

**VERBENA GEMMEA (VERBENACEAE),
A NEW SPECIES FROM CALIFORNIA AND BAJA CALIFORNIA**

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ABSTRACT

Verbena gemmea Uelman, **sp. nov.** (Verbenaceae), is described from California and Baja California. It is similar to *Verbena lasiostachys* (including varieties) but is morphologically distinct and sympatric with it. It is distinguished from typical *V. lasiostachys* by its erect habit, densely stipitate-glandular vestiture, calyces less than or equal to the floral bracts, calyces oval in shape when in fruit, densely papillose elliptic mahogany nutlets, and preference for moist areas.

In 2017, I observed unusual plants of *Verbena* (Verbenaceae) near a stream in the Agua Amarga Reserve on the Palos Verdes Peninsula in Los Angeles Co., California. I later found specimens of this *Verbena* at SBBG, CSLA, IRVC, and RSA, many of which had been identified as *V. lasiostachys* var. *scabrida*. They are closest to *V. lasiostachys* Link but are not a good match for it, even considering var. *scabrida* (Greene 1898; Munz 1974; Wilken 2012). Based on morphology, ecology, and a propagation study, this *Verbena* appears to represent a distinct species. The decision here to treat these plants at specific rank necessitates a reevaluation of variation within *V. lasiostachys* in its current concept.

1. Stems procumbent to decumbent-ascending, densely hirsute-villous, sparsely stipitate-glandular; calyces longer than bracts, vase-shaped when ripe nutlets present; prominent ring of hairs at top of corolla tube and base of anthers; corolla tube with purple, hyaline-stripped base, with pouched spur; nutlets dark brown, oblong, bare to minimally whitish-glandular-papillate; dry areas **Verbena lasiostachys**

1. Stems erect, densely stipitate-glandular, minimally hirsute; calyces shorter than or equal to bracts, oval in shape when ripe nutlets present; faint ring of hairs at top of corolla tube, no hairs at base of anthers; corolla tube with hyaline base, without pouched spur; nutlets mahogany, elliptic, densely creamy orange-glandular-papillate; wet to seasonal flooded areas **Verbena gemmea**

VERBENA GEMMEA Uelman, **sp. nov.** **TYPE: USA. California.** Los Angeles Co.: Palos Verdes Peninsula, Agua Amarga Canyon, 33.76481°, -118.40042°, 174 m, 14 Jun 2017, *N. Uelman s.n.* (holotype: UCR 0114994).

Distinct from *Verbena lasiostachys* in its combination of erect and tall growth habit, densely stipitate-glandular vestiture, calyces less than or equal to the floral bracts, calyces oval in shape when in fruit, mahogany-colored nutlets with densely orange-glandular-papillate commissural faces, and a preference for moist habitats.

Plants annual or perennial, taprooted. **Stems** 5–8 from the base, erect, 91–185 cm tall, densely stipitate-glandular, minimally hirsute. **Leaves** mostly on proximal half of stems, distally reduced, densely stipitate-glandular, minimally hispid, lower and midstem 5.5–11 cm long, 2.5–5 cm wide, +/- ovate, coarsely serrate, +/- deeply 1–2 lobed near base, veins slightly impressed adaxially, veins raised abaxially, petiole 1.5–3 cm long and narrowly winged. **Fruiting spikes** 1–25 per stem from distal branches, erect, 4–24 cm, rachis densely and persistently stipitate-glandular; floral bracts lanceolate, greater than or equal to the calyces, stipitate-glandular, margins ciliate and stipitate-glandular, with some tips ending in a +/- bulbous based unicellular trichome. **Calyces** 3–3.75 mm, densely stipitate-glandular, lobes widely lanceolate with some lobe tips ending in a +/- bulbous based unicellular trichome, lobes fused to each other by thin clear membrane, persistent in fruit and oval in shape when

in fruit. **Corollas** pink to violet, tubes 4–4.2 mm, 1.2–1.5 mm longer than the calyx, limbs 1–1.2 mm in diam, sparse ring of hairs present at the top of the tubes on the inside, tube glabrous near base of anthers, tube base hyaline, tubes minimally hairy on the outside, no pouched spur present on the outside. **Nutlets** 1.2–1.5 mm, elliptic, mahogany throughout, separating at maturity, commissural faces ending below nutlet tips, densely creamy orange-glandular-papillate.

Moist or seasonally flooded areas; coastal scrub and riparian woodlands; 10-1200 m; Flowering May-September.

The epithet alludes to the overall glittering, gemstone-like appearance of plants in the field due to dense covering of glandular trichomes that reflect the sunlight (Fig. 3). Suggested common name: glittering vervain.

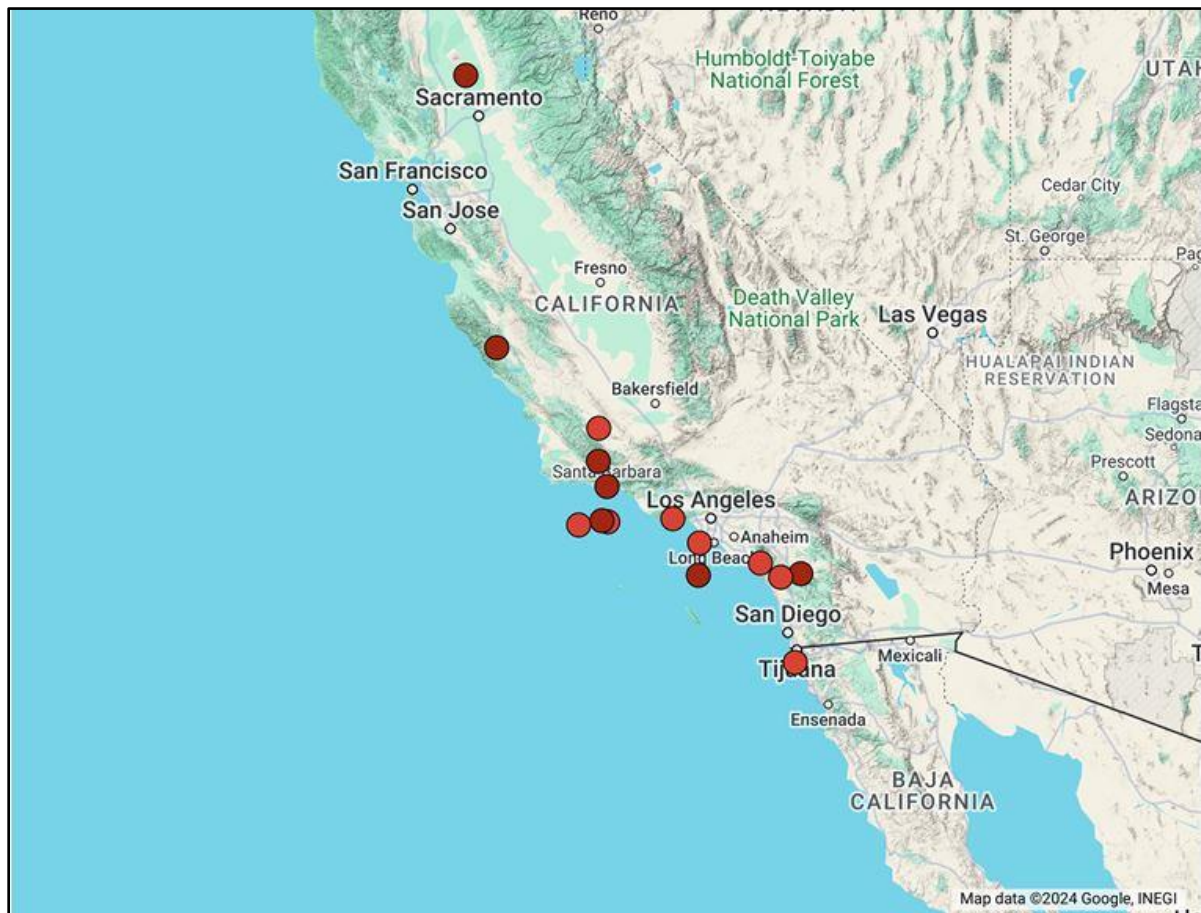


Figure 1. Distribution of *Verbena gemmea* based on herbarium records.

Additional collections examined. USA. California. Sutter Co.: Sutter, Myers Ranch, Sutter Buttes, [39.26778°, -121.813333°], 19 Jun 1982, *Ahart 3599* (CHSC 037245). San Luis Obispo Co.: Caliente Range, Wells Spring, [35.032222°, -119.684167°], [± 897 m], 29 Jun 2005, *Wilver 492* (OBI 114900). Monterey Co.: Fort Hunter Liggett, [35.885833°, -121.285556°], 25 Mar 2000, *Hrusa 15503C* (OBI 114905). Santa Barbara Co.: Santa Rosa Island, E fork of Wreck Canyon, [33.9387°, -120.07201°], [± 200 m], 18 Aug 1998, *Junak SR-771* (SBBG 153930); San Rafael Mountains, Fish Creek, [34.7425°, -119.924°], [± 1000 m], 22 Jul 1994, *Blakley 7618* (SBBG 231194); Santa Cruz Island, Canada Christi watershed in Canyon just E of road to Triangulation Point John, [34.0293°, -119.864°], [± 750 m], 7 Aug 1994, *Junak SC-4072* (SBBG 153934); Santa Cruz Island, Coches Prietos Anchorage at mouth of creek, [33.9703°, -119.7081°], [± 400 m], 28 May 2002, *Junak SC-4423* (SBBG 153940); Santa Cruz Island,

Prisoners Harbor, [34.017°, -119.682°], [± 800 m], 12 Aug 1939, *Dunkle 8548* (SBBG 42318); Santa Barbara, Along Lost Valley trail, [34.76771°, -119.91899°], [± 627 m], 24 Jun 2018, *Guilliams 4559* (SBBG 231196). **Los Angeles Co.:** Santa Catalina Island, E of lower reservoir, Bulrush Canyon, [33.3392°, -118.4183°], [± 200 m], 10 Sep 1999, *Junak SCA-1090* (SBBG 153939); Malibu Vista, Maguire and Latigo Canyon Road, [34.0514°, -118.776°], [± 100 m], 20 Aug 1978, *Silverstone 317* (CSLA 019556); Palos Verdes Peninsula, Lunada Canyon, [3376481°, -118.40042°], [174 m], 14 Jun 2017, *Uelman 185* (UCR 114994). **Orange Co.:** Ronald W. Caspers Wilderness Park, Nature Loop Trail, [33.54826°, -117.56352°], [131 m], 24 Jun 2020, *Simpson 4639* (IRVC 113549). **San Diego Co.:** San Diego, Fallbrook Naval Weapons Station, W of Fallbrook, [33.9387°, -120.07201°], [130 m], 14 Sep. 2020, *Rebman 37012* (SD 00055368); Agua Tibia Mountains, Pala Indian Reservation, [33.365804°, -117.077388°], [± 1200 m], 16 Jun 1997, *Banks 2125* (RSA 619869). **MEXICO. Baja California.** Rancho Cuevas, S of Rosarito, [32.3°, -117.05°], [10 m], 11 Jun 1980, *Moran 28754* (CSLA 019555).

Propagation. Seeds from the Palos Verdes Peninsula were germinated to observe the overall growth of the plant. New plants from the wild-collected seeds maintained the densely stipitate-glandular vestiture, erect and tall growth habit, diagnostic calyces features, flower morphology, and elliptic, densely papillose, mahogany nutlets. Nutlets were broadcast (winter of 2018) throughout beds of the native plant demonstration garden at the White Point Nature Education Center and Preserve (San Pedro, California) — following rains that winter, the majority of the plants germinated in seasonally flooded bioswales of the garden (Fig. 8). Plants germinating in the bioswales as well outside of them (drier locations) maintained the densely stipitate-glandular vestiture. The cotyledons of the seedlings, as well as the first true leaves, exhibited the densely stipitate-glandular vestiture (Fig. 7).

Stipitate-glandular vestiture and carnivory. A diagnostic characteristic of this *Verbena* is its stipitate-glandular vestiture. The stems, leaves (adaxial and abaxial sides), inflorescences, and calyces are densely covered in stipitate-glandular trichomes. These trichomes are stalked and tipped with a gland-head (Fig. 3, 10, 11) that secretes a clear wet sticky fluid (Fig. 11). Plants are so densely glandular that they glisten in the sun and when touched, feel wet or clammy (herbarium vouchers also note this — SBBG 42318, CSLA 019555, OBI 114905). Mixed with the stipitate-glandular trichomes are large, unicellular, sharp-pointed trichomes, but the density of unicellular trichome is very low (Fig. 12). When plants are pressed, the fluid at the stipitate-glandular tip dries, but the gland-head remains intact, the stalk collapses, and the overall trichome shrivels (Fig. 10, 11). These dried trichomes do not disappear on pressed plants (Fig. 10, 17) and can still be seen with the aid of magnification and backlighting. As a result, pressed specimens of this *Verbena* appear glabrous to very minimally hirsute (Fig. 17). On close examination, however, the stems are densely covered in shriveled stipitate-glandular trichomes. Stems in the wild and on herbarium specimens can also appear dirty because of tiny debris sticking to the stipitate-glandular trichomes (Fig. 10).

These stipitate-glandular trichomes trap numerous insects, and the plants can become densely covered in insects (Fig. 15). This is often seen on wild plants as well as on many herbarium specimens (Fig. 15, 16). The trichomes appear to bend in towards insects when the insects become trapped (Fig. 15), and the stipitate-glandular trichomes release their substance when any part of the plant is touched, producing a musky, fetid odor. These coupled observations suggest that the plants may be carnivorous, with the stipitate-glandular trichomes as defensive structures as well as a means of obtaining nitrogen.

Nutlet morphology. Nutlets of *Verbena gemmea* are elliptic and mahogany-colored with creamy brown nutlet tips (Fig. 13, 14). The adaxial side is reticulated (Fig. 13, 14). The abaxial side has a commissural face densely glandular-papillate with creamy orange papillae (Fig. 13, 14). In contrast, nutlets of *V. lasiostchys* are oblong and dark brown with white to creamy white tips. Commissural faces are bare to sparsely glandular-papillate with whitish papillae (Fig. 14).

Corolla. The corolla of *Verbena gemmea* has a faint ring of hairs on the inside where the corolla tube meets the base of the corolla lobes (Fig. 20). In addition, the bottom half of the corolla

tube is hyaline, there are no hairs present at the base of the anthers, and the corolla tube lacks a pouched spur on the outside of the tube (Fig. 21). In contrast, *V. lasiostachys* has a prominent ring of hairs on the inside of the corolla where the corolla tube meets the base of the corolla lobes (Fig. 20), the bottom half of the corolla tube is blue to purple with clear stipes, there is a patch of hairs present at the base of the anthers, and the corolla tube has a slight pouched spur on the outside of the corolla tube (Fig. 21).

Calyx. The calyx of *Verbena gemmea* is shorter than or equal to the bracts and the lobes are widely lanceolate (Fig. 5, 22). The overall calyx, when mature nutlets are present, is stout and oval in shape (Fig. 22). In contrast, *V. lasiostachys* has calyces that are longer than the bracts, the overall calyces are slender, and the lobes of the calyces are narrowly lanceolate (Fig. 22). The overall calyces, when mature nutlets are present, are more vase-shaped (Fig. 22).

Habit. Stems of *Verbena gemmea* are erect and 1-numerous (Fig. 4, 9). The overall plants can be quite tall, as seen in wild individuals as well as individuals grown in a garden setting (Fig. 4, 9). This contrasts with the typical growth habit of *V. lasiostachys*, which is spreading to ascending (Fig. 19).

ACKNOWLEDGEMENTS

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Figure 2. *Verbena gemmea*. Holotype (UCR 0114994). Photo by author.



Figure 3. *Verbena gemmea*. 1. Stem overall. 2. Close-up of stem showing densely stipitate-glandular vestiture. 3. Backlit view of side of stem showing densely stipitate-glandular vestiture. 4. Inflorescence. 5. Flowers. 6. Close up of flower. 7. Leaf adaxial side. 8. Leaf abaxial side. 9. Leaf cross-section showing densely stipitate-glandular vestiture and stuck insect. Photos by author.

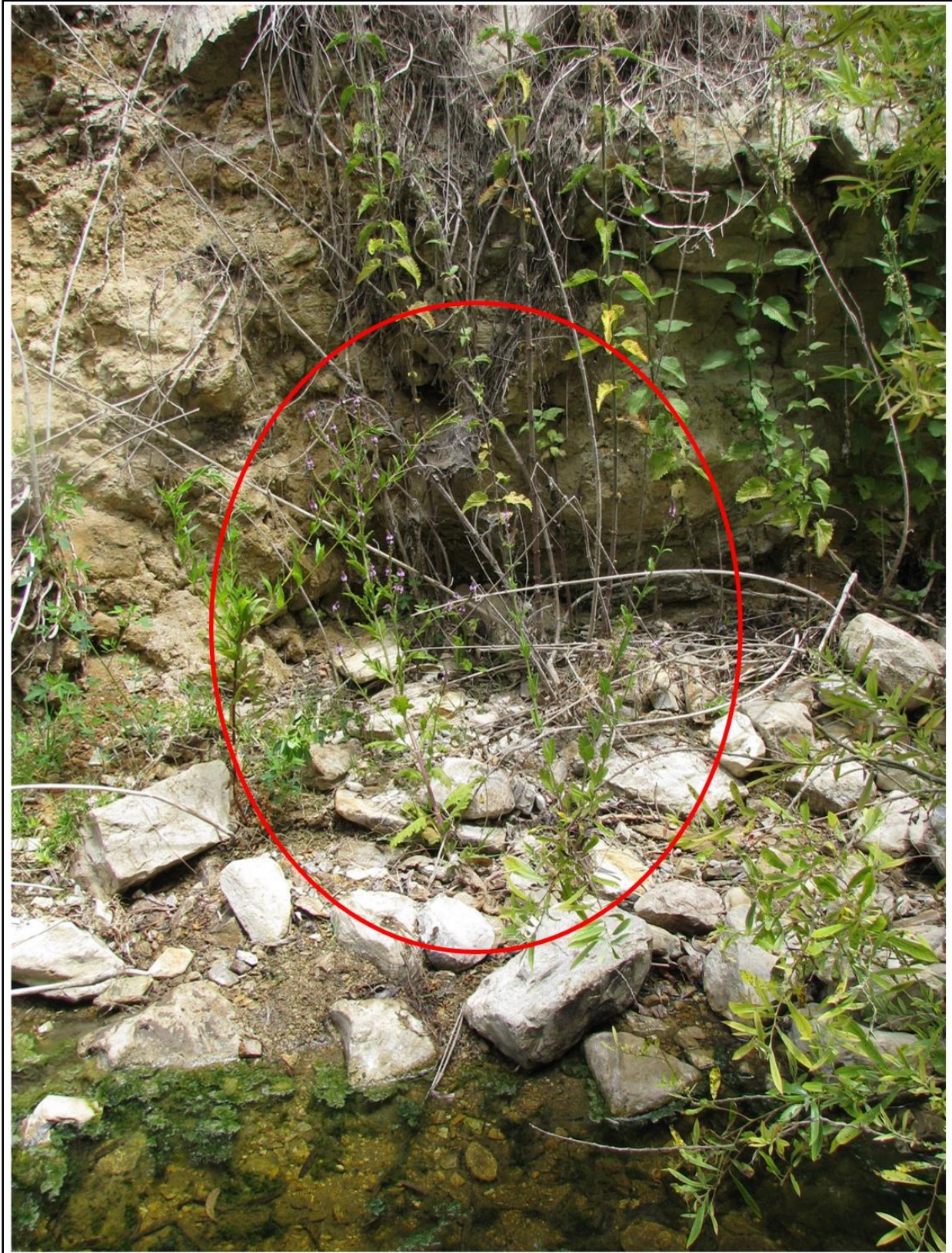


Figure 4. *Verbena gemmea*. 1. Overall, of wild *V. gemmea* on the Palos Verdes Peninsula. 2. Overall of wild *V. gemmea* on Santa Catalina Island. Photos by author.



Figure 5. *Verbena gemmea*. 1. Calyces & bracts along inflorescence. 2. Calyx and bract (calyx less than or equal to the bract). 3. Calyx and bract backlit showing densely stipitate-glandular vestiture. 4. Tip of calyx lobe spine tipped. 5. Bract. 6. Tip of bract with multiple spines. 7. Bract backlit showing densely stipitate-glandular vestiture. Photos by author.



Figure 6. *Verbena gemmea*. 1-2. Overall of inflorescences from herbarium specimens showing calyces and bracts. 3. Close-up of pressed calyx and bract from herbarium specimen (shriveled stipitate-glandular trichomes – red arrow). Photos by author.

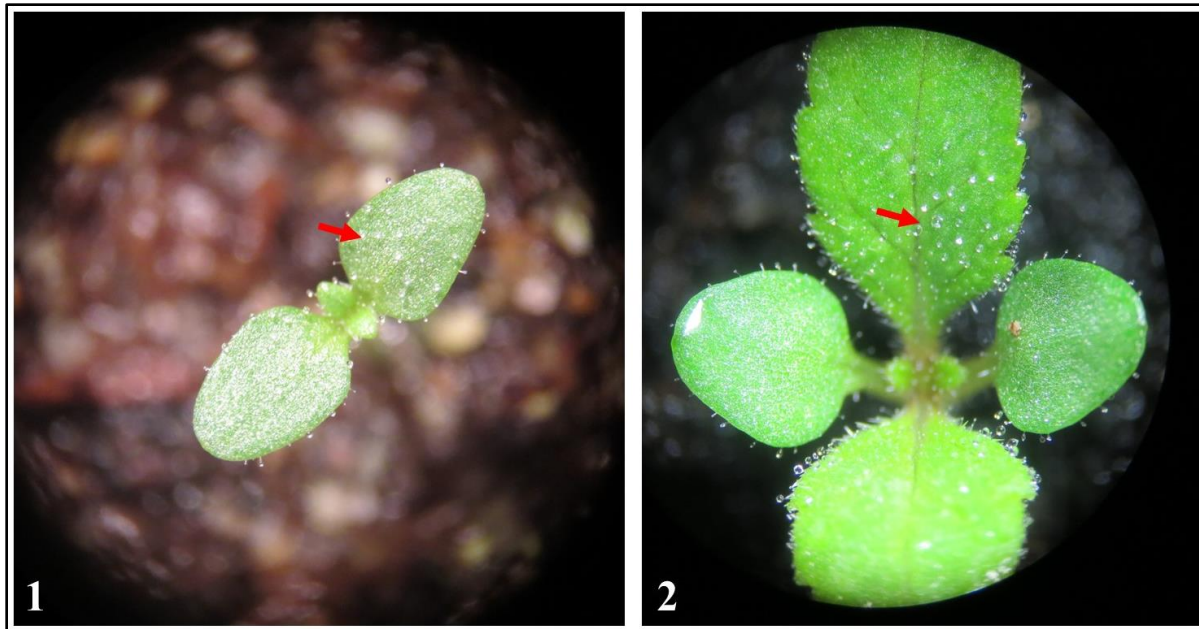


Figure 7. *Verbena gemmea*. 1. Cotyledons with stipitate-glandular trichomes (red arrow). 2. First true leaves with stipitate-glandular trichomes (red arrow). Photos by author.



Figure 8. *Verbena gemmea*. 1-2. Growing in bioswales at the White Point Nature Preserve and Education Center native plant garden in San Pedro, California. Photos by author.



Figure 9. *Verbena gemmea*. 1-2. Erect and tall growth habit in the wild. 3-4. Erect and tall growth habit in a garden setting. Photos by author.

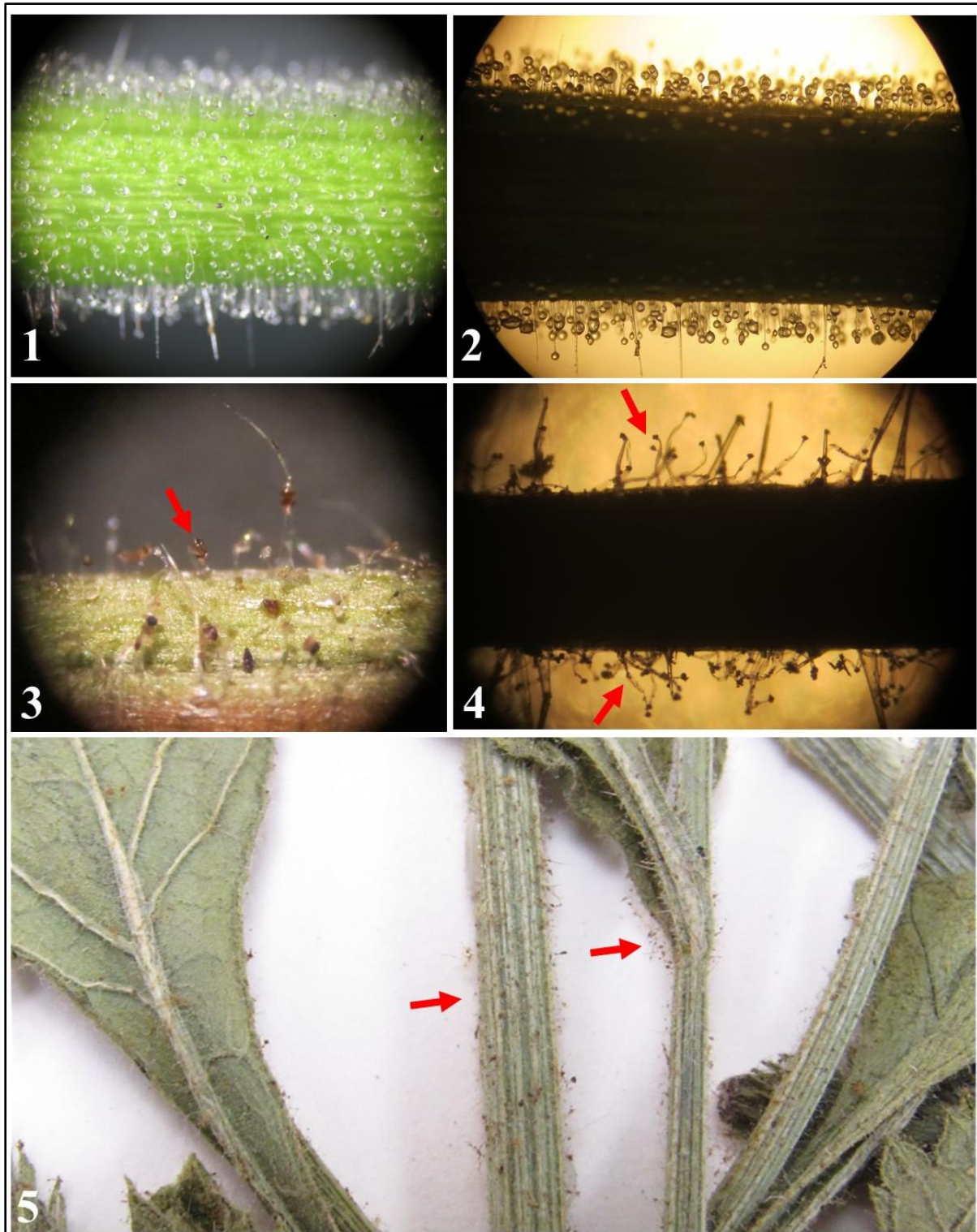


Figure 10. *Verbena gemmea*. 1. Stem showing stipitate-glandular trichomes. 2. Stem backlit showing stipitate-glandular trichomes. 3. Pressed stem showing shriveled stipitate-glandular trichomes. 4. Pressed stem that is backlit showing shriveled-stipitate-glandular trichomes. 5. Pressed stems appearing dirty due to tiny debris stuck to the shriveled stipitate glandular trichomes. Photos by author.

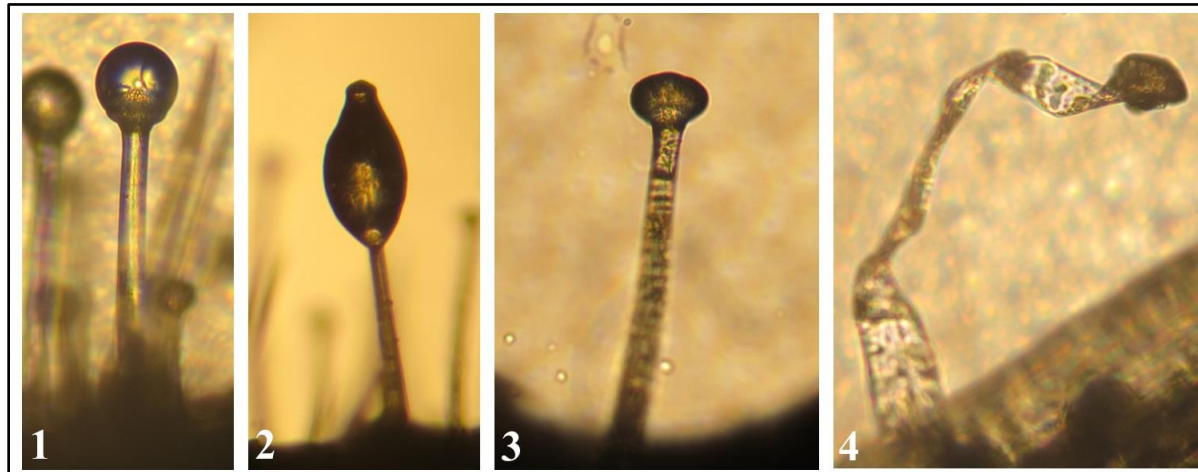


Figure 11. *Verbena gemmea*. 1. Stipitate-glandular trichome secreting substance. 2. Stipitate-glandular trichome with fully secreted substance. 3. Stipitate-glandular trichome after substance is fully gone. 4. Spent and shriveled stipitate-glandular trichome (this stage seen on herbarium samples). Photos by author.



Figure 12. *Verbena gemmea*. Unicellular stiff & sharp pointed trichome (red arrow) present but with low occurrence. Photos by author.

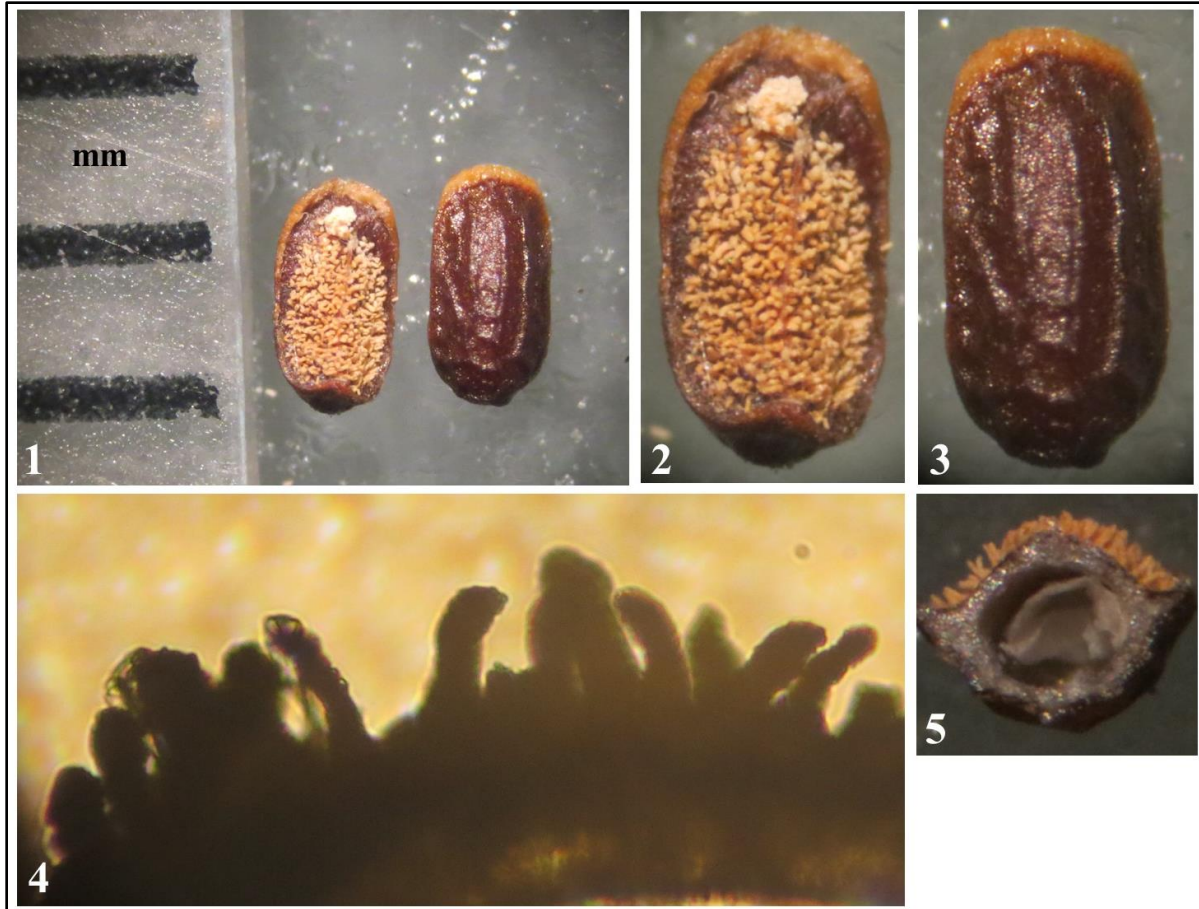


Figure 13. *Verbena gemmea*. 1. Nutlets showing abaxial and adaxial sides. 2. Close-up of abaxial side showing nutlet scar that is densely papillated with papilla a creamy orange color. 3. Close-up of the adaxial side of the nutlet. 4. Papilla of nutlet scar backlit. 5. Cross-section of nutlet. Photos by author.

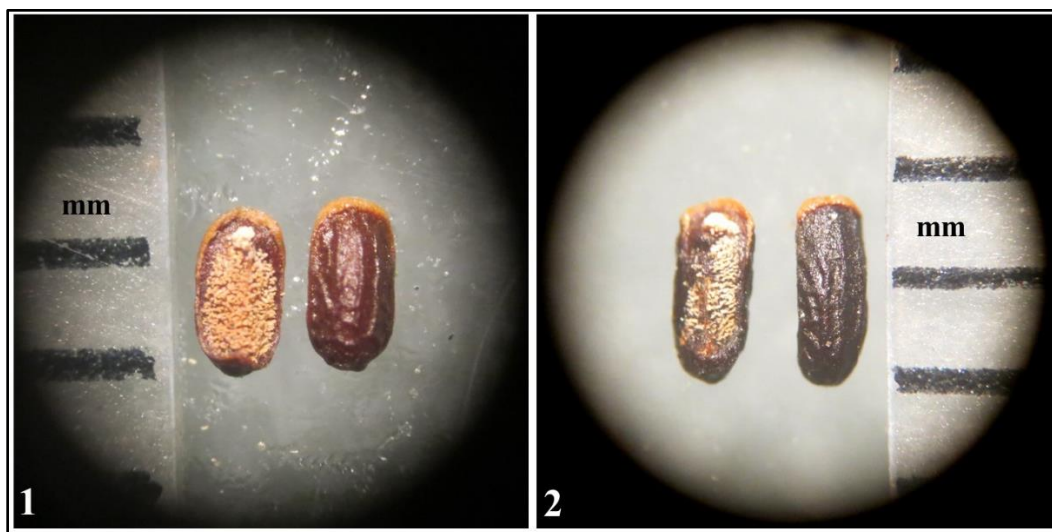


Figure 14. *Verbena gemmea*. 1. Comparison of nutlets of *V. gemmea* (1) and *V. lasiostachys* (2). Photos by author.

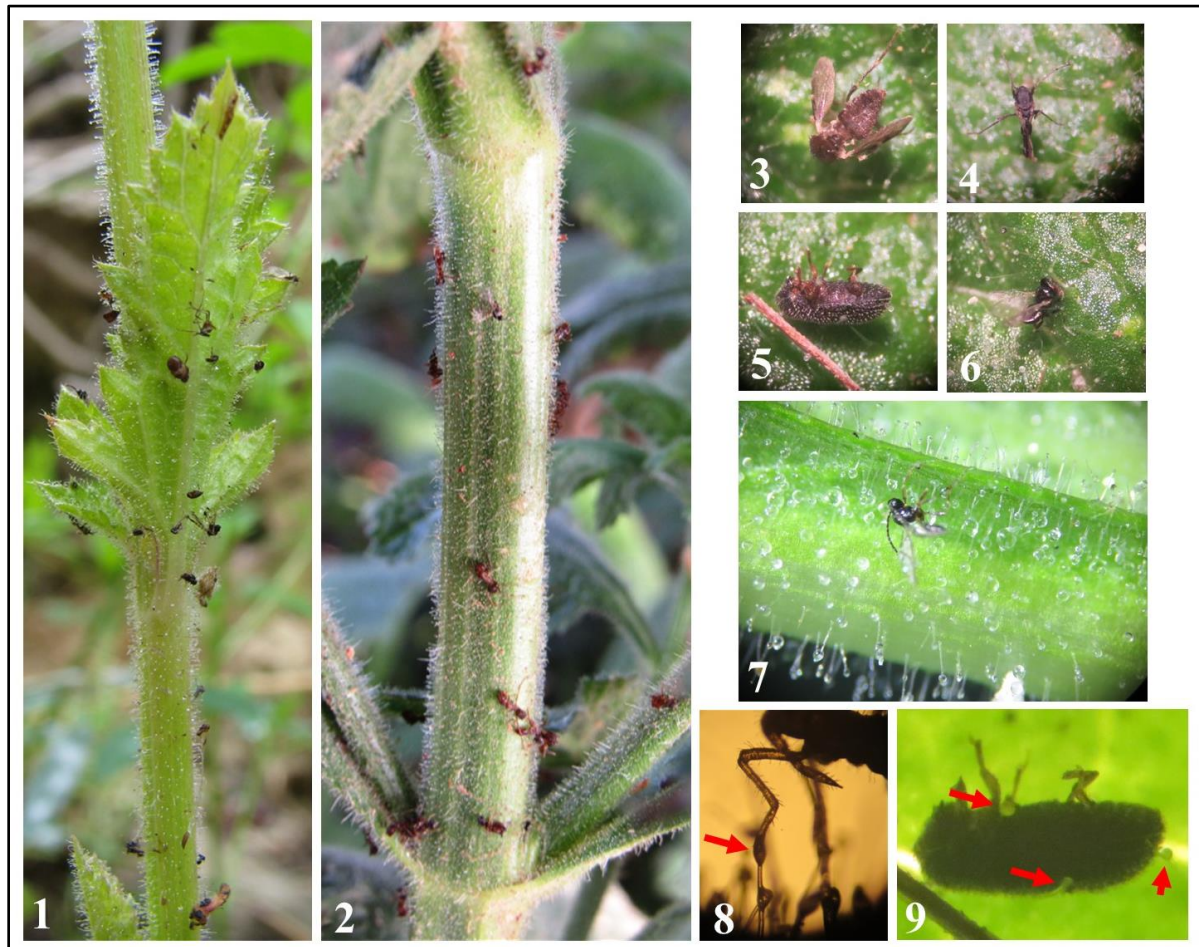


Figure 15. *Verbena gemmea*. 1-2. Stems covered in various types of small insects. 3-7. Various types of insects encountered on stems and leaves. 8. Close-up showing the head of the stipitate-glandular trichome stuck to an insect leg (red arrow). 9. Stipitate-glandular trichomes bent towards trapped insect (red arrow). Photos by author.



Figure 16. *Verbena gemmea*. 1-3. Herbarium samples of *V. gemmea* (1. CHSC 037245, 2. SBBG 153934, 3. CSLA 019556) showing insects (black dots) covering leaves and stems. 4. Close up of insects encountered on herbarium samples. Photos by author.

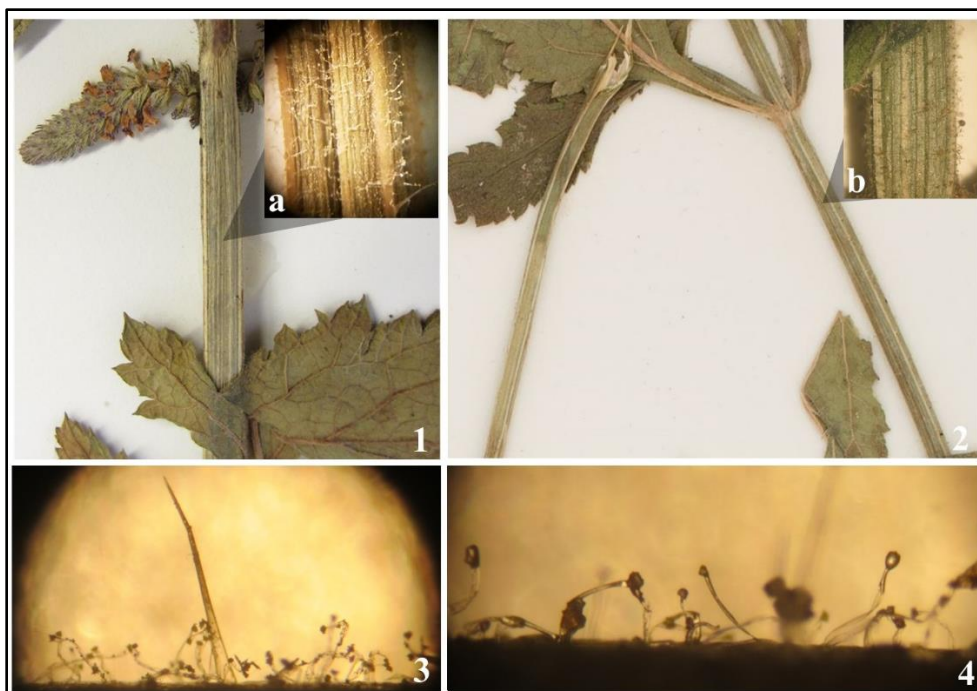


Figure 17. *Verbena gemmea*. 1-2. Plants of *V. gemmea* on herbarium sheets appear glabrous to sparsely hairy due to all the stipitate-glandular trichomes shriveling up and low occurrence of unicellular stiff trichomes (a-b. stems under magnification). 3-4. Backlit of stems from pressed plants showing shriveled stipitate-glandular trichomes. Photos by author.

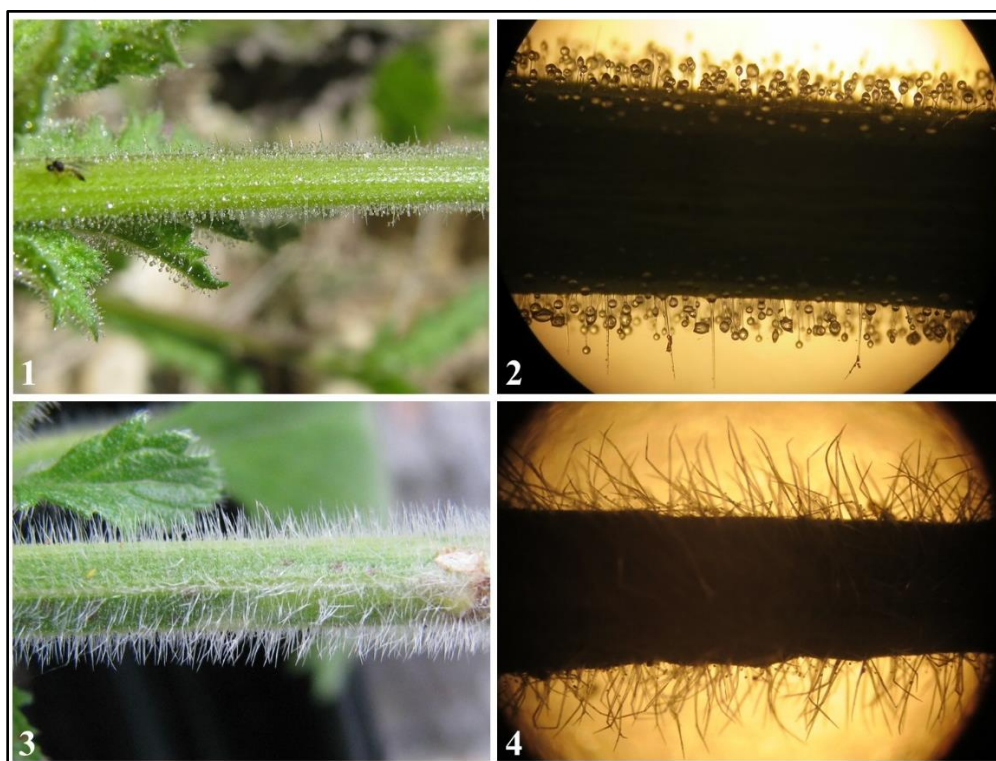


Figure 18. *Verbena gemmea*. 1-2. Stem of *V. gemmea* and backlit of stem. 3-4. Stem of *V. lasiostachys* and backlit of stem. Photos by author.



Figure 19. *Verbena gemmea*. 1-4. Comparison of *V. gemmea* (1,2) and *V. lasiostachys* (3,4) typical growth habit (*V. gemmea* having the erect growth habit versus *V. lasiostachys* having the decumbent to ascending growth habit). Photos by author.

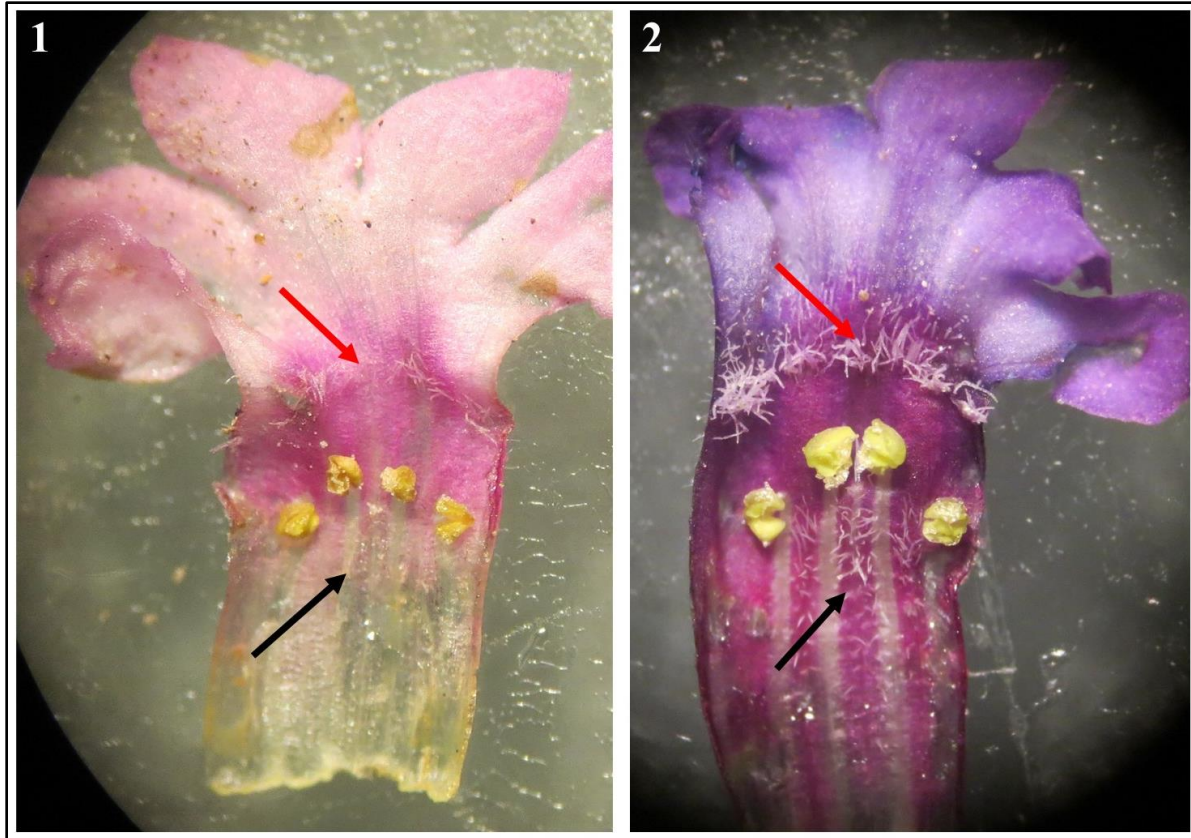


Figure 20. *Verbena gemmea*. 1. Longitudinal section of the corolla for *V. gemmea* showing minimal hairs at the top of the tube (red arrow) and lack of hairs below the anthers (black arrow) as well as the overall base of the tube being hyaline. 2. Longitudinal section of the corolla for *V. lasiostachys* showing dense hairs at the top of the tube (red arrow) and hairs below the anthers (black arrow) as well as the overall base of the tube being striped. Photos by author.

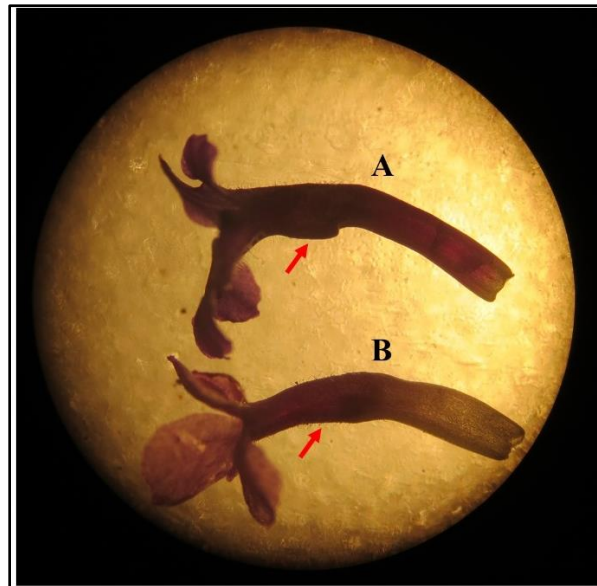


Figure 21. *Verbena gemmea*. Comparison of the corollas of *V. lasiostachys* (A) and *V. gemmea* (B) *V. gemmea* has no pouted spur present. Photos by author.

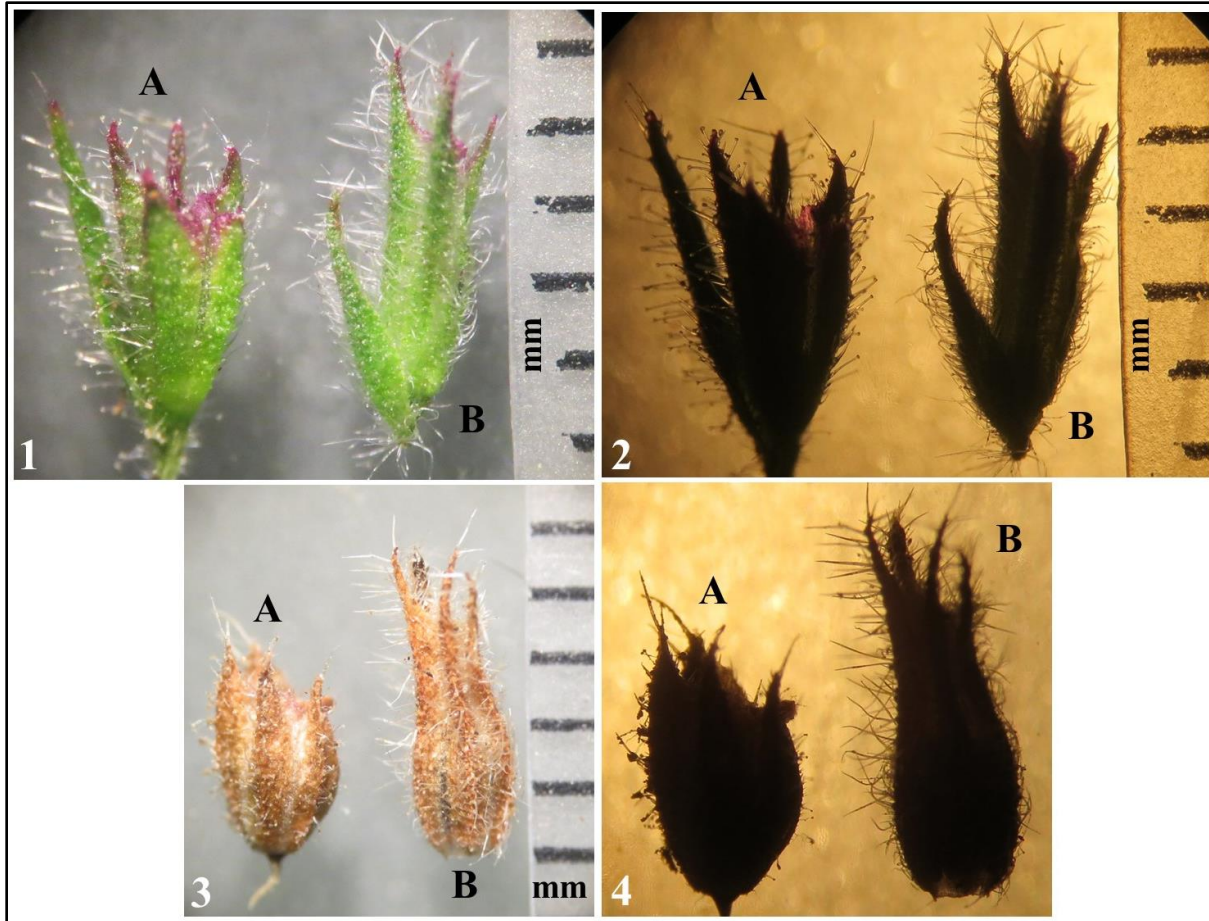


Figure 22. *Verbena gemmea*. 1. Comparison of *V. gemmea* calyx and bract (A) with the calyx and bract of *V. lasiostachys* (B). 2. Backlit view of *V. gemmea* calyx and bract (A) as well as *V. lasiostachys* calyx and bract (B). 3. Comparison of ripe calyx (containing ripe nutlets) of *V. gemmea* (A) with ripe calyx (containing ripe nutlets) of *V. lasiostachys* (B). Backlit view of ripe calyx of *V. gemmea* (A) as well as *V. lasiostachys* (B) both containing ripe nutlets. Photos by author.