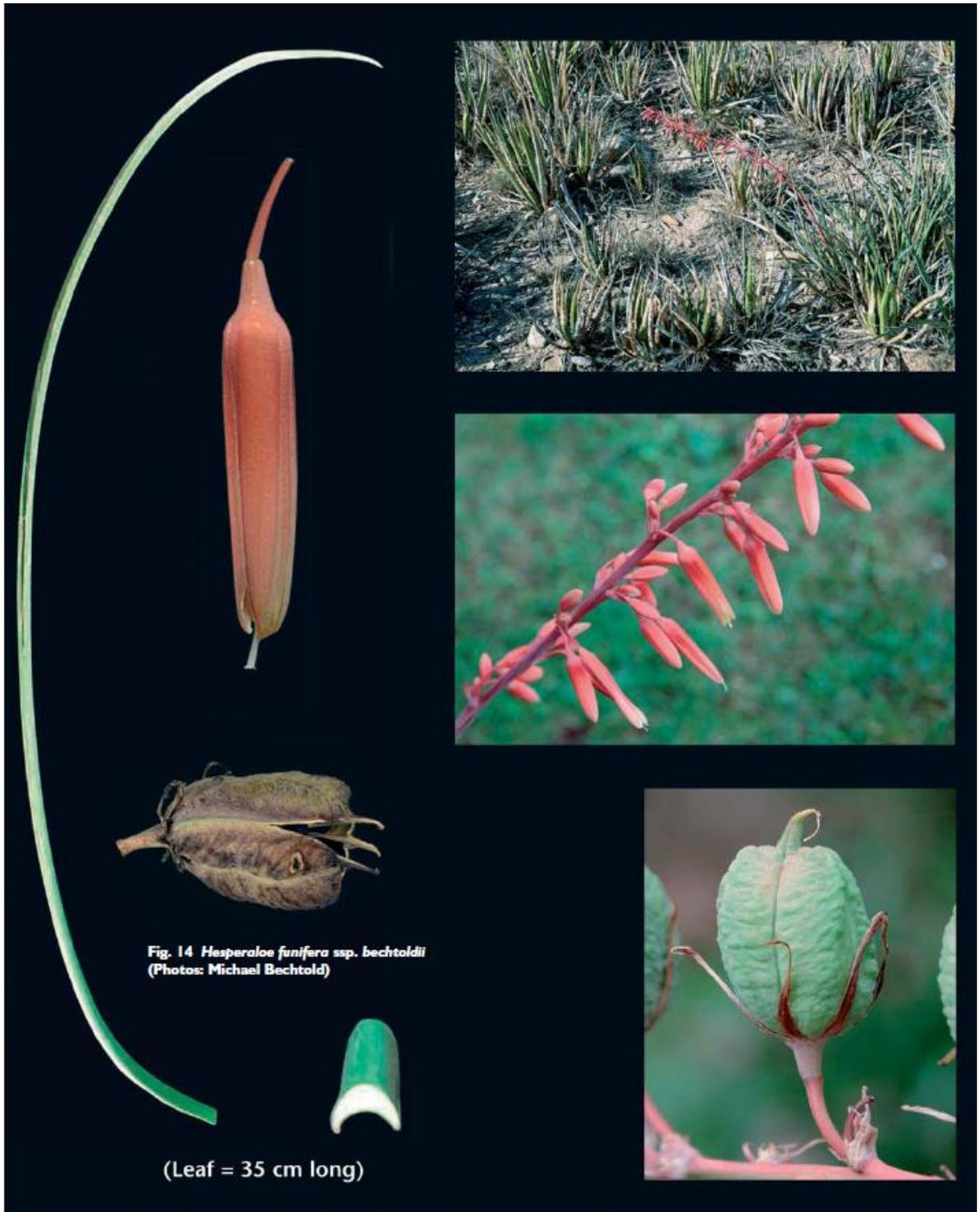


Fig. 14 *Hesperaloe funifera* ssp. *bechtoldii*
(Photos: Michael Bechtold)

(Leaf = 35 cm long)

Hesperaloe parviflora subsp. *bechtoldii* Hochstätter

This subspecies differs from ssp. *parviflora* and other *Hesperaloe* by its smaller size, longer, diurnal, salmon-coloured flowers, not opening wide, with style exserted, and flowering only in April or May.

Etymology: This subspecies is named for Michael Bechtold (Fig. 15), who has made a life-long study of *Hesperaloe*, as well as the *Agavaceae* and *Cactaceae*.

Common name: Dwarf Hesperaloe.

Distribution: Mexico, Coahuila, growing in flat sandy areas, associated with *Agave lechuguilla*, *Agave havardiana*, *Echinocactus horizontalis*, *Echinocereus caespitosus* and *Opuntia* spp. Only known from the type locality.

Stem acaulescent, rhizomatous, forming irregular small clumps to 20–40cm diameter. **Leaves** stiff, erect, curving somewhat to the side, green, finely canaliculate, lanceolate, 20–40cm long, with pronounced marginal fibres, 2–4cm long. **Inflorescence** erect, leaning somewhat when in full bloom, 30–80cm long, unbranched. **Flowers** not opening widely, salmon-coloured, appearing above the leaves, tubular, 30–50mm long, open during the day, closing in the evening, filaments 8–16mm long, anthers 2–4mm long, ovary at anthesis 4–8mm long and wide, style exserted (in contrast to ssp. *parviflora*), 12–18mm long. Ripe **capsules** woody, ovate to oblong, 25–30mm long, 20–30mm wide. **Seeds** black, 8–10mm long, 5–7mm wide, 1mm thick.

Subspecies *bechtoldii* grows in a flat, sandy area and is only from this locality. Associated plants are *Agave lechuguilla*, *Agave havardiana*, *Echinocactus horizontalis*, *Echinocereus caespitosus* and *Opuntia* spp.

This is in contrast to subspecies *parviflora*, which is repeat-flowering over a longer period from March to September, as does also *Hesperaloe campanulata*. The flowers of both subspecies open during the day and close in the evening in contrast to those of *Hesperaloe nocturna* and *Hesperaloe tenuifolia*, which are night-flowering. The seeds are ripe in June or July.

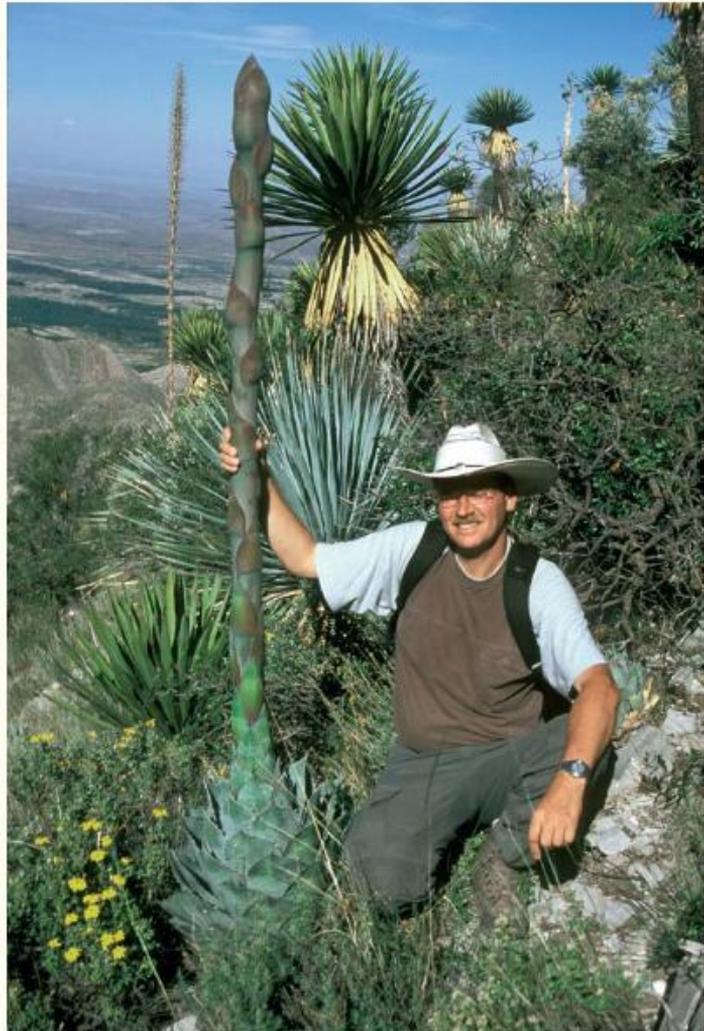


Fig. 15 Michael Bechtold at the location of *Agave parrasana* in SE Coahuila, Mexico. In the background are *Yucca carnerosana*, *Agave gentryi*, *Dasylyrion* spec (Photo: Michael Bechtold)

Hesperaloe tenuifolia G.D.Starr, *Madroño* 44(3): 293–294. 1997. (Fig. 16)

Common name: Tropical Hesperaloe.

Type: Mexico, Sonora, 24km NE of Alamos, near Rancho Santa Barbara on Cerro Agujudo, 1500m; 16 May 1990, S MEYER & P JENKINS 9063 (ARIZ).

Distribution: known only from the Sonoran type locality, on dry, rocky hilltops in pine and oaks woods at 1500m altitude.

Stem acaulescent, forming open, small clumps to 50cm wide. **Leaves** curved, variable, linear, 50–100cm long,

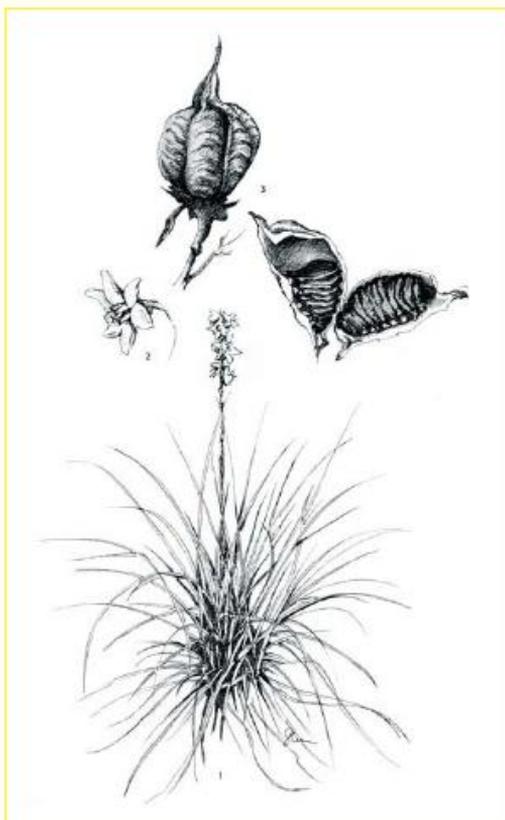


Fig. 16 *Hesperaloe tenuifolia*. 1 Plant, 2 Flower, 3 Fruit, closed and open. Drawn by Tom Sloan

5–10mm wide at the base, tapering to the apex, margins with thin, scarcely curved, white, fine fibres. **Inflorescence** 1.5–2m long, racemose or a 2–3 branched panicle. **Flowers** rotate, nocturnal, 30mm long, 25mm wide, exterior dark pinkish-red, white with reddish margin within, outer perianth segments 13mm long and 5mm wide, inner segments 15mm long and 8mm wide. **Capsules** woody when ripe, ovoid, 20–30mm long and to 25mm wide.

H. tenuifolia is night-flowering, like *H. nocturna*. It has very long, thin leaves with thin marginal fibres. One characteristic is that the flowers do not open widely, in contrast to most other species in the genus.

Flowering period: April to May. Seeds are ripe in June to July.

Widely cultivated in the USA. It can also be grown outside in Europe in a sunny place with good rocky drainage and limited watering. In areas that are too hot, eg Tucson, Arizona, it benefits from some shade.

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