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Author(s): Kim L. Marsden and Michael G. Simpson

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ERYNGIUM PENDLETONENSIS (APIACEAE), A NEW SPECIES FROM SOUTHERN CALIFORNIA

KIM L. MARSDEN¹ AND MICHAEL G. SIMPSON

Department of Biology, San Diego State University, San Diego, CA 92182-4614

ABSTRACT

Eryngium pendletonensis (Apiaceae) is a new species from Camp Pendleton Marine Corps Base, San Diego County, CA. It occurs in seasonally moist grasslands, swales, and vernal pools on coastal slopes and mesas and is distinguished from other species of *Eryngium* sect. *Armata* in having a combination of flower bracts with thickened margins, pinnately divided leaves, and short, central primary stem axes.

Eryngium L. sect. *Armata* Sheikh contains 12 species (14 infraspecific taxa) of perennial plants distributed in California, western Oregon, southeastern Washington, southwestern Idaho, and northern Baja California, Mexico (Sheikh 1978, 1983). Ecological studies conducted at Camp Pendleton Marine Corps Base, San Diego County, CA (Bliss and Zedler 1993) resulted in the discovery of a new taxon referable to this section (Hickman 1993, 1996; Munz 1959, 1968).

Eryngium pendletonensis K. L. Marsden & M. G. Simpson, sp. nov.—TYPE: USA, California, San Diego Co., Camp Pendleton Special 1-DMATC series V795S ± 10", Camp Pendleton Marine Corps Base, bluffs just south of Las Pulgas Creek (Red Beach), 15 m (50 feet) north of the Harrier Pad at Red Beach, disturbed grassland habitat on an eroding coastal bluff, 33°17'09"N, 117°27'17"W, 30 m (100 feet) elevation, 13 Jun 1992, *K. L. Marsden 13VI92A* (holotype: SD 142722; isotypes: BCMEX, CAS, DAV, LA, MO, RSA, SDSU, UC, UCR, UCSB, US).

Differt a *Eryngio pinnatisecto* indumentis minus scabris, habitibus prostratis, axibus primariis brevioribus (1–6 cm), et floribus capitulorum paucioribus.

Plants herbaceous perennials, 0.5–2 dm tall; growth apparently colonial, several individuals often clumped together giving the appearance of one plant, clumps up to 5 dm in diameter; roots fascicled, adventitious, arising from a short, erect rootstock; rootstock (a caudex) brown, as wide as long, 5–10 mm, giving rise to basal leaves at apex, slightly thickened relative to aerial stems; aerial stems a central primary axis (continuous with rootstock) plus (0–)1(–2) lateral primary axes arising from apex of rootstock (Fig. 1); central primary axis erect, 1–6 cm long at maturity (Fig. 5); branching of primary axes dichasial, at apex giving rise to two cauline leaves, a terminal pedunculate head, and

(1–)2 secondary axes; this dichasial pattern repeated up to 6 times in secondary and subsequent axes (Fig. 1); all aerial axes ribbed, ribs scaberulous; leaves basal and cauline; basal leaves arising from apex of rootstock, sheathing, crowded; first 3–7 leaves typically linear to acicular, unlobed, with transverse septa; later leaves pinnately to bipinnately divided (Figs. 2B, 3A), 8–25 cm long, oblanceolate in outline, septate only in petiole region, ascending at first, drooping with maturity, withering or senescing prior to or at the onset of flowering; leaf lobes mostly narrowly elliptic to lanceolate, often apiculate at maturity; cauline leaves opposite, resembling basal leaves but not septate, size diminishing with distance from rootstock; inflorescence a pedunculate, congested head (Fig. 2C), inflorescence bracts absent, flowers 9–19 per head, head size (including number of flowers) diminishing with distance from rootstock; peduncles 2–3 cm long; flowers bisexual, actinomorphic, erect, sessile, 3–4 mm long (Fig. 2D); flower bracts (Figs. 2C, D, 4) 5–21 mm long (decreasing in size from

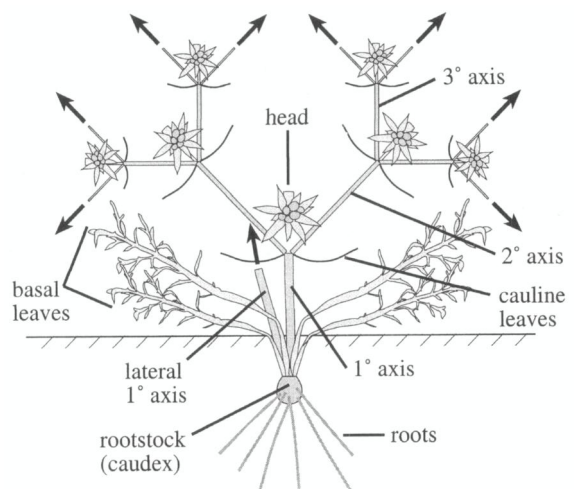


FIG. 1. Diagram of *Eryngium pendletonensis* growth habit. Note that axes actually have a sprawling, not erect, habit.

¹ Current address: U.S. Fish and Wildlife, 2730 Loker Ave. West, Carlsbad, CA 92008.

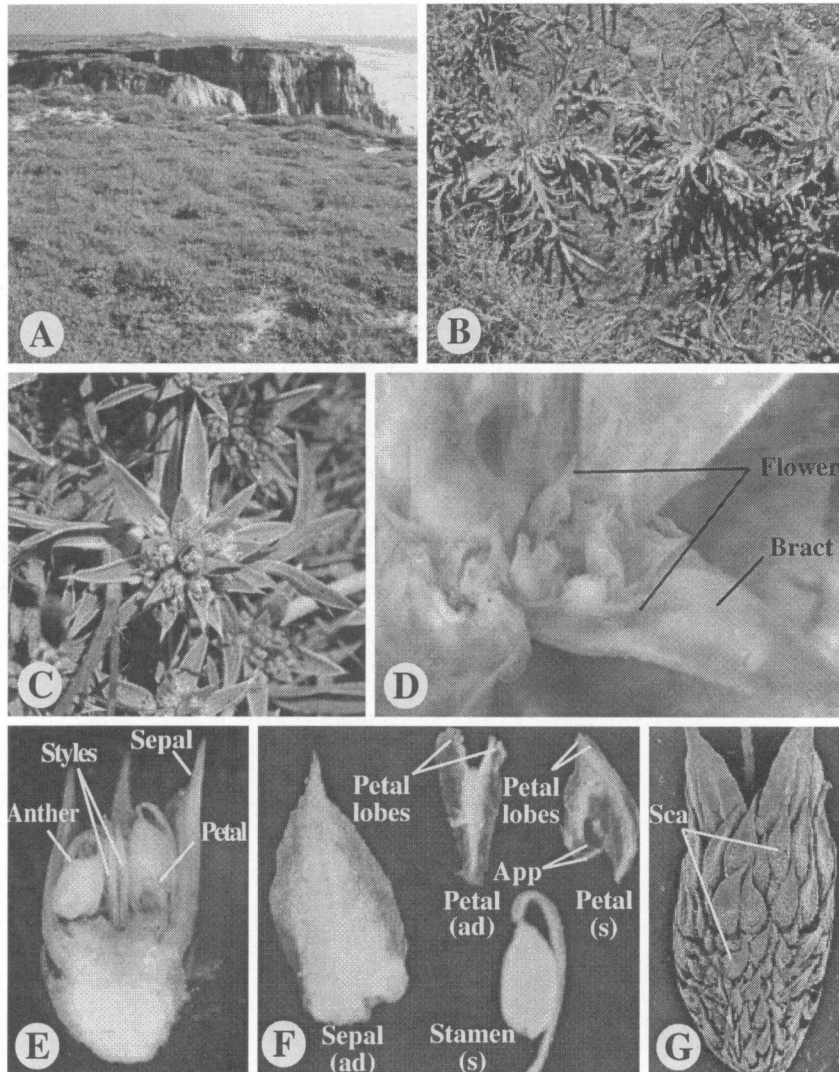


FIG. 2. *Eryngium pendletonensis*. A. Habitat, type locality. B. Whole plant, prior to flowering. C. Head with flowers subtended by bracts. D. Close-up of flower and bract. E. Flower close-up, with facing sepals, petals, and stamens removed. F. Dissected floral parts. G. Mature fruit, showing numerous scales (scanning electron micrograph). Abbreviations: App = appendages of petal; Sca = scales of fruit; (ad) = adaxial side facing; (s) = side view (adaxial at left).

base to apex of head), sessile, narrowly triangular to lanceolate, flat to conduplicate, apically acuminate-spinose, margins entire, thickened, abaxial surfaces mostly with very sparse to dense, minute scabrosity, especially along the veins, with white membranous basal sheaths at lower third, sheaths open, wrapping around the ovary, margins sometimes overlapping; perianth dichlamydeous, imbricate; calyx aposepalous, approximately 2 mm long, green; sepals oblong to ovate, 1-veined, with widely scarios margins, each apex with an apiculate process (Fig. 2E, F); corolla apopetalous; petals ca. 1 mm long, white, membranous, delicate, caducous, 1-veined, surface folded along central vein such that abaxial surfaces face one another (reduplicate);

apex incurved to near petal base, ending in 2 elongate appendages; folded surfaces forming fimbriate lobes at mid-region (Fig. 2E, F); androecium uniseriate; stamens 5, apostemonous, whorled, antise-palous; filaments incurved early in development, extended and ca. 2.1 mm long at maturity; anthers yellow, narrowly oblong, thecae angled in cross-section, basifixed, longitudinally dehiscent; ovary inferior, 1–1.2 mm long, obovoid, slightly angled, covered with overlapping, hyaline scales persistent in fruit; carpels and locules 2; placentation apical-axile; ovules 1 per carpel; stylopodium low, 2-lobed; styles 2, ascending; stigmas terminal, obscure; fruits oblance-ovoid, prismatic, 5-angled and ribbed; scales lanceolate to lance-ovate, acuminate,

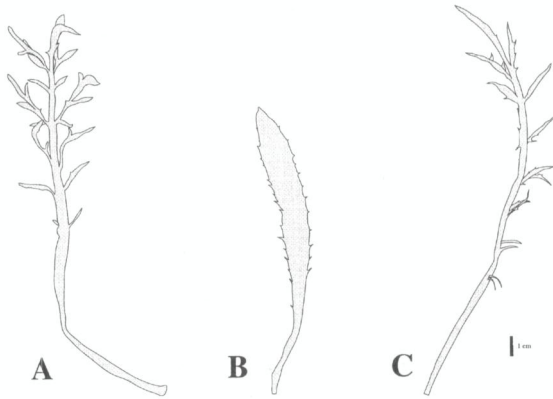


FIG. 3. Leaf outlines. A. *Eryngium pendletonensis*. B. *E. armatum*. C. *E. pinnatisectum*.

variable in size (Fig. 2G); cotyledons linear. Chromosome number: $2n=16$ II (counted at metaphase I of microsporogenesis; equivalent to $2n=32$; see Strother & Nesom 1997).

Paratype. Near Oceanside, southern California, 16 Apr 1902, G. B. Grant, *s.n.*, (DS 129228).

Distribution, habitat, phenology, and rarity. *Eryngium pendletonensis* is a narrow endemic to San Diego County, CA, in ca. 25 square kilometers (9 square miles) of Camp Pendleton Marine Corps Base (ranging within $33^{\circ}21'04''$ – $33^{\circ}33'11''$ N; $117^{\circ}23'27''$ – $117^{\circ}31'40''$ W), where it occurs along exposed coastal bluffs (Fig. 2A) and grasslands. Clay soils of the Huerhuero series (Bowman 1973) are the substrate type. The vegetation type of the surrounding area is disturbed native grassland or sparse Coastal Sage Scrub. Common associates include *Artemisia californica* Less., *Dudleya blochmaniae* (Eastw.) Moran, *Hemizonia fasciculata* (DC.) Torrey & A. Gray, *Lasthenia californica* Lindley, *Chlorogalum parviflorum* S. Watson, *Linanthus dianthiflorus* (Benth.) E. Greene, *Isocoma menziesii* (Hook. & Arn.) G. Nesom, *Grindelia camporum* E. Greene var. *bracteosum* (J. Howell) M. A. Lane, *Sisyrinchium bellum* S. Watson, *Brodiaea filifolia* S. Watson, *Juncus bufonius* L., *Nassella pulchra* (A. Hitchc.) Buckworth, *Vulpia myuros* (L.) C. Gmelin, *Avena barbata* Link, and *Bromus* spp.

Plants flower from April to June. Flowering is diurnal and is roughly synchronous within a population. Heads remain largely intact in fruit. Small beetles, flies, native bees, and wasps have been observed visiting the flowers.

Factors contributing to the rarity of *Eryngium pendletonensis* include its narrow habitat specificity and small geographic range. The species has a patchy distribution and can be locally abundant within subpopulations. Although no population trend data are available, ongoing military training activities pose a threat to this species. Populations

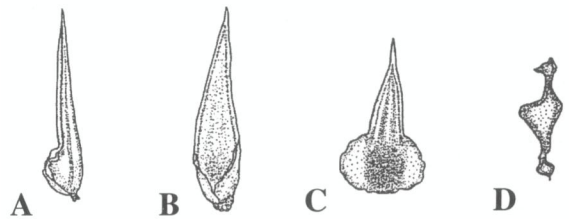


FIG. 4. *Eryngium pendletonensis* flower bracts. A. Outer flower bract, side view, adaxial at left. B. Outer flower bract, adaxial side facing. C. Inner flower bract, flattened to show scarious base, adaxial side facing. D. Outer bract cross-section at mid-region, showing thickened margins.

that occur on the coastal bluffs are especially at risk.

Relationships. Within *Eryngium* sect. *Armata*, *E. pendletonensis* resembles *E. armatum* (S. Watson) J. Coulter & Rose and *E. pinnatisectum* Jepson in having flower bracts with thickened, entire margins (Fig. 4). All other species in this section have flower bracts with unthickened, spinose margins. *Eryngium pendletonensis* differs from *E. armatum* in that the latter has undivided, serrate leaves (Fig. 3B). *Eryngium pendletonensis* differs from *E. pinnatisectum* (Fig. 3C) in that the former has a shorter primary axis (Fig. 5), a sprawling (as opposed to more erect) habit, fewer flowers per head, and reduced scabrosity on flower bracts and ribs of stem axes, resulting in a mostly greenish coloration (as opposed to silvery in *E. pinnatisectum*).

REVISED KEY TO THE SPECIES OF ERYNGIUM IN CALIFORNIA

(Appropriate section modified from the Jepson Manual, Hickman 1993, 1996)

- 4. Bracts and bractlets very rigid, margins gen entire, prominently thickened
- 5. Lf unlobed, margin gen sharply serrate to irregularly cut *E. armatum*
- 5' Lf pinnately to bipinnately lobed

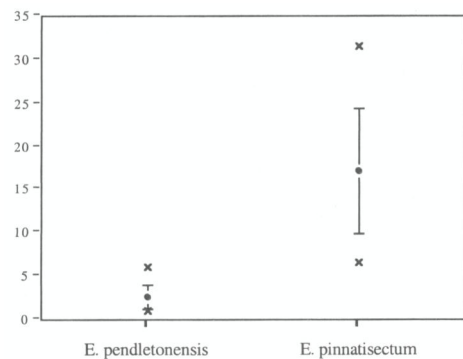


FIG. 5. Primary axis length (in centimeters) of *E. pendletonensis* (sample size = 42 individuals) and *E. pinnatisectum* (sample size = 23 individuals). Means = ●; ranges = x; bars = ± 1 standard deviation of the mean.

- 6. Pl erect, silvery, primary stem axis 7–32 cm; n&c SNF *E. pinnatisectum*
- 6' Pl sprawling, greenish, primary stem axis 1–6 cm; SCo. *E. pendletonensis*
- 4' Bracts and bractlets ± flexible, margin generally sharply toothed, not thickened

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