

**TAXONOMY AND NOMENCLATURE OF THE *ERYSIMUM*
ASPERUM-E. CAPITATUM COMPLEX (BRASSICACEAE)**

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ABSTRACT

The *Erysimum asperum-capitatum* complex includes a vast array of taxa in the western U.S.A. and Mexico, most of these bearing specific or infraspecific names, and all to some extent intergrading in regions of allopatry. These appear to be best treated as belonging to but a single species, *Erysimum asperum*, with two subspecies: subsp. *asperum*, with but a single relatively well-marked var. *asperum*, this confined to the Great Plains Region of the central U.S.A., and subsp. *capitatum* of the higher, more western regions, the latter having an array of varietal names, the earliest being var. *elatum*, first proposed by Torrey in 1858. To accommodate the nomenclature of this overview, the following names are proposed: **E. asperum** subsp. **capitatum** (Douglas) B.L. Turner, **comb. and stat. nov.**, and **E. a.** var. **lompocense** (Rossbach) B.L. Turner, **comb. nov.**

KEY WORDS: Brassicaceae, *Erysimum*, *E. asperum*, *E. capitatum*, California.

As noted by Al-Shehbaz (1988) and Rollins (1993), *Erysimum* is a genus of about 200 species largely confined to the Northern Hemisphere. Most of its species are confined to Eastern Europe and southwestern Asia. Rollins recognized 17 species as native to North America, these largely confined to the western United States. He also provided a tortuous key to the American taxa, based upon considerable herbarium and field experience. Among American species, the most difficult taxa belong to the *Erysimum asperum-E. capitatum* complex of the western United States, which is the subject of the present contribution.

In his treatment of the complex, Rollins recognized both *E. asperum* and *E. capitatum*, distinguishing between these in his key lead 10/10, as follows:

10. Siliques rigidly spreading nearly at right angles to the rachis, tetragonal; valves strongly ribbed, densely pubescent between the ribs and sparsely pubescent on the ribs giving a striped appearance.....**E. asperum**
10. Siliques divaricately ascending to erect; valves not strongly ribbed, more or less evenly pubescent, not markedly striped.....**E. capitatum** et al.

The principal distinction between the two taxa is clearly that of silique divergence, which in mature fruiting material is readily seen. In my opinion, other than divergence, the valve distinctions called to the fore by Rollins are exceedingly arbitrary. At least these are not readily apparent in the large number of pressed specimens I have examined.

Nevertheless, *E. asperum* (the earliest name for the duo), does exist as a well defined morphogeographical entity of the Great Plains of the central United States (Figs. 1, 2), readily recognized by its smaller habit, spreading siliques, and confinement to grassland habitats. Westwards and/or upslope, *E. asperum* grades into the largely allopatric *E. capitatum*, either as a result of extant or near extant hybridization (secondary intergradation) and/or ancestral in situ divergence (primary intergradation) of the two taxa concerned. Intergradation of the latter type (allopatric introgression) is usually much more gradual and more difficult to detect than the former (sympatric hybridization), as well noted by Anderson (1953).

Weber (1990) noted that both *E. asperum* and *E. capitatum* occur in Colorado and that the former hybridizes with the latter "along the base of the foothills." He further notes that *E. capitatum* has "siliques green and almost glabrous, ascending, usually nearly parallel to the stem, although the pedicels may spread widely." He also added that *E. capitatum* is "very common and extremely variable."

Indeed, intergrades between the two taxa can be found (or inferred) throughout the region of allopatric and/or sympatric contact, this often

perceived in populations relatively remote from regions of immediate contact, suggesting long-term introgression, this supporting the view that the intergradation is of a primary nature.

Regardless, numerous floristic workers have been confounded by the two taxa, some treating these as but a single widespread variable species (e.g., Davis 1952; Hitchcock and Cronquist 1973; Harrington 1979 [who noted that *E. asperum* included elements of the *E. capitatum* complex and that its siliques may be "ascending or rarely divaricate."]; Walsh et al. 1987; Albee et al. 1988; Scott 1995 [who recognized but a single species, *E. asperum*, under this listing 22 specific names in synonymy, this perhaps unrivaled among any other plant species of the western U.S.A.]).

Even within the boundaries of California Hoover (1970), in his discussion of *E. capitatum*, *E. moniliforme* and *E. occidentale*, noted that "Herbarium specimens of both *E. occidentale* and *E. asperum* can be found which differ from individuals of *E. moniliforme* in no outwardly visible way. I suspect that, after adequate studies of the plants in all their habitats and in cultivation, these plants will ultimately be included in *E. asperum*."

Nevertheless, Price (1993), in his treatment of Californian *Erysimum* for the Jepson Manual, excluded *E. asperum* from that state, but he did recognize *E. capitatum* (albeit with at least 4 subspecies, and yet other specific segregates such as *E. franciscanum*, *E. suffrutescens*, and *E. insulare*).

Reveal (1972) summed up the controversy over the competing names thusly:

Erysimum asperum is a widespread and highly variable species that is composed of several weakly defined varieties. The type of the species comes from the Great Plains and has more or less spreading fruits. The western United States material with yellow flowers and erect fruits should be called var. *purshii*. Hitchcock (1964) was unable to determine which name should be applied to this phase, being unaware of Durand's publication. In most western floras, this phase has been called *E. capitatum* (Doug. ex

Hook.) Greene, although Welsh et al. (1965) call this plant simply *E. asperum*.

Those specimens with orangish or reddish flowers from the southern Rocky Mountains and high mountains of Utah should be called *E. asperum* var. *amoenum* (Greene) Reveal, comb. & stat. nov., based on *Cheiranthus nivalis* var. *amoenus* Greene, Pittonia 3: 137. 1896. Holmgren (1959) and Welsh et al. (1965) have called this phase *E. wheeleri* Rothr. Similar plants occur sporadically in the Pacific Northwest but appear to represent another kind as yet undescribed (Hitchcock 1964), while those of the southern Coast Range of California are called *E. asperum* var. *stellatum* J. T. Howell.

Reveal briefly outlined the nomenclatural consequences of a widespread highly variable *E. asperum* (including *E. capitatum*, this relegated to synonymy under *E. asperum* var. *purshii*), he apparently was unaware of the earlier varietal name, *E. asperum* var. *elatum* (Nutt. ex Torr. & Gray) Torr., a combination first published in 1858 (2 years before *E. asperum* var. *purshii*). The type of *E. a.* var. *elatum* (= *E. elatum* Nutt.) is from northwestern Oregon, reportedly from along the Wahlamet (= Willamet) River, first collected by Nuttall himself. Rollins (1993) included this variety within his concept of *E. capitatum* var. *capitatum*. Clearly though, if *E. capitatum* is treated within an expanded *E. asperum*, such as I do for the state of Texas, the earliest legitimate varietal name for the *E. capitatum* complex (sensu lato) is *E. asperum* var. *elatum*.

My taxonomic account of the *E. asperum*-*E. capitatum* complex can be summarized as follows:

Erysimum asperum comprises two subspecies: 1.) subsp. *asperum*, which is composed of a single, more or less well defined var. *asperum*, largely confined to the prairie lands of the central U.S.A.; and 2.) subsp. *capitatum*, which is largely confined to the more montane regions of the western U.S.A., Canada, and Mexico, although occasional populations occur in the more forested regions of the eastern U.S.A., where perhaps introduced. Within the subsp. *capitatum* numerous forms and populations exist, some seemingly worthy of varietal recognition as espoused by the criteria of Turner and Nesom (2000).

Price (1993), in his treatment of the genus *Erysimum* for California, did not recognize *E. asperum*, but instead, treated all of the taxa relating to this as *E. capitatum*. Within the latter he recognized four subspecies, as follows: 1.) subsp. **angustatum** (E. Greene) R.A. Price [= *E. capitatum* var. *angustatum* (E. Greene) Rossbach]; 2.) a typical *E. c.* subsp. **capitatum** [including *E. asperum* var. *stellatum* J. Howell, *E. capitatum* var. *bealianum* (Jeps.) Rossbach, *E. argillosum* (E. Greene) Rydb., and *E. moniliforme* Eastw.]; 3.) subsp. **lomdocense** (Rossbach) R.A. Price [= *E. capitatum* var. *lomdocense* (Rossbach) Kartez = *E. suffrutescens* (Abrams) Rossbach var. *lomdocense*]; and 4.) subsp. **perenne** (Cov.) R.A. Price [= *E. perenne* Coville) Abrams; and *E. capitatum* var. *perenne* (S. Wats. ex Cov.) R.J. Davis]. Unfortunately, as of this writing none of the aforementioned subspecies has been formalized.

Price noted that the four subspecies (or varieties) intergrade locally with peripheral subspecies, including also *E. insulare* ssp. *suffrutescens*. This being so, I am inclined to recognize the taxa concerned as varieties within the larger subspecific category, *capitatum* of *Erysimum asperum*. The formal nomenclature for the Californian taxa follows:

Erysimum asperum (Nutt.) DC., Syst. Veg. 2: 505. 1821. Based on *Cheiranthus asperum* Nutt., Gen. N. Amer. Pl. 2: 69. 1818.

Erysimum asperum (Nutt.) DC. subsp. **asperum**

Price (1993) proposed, but did not make formal, the rank of subsp. *capitatum* within his concept of *E. capitatum*.

Erysimum asperum subsp. **capitatum** (Douglas) B.L. Turner, **comb. & stat. nov.**, Based on *Cheiranthus capitatus* Douglas, in Hook. Fl Bor. Am. 1: 38. 1829.

Erysimum asperum var. **angustatum** (Rydb.) B. Boivin, *Phytologia* 16: 298. 1968.

Erysimum asperum var. **elatum** (Nutt.) Torrey, Pacific Railroad Report 7, Pt. 3. 1858. This is the earliest varietal name within the subsp. *capitatum*, having priority over *E. asperum* var.

capitatum (Douglas ex Hook.) B. Boivin, Naturaliste Canad. 94: 646. 1972.

Erysimum asperum* var. *lompocense (Rossbach) B.L. Turner, **comb. nov.** Based upon *Erysimum suffrutescens* var. *lompocense* Rossbach, Aliso 4: 123. 1958.

Erysimum asperum* var. *perenne S. Watson ex Coville, Proc. Biol. Soc. Washington: 7: 70. 1892.

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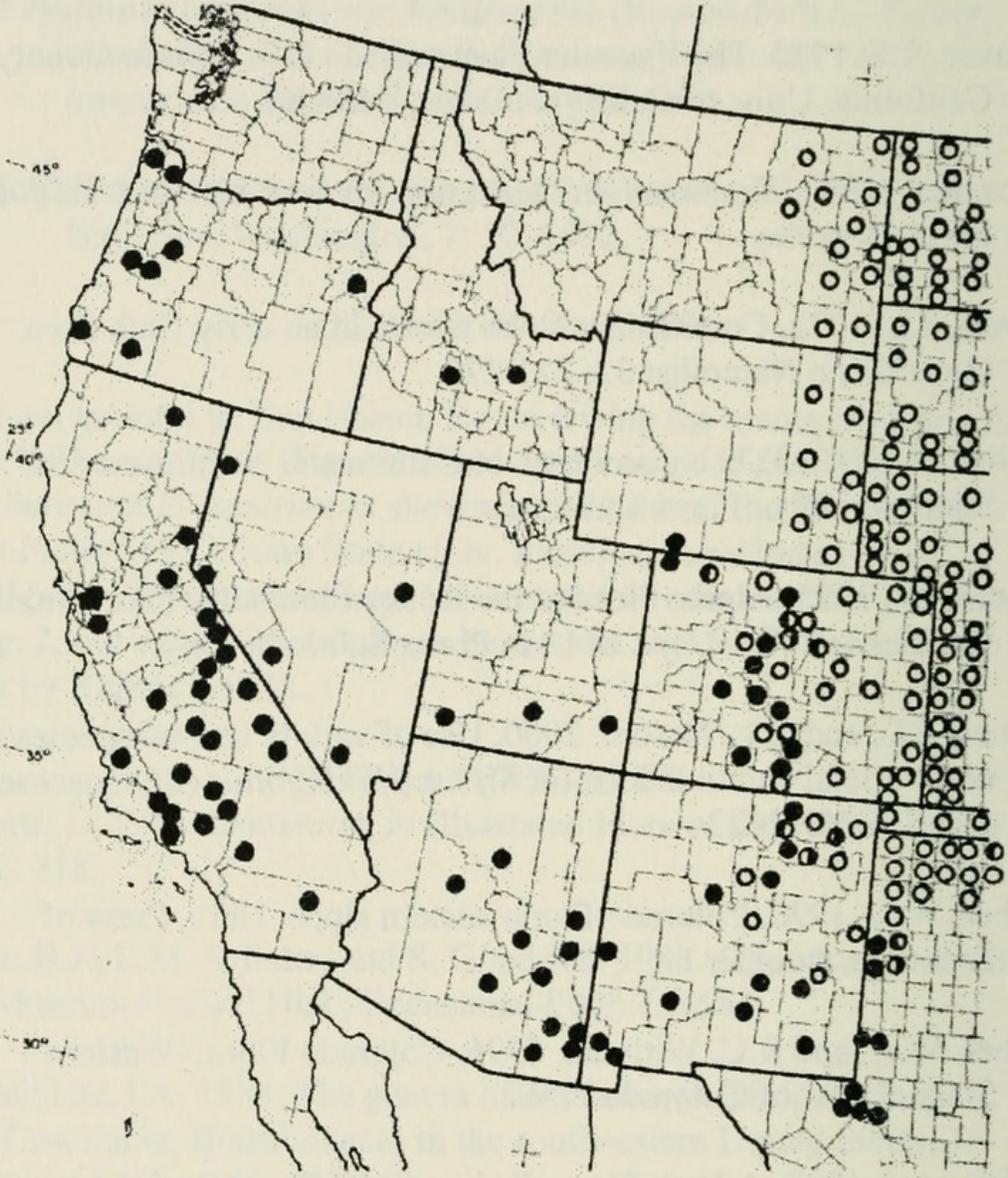


Fig. 1. Distribution of *Erysimum asperum* subsp. *asperum* (open circles); subsp. *elatum* (closed circles; intermediates (half circle)).

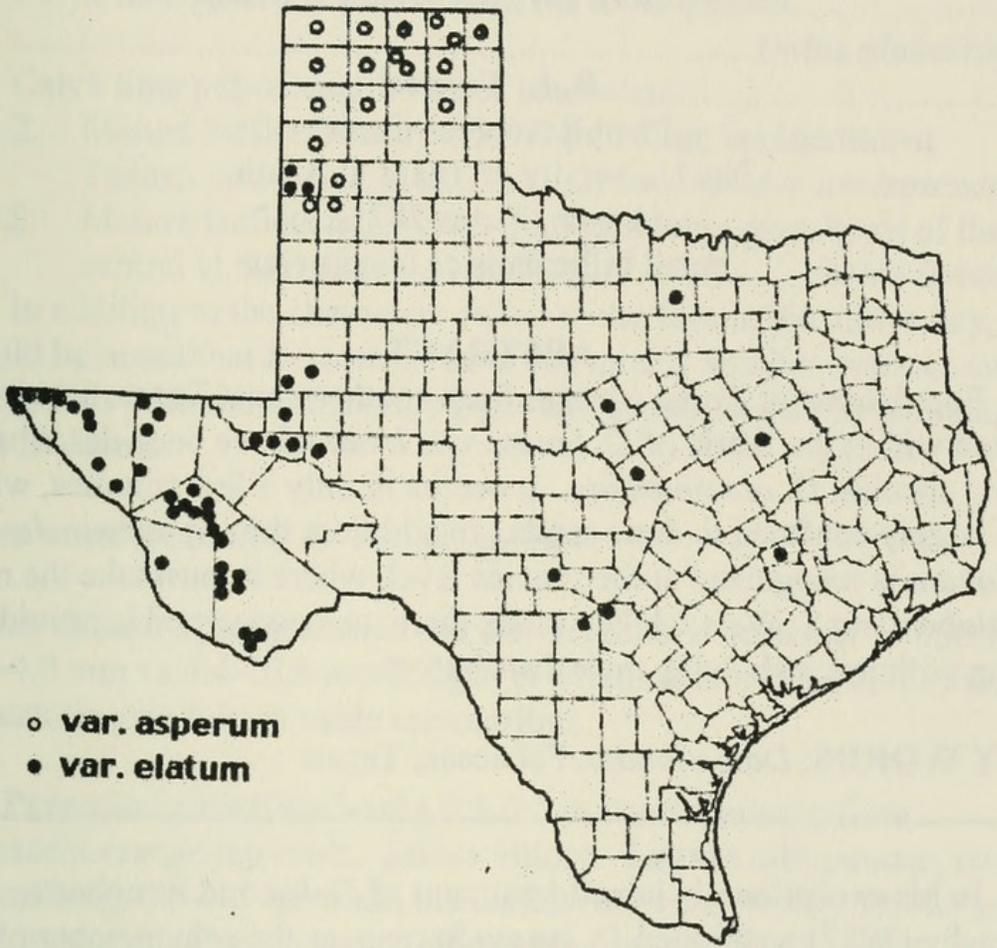


Fig. 2. *Erysimum asperum* (in Texas); Intermediates not shown.



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