

Oenothera acutissima (Onagraceae), a New Species from Northwestern Colorado and Adjacent Utah



Warren L. Wagner

Systematic Botany, Vol. 6, No. 2. (Apr. - Jun., 1981), pp. 153-158.

Stable URL:

<http://links.jstor.org/sici?sici=0363-6445%28198104%2F06%296%3A2%3C153%3AOA%28ANS%3E2.0.CO%3B2-S>

Systematic Botany is currently published by American Society of Plant Taxonomists.

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/aspt.html>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is an independent not-for-profit organization dedicated to creating and preserving a digital archive of scholarly journals. For more information regarding JSTOR, please contact support@jstor.org.

***Oenothera acutissima* (Onagraceae), a New Species from Northwestern Colorado and Adjacent Utah**

WARREN L. WAGNER

Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166

ABSTRACT. *Oenothera acutissima* W. L. Wagner is a rare new species of sect. *Lavauxia* from Moffat Co., Colorado, and adjacent Daggett Co., Utah. *Oenothera acutissima* is clearly distinguished from its closest morphological relatives, *O. flava* and *O. triloba*, by its long slender branching taproot, which is capable of vegetative reproduction by producing new shoots along its length, linear irregularly dentate leaves, deep reddish-orange color of the faded petals, and small, fewer-seeded capsules. It occurs in seasonally moist sandy soils in medium altitude conifer forests to sagebrush scrub communities, whereas *O. flava* grows in heavier clay soils and rarely comes in contact with *O. acutissima*. Attempts to produce artificial hybrids produced mostly empty seed, but with difficulty two variegated plants were obtained.

The distinctive new species of *Oenothera* described here was first recognized by William M. Klein, who collected it with the late H. D. Harrington at Stuntz Reservoir, Moffat County, Colorado, in 1966. A decade later, I initiated the preparation of a revision of *Oenothera* L. sect. *Lavauxia* (Spach) Endl. and was able to confirm Klein's suggestion that this population did represent an undescribed species. It is now known from a few scattered localities in Moffat Co., Colorado, and adjacent Daggett Co., Utah.

In 1978, I studied a population consisting of approximately 15 scattered individuals of this species in the Douglas Mountain area of Colorado. At the same time, Elizabeth Neese and Scott Peterson located a population at Flaming Gorge, Daggett Co., Utah, from which Peterson kindly provided seed for the cultivation of a second strain for further study. I am publishing the name of this species in advance of my revision of the section primarily because of the current listing of the species in the Federal Register by U.S. Fish and Wildlife Service (1980, p. 82524) as *Oenothera* sp., a potentially threatened species.

***Oenothera acutissima* W. L. Wagner, sp. nov., figure 1.**—TYPE: U.S.A., Utah, Daggett Co., Greendale Campground, Flaming Gorge National Recreation Area, 12.8 km SW of Dutch John on Hwy 260 and 0.5 km NW of Forest Service Road 10187, seasonally wet meadow, sandy soil, 1880 m, 8 Jun 1978, *E. Neese and J. S. Peterson 5428* (holotype: MO-2715526; isotypes: BRY, CS).

A *O. flava* (A.Nels.) Garrett differt: radices lignosae radicibus secundariis plus elongatis novellos surculos edentibus. Folia pauca crassa rigida, linearia vel anguste elliptica 7–14(–18) cm longa, 5–10(3–15) mm lata, grosse dentata vel pinnate lobata, lobi triangulares vel lineares. Petala flava demum roseo-aurantiaca, 2.8–5 cm longa, 2.5–4.3 cm lata. Capsula

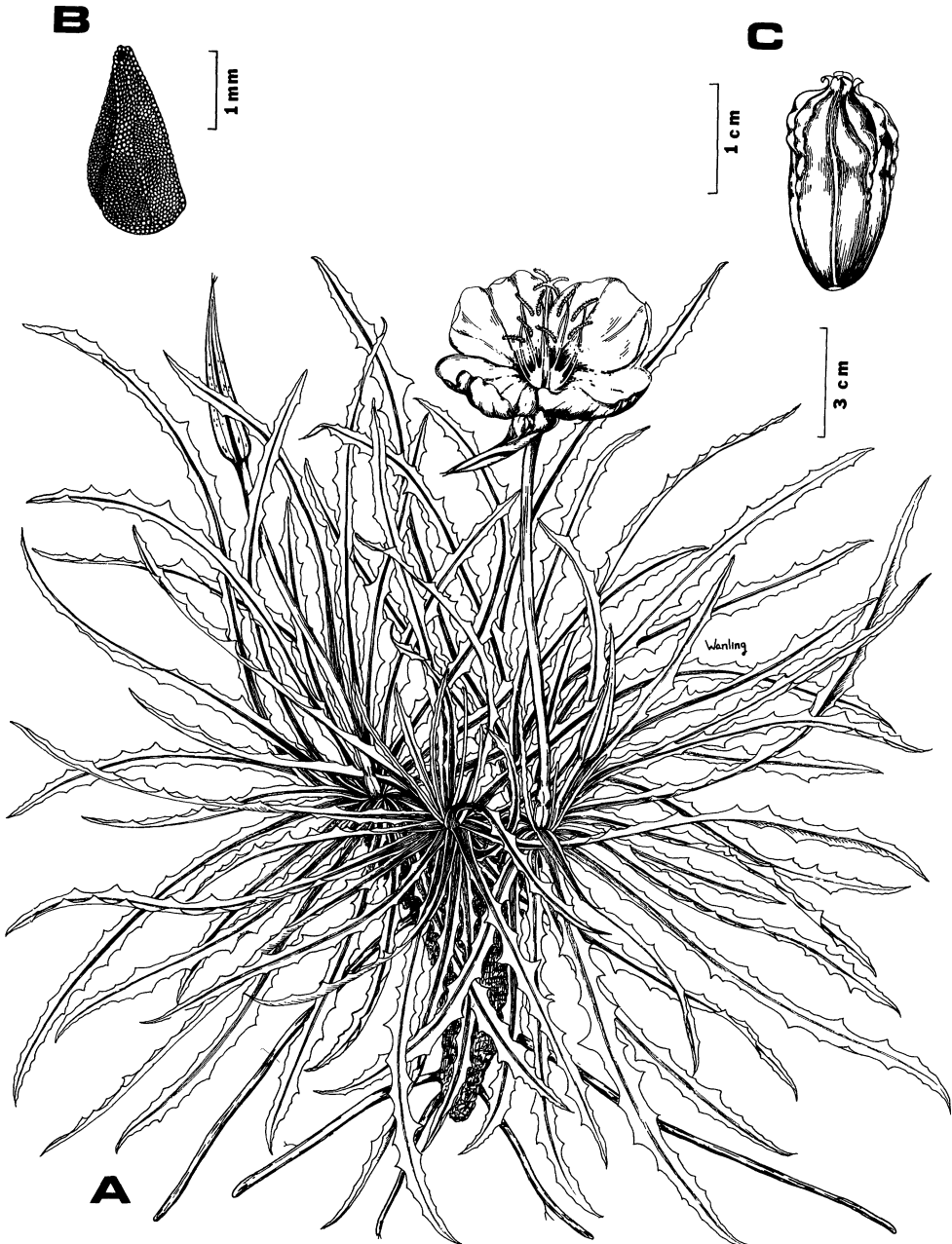


FIG. 1. *Oenothera acutissima*. A. Habit. B. Seed. C. Mature fruit, soon after dehiscence. All from greenhouse grown progeny of Peterson 1293.

oblonga-oblancoidea, 14–22 mm longa, ala valvulae 1–2(–4) mm lata per duos longitudinis trientes superiores prope apicem latior inferne gradatim deminuta praeditae; capsula per unum ad duos longitudinis trientes dehiscens. Numerus gameticus chromosomaticus, $n = 7$.

Subcaulescent perennial herb from a stout taproot, usually with several long, slender lateral roots that produce new shoots along their length, rosettes usually several up to ca. 10 or occasionally single, densely leafy, the short stems 1–2 cm long, these below ground. Leaves bright green, moderately thick and stiff, the yellowish-green midribs prominent, lateral veins inconspicuous, strigillose mostly along the margins, the hairs creamy white, 0.1–0.3 mm long with an admixture of minute, erect, transparent glandular hairs 0.1–0.2 mm long scattered about the surface, linear to very narrowly elliptic, 7–14(–18) cm long, 5–10(3–15) mm wide, apex long-attenuate, irregularly and coarsely dentate to sometimes pinnately lobed, the teeth triangular to linear, 0.3–4 mm high, gradually tapering to a broad and narrowly winged petiole (1.2–)3–5 cm long, flaring near the point of attachment. Flowers 1–3, opening near sunset, scented with a light semen-like odor. Buds oblong-ovoid, the apex acuminate and with unequal free tips 1–3 mm long. Ovary sparsely glandular-pubescent, usually also sparingly strigillose and sometimes with a few scattered spreading or erect hairs 0.5–0.7 mm long, sessile. Floral tube (5.3–)6–10 cm long, 1–1.5 mm in diameter medially, flaring to 8–9 mm at the mouth, sparsely glandular and strigillose and sometimes a few of the longer hairs present, glabrous within. Sepals coherent and reflexed to one side at anthesis, green with a reddish tinge, the margins with a dark reddish-purple stripe and often with reddish-purple splotches, narrowly lanceolate, 2.6–5 cm long, 4–5 mm wide, pubescent with evenly scattered glandular hairs and also sparsely strigillose usually along the margins. Petals bright yellow fading a deep reddish-orange, obovate, 2.8–5 cm long, 2.5–4.3 cm wide. Staminal filaments yellow, 2.1–3.5 cm long; anthers yellow, 9–11 mm long. Style yellow, 7.5–14.3 cm long, well elevated above or outside the ring of stamens; stigma lobes 3–5 mm long. Capsules relatively few maturing per rosette, oblong-oblancooid, 14–18(–22) mm long, 7–8 mm diam. (excluding wings), abruptly constricted at the apex, the free tips ca. 1 mm long, widely spreading, the valves with a wing 1–2(–4) mm wide restricted to the upper $\frac{2}{3}$ of the capsule, the wing broadest at a point near the apex, gradually reduced below, the veins on the valves inconspicuous, dehiscing $\frac{1}{4}$ – $\frac{1}{3}$ the length of the capsule. Seeds 70–110 per capsule in two adjacent and distinct rows, asymmetrically cuneiform, very dark purplish-brown, 2–2.5 mm long, 0.8–1 mm wide, ca. 0.8 mm high, the surface minutely beaded, narrowly winged from the distal end and along one adaxial margin, the raphe slightly raised. Self-compatible, but outcrossing. Gametic chromosome number, $n = 7$.

Distribution. *Oenothera acutissima* is restricted to sandy and gravelly soils, in seasonally wet areas, in meadows, depressions, or along arroyos,

TABLE 1. Comparison of the salient characteristics of the yellow-flowered species of *Oenothera* sect. *Lavauxia*.

Characters	<i>O. acutissima</i>			<i>O. flava</i>		<i>O. triloba</i>	
	Perennial	Short-lived perennial	Annual or biennial				
Root	Woody, slender taproot with long laterals that sprout new shoots	Fleshy, stout taproot	Slender to thick taproot				
Leaf texture	Moderately stiff, thick	Flexible, thick	Flexible, thin				
Leaf margin	Irregularly and coarsely dentate to pinnatifid, the lobes triangular	Irregularly pinnatifid, the lobes variable in shape, rarely subentire	Irregularly pinnatifid, rarely subentire				
Leaf shape	Linear to very narrowly elliptic	Oblanceolate to linear-oblong	Oblanceolate to oblong-obanceolate				
Petal color	Bright yellow	Bright yellow	Pale yellow				
Petal faded color	Deep reddish-orange, drying purplish-brown	Orange, drying purple	Pale orange, drying pale lavender				
Capsule length (mm)	14-22	(10-)-20-40	(10-)-20-30				
Capsule wings width (mm)	1-2	2-5	5-10, often with a tooth at the widest part				
Capsule texture	Leathery	Leathery	Woody				

in mixed conifer forest to sagebrush scrub, from the vicinity of Manila in the eastern portion of the Uinta Mountains, Daggett County, Utah, east to areas in and around Douglas and Blue Mountains in Moffat County, Colorado, 1190–2600 m. Known to flower in June.

Additional specimens examined. U.S.A., COLORADO, Moffat Co., summit of Douglas Mtn., *Brown 149* (BRY); Blue Mtn., 35.2 km N of Dinosaur, Stuntz Reservoir, *Harrington 9924* (CS, 3 sheets); Douglas Mtn., Chicken Springs, along Hwy. 116 (Douglas Mtn. Blvd.; T8N, R102W, Sec. 35), *MacLeod 790* (COLO); Douglas Mtn., 5.6 km SW of Greystone (T7N, R101W, Sec. 11), *MacLeod and MacLeod 837* (COLO); Douglas Mtn., W Boones Draw (T8N, R100W, Sec. 1–2), *Wagner 3724* (MO). UTAH, Daggett Co., 14.4 km SSW of Manila (T2N, R19E, SW $\frac{1}{4}$ Sec. 29), *Neese and Welsh 7889* (BRY, MO); Flaming Gorge Nat'l. Recreation Area, Greendale Campground, *Peterson 1293* (BRY, CS, MO, NY, UT, UTC).

Collections examined cytologically. Three individual progeny of *Peterson 1293* formed 7 bivalents at diakinesis or meiotic metaphase I.

This beautiful large-flowered species is a member of *Oenothera* sect. *Lavauxia*, a distinctive group of five species (Munz 1930). It is easily distinguished from the other yellow-flowered species of sect. *Lavauxia* by features listed in table 1, the most diagnostic being features of the root, leaf shape and margin, faded petal color, and capsule size.

Oenothera acutissima, which is genetically self-compatible but outcrossing, occurs in scattered, small populations in sandy soils in meadows or along arroyos, and sometimes on rock outcrops. In contrast *O. flava* is modally autogamous in this part of its range and grows in heavier clay soils, especially in meadows, along margins of ponds and streams, or in moist disturbed areas. In 1966, plants of the two species were observed growing within 15 m of one another by W. M. Klein and H. D. Harrington at Stuntz Reservoir, Moffat Co., Colorado. About 50 widely scattered clumps of *O. acutissima* were observed growing in the crevices of a rock outcrop about 100 m across. Plants of *O. flava* were frequent in clayey soil along the shore of the reservoir in the same vicinity. No intermediates were observed (Klein, pers. comm.). No plants of *O. acutissima* could be found at this heavily grazed locality by Klein in 1973 or by me in 1978, and perhaps it has become extinct at this locality. These two related species have not been observed growing together elsewhere. In such an event, the predominant autogamy of *O. flava* would tend to limit pollen transfer.

Attempts to hybridize plants of the two species when they were cultivated together at the Missouri Botanical Garden in 1979 and 1980 led mostly to empty seeds. A few functional seeds were obtained in 1980, however, from a cross in which *O. flava* was used as the pistillate parent. Six of these seeds germinated in the spring of 1981; four individuals had non-functional plastids and were completely white; the other two individuals were variegated. The white plants died in the cotyledon stage;

the two variegated plants, although weak, have remained alive, but they have not yet flowered. In any case, it seems unlikely that functional hybrids would be found in nature.

ACKNOWLEDGMENTS. This work was supported in part by a grant from the National Science Foundation to Peter H. Raven. I am grateful to Wanling Peng for the illustration and to Scott Peterson, Colorado State University, who kindly provided additional seed used in the greenhouse studies.

LITERATURE CITED

- MUNZ, P. A. 1930. Studies of Onagraceae V. The North American species of the subgenera *Lavauxia* and *Megapterium* of the genus *Oenothera*. Amer. J. Bot. 17:358–370.
- UNITED STATES FISH AND WILDLIFE SERVICE. 1980. Endangered and threatened wildlife and plants: review of plant taxa for listing as endangered or threatened species. Federal Register 45(242, IV):82480–82569.