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ERIOGONUM CODIUM (POLYGONACEAE: ERIOGONOIDEAE), A NEW SPECIES FROM SOUTHCENTRAL WASHINGTON

JAMES L. REVEAL, FLORENCE CAPLOW, AND KATHRYN BECK

ABSTRACT

Eriogonum codium (Polygonaceae: Eriogonoideae), a low, matted, cespitose perennial with tomentose flowers and achenes found on the Hanford Nuclear Reservation (the Hanford Site), Benton Co., Washington, U.S.A., is described as a new species. It belongs to the same group of matted perennials in the subgenus *Eucycla* as *E. chrysops* but has a cymose-umbellate inflorescence similar to *E. cusickii*. The tomentose flowers and achenes readily distinguish the new species from all of its near relatives.

Key Words: Polygonaceae, Eriogonoideae, *Eriogonum codium*, floristics, rare plants, Hanford Nuclear Reservation

The genus *Eriogonum* Michx. (Polygonaceae Juss.: Eriogonoideae Arn.), a taxon of more than 240 species widely distributed in temperate North America, is divided into eight subgenera (Reveal, 1989). The most speciose is subg. *Eucycla* (Nutt.) Post & Kuntze, containing nearly half of the known species. The majority of cespitose to pulvinate-matted perennials with captitate or cymose-umbellate inflorescences belong to the sect. *Capitata* Torr. & A. Gray. The type of this section is *E. pauciflorum* Pursh, an atypical member in the sense that it has densely tomentose flowers whereas all other species have glabrous or glandular pubescent flowers. Related to this section is another group of species that have villous or pilose flowers; and, in one of these, *E. shockleyi* S. Wats., the ovaries and achenes are densely tomentose. Prior to the discovery of *E. codium*, this was the only cespitose species of the subg. *Eucycla* with this latter condition.

Eriogonum codium Reveal, Caplow & K. Beck, sp. nov. (Figure 1). A *E. cusickii* floribus et achenis pubescentibus differt.

Low, cespitose, herbaceous perennials, the aboveground woody caudex system forming highly branched mats (1) 2–7 (9) dm across, arising from a stout, woody taproot; **leaves** basal, persistent, the leaf-blades oblanceolate to elliptic, (5) 6–12 mm long, 3–6 mm

wide, densely white-tomentose on both surfaces, only slightly less so above in some, the apex mostly acute, the base cuneate, the margin entire and plane, the petiole short, 2–8 (10) mm long, tomentose, the petiole-base elongate-triangular, 1.5–3 (4) mm long, 0.8–1.6 (2) mm wide, densely tomentose abaxially, sparsely so to glabrous adaxially; **flowering stems** scapose, erect, 2–9 cm long, tomentose, often brittle; **inflorescences** cymose-umbellate to cymose, divided 2–3 times, up to 2 cm high and 4 cm across, tomentose, each typically with a centrally positioned, pedunculate involucre and two lateral, short, dichotomous branches; **bracts** scale-like, ternate, triangular, 1–2.5 mm long, 1–2 mm wide, tomentose without, glabrous within, connate at the base; **peduncles** restricted to the lower node, (1.5) 2–5 (7) mm long, glabrous, faintly winged; **involucres** solitary, appearing congested in early anthesis, turbinate-campanulate, membranaceous, 2.5–4 mm long, 2–2.5 mm wide, tomentose to floccose without, glabrous within, the 5 sharply acute teeth 0.8–1.2 (1.5) mm long, the bractlets linear, 2–3 mm long, with marginal glands and scattered teeth, the pedicels 2–3.5 mm long, glabrous; **flowers** lemon-yellow with greenish midribs and yellowish-green bases, 2–3 mm long, moderately (at anthesis) to thinly (in fruit) tomentose without, sparsely so and minutely glandular along the midrib within, the tepals essentially similar, broadly oblong often with the apex emarginate, 1.2–1.5 mm wide, those of the inner whorl narrower (0.9–1.2 mm) than those of the outer whorl and with rounded apices, united about ½ the length of the flower; **stamens** slightly exserted, 2.5–3.5 mm long, the filaments sparsely hairy at the very base, the anthers yellow, 0.5–0.6 mm long, oblong; **achenes** trigonous, light brown, 2.5–3 mm long, sparsely tomentose, the globose base tapering to a long, 3-angled beak.

TYPE: U.S.A. Washington: U.S. Department of Energy's Hanford Site, on the northern edge of Umtanum Ridge west of Washington Highway 24 overlooking the Columbia River about 38 air miles northwest of Richland, Benton Co., on volcanic soil associated with *Grayia spinosa* (Hook.) Moq., *Artemisia tridentata* Nutt., *Salvia dorrii* (Kellogg) Abrams, *Hesperostipa comata* (Trin. & Rupr.) Barkworth, and *Pseudoroegneria spicata* (Pursh) A. Löve at about 350 m elev. in sec. 13, T.13N., R.24E., 27 Jun 1995, *Reveal, Caplow & Sackschewsky 7484*. (Holotype: US; Isotypes: BM, BRY, CAS, COLO, GH, K, MARY, MO, NY, RM, RSA, TEX, UC, WS, WTU, and elsewhere).

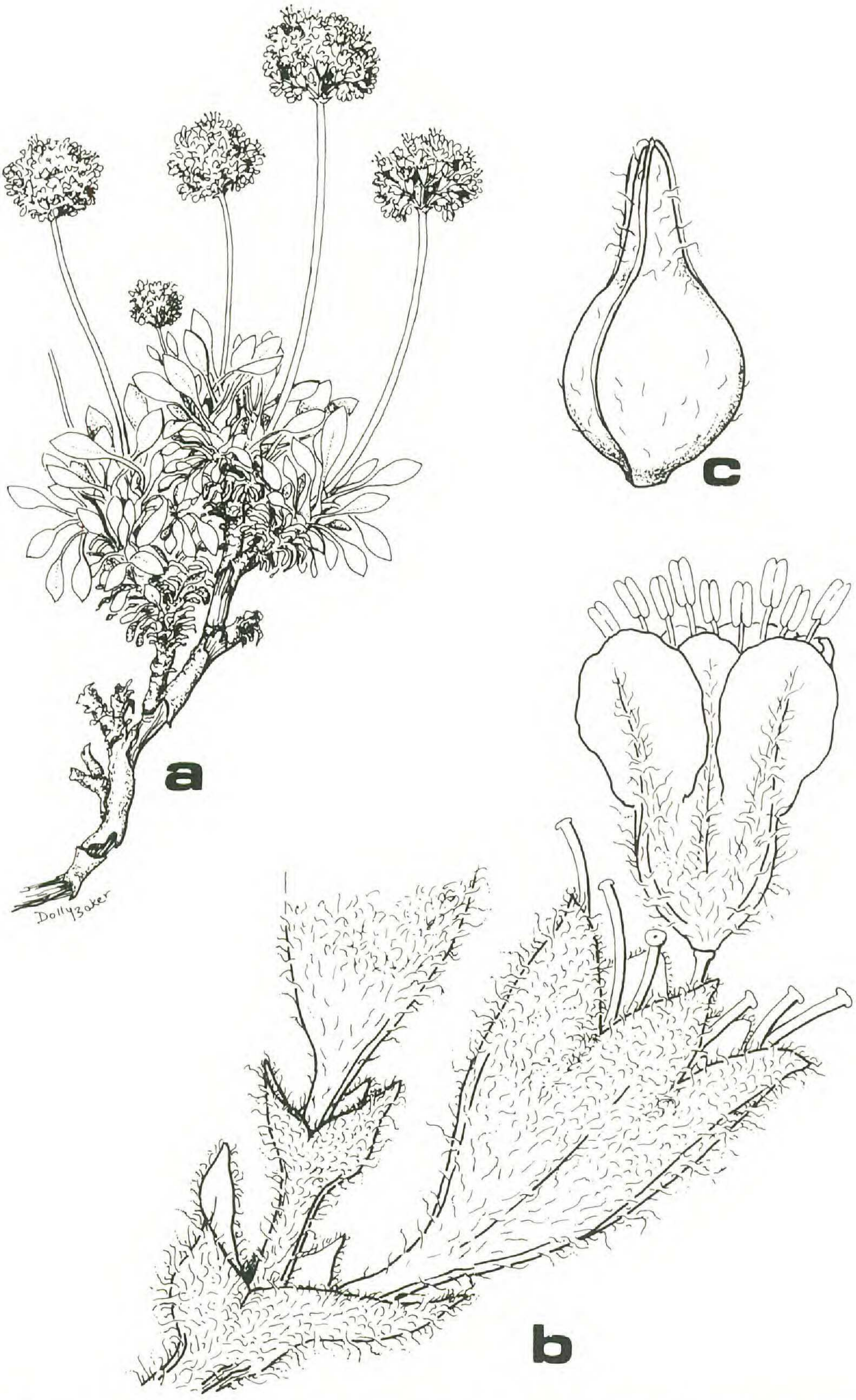

Figure 1. *Eriogonum codium* showing (a) general habit (× 0.75) with details of the (b) cymose inflorescences showing the pedunculate, centrally positioned

ETYMOLOGY: From *kodion* Gr., the diminutive of *koas,* fleece, referring to the woolly nature of the flowers and achenes.

The basalt desert buckwheat, *Eriogonum codium,* was found on the Hanford Nuclear Reservation (the Hanford Site) during the botanical survey portion of the Hanford Biodiversity Project sponsored by the U.S. Department of Energy and the Washington State Chapter of The Nature Conservancy. The new species is related to those of sect. *Capitata* noted for their highly restricted distributions and generally minor morphological differences. The majority of these species occur in the Intermountain West and are differentiated into two major groups, those with distinctly rigid involucres (e.g., *E. ochrocephalum* S. Wats.) and those with membranaceous involucres (e.g., *E. kingii* Torr. & A. Gray). The vast majority of plants in these two groups have capitate inflorescences with the involucres in clusters atop a short scape (e.g., *E. chrysops* Rydb. and *E. capistratum* Reveal). Only a few have a branched inflorescence (e.g., *E. novonudum* M. E. Peck and *E. cusickii* M. E. Jones of Oregon, and the Sierra Nevada endemic, *E. breedlovei* (J. T. Howell) Reveal). Nonetheless, none of these plants has tomentose flowers or achenes. The cymose-umbellate inflorescences of the new species readily differentiate it from the capitate Great Plains species, *E. pauciflorum,* and the sparsely tomentose flowers and achenes of *E. codium* are unlike the more densely pilose flowers and densely tomentose achenes found in *E. shockleyi.* As currently understood, *Eriogonum codium* does not appear to be closely related to any of the known species in and related to those of section *Capitata,* except that it belongs with those species related to *E. chrysops* found mainly in Oregon, Idaho, and Nevada.

Eriogonum codium is highly restricted in its distribution. The only known population occurs at elevations ranging between 340 and 400 m on flat to gently sloping substrates at the top edge of the steep, north-facing basalt cliffs of Umtanum Ridge overlooking the Columbia River. Approximately 5000 plants grow interruptedly in a narrow band 2.5 km long and generally less than 30 m wide. The plants occur only on the ridge which is subject to

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involucre on a short branch with three bracts (left) and an entire involucre with numerous pedicels, one of which bears a flower, and (c) an achene with fine hairs on the beak (both × 15).

the strong winds of the Columbia River canyon. Precipitation averages less than 15 cm annually.

The new species occurs exclusively on the exposed basaltic flow top of the Lolo Flow (mid-Miocene, 14 mybp) of the Priest Rapids Member of the Wanapum Formation (Goff, 1981), with the gaps in the population correlating with the absence of exposed flow top. The flow top material typically has high porosity and high permeability. Weathering has transformed the top into a surface comprised of pebble to gravel sized pieces of vesicular volcanic material. The average chemical composition of the Lolo basalt flow differs from the other Columbia Basin basalt formations in having high concentrations of calcium oxide, iron oxide, magnesium oxide, phosphorous pentoxide, titanium oxide, and the mineral olivine (Reidel & Fecht, 1981). In addition, the Priest Rapids Basalt flows have unusually high water-holding capacity (Reidel, pers. comm., 1995). It is not known if the strong association of *Eriogonum codium* with the Lolo Flow is related to the particular chemical composition of the flow.

The basalt desert buckwheat occurs in the shrub-steppe vegetation zone which is the primary vegetation of the Columbia Basin (Franklin and Dyrness, 1973). Perhaps as a result of the chemistry of the substrate, vegetational cover in the vicinity of *Eriogonum codium* is low when compared with other shrub-steppe sites. Common perennial associates include *Artemisia tridentata, Grayia spinosa, Krascheninnikovia lanata* (Pursh) A. D. J. Meeuse & Smit, *E. sphaerocephalum* Dougl. ex Benth., *Salvia dorrii, Hesperostipa comata, Pseudoroegneria spicata, Poa sandbergii* Vasey, *Sphaeralcea munroana* (Dougl. ex Lindl.) Spach ex A. Gray, *Astragalus caricinus* (M. E. Jones) Barneby, and *Balsamorhiza careyana* A. Gray. Common annual associates include *Bromus tectorum* L., *Phacelia linearis* (Pursh) Holz., *Gilia leptomeria* A. Gray, *G. inconspicua* (Sm.) Sweet var. *sinuata* (Dougl. ex Benth.) A. Gray, *Camissonia minor* (A. Nels.) Raven, *Mentzelia albicaulis* (Dougl. ex Hook.) Dougl. ex Torr. & A. Gray, and *Cryptantha pterocarya* (Torr.) E. Greene. Adjacent areas on Umtanum Ridge support populations of two local, rare endemics, *Lomatium tuberosum* Hoov. and *Astragalus columbianus* Barneby.

The cover of *Eriogonum codium* is higher than that of most other species within its habitat. There is a wide range of size and age classes within the population. In 1995 (a wet year), plants were in flower from early May through late August. Seed set,

however, was low with less than five percent of the flowers producing mature, viable seed in 1995. Seed germination has not been evaluated.

Umtanum Ridge is currently managed by the U.S. Department of Energy. The Hanford Site has large areas of relatively undisturbed, high-quality shrub-steppe vegetation due to the cessation of virtually all agricultural and grazing activities when the Site was established in 1943. Therefore, the population of *Eriogonum codium* does not appear to be threatened by human activity at this time. Change in ownership or changes in the Department of Energy's management policies could allow public access, the use of off-road vehicles, and/or livestock grazing. If public access is allowed in this area, the population could also be affected by petrified wood collectors. Major deposits of petrified wood occur in the substrate throughout the area. Petrified wood is often collected with the aid of bulldozers and other heavy machinery. Any change of ownership or management of the Umtanum Ridge area could potentially threaten the viability of this highly restricted species.

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J. L. R.
DEPARTMENT OF PLANT BIOLOGY
UNIVERSITY OF MARYLAND
COLLEGE PARK, MARYLAND 20742-5815

F. C. & K. B.
CALYPSO CONSULTING
3963 SQUALICUM LAKE ROAD
BELLINGHAM, WA 98226