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## *Oenothera kleinii* (Onagraceae), a New Species from Southcentral Colorado

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**ABSTRACT.** *Oenothera kleinii* is a very rare new species of sect. *Anogra* known from only one site in Colorado, Mineral Co., below Wolf Creek Pass. The site has recently been destroyed by road construction. The species is morphologically most similar to *O. deltooides*, a polytypic species that ranges from sandy xeric habitats in the Sonoran and Mojave deserts to the seasonally dry interior valleys of California. *Oenothera kleinii* is especially similar to the only perennial taxon of *O. deltooides*, subsp. *howellii*.

The distinctive new species of *Oenothera* described here was first discovered in an open area below Wolf Creek Pass in Sep 1981. A return trip to this area in Sep 1982 revealed that road construction, which was in progress at the time of the first collection, had eliminated the entire population. A search for undisturbed sites in the vicinity of the former population and other sites between Pagosa Springs and the summit of Wolf Creek Pass failed to yield any additional populations of this striking species. Although it is known from only one collection, we are describing it here because it is quite distinct and especially to draw attention to this rare and biogeographically interesting entity in hopes that it may be rediscovered.

***Oenothera kleinii*** W. L. Wagner & S. Mill, sp. nov., figure 1.—**TYPE:** U.S.A., Colorado, Mineral Co., below Wolf Creek Pass along U.S. Hwy. 160, 8.6 km N of the Archuleta County line (T37N, R1E), rocky soil derived from Tertiary Volcanics, open site along highway in mixed conifer forest, 2440 m, 18 Sep 1981, *W. L. Wagner 4531* (holotype: MO-3046691; isotypes: BM, COLO, CS, MOAR, RM, RSA).

Herba perennis radice crasse carnosa. Caules assurgentes vel erecti, 1.5–3 dm longi. Sepali, tubus floralis, et margines foliorum longo-villosi, pilis tenuibus, (0.8–)1.5–3 mm longis; superficies foliorum sparse strigillosa, pilis appressis vel subpatulis, 0.3–0.7 mm longis. Alabastra nutantia oblonga; apex alabastrorum obtusus, apicibus sepalorum liberis 0.8–1.2 mm longis, supra medium 4-angulatis. Petala alba, 38–43 mm longa. Capsula sursum curva, cylin-

drica, apicem versus angustata 4–8 cm longa. Numerous chromosomatum somaticus,  $2n = 14$ .

Perennial herb from a thick fleshy taproot with a central erect stem and several leafy ascending branches arising from near the base, these glabrous, 1.5–3 dm long, leafy secondary branches, 0–10 mm long, the epidermis of older stems becoming tawny and exfoliating. Leaves bright green, thin, long-villous primarily along the margins and sparsely strigillose on the upper surface, the longer hairs erect, (0.8–)1.5–3 mm long and the hairs on the upper leaf surface appressed to somewhat spreading, 0.3–0.7 mm long; the lower leaves oblanceolate, 15–18 cm long, dentate or serrate in the upper half to subentire, tapering to a 60–80 mm long petiole; the stem leaves elliptic to lanceolate, 12–15 cm long, dentate to serrate, tapering to a 15–50 mm long petiole; the leaves in small axillary clusters narrowly lanceolate, 1–3.5 cm long, denticulate to serrulate, tapering to the 3–5 mm long petiole. Buds nodding by the reflexed floral tube, becoming erect at or shortly before anthesis, oblong, the apex obtuse with spreading free sepal-tips 0.8–1.2 mm long, conspicuously 4-angled above the middle, the angles rounded. Flowers 1–3(–4) per stem opening near sunset, scented with a moderately strong sweet fragrance. Ovary glabrous or rarely very sparsely long-villous, (15–)20–22 mm long, spreading from the stem, sessile. Floral tube moderately to sparsely long-villous, 32–37 mm long, flaring to 4–5 mm at the mouth. Sepals green to yellowish green sometimes with light reddish purple stripes along the margin, 25–30 mm long, ca. 4 mm wide, sparsely long-villous. Petals white with a pale yellow center,



FIG. 1. *Oenothera kleinii* drawn from the type collection and live material grown from seed from the type.

fading pink, broadly obcordate, 38-43 mm long, 44-55 mm wide. Staminal filaments 13-14 mm long. Anthers 7-9 mm long. Style 5.6-8 cm long; stigma lobes (8-)12-17 mm long, well elevated

above the anthers at anthesis. Capsules cylindrical, becoming narrowed toward the apex, nearly always curved upward, 4-8 cm long, ca. 4 mm in diameter toward the base. Seeds ca.

50–75 per capsule arranged on one row per locule with the distal ends directed toward the base of the capsule, 2.5–2.8 mm long, ca. 0.8 mm wide, ca. 0.5–0.6 mm thick, flattened parallel to the raphe, straw-colored throughout or becoming brownish purple toward either end, often with small reddish purple spots, and always with a dark reddish purple dimple at the distal end of the raphe, the raphe conspicuous as a low ridge. Mitotic chromosome number,  $2n = 14$ .

Distribution. *Oenothera kleinii* is known only from the type collection. Known to flower in Sep but probably also earlier.

The name is intended to honor William M. Klein, Director of the Morris Arboretum of the University of Pennsylvania, who has studied *Oenothera* sect. *Anogra* for over two decades and has done much to further our knowledge of relationships in this group, especially through artificial hybridization and cytological studies (see Klein 1962, 1964, 1970).

A root-tip squash from one plant of *Oenothera kleinii* grown at the Missouri Botanical Garden in 1982 provided a chromosome count of  $2n = 14$ . The plants did not flower in cultivation; it is not known if *O. kleinii* is self-incompatible. Most large-flowered species of *Oenothera*, such as *O. kleinii*, are self-incompatible, but this is not always the case.

*Oenothera kleinii* differs from the other species of sect. *Anogra* in Colorado and New Mexico [*O. pallida* Lindley, *O. latifolia* (Rydb.) Munz, *O. nuttallii* Sweet, *O. engelmannii* (Small) Munz, and *O. neomexicana* (Small) Munz] in its combination of dentate to serrate large leaves, some of which are over 10 cm long; 4–8 cm long capsules that taper toward the apex; petals over 4 cm long; and obtuse, 4-angled buds with free sepal-tips 0.8–1.2 mm long. Among these species, *O. kleinii* is morphologically similar to *O. neomexicana*, which ranges from the Mogollon Plateau in Arizona to scattered montane localities across southern and central New Mexico. *Oenothera neomexicana* differs in its erect, thicker and shorter, 4-angled capsules, which are unique in sect. *Anogra* and are more similar to some species in other sections of *Oenothera*; sinuate-dentate leaves that never exceed 8 cm

in length; longer floral-tube, 3–6 cm long; and longer free sepal-tips, 1–4 mm long.

Among all the species of sect. *Anogra*, *Oenothera kleinii* is morphologically closest to *O. deltoides* Torrey & Frémont, a polytypic species occurring in shady, low elevation, xeric habitats from the Sonoran and Mojave deserts to the seasonally dry interior valleys of California. *Oenothera kleinii* shares several characters with at least one or more of the five subspecies of *O. deltoides*, including large leaves; long tapering, upwardly curved capsules; obtuse 4-angled buds; long-villous pubescence; and large flowers with elevated stigmas. Among the subspecies of *O. deltoides*, *O. kleinii* is especially similar to subsp. *howellii* (Munz) Klein, the only perennial subspecies of *O. deltoides*, restricted to sand dunes near Antioch, Contra Costa Co., California, but differs from it primarily in its lack of strigillose pubescence on the floral-tube and sepals; complete lack of glandular pubescence; dentate leaves; and very different habitat. The shared features, however, do not suggest a particularly close phylogenetic relationship between *O. kleinii* and *O. deltoides* or *O. neomexicana* because these characters are ancestral ones. Thus, one can only suggest that *O. kleinii*, along with *O. deltoides* and *O. neomexicana*, has retained a number of generalized features that were probably present in the common ancestor of *Oenothera* sect. *Anogra*.

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