Felger, R.S., J.A. Hawkins, J. Verrier, and S.D. Carnahan. 2017. New combinations for Sonoran Desert plants. Phytoneuron 2017-48: 1–6. Published 18 July 2017. ISSN 2153 733X

NEW COMBINATIONS FOR SONORAN DESERT PLANTS

RICHARD STEPHEN FELGER
Herbarium, University of Arizona
Tucson, Arizona 85721, USA
*Author for correspondence: rfelger@email.arizona.edu

JULIE A. HAWKINS
School of Biological Sciences
University of Reading
Whiteknights, Reading RG6 6BX, UK
j.a.hawkins@reading.ac.uk

JAMES VERRIER
Herbarium, University of Arizona
jverrier@email.arizona.edu

SUSAN DAVIS CARNAHAN
Herbarium, University of Arizona
scarnahan@email.arizona.edu

ABSTRACT

We provide new nomenclatural combinations for three Sonoran Desert plants: **Opuntia engelmannii** var. **laevis** (J.M. Coulter) Felger, Verrier, & Carnahan, **comb. nov**.; **Parkinsonia florida** subsp. **peninsulare** (Rose) Hawkins & Felger, **comb. nov**.; and **Parkinsonia** ×**sonorae** (Rose & I.M. Johnston ex I.M. Johnston) Hawkins & Felger, **comb. nov**.

In the course of studies of Sonoran Desert flora (e.g., Felger et al. 2016, 2017a, 2017b) and sky islands in southern Arizona (Verrier in prep.), we find three taxa needing nomenclatural updates. The new combinations are provided below.

CACTACEAE

Opuntia engelmannii Salm-Dyck ex Engelm. var. **laevis** (J.M. Coulter) Felger, Verrier, & Carnahan, **comb. nov.** *Opuntia laevis* J.M. Coulter, Contr. U.S. Natl. Herb. 3: 419. 1896. *Opuntia phaeacantha* var. *laevis* (J.M. Coulter) L.D. Benson, Cacti Arizona (ed. 3), 21. 1969. **TYPE**: **Arizona**. [Pima Co.]: Santa Catalina Mountains, canyons, 17 May 1881, *C.G. Pringle s.n.* (holotype: F 92182).

Benson (1969) aligned this prickly pear with *Opuntia phaeacantha*. Pinkava (2003) relegated var. *laevis* to a synonym of *O. phaeacantha* but did not recognize varieties. However, plants from the type locality in the Santa Catalina Mountains are characteristic of *O. engelmannii*: the cladodes (pads) remain green all year, the flowers are relatively large, and the tepals are monochromatic yellow, becoming brownish-orange on the second day (Figures 1–3). In contrast, *O. phaeacantha* cladodes often become reddish-purple during winter and dry seasons, the flowers tend to be somewhat smaller, and the tepals are reddish basally, so that the flower is yellow with a reddish center. The fruits of var. *laevis* are relatively large, white-fleshed, and juicy, with a sweet flavor reminiscent of honeydew melon (other varieties of *O. engelmannii* are also fleshy but have reddish-purple fruit pulp and are also sweet but with a different flavor). The fruits of *O. phaeacantha* are smaller and the pulp is dull whitish, not very juicy, and not sweet. Like other forms of *O. engelmannii*, plants of var. *laevis* are relatively large and have an upright growth pattern, a stark difference from the low, sprawling form of

O. phaeacantha. Mature and older specimens of var. *laevis* become arborescent and can become massive, growing to 2.5 meters tall. Var. *laevis* occupies different habitats than those of *O. phaeacantha*, growing exclusively on cliffs, rock outcrops, and steep slopes. Var. *laevis* is a spineless or nearly spineless morphotype. Young plants are spiny for the first few years, and then begin to produce few-spined to essentially spineless cladodes.

FABACEAE

Julie Hawkins and associates considered *Cercidium* to be a synonym of *Parkinsonia* based on phylogenetic studies which show *Cercidium* species nested with *Parkinsonia* (Hawkins 1996; Hawkins et al. 1999; Hughes et al. 2003). We provide new combinations for two taxa that have not been transferred from *Cercidium* to *Parkinsonia*.

Nine taxa of *Parkinsonia* trees are found in the Sonoran Desert. A key for the eight naturally occurring taxa is provided below. In addition, a horticultural selection of a hybrid found in the Tucson region — *Parkinsonia* [*Cercidium*] cv. "Desert Museum" is grown in the Sonoran Desert region as a landscape tree. It involves hybridization of *P. aculeata*, *P. florida*, and *P. microphylla* (Dimmitt 1987). This hybrid is propagated by grafting onto *P. aculeata* rootstocks.

1. Leaves more than 10 cm long, pinnae usually strap-like (each pinna resembling an individual leaf) ..... **Parkinsonia aculeata**
1. Leaves less than 7 cm long; pinnae usually not strap-like.

2. Pinnae with (8) 16–45 pairs of leaflets ..... **Parkinsonia ×carterae**
2. Pinnae with 2–8 pairs of leaflets.

3. Twigs spinescent at tip; axillary spines absent; petiole absent, the leaflets mostly 1–3.3 mm long ..... **Parkinsonia microphylla**
3. Twigs not spinescent at tip (sometimes moderately spinescent in *P.* ×*sonorae*); short axillary spines often present; leaves petioled, the leaflets mostly 2–10 mm long.

4. Leaves with 1 pair of pinnae, each pinna with 2–4 pairs of leaflets ..... **Parkinsonia florida**

5. Branchlets glabrous or glabrate; leaflets 4–8 mm long, (2) 3 pairs per pinna; inflorescences relatively open; racemes including rachis mostly 1–4.5 (7) cm long; pedicels 6–12 (20) mm long; with age the upper petal usually orange-dotted ..... **P. florida** subsp. **florida**
5. Branchlets villous or pilose; leaflets 6–15 mm long, mostly 2 pairs per pinna; inflorescences relatively compact; racemes including rachis mostly 0.3–1 (2) cm long; pedicels 4–9 (12) mm long; upper petal not orange-dotted ..... **P. florida** subsp. **peninsulare**

4. Leaves with 1 or 2 pairs of pinnae, each pinna with 4–8 pairs of leaflets.

6. Spines 1 or 2 at each node, stout; petioles 4–21 mm long; leaflets 4–13 mm long; flowers including the banner bright yellow, the banner often with orange spots ..... **Parkinsonia praecox**
6. Spines 1 per node and slender, or absent; petioles to 3 mm long; leaflets 2–6 mm long; flowers pale yellow, the banner white to pale yellow without orange spots ..... **Parkinsonia ×sonorae**

Parkinsonia florida (Benth. ex A. Gray) S. Wats. subsp. **peninsulare** (Rose) Hawkins & Felger, **comb. nov.** *Cercidium peninsulare* Rose, Contr. U.S. Natl. Herb. 8: 301. 1905. *Cercidium floridum* Benth. ex A. Gray subsp. *peninsulare* (Rose) A.M. Carter, Proc. Calif. Acad. Sci., ser. 4, 40: 35. 1974. **TYPE**: **MEXICO**. [**Baja California Sur**]. Lower California, La Paz, 16 Apr 1899, *E.A. Goldman 388* (holotype: US 360309, bar code 2535).

This subspecies is distinguished from subsp. *florida* by its generally larger leaflets, denser and more persistent pubescence of larger hairs, differences in size of the inflorescences, and stoutness of pedicels (Carter 1974; Hawkins 1996). Subsp. *peninsulare* occurs in Baja California Sur (Carter 1974), the south end of Isla Tiburón (Felger et al. 2001; Felger & Wilder 2012), and in Sonora in Guaymas ("27°56'N, 110°49'W, 10 m elev, on the outskirts of the city," 27 Jan 1992, *Hughes 1562 et al*., MO) and on the coastal plain southward from Guaymas.

Parkinsonia ×**sonorae** Rose & I.M. Johnston ex I.M. Johnston) Hawkins & Felger, **comb. nov.** *Cercidium sonorae* Rose & I.M. Johnston ex I.M. Johnston, Contr. Gray Herb. 70: 66. [April] 1924. **TYPE**: **MEXICO**. **Sonora**. Vicinity of Guaymas, dry hills, 10 Mar 1910, *Rose, Standley & Russell 12586* (holotype US 6354, bar code 2533).

Cercidium molle I.M. Johnston, Proc. Calif. Acad. Sci. 4, 12: 1038. [May] 1924. **TYPE**: **MEXICO**. [**Baja California Sur**]. In a wash at Agua Verde Bay, Lower California, 26 May 1921, *Johnston 3877* (holotype CAS 1283; isotype UC 251946).

This natural hybrid between *Parkinsonia microphylla* and *P. praecox* occurs where the ranges of the parent species overlap (Carter 1974). It is common in parts of western Sonora and relatively rare in Baja California Sur (Carter 1974; Felger et al. 2001; Rebman et al. 2016; Turner et al. 1995).

ACKNOWLEDGEMENTS

We thank the staff at ARIZ, especially George Ferguson, for continued research support and Walter Frank Fertig for review of this contribution.

LITERATURE CITED

Benson, L.D. 1969. Cacti of Arizona (ed. 3). Univ. of Arizona Press, Tucson.

Carter, A.M. 1974. The genus *Cercidium* (Leguminosae: Caesalpinioideae) in the Sonoran Desert of Mexico and the United States. Proc. Calif. Acad. Sci. 40: 17–57.

Dimmitt, M.A. 1987. The hybrid palo verde 'Desert Museum': A new, superior tree for desert landscapes. Desert Plants 8: 99–103.

Felger, R.S., S.D. Carnahan, J.J. Sánchez-Escalante, M. Bogan, A. Búrquez-Montijo, and F.S. Molina. 2016. The desert edge: flora and ethnobotany of the Guaymas region of Sonora, Mexico. The Plant Press [Arizona Native Plant Society] 39: 1–6.

Felger, R.S., S.D. Carnahan, and J.J. Sánchez-Escalante. 2017a (accepted for publication). Oasis at the desert edge: Flora of Cañón del Nacapule, Sonora, Mexico. Proceedings of the Desert Laboratory, Univ. of Arizona, Vol. 1.

Felger, R.S., S.D. Carnahan, and J.J. Sánchez-Escalante. 2017b. The desert edge: Flora of the Guaymas region of Sonora, Mexico. Part 1: The checklist. Desert Plants, Vol. 32 (submitted).

Felger, R.S., M.B. Johnson, and M.F. Wilson. 2001. Trees of Sonora, Mexico. Oxford Univ. Press, New York.

Felger, R.S. and B.T. Wilder. 2012. Plant Life of a Desert Archipelago: Flora of the Sonoran Islands in the Gulf of California. Univ. of Arizona Press, Tucson.

Hawkins, J.A. 1996. Systematics of *Parkinsonia* L. and *Cercidium* Tul. (Leguminosae: Caesalpinioideae). Ph.D. dissertation, Univ. of Oxford, Oxford.

Hawkins, J.A., L. White Olascoaga, C.E. Hughes, J.-L.R. Contreras Jiménez, and P. Mercado Ruaro. 1999. Investigation and documentation of hybridization between *Parkinsonia aculeata* and *Cercidium praecox* (Leguminosae: Caesalpinioideae). Pl. Syst. Evol. 216: 49–68.

Hughes, C.E., A.D. Yamona, and J.A. Hawkins. 2003. A new Palo Verde (*Parkinsonia*, Leguminosae; Caesalpiniodeae) from Peru. Kew Bull. 58: 467–472.

Pinkava, D.J. 2003. *Opuntia* Miller. Pp. 123–148, in Flora of North America, Vol. 4. Oxford Univ. Press, New York.

Rebman, J.P., J. Gibson, and K. Rich. 2016. Annotated Checklist of the Vascular Plants of Baja California, Mexico. Proc. San Diego Soc. Nat. Hist. 45: 1–363.

Turner, R.M., J.E. Bowers, and T.L. Burgess. 1995. Sonoran Desert Plants: An Ecological Atlas. Univ. of Arizona Press, Tucson.

Verrier, J. In prep. Flora of the Santa Catalina Mountains, Arizona.

Figure 1. *Opuntia engelmannii* subsp. *laevis*. Grosvenor Hills on Salero Ranch, Santa Cruz Co., Arizona, 2 May 2011. Photo by Sue Carnahan.

Figure 2. *Opuntia engelmannii* subsp. *laevis*. Grosvenor Hills on Salero Ranch, Santa Cruz Co., Arizona, 24 April 2011. Photo by Sue Carnahan.

Figure 3. *Opuntia engelmannii* subsp. *laevis*. An older flower, probably the second day; Diablo Canyon, Santa Catalina Mountains, Pima Co., Arizona, 11 May 2016. Photo by James Verrier.