

NEW NAMES AND COMBINATIONS IN *ENCELIA FRUTESCENS* SENSU LATO  
(ASTERACEAE: HELIANTHEAE)

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At its broadest circumscription, *Encelia frutescens* (A. Gray) A. Gray contained the types of six taxa (Blake 1913). All are shrubs with solitary heads having yellow disks and (when present) yellow rays, but they show great variation in other aspects of their morphology. For example, *E. frutescens* var. *actoni* (*sensu* Blake; *E. actoni* Elmer) has broad disks, many well-developed rays, and broad leaves with a soft silvery pubescence, whereas *E. frutescens* var. *frutescens* has smaller eradiate heads and small leaves with a scant strigose pubescence. It was apparent to Keck (1958) that *E. actoni* and *E. virginensis* A. Nels. should be separated from the rest of the complex, and Clark and Kyhos (1979, 1980) and Allan et al. (1993, 1997) showed that the latter originated by stabilization of hybrids between the former and *E. frutescens* var. *frutescens*. Discovery of distinctive plants in northeastern Baja California and examination of specimens and living plants from northern Arizona and southern Utah led me to further resolve the taxonomy of the group.

*ENCELIA FRUTESCENS* subsp. ***glandulosa*** C. Clark, subsp. nov.—**TYPE:** México. Baja California: Occasional in sandy desert, mouth of Arroyo Taraizo. 1 May 1976. Reid Moran 22966. holotype, RSA!; isotypes, DAV!, SD!.

A subspecies typica differt trichomatibus glandularibus biseriatis stipitatis foliorum, trichomatibus erectis uniseriatis latis foliorum, et phyllariis subpilosis.

Differing from subsp. *frutescens* by the presence of biseriate stalked glandular leaf hairs, erect broad uniseriate leaf hairs, and subpilose phyllaries.

Subspecies *glandulosa* occurs as far north as the region of La Ventana just south of the Laguna Salada

basin south of San Felipe in Baja California, México. North of the basin, and along its west side as far south as Cañon de Guadalupe, is subsp. *frutescens*. If the two subspecies are in contact it is most likely in the region further south along the east edge of the Sierra de Juárez. Subspecies *glandulosa* continues south an unknown distance past San Felipe and west to the base of the Sierra San Pedro Mártir.

Plants of subspecies *glandulosa* from the region of San Felipe are easily distinguished from subsp. *frutescens*; on the basis of these distinctive plants alone I might have considered describing subsp. *glandulosa* at the species rank. Further north in the area around La Ventana, however, the plants cannot be distinguished from subsp. *frutescens* without magnification, and I suspect that a zone of intergradation may exist between them. Preliminary sequences of the intergenic transcribed spacer of nuclear ribosomal DNA (ITS) are identical in subsp. *frutescens* and subsp. *glandulosa* (Clark 1995 and unpubl.).

Subspecies *glandulosa* is one of the putative parents of the stabilized homoploid hybrid species *E. asperifolia* (S. F. Blake) C. Clark & Kyhos (Clark and Kyhos 1980; Clark et al. 1980); *E. californica* Nutt. is the other putative parent.

***Encelia resinifera*** C. Clark, stat. nov.—*Encelia frutescens* var. *resinosa* M.E. Jones ex S. F. Blake, *Proc. Amer. Acad. Arts* **49**: 364, 1913, non *Encelia resinosa* Brandegee.—**TYPE:** United States. Arizona. [Navajo or Coconino Co.]: “South of Little Colorado River near Winslow Ariz.” 10 June 1850. M. E. Jones. holotype, RSA!.

*Encelia frutescens* f. *radiata* H. M. Hall, *Univ. Calif. Publ. Bot.* **3**(1): 135, 1907.

*Encelia resinifera* is the *Encelia* of the Colorado Plateau, occurring along the Colorado River from the

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Grand Canyon to the region of Moab, Utah, along the Little Colorado R. to Holbrook, Arizona, the San Juan R. beyond Mexican Hat, Utah, and at similar elevations along other smaller tributaries. Its leaves are broader than those of *E. frutescens*, and it is strictly radiate. Had the strictly *eradiate* nature of *E. frutescens* not been obscured by hybrids with *E. farinosa*, it is likely that Jones would have described *E. resinifera* as a species rather than a subspecies. Beyond their morphological distinctiveness, they differ in secondary chemistry (Proksch and Clark 1986) and sequence of the ITS region (Clark 1995 and unpubl.).

*ENCELIA RESINIFERA* subsp. **tenuifolia** C. Clark, subsp. nov.—TYPE: United States. Arizona. Coconino Co: 4 miles down Supai Trail, Havasupai Canyon. 3 June 1961. C. and C. Dailey s.n., MNA 2256/B12,747. holotype: MNA!

A subspecies typica differt foliis et corollis florum radiantium angustissimis.

Differing from subspecies *resinifera* by its much narrower leaves and ray corollas.

Subspecies *tenuifolia* occurs almost entirely within the Grand Canyon of the Colorado River in northern Arizona, ranging from the Grand Wash Cliffs east to Marble Canyon, evidently following the 1200 m contour. Plants from the east end of the canyon intergrade with subspecies *resinifera*. Northwest of the Grand Wash Cliffs, subspecies *tenuifolia* may hybridize with *E. virginensis*.

#### KEY TO THE TAXA

1. Leaves silvery pubescent, broad
  2. Rays numerous, well-developed, leaf pubescence of long, soft hairs and occasional glands . . . . . *E. actoni*
  2. Rays fewer, short, leaf pubescence of long, soft hairs, short, broad, coarse hairs, and glands . . . . . *E. virginensis*
1. Leaves green with sparse, coarse hairs, or if silvery pubescent then small or narrow and often on axillary spur shoots
  3. Rays absent, or if present then few, short, and deeply trifold
  4. Rays present, appearing stunted, capitula not strictly solitary, leaves with some long, curly hairs, plants usually growing with *E. farinosa* . . . . .  
. . . . . *E. frutescens* subsp. *frutescens* × *E. farinosa*
4. Rays absent, capitula solitary
  5. Coarse leaf hairs erect, glands present *E. frutescens*  
. . . . . subsp. *glandulosa*
  5. Coarse leaf hairs curved toward the leaf apex, glands absent . . . . . *E. frutescens* subsp. *frutescens*
3. Rays present
  6. Leaves broadly ovate, rays broad . . . . .  
. . . . . *E. resinifera* subsp. *resinifera*
  6. Leaves lanceolate or linear, rays narrow . . . . .  
. . . . . *E. resinifera* subsp. *tenuifolia*

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#### LITERATURE CITED

- ALLAN, G. J., C. CLARK, AND L. H. RIESEBERG. 1993. *Encelia virginensis* (Asteraceae): Origin and genetic composition of a diploid species of putative hybrid origin. *Amer. J. Bot.* **80**(6), Supplement, p. 129.
- , ———, AND ———. 1997. Distribution of parental DNA markers in *Encelia virginensis* (Asteraceae: Heliantheae), a diploid species of putative hybrid origin. *Pl. Syst. Evol.* **205**: 205–221.
- BLAKE, S. F. 1913. A revision of *Encelia* and some related genera. *Proc. Amer. Acad. Arts* **49**: 346–396.
- CLARK, C. 1995. Reconciling phenotypic and ITS sequence phylogenies in the *Encelia* alliance (Asteraceae: Heliantheae) to study character evolution. *Amer. J. Bot.* **82**(6), Supplement, p. 120.
- , AND D. W. KYHOS. 1979. Origin of species by hybridization in *Encelia* (Compositae: Heliantheae). Botanical Society of America, Misc. Ser., Publ. 157.
- , AND ———. 1980. Specific status for *Encelia californica* var. *asperifolia* (Compositae: Heliantheae). *Madroño* **27**: 48.
- , ———, AND W. C. THOMPSON. 1980. Evidence for the origin of diploid species in *Encelia* (Compositae: Heliantheae) by hybridization, p. 165. In: *Evolution Today*, Second International Congress of Systematic and Evolutionary Biology, Abstracts.
- KECK, D. D. 1958. Taxonomic notes on the California flora. *Aliso* **4**: 101–114.
- PROKSCH, P. AND C. CLARK. 1986. Systematic implications of chromenes and benzofurans from *Encelia* (Asteraceae). *Phytochemistry* **26**: 171–174.