Variation in *Triantha occidentalis* (S.Watson) R.R.Gates characteristics in California

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In case you haven't noticed, recent research (Lin *et al*. 2021) indicates that the showy monocot *Triantha occidentalis* may be carnivorous. *Triantha occidentalis* contains three subspecies—*T. o.* subsp. *occidentalis*, *T. o.* subsp. *brevistyla*, and *T. o.* subsp. *montana* (Rice 2021). In their paper, Lin *et al*. focused their *Triantha* work on Canadian specimens of *Triantha occidentalis* subsp. *brevistyla* (S. Graham, pers. comm. 2021). However, they included images of *Triantha occidentalis* subsp. *occidentalis* in their discussions, indicating that they are concluding carnivory occurs in all the subspecies of *Triantha occidentalis*.

In a previous paper (Rice 2022) I provided observations and imagery that I made on a trip to Washington state. They appear to support evidence of carnivory in *Triantha occidentalis* subsp. *brevistyla*—the plants occupied the same habitats as carnivorous plants, had impressively sticky red glands on the flowering stems, and were capturing insects (Fig. 1A).

In my home state of California, we have the southern subspecies, *Triantha occidentalis* subsp. *occidentalis*. Broadly speaking, *Triantha* in California occurs in two large range segments. One segment is in the northwest corner of the state. The other segment is a long strip following the Sierra Nevada, from Shasta County southeast to Tulare County. There are also, strangely, a few disjunct locations on the coast in central California. In this paper I present a few observations of this plant that I made at four populations at three separate locations.

The first site was in Marin County, at Point Reyes National Seashore, at one of the disjunct coastal sites. The plants occur in a heavily grazed area, where freshwater seeps through the

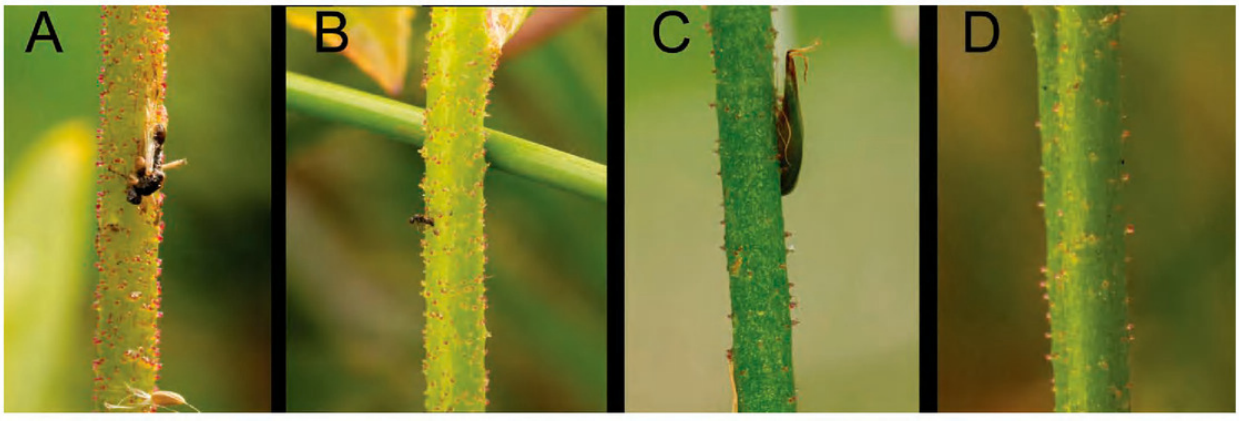

Figure 1: Inflorescence glands just below the lowest flower or fruit. A) *Triantha occidentalis* subsp. *brevistyla*, Whatcom County, Washington; B) *Triantha occidentalis* subsp. *occidentalis*, Marin County, California; C) *Triantha occidentalis* subsp. *occidentalis*, western slope Nevada County, California; D) *Triantha occidentalis* subsp. *occidentalis*, eastern slope Nevada County, California.

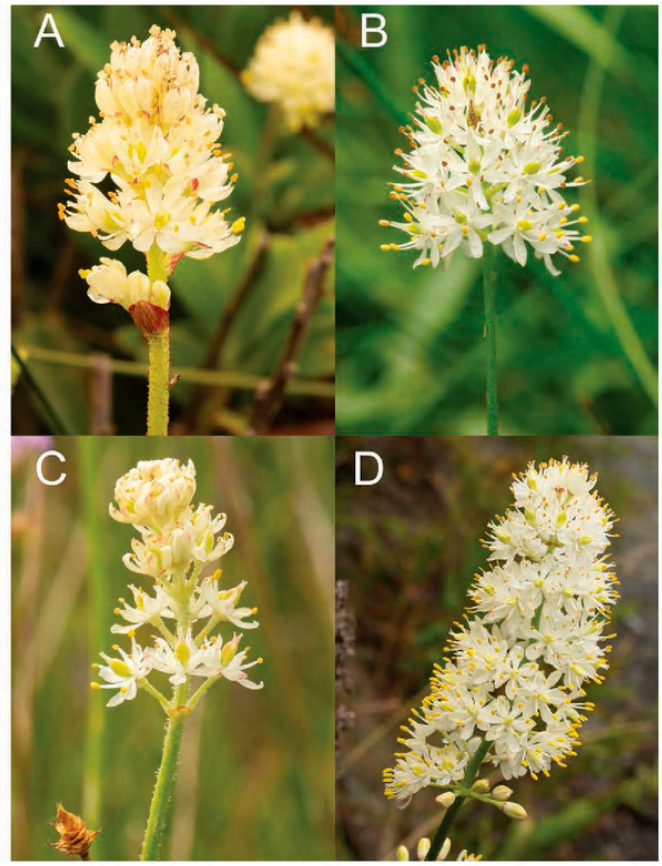

Figure 2: (left): Compact fruiting *Triantha occidentalis* subsp. *occidentalis* in Marin County, California.

Figure 3: (right): Inflorescence heads of *Triantha occidentalis* subsp. *occidentalis* in California. A) Marin County; B) western slope Nevada County; C) eastern slope Nevada Count; D) Del Norte County.

muck into an estuary, essentially at sea level. No carnivorous plants occur in the area, but other plants that often occur with carnivorous plants in California (such as the orchid *Spiranthes romanzoffiana*) were present. In addition to the population I visited, at least one other smaller colony exists in the area (A. Yin, pers. comm. 2022). Plants were compact and relatively short (typically flowering stems were less than 30 cm tall) and many showed indications of browsing—cattle and deer are common in the area. The inflorescences were also very compact and capitate (headlike). Point Reyes is a very windy place, and much of the vegetation there responds by adopting a compact habit—this might explain the short stature of the *Triantha* there (Fig. 2).

Generally speaking, the plants in Marin County (Fig. 1B) exhibited the same glandular structure as the specimens of *Triantha occidentalis* subsp. *brevistyla* that I observed in Washington. While the glands were as densely packed as they were in the Washington plants, they did not seem to be quite as brightly pigmented. Minute, trapped insects were frequently observed.

The second site I visited was in a wet seepage in Nevada County, at an elevation of about 1800 m, on the western slopes of the Sierra Nevada. This site is notable for its population of *Darlingtonia californica* f. *viridiflora*, as well as *Drosera rotundifolia*. The *Triantha* plants here were nearly twice as tall as the plants in Marin County, and the inflorescences were commensurately larger and more delicate (Fig. 4) although still very capitate (Fig. 3B). The glands on the inflorescences were more scattered, and less brightly pigmented (Fig. 1C). While some of the flowering stems had

Figure 4: Tall flowering *Triantha occidentalis* subsp. *occidentalis* in Nevada County, California, on the western slopes of the Sierra Nevada. The large dried infructescences belong to *Bistorta bistortoides*.

bits of detritus stuck to them (seeds, dirt, etc.), none of them were observed to have what could be clearly identified as captured insects.

The third location I visited was also in Nevada County, at an elevation of 2000 m, on the eastern slopes of the Sierra Nevada. There were two separate *Triantha* populations here. One was in an area subject to seasonal dry periods—while it was moist enough for some wetland plants such as the orchid *Platanthera dilatata* var. *leucostachys*, or *Erythranthe primuloides*, it had no carnivorous plants. It was the densest population of *Triantha* I have yet observed (Fig. 5), and the plants were large and diffuse, similar to the plants at the previously described Nevada County site. Interestingly, the glands on these plants were more sparsely scattered than I observed on any other plants. Furthermore, they were essentially lacking in red pigmentation while in flower, although they developed some red pigmentation when in fruit (Fig. 1D). The second population of plants occurred in a nearby perennial seepage that also housed *Drosera rotundifolia*, *D. anglica*, *D.* × *obovata*, and *Utricularia minor*. These plants were slightly shorter and somewhat more glandular. The plants at both sites had comparatively more elongate inflorescences (Fig. 3C). Plants from the northwestern portion of California have even larger, more elongated inflorescences, as can be seen in an image I took on a previous trip to Del Norte County (Fig. 3D).

The carnivorous character of *Triantha occidentalis* is certainly quite variable, and should be studied more. It would be interesting to determine if all the varying forms of *Triantha occidentalis* subsp. *occidentalis* are as carnivorous as *Triantha occidentalis* subsp. *brevistyla*. It would also be interesting to carefully examine the plants in the northwestern part of the state, especially since some of the plants in that part of the state are particularly large.

Figure 5: A dense population of *Triantha occidentalis* subsp. *occidentalis* in Nevada County, California, on the eastern slopes of the Sierra Nevada.

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