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ERIASTRUM JOHNSONII (POLEMONIACEAE), A NEW SPECIES FROM THE WESTERN TRANSVERSE RANGES OF CALIFORNIA

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ABSTRACT

Eriastrum johnsonii D. Gowen & K. Pankratz, **sp. nov.**, is described — it is known only from the San Francisquito Canyon area (Los Angeles County) of the Transverse Ranges of California. It is distinguishable particularly by its pink-purple corollas and glandular pubescence.

In the early 2000s the first author noticed a collection at UC/JEPS identified as *Eriastrum* aff. *sparsiflorum* that did not fit with known *Eriastrum*. The stamens were too long for *E. sparsiflorum* (Eastw.) H. Mason and the anthers were too large for *E. filifolium* (Nutt.) Wooton & Standl. In subsequent years he made several collections and propagated plants in an Oakland garden to compare them with other species growing there. Evidence now is at hand to support the recognition of this small population system as a distinct species.

Eriastrum johnsonii D. Gowen & K. Pankratz, **sp. nov.** (Figs. 1 and 2). **TYPE**: **CALIFORNIA**. Los Angeles Co.: Easterly sloping ridge of Red Mtn., along firebreak above the saddle between Ruby and Clearwater canyons, 1 Jun 2022, *D. Gowen 1667* (holotype: JEPS; isotype: BRY).

Differing from *E. filifolium* by having larger anthers (0.75–1.5 mm vs. 0.5–1.1 mm) and corollas (9.3–11 mm vs. 7–9 mm), and having minutely glandular-pubescent vegetative parts. Sharing the glandularity of *E. sapphirinum* subsp. *ambiguum* (M.E. Jones) H. Mason but differing by having shorter anthers (0.75–1.5 mm vs. 1.5–1.75 mm) and proportionally shorter corolla lobes (lobes ca 35% corolla length vs. ca 50%).

Plants erect to somewhat spreading annual, to 27 cm tall, but most often shorter, usually appearing bushy rather than virgate; stems simple or often with several main stems from the base, not thin and brittle, internodes often short giving a zig-zag appearance, 0.2–3 cm; herbage lightly floccose and noticeably minutely glandular-pubescent. **Leaves**: lower leaves linear but not filiform, 1.6–3.1 cm long, dark green, subulate or awn-tipped, upper leaves 0.8–1.9 cm long, pinnate with one pair of lateral lobes or entire, lateral lobes to ca. 5 mm long. **Inflorescence** heads terminal on short branches and axillary, lightly woolly but not concealing the architecture, 0.8–1.4 cm long excluding tips of bracts; larger bracts 9–12 (–15) mm long, equal to slightly exceeding heads, pinnate with 1 pair, occasionally 2 pairs of lateral lobes 2–5 mm long, shorter bracts 6–10 (–12) mm long with 1 pair of lateral lobes 1.5–2.5 mm long. **Calyx** (4.1–) 5.4–7.2 (–8.3) mm long, densely woolly and minutely glandular pubescent, lobes unequal, tips not obscured by trichomes. **Corolla** regular, sub-salverform, 8–11 mm long, lobes pinkish-purple, throat plus tube 5.0 – 6.3 mm long, yellowish or white in the throat, blending to whitish in the tube, lobes (3.0–) 3.5–3.8 (–4.0) mm long and (0.95–) 1.2–1.6 (–1.8) mm wide. **Stamens** 3.8–5 mm long, attached 1.0 –1.4 (–1.5) mm below sinus, exserted 1/2–3/4 the length of the corolla lobe; filaments 2.5–3.5 mm long; anthers versatile, 0.75–0.85 (–.93) mm long

(dry), 1.3–1.5 mm long (rehydrated). **Style** 3.5–3.9 mm long, stigmas 0.4–0.45 mm long. **Capsule** ca 5+ mm long and 2 mm wide; 3-loculed, each locule with 2–3 seeds.

Additional collections. **California**. Los Angeles Co.: Open gravelly bank, Elizabeth Lake Canyon, N Los Angeles County, 7 Jun 1930, *Hoffmann s.n.* (SBBG image!); lower flat, Bouquet Canyon, L.A. Co., 2 May 1931, *Hoffmann s.n.* (SBBG! and image!); Lower, easterly ridge of Red Mtn. ca 700-840 m SE of the saddle between Ruby and Clearwater Canyons, 23 May 1993, *Ross & Boyd 7251* (RSA, SFSU image!, UC!, UCR image!, US); San Francisquito Canyon, west side of canyon at eastern end of Red Mountain ridge system, just north of confluence with Bee Canyon and 1.5 miles by road south of the Clearwater Canyon Truck Trail 6N24, 6 May 1997, *Boyd & Raz 9706* (ASU image!, OBI image!, RSA, UCR image!); Liebre Mountains region, approximately 765 meters south of Deer summit (3599'), along ridge between Dry Canyon and Haskell Canyon, 2001 Stables Fire area, 8 May 2002, *Soza & Gross 1456* (RSA image!); W of San Francisquito Canyon on firebreak SW of Plum Spring and ca 1/2 mi S of 6N24, 9 May 2007, *Gowen 710* (JEPS); same area, 19 Jun 2008, *Gowen 953* (JEPS); fairly steep firebreak at junction of Ruby Canyon and Tule Ridge roads, 15 May 2016, *Gowen 1330* (JEPS); same area, 25 May 2017, *Gowen 1419* (JEPS); firebreak along ridge on E slope of Red Mtn, *Gowen 1420*; (JEPS) same area as *Gowen 1330* (JEPS), 16 Jun 2020, *Gowen 1549* (JEPS); same area, 31 May 2022, *Gowen 1666* (JEPS); E of San Francisquito Canyon on Del Sur Ridge Road (6N18), S of junction with Quarry Road, 25 May 2017, *Gowen 1424* (JEPS).

Distribution and habitat. *Eriastrum johnsonii* is only known from a small area of the western Transverse Ranges in northwestern Los Angeles County. This area is centered at the upper end of San Francisquito Canyon, with Warm Springs Mountain and Elizabeth Canyon to the west and Sierra Pelona and Bouquet Canyon to the east. Encompassed within the Liebre Mountains, the region was the subject of a flora (Boyd 1999) in which the species was catalogued as *E. filifolium*. The habitat is primarily sparsely vegetated openings of chaparral, as well as on bare areas of fuel breaks. Populations have been found between 609 and 1433 meters elevation (2,000–4,700 feet).

There have been relatively few collections of the new species, but several observations of this species are posted on iNaturalist.org. As shown on Map 1, all the known locations are within an area approximately 20 km long (12 miles) and 8 km wide (5 miles).

Discussion. Because the new species has been so seldom encountered, there has not been consensus as to its relationships. Hoffmann labeled one of his collections simply *Hugelia* Benth. and the other as *Hugelia virgata* Benth., *Hugelia* being the name applied to the genus prior to Craig (1934) placing them into *Gilia*. Neither of these collections has been formally annotated during the ensuing 90 years. The earliest collection, *Hoffmann s.n.* from Elizabeth Lake Canyon, was mentioned by Craig (1934) under *Gilia filifolia* [*Eriastrum filifolium*] as a "large flowered intergrade with *virgata.*" Craig treated the three subspecies of *Eriastrum sapphirinum* (Eastw.) H.Mason, subsp. *ambiguum* (M.E. Jones) H. Mason, subsp. *dasyanthum* (Brand) H.Mason, and subsp. *sapphirinum*, as well as *E. virgatum* (Benth.) H. Mason, as varieties of his *virgata*. This group, other than *E. virgatum*, is notable by having varying degrees of glandular pubescence.

More recent collections have been identified either *E. sparsiflorum* or *E. filifolium* and treated as *E. filifolium* by De Groot (2016). Several characters help to differentiate the new species from *E. filifolium* as presented in Table 1. *Eriastrum johnsonii* has corollas ±10 mm long and anthers ±1 mm long, that appear to be about twice as long as wide. *Eriastrum filifolium* has corollas ±7 mm long and anthers ±0.5 mm long, that appear to be barely longer than wide. Flower color is a pinkish-purple in *E. johnsonii*, and while most often *E. filifolium* corollas are bluish, they can be a light pink-purple in the Santa Barbara County plants. The new species is minutely glandular pubescent, which is apparently unknown in *E. filifolium*. Additionally, the distribution of the two plants is distinct — the

core range of *E. filifolium* (San Diego County and southward) is approximately 160 kilometers (100 miles) south of the known *E. johnsonii* occurrences, while the second population center of *E. filifolium* is in northwestern Santa Barbara County about 160 kilometers (100 miles) to the west.

Glandular pubescence is uncommon within *Eriastrum*, being most notable among the subspecies of *E. sapphirinum* as well as *E. sparsiflorum*. The glandularity and flower color of the new species has similarities to forms of *E. sapphirinum* subsp. *ambiguum* that occur not far distant (e.g., *Gowen 957* from Plum Canyon) and we suspect that there is a close relationship between the two. They differ in numerous ways, among them the proportionally shorter corolla tube and longer anthers of *E. sapphirinum* subsp. *ambiguum*. This taxon, primarily a desert form, is near its southern extent at the Transverse Ranges and is found as far north as Lone Pine in Inyo County. It was neglected in several treatments (Harrison 1972; Patterson 1993; De Groot et al 2012) and later treated as subsp. *brevibracteatum* (De Groot 2016), but this name should be considered a synonym of subsp. *ambiguum* (Gowen 2023).

Table 1. Comparison of several characters of *Eriastrum johnsonii*, *E. filifolium*, and *E. sapphirinum* subsp. *ambiguum*. Measurements are a composite of our own, Craig (1934), and De Groot (2016, as subsp. *brevibracteatum*).

	E. johnsonii	*E. filifolium*	*E. s.* subsp. *ambiguum*
distal stem surface	glandular-pubescent	subglabrous to lightly floccose	densely glandular hairy
corolla length	9.3–11	7–9	7–10.4
corolla lobe length	(3.0–) 3.5–3.8 (– 4.0)	2.5–3.0	3.5–5.3
corolla lobe/tube	34–37%	33–36%	50–51%
corolla color	pink-purple	blue, pink-purple	blue, pink-purple, white, yellow
anther length dry rehydrated	0.75–0.85 (–.93) dry 1.3–1.5 rehydrated	0.47–0.60 dry 0.8–1.1 rehydrated	? dry 1.5–1.75 rehydrated
seeds per locule	2–3	3–5	1–2 (3?)

Etymology. The specific epithet honors Leigh A. Johnson, a familiar name especially regarding Polemoniaceae as a long-time contributor to knowledge of the family. He is a long-time friend and collaborator and a faculty member at BYU. The first author was fortunate to stumble upon his gentle and inclusive way of teaching 20 years ago. And both authors have the good fortune to be working with him still today.

Conservation status. Given the small geographic area of occurrences and limited number of populations, we consider *Eriastrum johnsonii* a rare plant and recommend its inclusion in the CNPS Inventory with a rare plant rank of 1B.3.

Geographic-geologic discussion. *Eriastrum* species as a group are not widespread across the landscape. They have exacting requirements for their habitats, which include generous heat, sunlight, and good soil drainage. They are poor competitors with other vegetation, so they occur on open flats, gentle slopes, and often on a soil substrate or texture that is not always widespread in an area. Perhaps these conditions also provide the less competitive environment necessary for them.

Figure 1. Upper. *Eriastrum johnsonii* at type locality. Left. Portion of flowering head showing large anthers and glandular pubescence. Right. Typical bushy habit. Lower. Scans of pressed specimens (*Gowen 1419*). White bar represents 1 cm.

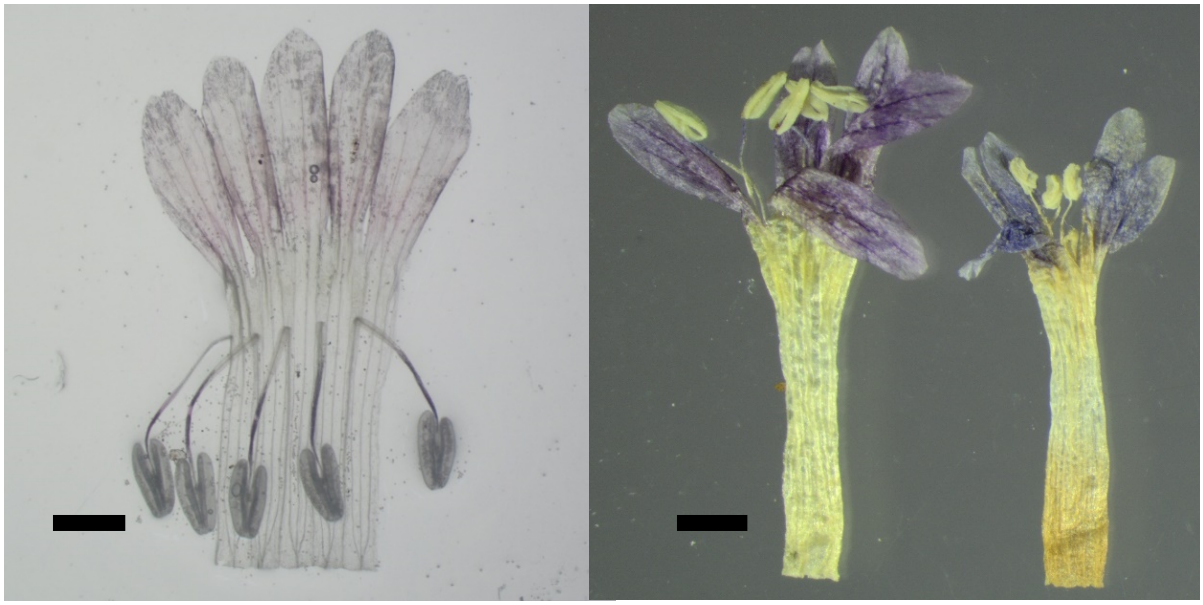
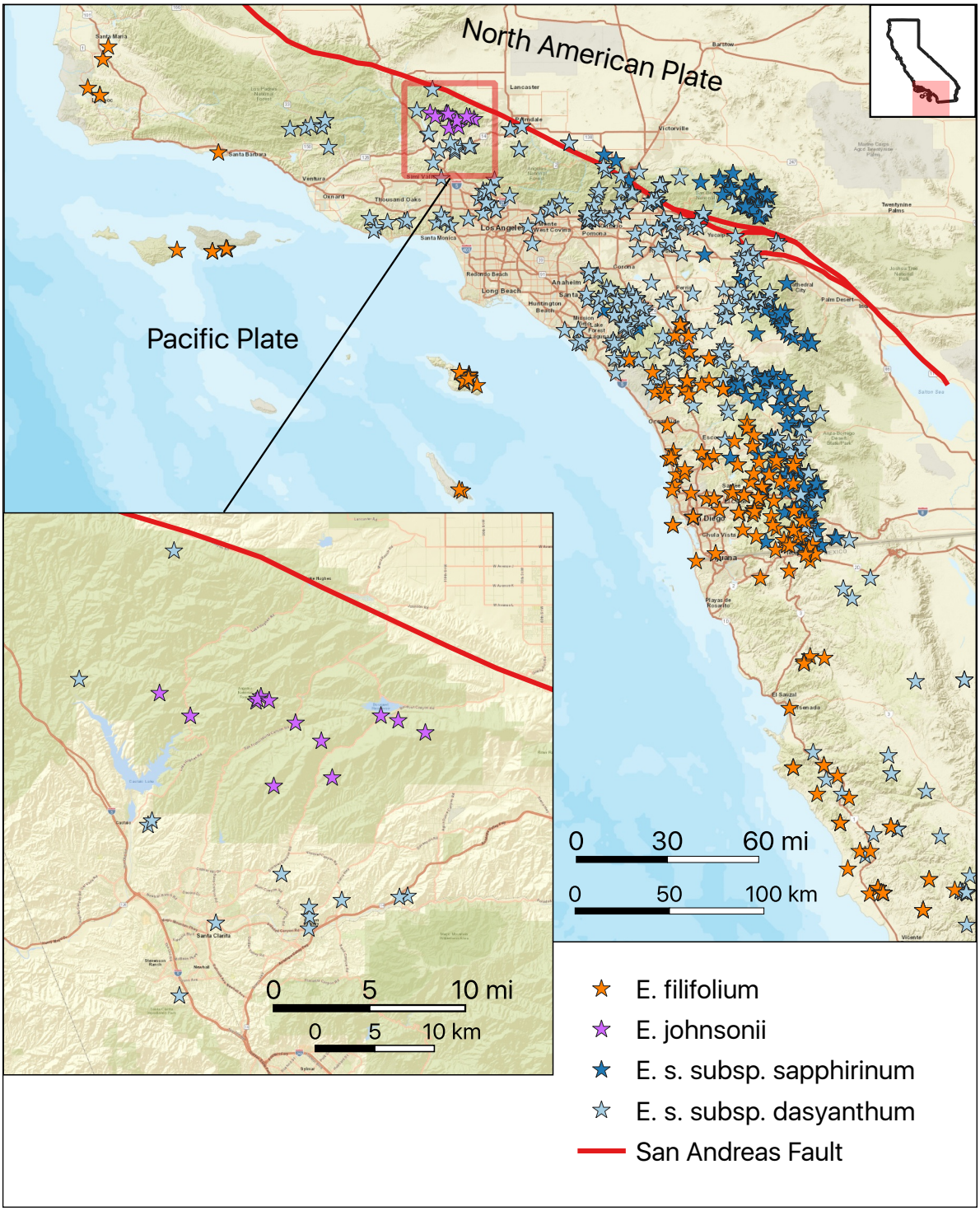


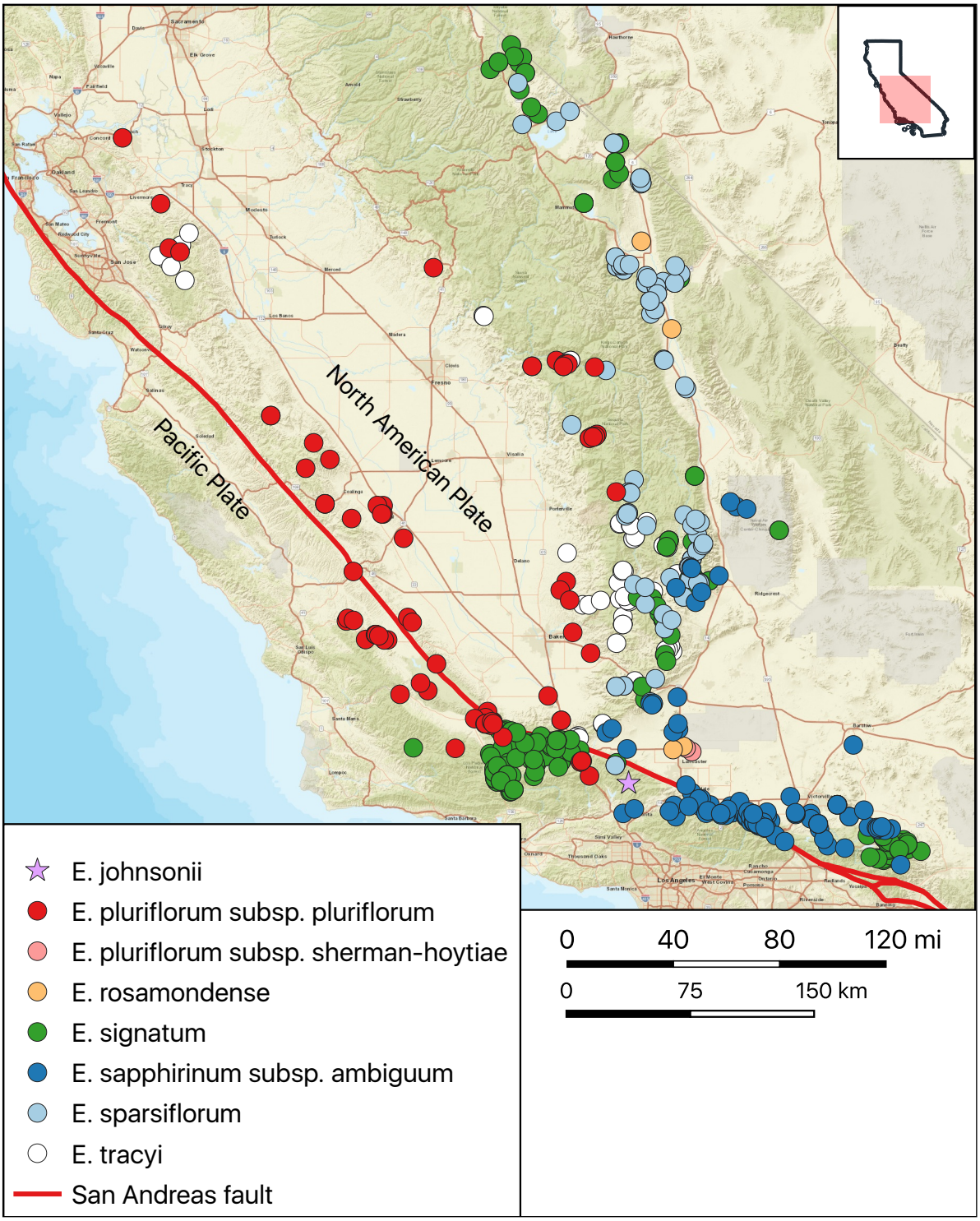
Figure 2. Left. *Eriastrum johnsonii* dissected corolla (*Gowen 1419*). Right. Corolla size comparison between *Eriastrum johnsonii* on the left (*Gowen 1667*) and *Eriastrum filifolium* on the right (*Gowen 936*). Black bar represents 1 mm.

Eriastrum johnsonii occurs in a small area of the Transverse Ranges referred to as the Ridge Basin, which comprises an area approximately 6–15 km wide and 30–40 km long, more or less bounded by two faults, the San Andreas on the north and the San Gabriel on the south (Crowell 1982). This basin consists of various marine sediments that were later uplifted. Toward the east end of this basin lies a strata named the San Francisquito Formation (Dibblee 1967), also bounded by faults, the Clearwater on the north and the San Francisquito on the south. This formation overlaps, along its eastern side, older rocks of Pelona Schist. All the known sites for *Eriastrum johnsonii* occur within these two small geologic units (Map 3.). A distinctive boundary of this geology is readily apparent, as a main forest service road (6N24) essentially follows the Clearwater fault from San Francisquito Canyon in the east to Elizabeth Lake Canyon in the west. *Eriastrum johnsonii* is found on the slopes and flats immediately south of this road/boundary, but it has not been found north of this road. This geology, primarily of sediments, contrasts with the typical habitat of *E. filifolium* in San Diego County, which most often is granitic.

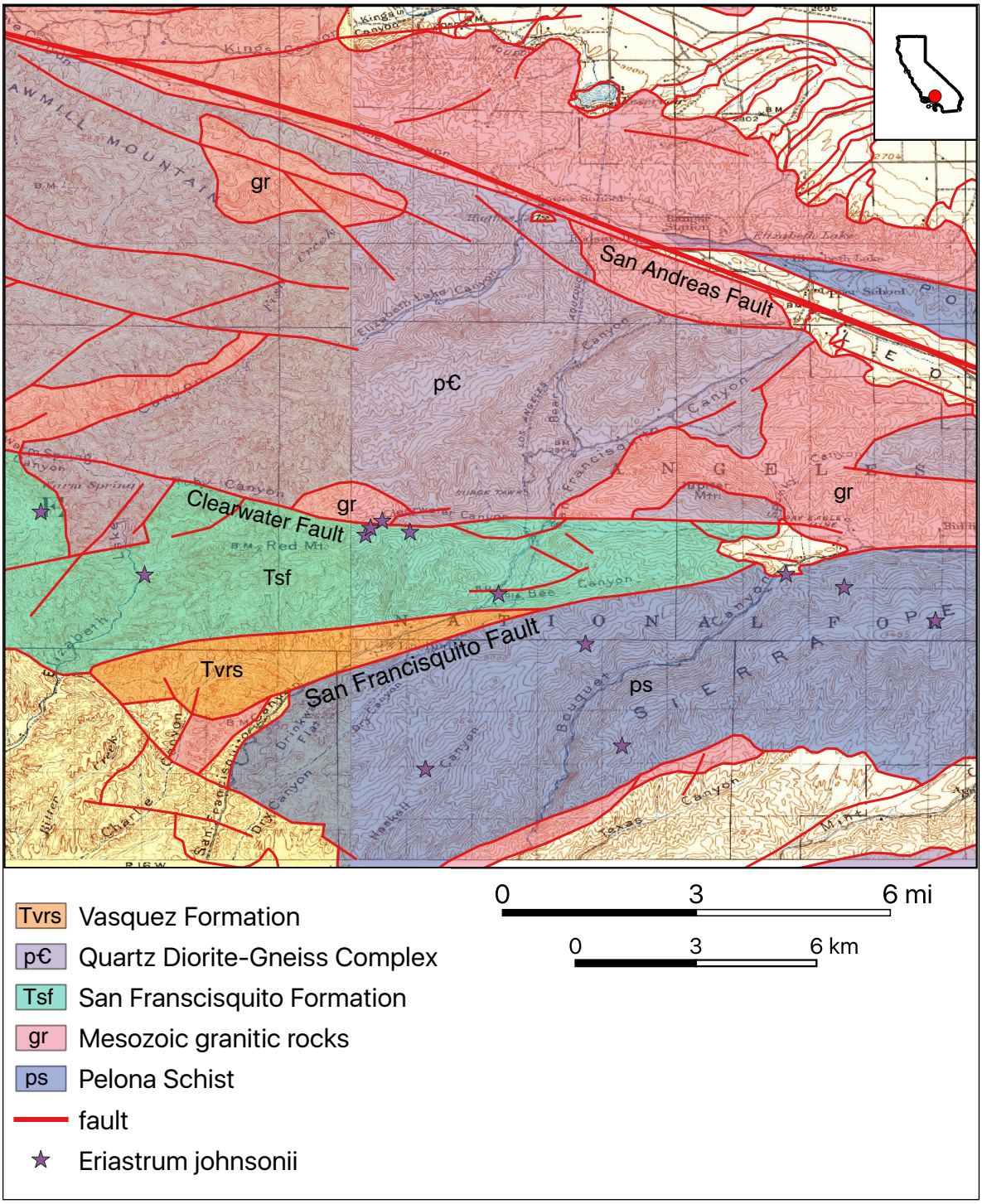
At a larger scale, it's interesting to note the overall importance of the Transverse Ranges as a general geographic boundary between what might be referred to as northerly and southerly ecological components. There are many reasons for this, among them being their high elevation. It is also worth noting that they represent the boundary between two distinct land units that are moving in opposing directions along the San Andreas Fault (SAF), the North American plate and the Pacific plate. This division in the Transverse Ranges (TR) is further accentuated on its north by the intersection near its middle of the extension from the Sierra Nevada. The southern tip of the Sierra Nevada at this point called the Tehachapi Mountains. This range provides an eastern/western ecological separation between the Mojave Desert on its east by the Garlock Fault, and the San Joaquin Desert on its west.



Map 1. Distribution of southern California *Eriastrum* taxa of the Pacific Plate and proximity to the San Andreas Fault. A smaller area of inset map is shown with geology on Map 3. Plant location data from authors and CCH2. Base map from ESRI.



Map 2. Distribution of many *Eriastrum* taxa of the North American Plate showing their limited extent beyond the San Andreas Fault. Plant locations from authors and CCH2. Base map from ESRI.



Map 3. Similar area as the inset of Map 1, showing *Eriastrum johnsonii* and major geologic units. Plant location by authors. Map data, Dibblee 1997, modified from Jennings et. al. 2010, USGS.

The location of *Eriastrum johnsonii* occurs very close to the intersection of this north/south division (San Andreas Fault) and the east/west division (Garlock Fault). This intersection is more or less in the vicinity of Gorman near the I-5 freeway. The relevance of all this to the distribution of *Eriastrum* can be seen on maps of the general locations of the various *Eriastrum* taxa. As shown on Maps 1 and 2, a high number of species occur in close proximity to *Eriastrum johnsonii*. Of the 22

minimum rank taxa of the annual members of *Eriastrum* in California, 7 occur within ca. 20 miles of the new species.

We speculate that the distribution of *Eriastrum* might have a geological component based on the separation of the North American and Pacific plates along the San Andreas Fault. Although it is beyond the scope of this paper, we tabulate this distribution in case it might prove informative to others.

The annual *Eriastrum* can be divided into two main groups (Maps 1 and 2). The first group consists of 6 taxa that occur on the Pacific Plate (Map 1). This group, which includes *Eriastrum johnsonii*, can be further divided into 4 taxa that don't cross the SAF (*luteum* and *virgatum* not shown), and 2 taxa that have a large distribution south of the Transverse Ranges but reach and slightly cross the SAF in the Transverse Ranges.

The second group (Map 2) consists of 17 taxa that occur on the North American Plate (NA). This group includes 5 taxa that are entirely on NA (*albifaux*, *ertterae*, and *wilcoxii* not shown), and 12 that reach or cross the SAF. The 12 taxa that cross the SAF can be further divided into 3 that cross in the Coast Ranges (*abramsii*, *calocyanum*, and *hooveri* not shown), 5 that have large distributions to the north and cross in the TR, and 4 that are desert taxa that cross the SAF south of the TR (*coachellae*, *diffusum*, *eremicum*, and *harwoodii* not shown). As can be seen on Maps 1 and 2, of the taxa that cross the SAF, none continue more than about 20 miles beyond it, even those with distributions hundreds of miles in length.

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