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THREE SPECIES OF *PYRROCOMA* (ASTERACEAE: ASTEREAE) FROM EAST-CENTRAL CALIFORNIA AND ADJACENT NEVADA

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ABSTRACT

Pyrrocoma prionophylla Greene (9 counties of California and Nevada), **Pyrrocoma mineralis** Nesom, **sp. nov.** (Mineral and Esmeralda cos., Nevada, and Mono Co., California), and **Pyrrocoma thermolibes** Nesom, **sp. nov.** (Mono Co., California) are described, mapped, and illustrated.

Pyrrocoma prionophylla Greene was recognized by Hall (1928, as *Haplopappus racemosus* subsp. *prionophyllus*) but it was listed in synonymy of *P. racemosa* var. *virgatus* by Mayes (1976), as a synonym of *P. racemosa* var. *paniculata* in the FNA account (Bogler 2006), and has not been recognized elsewhere. It is a distinctive species with a relatively broad geographical range.

1. PYRROCOMA PRIONOPHYLLA Greene, Leafl. Bot. Observ. Crit. 2: 12. 1909. *Haplopappus racemosus* subsp. *prionophyllus* (Greene) Hall, Publ. Carnegie Inst. Wash. 389: 131. 1928. *Haplopappus racemosus* var. *prionophyllus* (Greene) Welsh, Great Basin Nat. 43: 294. 1983. **TYPE**: **Nevada**. Ormsby Co.: Eagle Valley [now Carson City], 3760 feet, 11 Aug 1902, *C.F. Baker 1450* (holotype: US 00127861; isotypes: CAS, GH, NY, POM, RM-2 sheets, RSA, TEX, UC, US, WS). Figures 1-3.

Stems erect to ascending-erect, 15–35 cm, glabrous, eglandular, often purplish. **Leaves**: basal persistent in a rosette, thickened, oblanceolate, 5–15(–25) cm long, sometimes with a short petiolar region, blades (5–)8–18 mm wide, glabrous, eglandular, margins shallowly serrate or sometimes nearly entire and minutely serrulate, often with a narrow, white-indurate rim, fibrous remnants of petioles persistent, cauline 6–8, linear-lanceolate, closely appressed to closely ascending, proximal and medial clasping-sheathing, proximal with margins near the base short-ciliate, the cilia sometimes very short (scabrous-ciliate). **Heads** 1 or commonly 2–6(–12, -20^{+}) in a subspicate to loosely racemoid or subcorymboid inflorescence on peduncles 3–10 cm long, without immediately subtending bracts. **Involucres** 14–20 mm wide (pressed); phyllaries oblong with a ovate-lanceolate apex, closely appressed in 3–4 series of unequal length, green patch in the distal 1/2–1/3, inner 11–12 mm long, outer with a narrow, white-indurate border, inner with a narrow, scarious rim, eglandular. **Ray florets** 21–29, fertile, stigmatic branches short and barely exserted from the tube, corollas 10–12 mm long, 1.8–2 mm wide, coiling. **Disc corollas** 5–7 mm long. **Achenes** 3.5–4 mm long, narrowly oblong, glabrous. Chromosome number, n=12 (Carson City, *Mayes 88*, as reported by Mayes 1976). Figures 1-15.

Flowering July-September (-October). Meadows in mineral soil and alkaline spots, near seepage and springs, marsh edges, ephemeral lake edges, alkaline soil; (4300-)4800-7500(-8400, -9000) feet. Map 1.

Pyrrocoma prionophylla is recognuized by its persistent basal leaves with saw-toothed margins ciliate at least near the base, strongly reduced cauline leaves, the proxinmal to medial often with a clasping-sheathing base, heads in a subspicate to loosely racemoid inflorescence, often reduced to 1 or few, large involucres with glabrous, stiffly graduate phyllaries in 3-4(–5) series, and glabrous achenes.

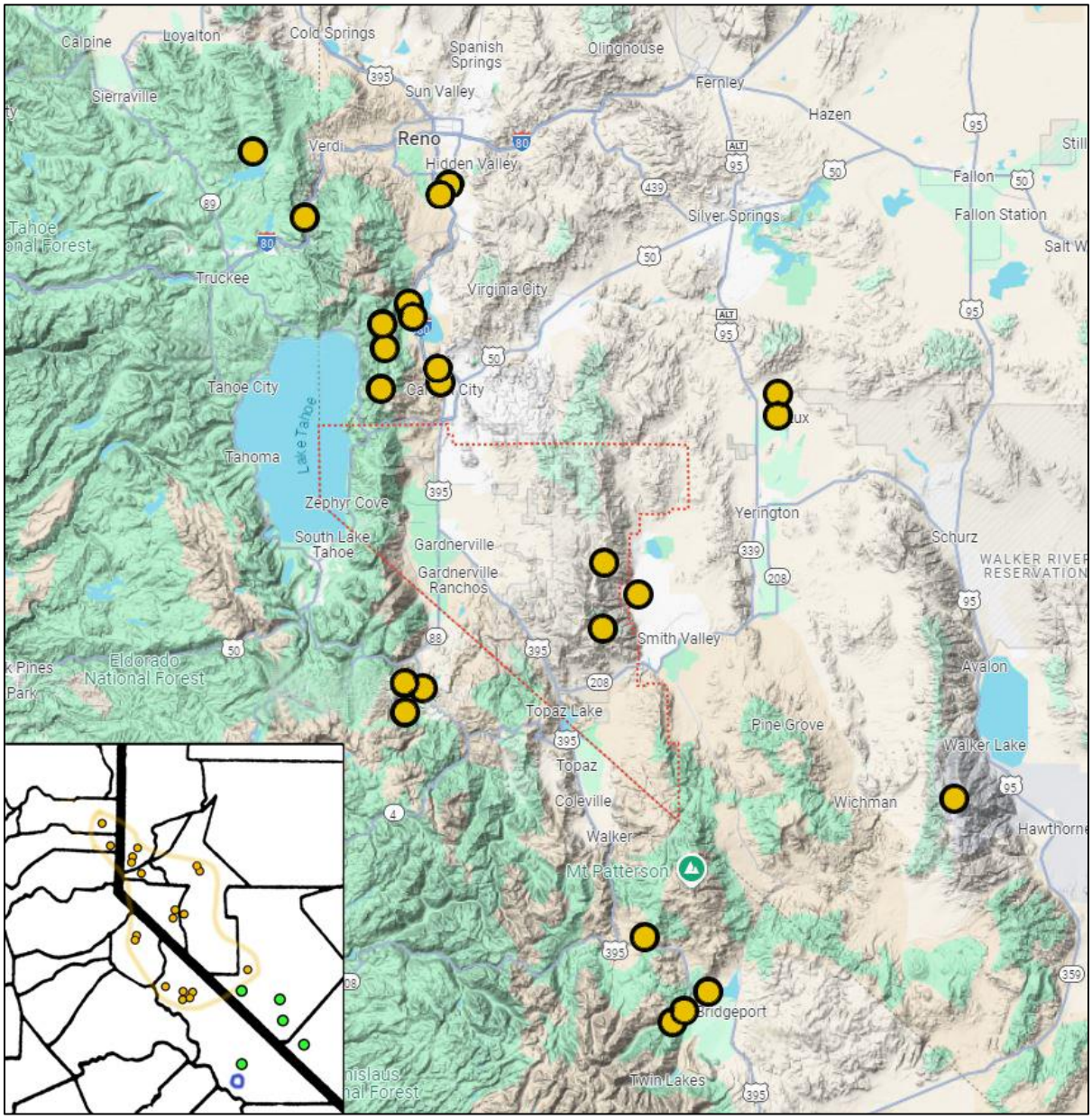
Hall (1928, p. 131) noted that the inflorescence of subsp. *prionophylla* is "exceedingly variable," from narrowly racemose (in the type) to racemose-paniculate to solitary. It is no wonder that Greene saw the type population as distinctive, with its long narrow, subspicate inflorescence (also see *Petersen 428*), but monocephalous stems are common and intergrades with the subspicate expression also are relatively common.

The collection identified here as *Pyrrocoma prionophylla* from Mineral County (*Archer 7082*, Fig. 15) has small heads like *P. mineralis* and is above (at 9000 ft) the characteristic elevational range for *P. prionophylla*, but it has glabrous achenes and and deeply toothed serrate leaf margins of the latter.

Additional collections. **California**. Alpine Co.: Grover Hot Springs State Park, W part of park, NW of hot springs on S side of Hot Springs Creek near S end of bridge, uplands with dry granitic soil, boulders, and *Artemisia* transitioning to dry meadow, in trail leading back to parking lot, 5876 ft, 17 Jul 2010, *Dean 6683* (DAV); Grover Hot Springs State Park, W side of park directly N of hot springs near culvert where hot spring effluent emerges on N side of road, edge of marshy area, alkaline soil with saltgrass, *Schoenoplectus americanus*, and *Oenothera* transitioning into wet meadow with *Juncus* and *Carex*, 5923 ft, 2 Aug 2010, *Dean 6767* (DAV); Grover Hot Springs State Park, W side of park, S of Hot Springs Creek and NW of hot springs, meadow just N of parking area, dry uplands with Jeffrey pine, *Artemisia tridentata*, *Poa pratensis*, and *Juncus arcticus*, 5894 ft, several at this spot, 2 Aug 2010, *Dean 6777* (DAV); Grover Hot Springs, mineral soil in meadow below hot springs, 5900 ft, 9 Aug 1964, *Howell 40907* (CAS). Mono Co.: Near Fales Hot Springs on Hwy 395, 4 Sep 1952, *Ferris 12566* (CAS); near Bridgeport (2.5 mi W and 0.5 mi N of town), meadowland, moist, grass thick and tall, no alkaline weeds, *Iris missouriensis*, *Crepis*, *Potentilla gracilis*, 6 Sep 1925, *Hall 12224* (DS, UC); Buckeye Creek, very damp meadows, 7500 ft, 16 Aug 1980, *Hardham 23732* (CAS); 6 mi NW of Bridgeport on Hwy 395, Huntoon Valley Public Campground, 21 July 1973, *Mayes 87* (CAS, DAV, SD, TEX); Buckeye Hot Springs, Hwy 17, saline area next to spring, 5 Jul 1979, *Mozingo 79-91* (RENO); between Fale's Hot Springs and Mono Lake, 8300 ft, 28 Jul 1938, *Winblad s.n.* (CAS). Nevada Co.: Truckee River Canyon at Farad Powerhouse [39° 25' 11" N, 120° 01' 30" W], alkaline seep, damp soil, 5200 ft, 5 Oct 1964, *True 1735* (CAS). **Nevada**. Carson City: 1 mi S of the Carson City northern city limits and 1 block E of Hwy 395, 22 Jul 1973, *Mayes 88* (NY, TEX). Douglas Co.: Pine Nut Mts, SE side of the range, head of the north fork of Red Canyon, 38.825267° N, 119.488821° W, in drying meadow with *Ivesia pityocharis* and *Muhlenbergia*, 18 Aug 1997, *Bair 265* (NY, RENO); Pine Nut Mts, 2 air mi NE of Mt. Siegel Peak, 38.9032° N, 119.4643° W, ephemeral lake, at the edge of the wet areas, 7150 ft, 11 Jul 1984, *Tiehm 8908* (NSMC, NY); [Pine Nut Mts], 1.2 air mi S of Slaters Mine on NE side of Mt. Siegel, meadow area, 7499 ft, locally common, 22 Jul 1985, *Tiehm 9989* (COLO, NSMC, NY, UTC). Lyon Co.: Wabuska Hot Springs, 0.5 mi N of town of Wabuska on a dirt road off US Hwy Alt-95, 39.158836° N, 119.184526° W, 19 Aug 1978, *Broome 2379* (RENO); Wabuska Hot Springs, 1.5 mi N of Wabuska, 4300 ft, 10 Sep 1976, *Tiehm 2993* (NY, RENO); [E base of Pine Nut Mts, ca. 0.5 mi E of Douglas Co. line], Smith Valley, Hinds Hot Springs along the road from Wellington to Mason Pass, W side of the valley, 38.903° N, 119.409° W common at the edge of meadow areas near the seepages, 28 Aug 1985, *Tiehm 10240* (NY, UNLV). Mineral Co.: Wassuk Range, Lapon Meadows [38.525° N, 118.812° W], 9000 ft, 12 Sep 1938, *Archer 7082* (MO, NY, RENO). Washoe Co.: 17 air mi SSW of Reno, Little Valley, Franktown Creek, 39.149° N, 119.889° W, drying soil of open meadows along the creek, 6500 ft, locally common, 10 Jul 1974, *Anderson 3713* (MO), *Anderson 3718* (LSU-2 sheets, NY), *Anderson 3720* (MO); Bowers [ca. 39° 17' N, 119° 50' W], 5100 ft, 31 Aug 1912, *Heller 10658* (NY, RENO, US); [southeastern Reno], Truckee Meadow, Double Diamond Ranch, off Hwy 395 and Virginia Street, grazed, dry meadow, heavy clay soils, 4750 feet, 1 Aug 1987, *Roberts & Jones 3562* (IRVC); Franktown [ca. Bowers], 5100 ft, 1 Sep 1912, *Kennedy 19*36 (LA, UC, as cited by Hall); S of Reno, Walsh ranch, [possibly in the former wetlands on the SE side of Truckee Meadows], 10 Aug 1918, *Petersen 428* (RENO-2 sheets); Carson Range, Little Valley, George Whittell Forest & Wildlife Area, 39.245° N, 119.879° W, near fence line, ACR-Grid2, 8 Aug 1973, *Risser s.n.* (RENO); Carson Range, S end of Little Valley, George Whittell Forest & Wildlife Area, near fence line, 6400 ft, 39.245° N, 119.878° W, 18 Jul 1973, *Williams 73-51-5* (RENO).

Cited by Hall (1928) as subsp. *prionophyllus*, not seen in this study. California. Sierra Co.: Sardine Valley [ca. 39.513° N, 120.109° W], moist ground near running water, 10 Jul 1892, *Sonne 7* (UC,

as cited by Hall). **Nevada**. Washoe Co.**:** W of Washoe Lake, *Hall 12143* (UC); Bowers, *Hall 12145* (UC); Hunter Creek Cañon, Jul 1907, *Kennedy* (UC). Ormsby Co.: Carson City, *Hall 12218* (UC); King's Canyon, *Hall 12220* (UC).



Map 1. Distribution of *Pyrrocoma prionophylla*. Douglas Co., Nevada, is outlined in red. Inset shows relative positions of *P. thermolibes* (blue) and *P. mineralis* (green).

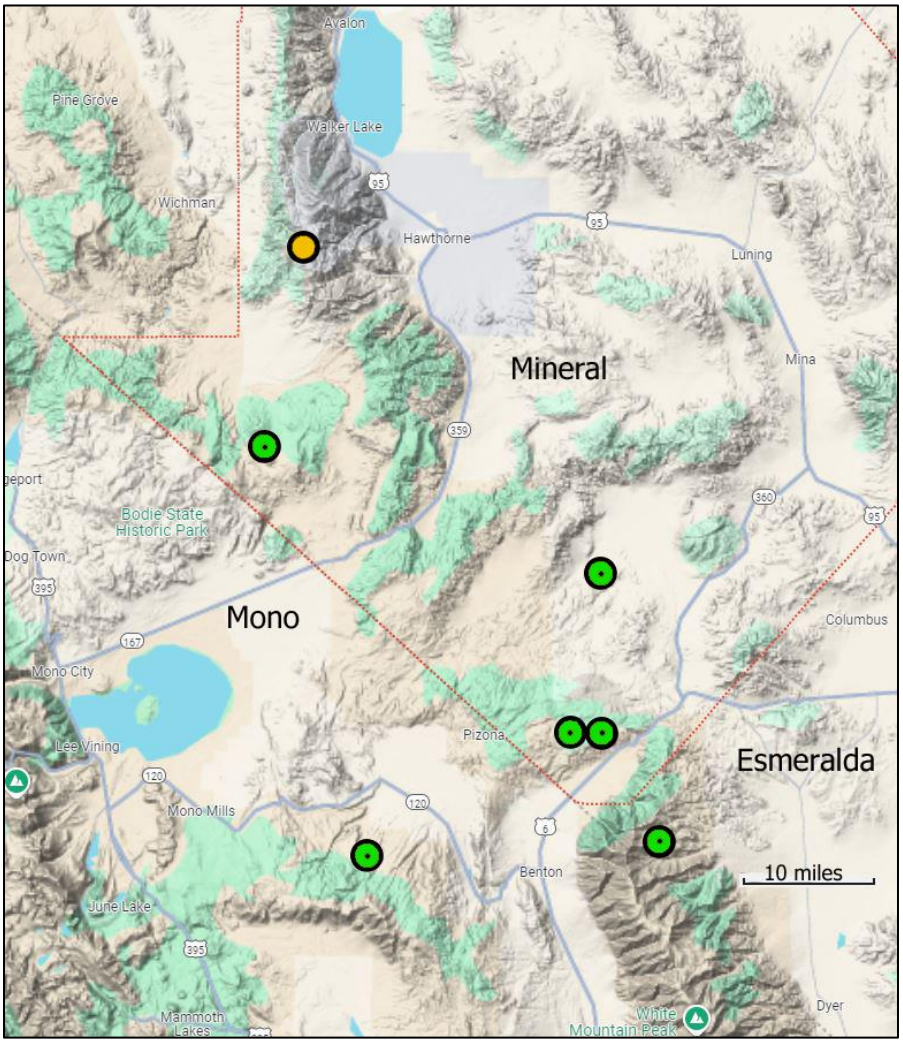
2. PYRROCOMA MINERALIS Nesom**, sp. nov. TYPE: Nevada.** Mineral Co.: Huntoon Mts, SW end of Truman Meadows, 37° 57' 09.9" N, 118° 26' 41.4" W, with *Chrysothamnus nauseosus* at edge of meadows, 7200 ft, 11 Sep 2006, *A. Tiehm 15354* (holotype: RENO; isotypes: ASC, BRY, COLO, KANU, NY, UTC). Figures 16, 17.

Similar to *Pyrrocoma prionophylla* in its clasping-sheathing cauline leaves, involucre with closely appressed, strongly graduate phyllaries, and numerous rays; different in its consistently entire to minutely denticulate-spinulose leaf margins, eciliate petioles, more distal branching and greater tendency for a

corymboid inflorescence, smaller heads (involucres 11–14 mm wide vs. 14–20 mm wide, inner phyllaries 6–7.5 mm long vs. 11–12 mm), short disc corollas (4.5–5 mm long vs. 5–7 mm), and strigose achenes (vs. glabrous). Distinct from western *P. lanceolata* in its mostly entire leaf margins, clasping-sheathing cauline leaves, larger involucres, ray florets more numerous and with linear, tightly coiling corollas, and geography.

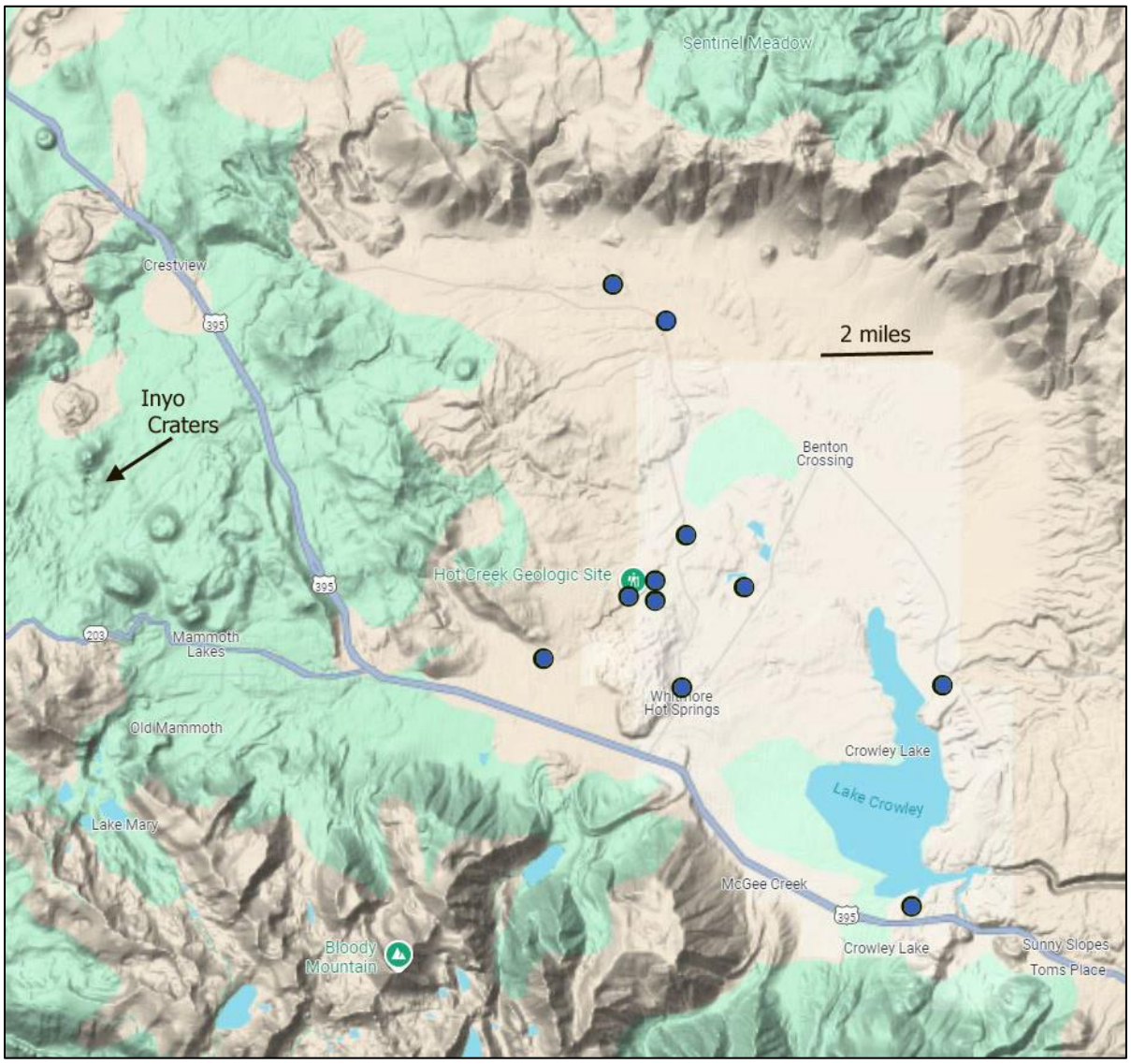
Stems erect to ascending-erect, 20–40 cm, glabrous, eglandular, often purplish. **Leaves**: basal persistent in a rosette, lanceolate to oblanceolate or elliptic-oblanceolate, 5–20 cm long, attenuate to a petiolar region 1/4–1/2 the leaf length, blades 5–12 mm wide, glabrous, eglandular, margins consistently entire to minutely denticulate-spinulose, without a white-indurate rim, eciliate, fibrous remnants of petioles persistent, cauline 7–12, linear-lanceolate to linear-oblanceolate, ascending, medial clasping-sheathing. **Heads** rarely 1, usually 2–4(–6) in a loosely racemoid to subcorymboid inflorescence on peduncles 2–7(–0) cm long, without immediately subtending bracts. **Involucres** 11–14 mm wide (pressed); phyllaries narrowly triangular-oblong to narrowly oblong with a triangular apex, in 3(–4) series of unequal length, with a narrow, scarious rim, inner 6–7.5 mm long, green patch ca. 13–1/2 the length, eglandular. **Ray florets** ca. 22–30, fertile, corollas 6–8 mm long, 1–1.5 mm wide, tightly coiling. **Disc corollas** 4.5–5 mm long. **Achenes** 4 mm long, sparsely strigose. Figures 16-22.

Flowering July-September. Seepage areas in meadows, saline, sometimes with *Chrysothamnus*; 5600-8200 feet. Map 2.

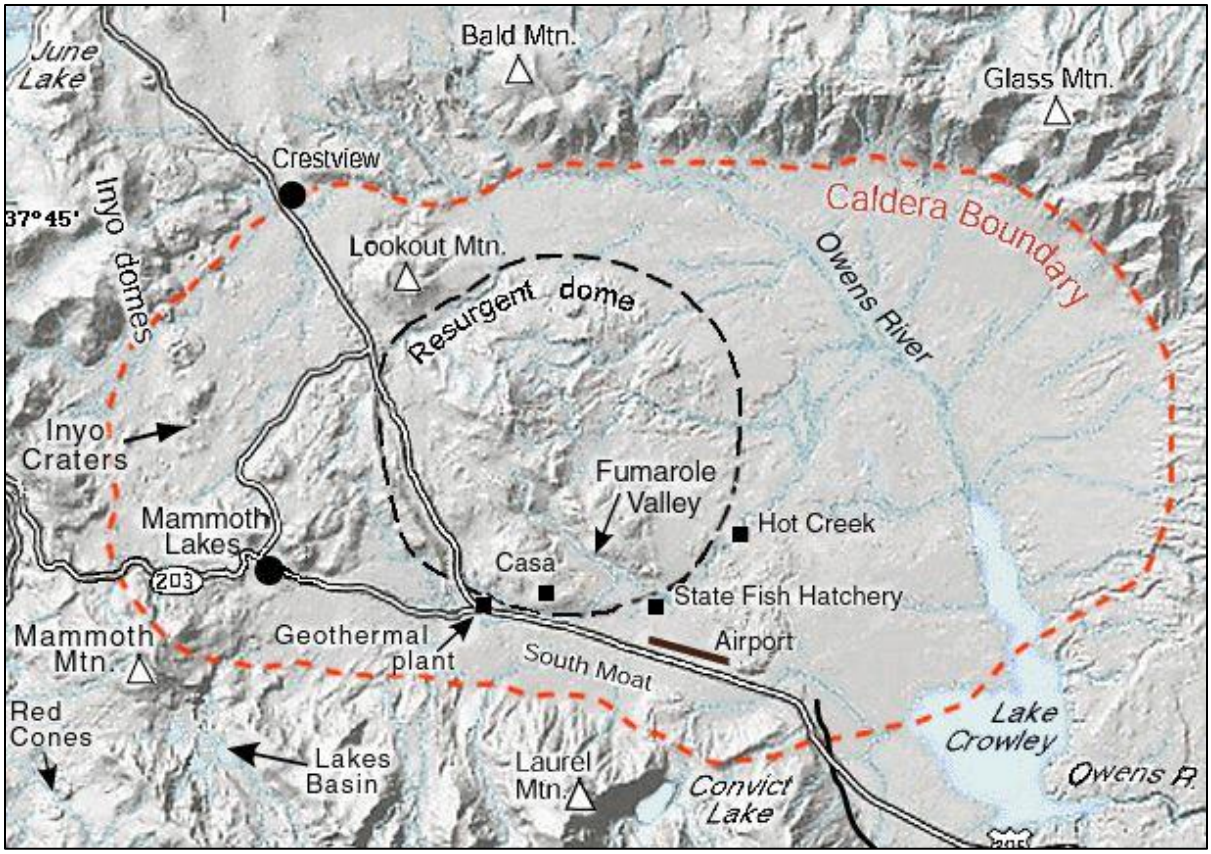


Map 2. Distribution of *Pyrrocoma mineralis*. Mineral and Esmeralda cos., Nevada, and Mono Co., California. The gold symbol is *P. prionophylla* in the Wassuk Range.

Additional collections. **California**. Mono Co.: Glass Mts. Region, Adobe Valley Basin, Taylor Canyon, in the yard of Upper Adobe Ranch, big rabbitbrush-saltgrass, sometimes irrigated, trampled, 6800 ft, slightly alkaline, 27 Aug 1964, *Reveal 1038* (OBI). **Nevada**. Esmeralda Co.: White Mts, Fishlake Valley drainage, Middle Creek canyon 4.0 mi S 77° E of Boundary Peak, 37.8463 N, 118.3019 W, moist sod in open alkaline meadow sloping 5° E with *Carex*, *Juncus*, *Sisyrinchium*, *Lupinus*, *Rosa*, *Salix*, *Iris*, *Potentilla*, etc., 8190 ft, 26 Jul 1986, *Morefield 4200* (NY, RENO). Mineral Co.: Truman's Meadows, first meadow, seepage area and by the willows, 7000 ft, abundant, 31 Aug 1977, *Williams 77-97-9* (NY-2 sheets, RENO-2 sheets, UNLV); S of Marietta, near Rock House Springs [ca 38.14° N, 118.37° W], seepage area, ca. 5600 ft, *Phragmites* in the spring, 9 Jul 1980, *Williams 80-195-3* (NY, RENO); near Aurora [38.29° N, 118.90° W], white-encrusted saline soil, with *Chrysothamnus*, 6900 ft, 19 Jul 1981, *Williams 81-114-1* (NY, RENO).



Map 3. Distribution of *Pyrrocoma thermolibes*, all within the Long Valley Caldera (see Map 3).



Map 4. Long Valley Caldera (Wikipedia). "One of the Earth's largest calderas, about 20 miles long (east-west), 11 miles wide (north-south), and up to 3000 ft deep."

3. PYRROCOMA THERMOLIBES Nesom, **sp. nov.** **TYPE**: **California**. Mono Co.: Long Valley, Hot Creek, moist alkali soil, grass meadow, aspen belt, 6700 ft, 23 May 1937, *P. Train s.n.* (holotype: DS; isotypes: MO, NEB, NY, RSA, UTC). Figure 23.

Distinct in its mostly solitary heads on long, arching-erect stems with non-clasping cauline leaves, eglandular vestiture, phyllaries in 3(–4) series of equal to subequal (or unequal) lengh, numerous ray florets, hairy achenes, and localization in the Long Valley Caldera.

Stems decumbent-ascending to ascending-erect, 12–30 cm, glabrous to sparsely flocculent and glabrate, often purple. **Leaves**: basal 4–8 cm long, attenuate to a petiolar region 1/3–2/3 the leaf length, blades elliptic-lanceolate to narrowly lanceolate or oblanceolate, 5–14 mm wide, glabrous, eglandular, margins evenly serrate with 4–9 pairs of teeth or sometimes subentire, cauline 5–8, narrowly lanceolate to oblanceolate, usually not clasping or subclasping, bracteate distally. **Heads** 1 or 2–3(–5) in a loosely racemoid inflorescence. **Involucres** 12–14 mm wide (pressed), sometimes tomentose at the very base; phyllaries narrowly elliptic-oblong to oblong-ovate with a triangular to narrowly ovate apex, in 3(–4) series of unequal to subequal (equal) length, inner 6–8 mm long, commonly purple-margined, green patch in the distal 1/3–2/3, narrowly rhombic, eglandular. **Ray florets** 28–40, fertile, corollas 8–10 mm long, 1.5–2 mm wide, coiling. **Disc corollas** 4.5–5 mm long. **Achenes** sericeous-strigose. Figures 23-27.

Flowering June-September (-October). Alkaline meadows, sandy creek banks; 6500-7000 feet. Maps 3 and 4.

Additional collections. Mono Co.: Hot Creek, 13 Jun 1936, *Cassel 253* (CAS); Little Alkali Lake, 37.666944 N, 118.787444 W, alkaline meadow, low water table, 6700 ft, 30 Jun 1988 *Clifton 18228* (PUA);

Hot Creek, Hot Creek Road 4.5 mi E of Hwy 395, sandy soil on the bank of a sulphurous creek, with *Juniperus occidentalis* and *Purshia tridentata*, 28 May 1977, *English 52* (UCSB); ca. 10 air mi NE of Mammoth Lakes, Inyo Natl Forest Rd 2S07 4.2 mi N of Hot Creek crossing, N of Lake Crowley, 37.731116° N, 118.817976° W, wet alkaline meadow edged by *Artemisia cana*, with *Distichilis* dominant, 7000 ft, abundant, 4 Sep 1986, *Ertter 6730* (MO, NY, RSA, SD, UC, UCR); Hot Creek Fish Hatchery, 1/2 mi E of Hwy 395, 37.641172° N, 118.859087° W, alkaline meadow, with grasses, *Crepis*, *Circium acaulescens*, *Sisyrinchium*, etc., abundant, 24 Aug 1945, *Ferris 11056* (CAS, DS, RSA, UC); spring [Layton Springs] on the E side of Lake Crowley 3.5 mi SSE of Benton Crossing, 37.63333 N, 118.73 W, grassy area in sagebrush scrub, at edge of flowing spring water, 6799 ft, solitary plant in bloom in dry sagebrush, 29 Sep 1996, *Helmkamp 1252* (UCR); Long Valley Basin; ca. 5 mi E of Arcularius Ranch just N of Owens River Road, 37.7457839° N, 118.8364799° W, alkaline meadow, with *Sisyrinchium*, *Spartina*, *Juncus*, *Carex*, 6960 ft, 30 Jun 1984, *Mark 29* (OBI); Long Valley, Jul 1938, *Noldeke s.n.* (CAS); Owens River, along the river road at the foot of Whisky Creek, 6700 ft, 29 Jul 1933, *Peirson 10748* (RSA); Owens River, river flats S of Whisky Creek, 6700 ft, 29 Jul 1933, *Peirson 10749* (RSA); Hot Creek Geysers, 20 July 1944, *Pollard s.n.* (CAS-2 sheets); Whitmore Hot Springs, desert, 7000 ft, 20 Jul 1935, *Rose 35413* (CAS); ca. 1/2 mi above Hot Springs in Hot Creek, moist, alkaline meadow along stream, 6970 ft, 4 Aug 1971, *Thorne 41208* (RSA); Long Valley, Hot Creek, alkali wet hay meadow, *Artemisia* belt, 6500 ft, 23 May 1937, *Train 769* (US).

Plants of the *Pyrrocoma sessiliflora* group (Nesom in prep.) grow sympatrically with *P. thermolibes* in the Long Valley area and in similar habitats — e.g., *Andre 21967* (RSA, UCR), *Howald 2792* (URC), *Howald 3306* (UCR), *Howald 4129* (RENO), *Howald 4717* (RENO), *Howell 54475* (CAS), *Matson 1744* (DAV), *Peirson 12162* (JEPS, RSA), *Thorne 71191* (RSA). Intermediates are not evident.

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Figure 1. *Pyrrocoma prionophylla*. Ormsby Co., Nevada. *Baker 1450* (POM), isotype.

Figure 2a. *Pyrrocoma prionophylla*. Ormsby Co., Nevada. *Baker 1450* (GH), isotype.

Figure 2b. *Pyrrocoma prionophylla*. Detail from GH isotype (Fig. 2a).

Figure 3. *Pyrrocoma prionophylla*. Ormsby Co., Nevada. *Baker 1450* (RM), isotype.

Figure 4. *Pyrrocoma prionophylla*. Washoe Co., Nevada. *Petersen 428* (RENO). Inflorescence similar to those of the type collection.

Figure 5. *Pyrrocoma prionophylla*. Washoe Co., Nevada. *Heller 10658* (RENO).

Figure 6. *Pyrrocoma prionophylla*. Washoe Co., Nevada. *Heller 10658* (US).

Figure 7. *Pyrrocoma prionophylla*. Alpine Co., California. *Howell 40907* (CAS).

Figure 8. *Pyrrocoma prionophylla*. Alpine Co., California. *Dean & Starbuck 6767* (DAV).

Figure 9. *Pyrrocoma prionophylla*. Mono Co., California. *Winblad s.n.* (CAS).

Figure 10. *Pyrrocoma prionophylla*. Mono Co., California. *Mayes 87* (CAS).

Figure 11. *Pyrrocoma prionophylla*. Mono Co., California. *Ferris 12566* (DS).

Figure 12. *Pyrrocoma prionophylla*. Lyon Co., Nevada. *Tiehm 2993* (NY).

Figure 13. *Pyrrocoma prionophylla*. Lyon Co., Nevada. *Tiehm 2993* (RENO).

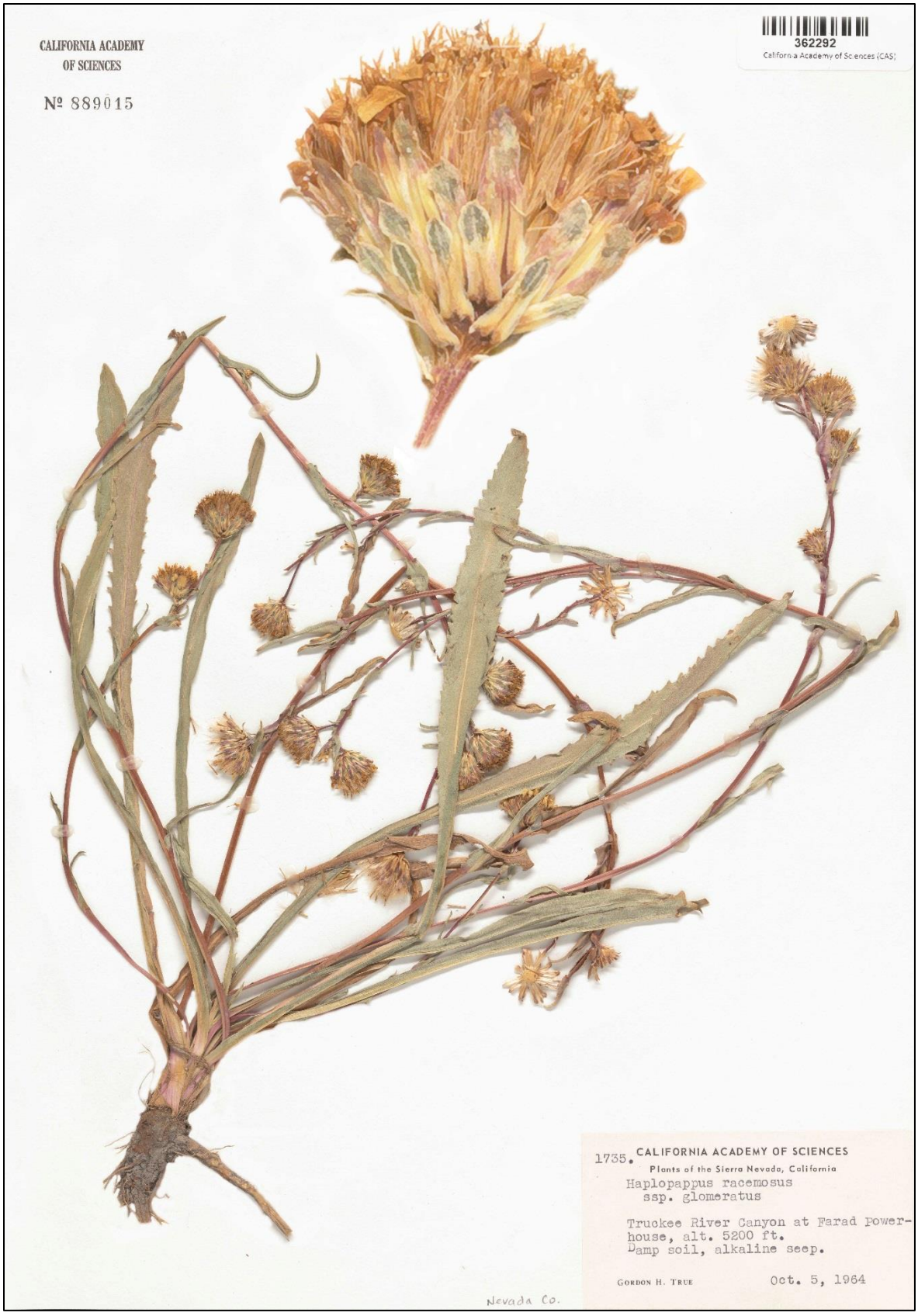

Figure 14. *Pyrrocoma prionophylla*. Nevada Co., California. *True 1735* (CAS).

Figure 15. *Pyrrocoma prionophylla*. Mineral Co., Nevada. *Archer 7082* (RENO).

Figure 16. *Pyrrocoma mineralis*. Mineral Co., Nevada. *Tiehm 15354* (RENO), holotype.

Figure 17. *Pyrrocoma mineralis*. Mineral Co., Nevada. *Tiehm 15354* (NY), isotype.

Figure 18. *Pyrrocoma mineralis*. Esmeralda Co., Nevada. *Morefield 4200* (NY).

Figure 19. *Pyrrocoma mineralis*. Esmeralda Co., Nevada. *Morefield 4200* (NY).

Figure 20. *Pyrrocoma mineralis*. Mineral Co., Nevada. *Williams 77-97-9* (NY).

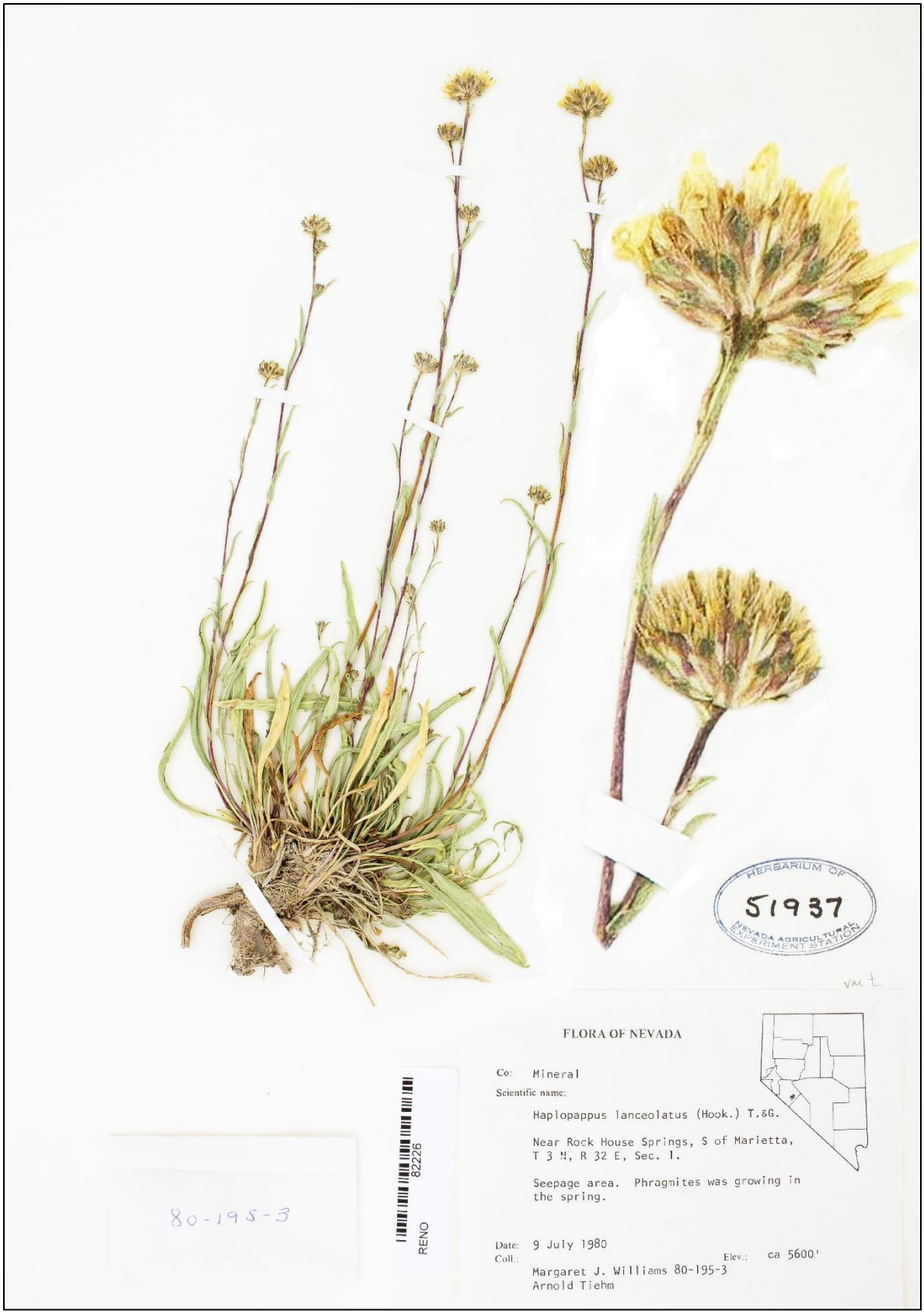

Figure 21. *Pyrrocoma mineralis*. Mineral Co., Nevada. *Williams 80-195-3* (RENO).

Figure 22. *Pyrrocoma mineralis*. Mono Co., California. *Reveal 1038* (INF-OBI).

Figure 23. *Pyrrocoma thermolibes*. Mono Co., California. *Train s.n.* (DS), holotype.

Figure 24. *Pyrrocoma thermolibes*. Mono Co., California. *Train 769* (US).

Figure 25. *Pyrrocoma thermolibes*. Mono Co., California. *Peirson 10749* (DS).

Figure 26. *Pyrrocoma thermolibes*. Mono Co., California. *Pollard s.n.* (CAS).

Figure 27. *Pyrrocoma thermolibes*. Mono Co., California. *English 52* (UCSB).