

**21. HETEROTHECA LOBOENSIS** Nesom, **sp. nov.** **TYPE: Texas.** Culberson Co.: Lobo [16 mi SSE of Van Horn on Hwy 90], roadside with Johnson grass, [4040 ft], 20 Sep 1968, *A.M. Powell 1633* (holotype: TEX, Fig. 85; isotypes: SRSC, USCH image).

Distinct in its tall, erect stems unbranched until above the middle, cauline leaves even-sized and evenly distributed, obovate-petiolate with a rounded and distinctly apiculate apex, heads usually numerous in a corymboid arrangement, on naked or bracteate peduncles. Different from *H. zionensis* in its more sparse and hirsute vestiture of coarser, thick-based hairs, leaf surfaces more densely sessile-glandular, and larger heads on longer peduncles. Different from *H. arizonica* and *H. fulcrata* in lack of capitular bracts and from *H. fulcrata* in its more erect, highly branched stems with more numerous heads.

**Stems** erect from the base, (10–)20–60 cm tall, hirsute to strigose-hirsute; axillary fascicles (distal nodes) of small leaves usually evident in earlier season plants. **Leaves** cauline, basal petiolate, usually not persistent, relatively even-sized above the basal and evenly distributed, spreading to ascending, midstem and distal basally attenuate but without a distinct petiole, mostly obovate to oblong-obovate or oblanceolate, 9–14 mm long, 4–7 mm wide, apex rounded to truncate and distinctly apiculate, surfaces strigose-hirsute to hirsute-strigose, ciliate or eciliate, glandular adaxially. **Heads** usually numerous in a corymboid arrangement, on naked or bracteate peduncles, without capitular bracts. **Involucres** turbinate-campanulate, 7–9 mm wide (pressed); phyllaries linear-lanceolate, in 4–5(–6) series strongly graduate in length. **Ray flowers** 18–25.

Flowering Jun–Sep. Rocky hills, mesas, canyon bottoms, crevices, roadsides, sand, alluvial silt, igneous and limestone soil, volcanic rocks, desert scrub with *Larrea*; 3900–4500(–6100) ft.

**Additional collections.** **New Mexico.** Chavez Co. [label says "Otero"]: W side of Guadalupe Mts, 3 mi W of Lincoln Natl forest, T20S R17E, Sec 4, 5800 ft, 10 Aug 1977, *Fletcher 2472* (UNM, Fig. 88b). **Texas.** Brewster Co.: Top of Elephant Mesa on Nevill ranch [now Elephant Mountain WMA] ca. 35 mi S of Alpine, dark volcanic rock, ca. 6100 ft, 20 Jun 1961, *Johnston 6424* (LL). Culberson Co.: Ca. 3 mi E of Van Horn, Hwy 80, sand, 3900 ft, 29 Aug 1947, *Hinckley 4024* (NY); Hurd's Draw [or Herds Pass Draw, ca. 32 mi E of Van Horn], buff silt (alluvial cover), hilly topography, [ca. 4300 ft], 9 Jun 1949, *Janszen 40* (TEX); near N end of Van Horn Mts, depression in gravelly calcareous soil, *Larrea-Flourensia*, 16 Jun 1943, *I.M. Johnston 4556* (NY); 12 mi E of Van Horn on IH-10, [ca. 3900 ft], abundant, 24 Jun 1974, *Powell 2782* (SRSC, TEX); Delaware Mts, 6-7 air mi SE of jct US Hwy 62-180 with Texas Hwy 54, near 31° 42' N, 104° 46' 30" W, rocky canyon bottom, 4500-4700 ft, 27 Aug 1994, *Worthington 23429* (SRSC, TEX, UTEP). Presidio Co.: San Esteban Lake, Marfa, [ca. 4400 ft], Jul 1936, *Hinckley s.n.* (TEX-2 sheets); [or Culberson Co.?] W side of Van Horn Mts, ca. 1 mi S of old mica mill, rocky prominences of low foothills, ca. 4300 ft, 20 Sep 1941, *Hinckley 2154* (NY-2 sheets); San Esteban Canyon, rocky crevice, igneous soil, 4400 ft, 28 May 1957, *Warnock 14465* (LL, SRSC). Hudspeth Co.: 2-4 mi W of Allamoore, frequent locally along hwy in limestone soil, 4100 ft, 7 Sep 1955, *Warnock 13660* (LL, SRSC).

Identification of goldenasters in trans-Pecos Texas remains problematic. *Heterotheca fulcrata* and *H. arizonica* apparently intergrade; *H. zionensis* also occurs in the area and may intergrade with *H. fulcrata*. Recognition of *H. loboensis* as a separate entity is a step toward making the trans-Pecos pattern more comprehensible; another undescribed entity may exist.

*Heterotheca loboensis* is similar to *H. zionensis* in its erect stems branched above the middle bearing a corymboid array of heads and its involucre without peduncular bracts. The latter, however, produces a closely strigose, more dense vestiture of thinner hairs, characteristically silvery-sericeous and with smaller and more inconspicuous sessile glands on the surface, and smaller heads (involucre (5–)6–9 mm wide, with fewer, less graduate phyllaries and fewer ((10–)12–20) rays) on shorter peduncles (compare Fig. 99, *H. zionensis* from Brewster Co., *Warnock W279*). Plants of *H. loboensis* with putative genetic influence of *H. fulcrata* lack immediately subtending capitular bracts, leaves and bracts with prominent marginal cilia, and distal stems with fewer branches and fewer heads — plants from Hurd's Draw in Culberson County (Fig. 90) perhaps show such intermediacy.

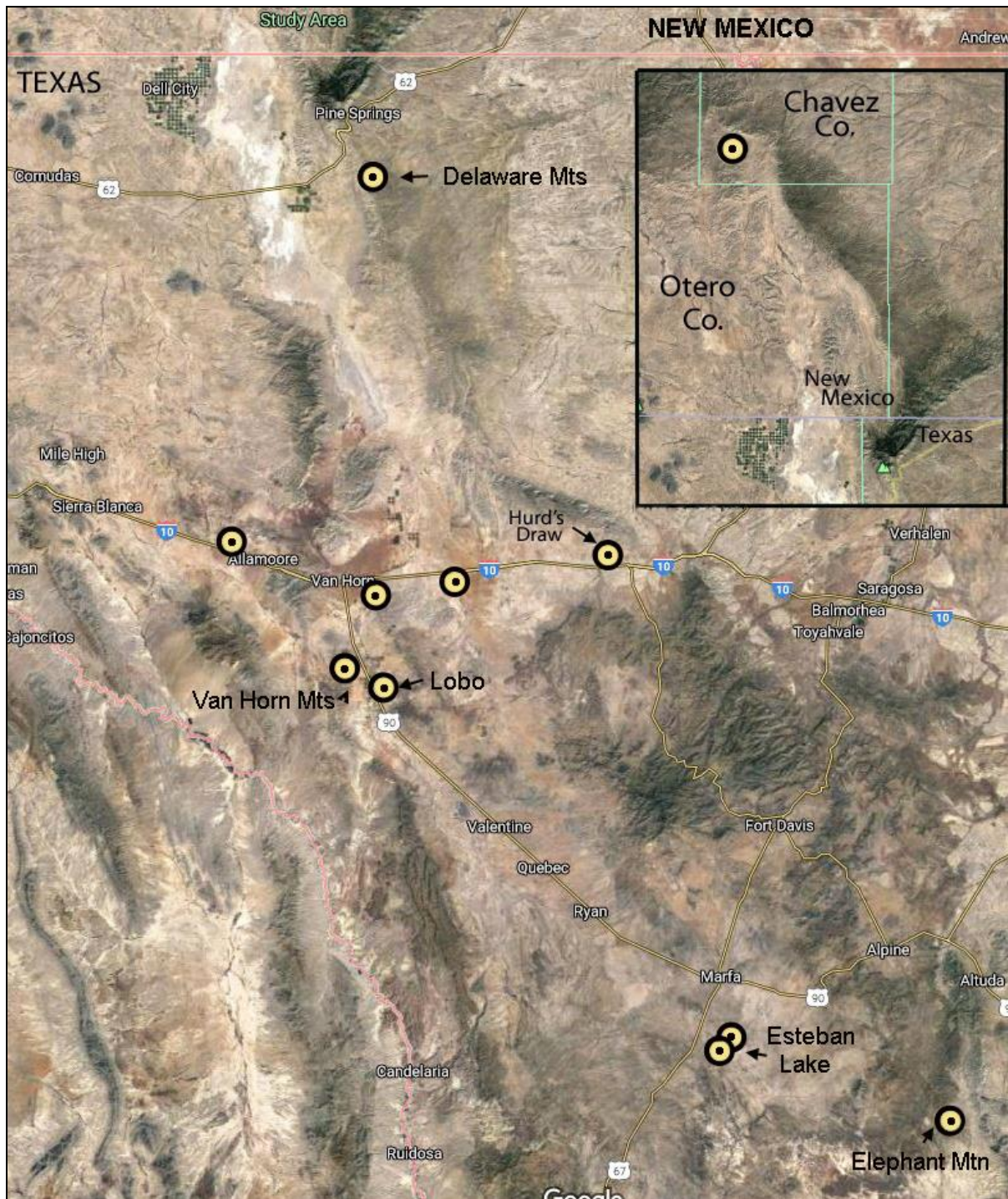


Figure 84. Distribution of *Heterotheca loboensis* — Hudspeth, Culberson, Presidio, and Brewster counties, Texas. Inset shows locality in New Mexico. Also see map in Figure 91.



Figure 85. *Heterotheca loboensis*, holotype (TEX).



Figure 86. *Heterotheca loboensis*, west of Allamore in Hudspeth Co., Texas. Warnock 13660 (LL).

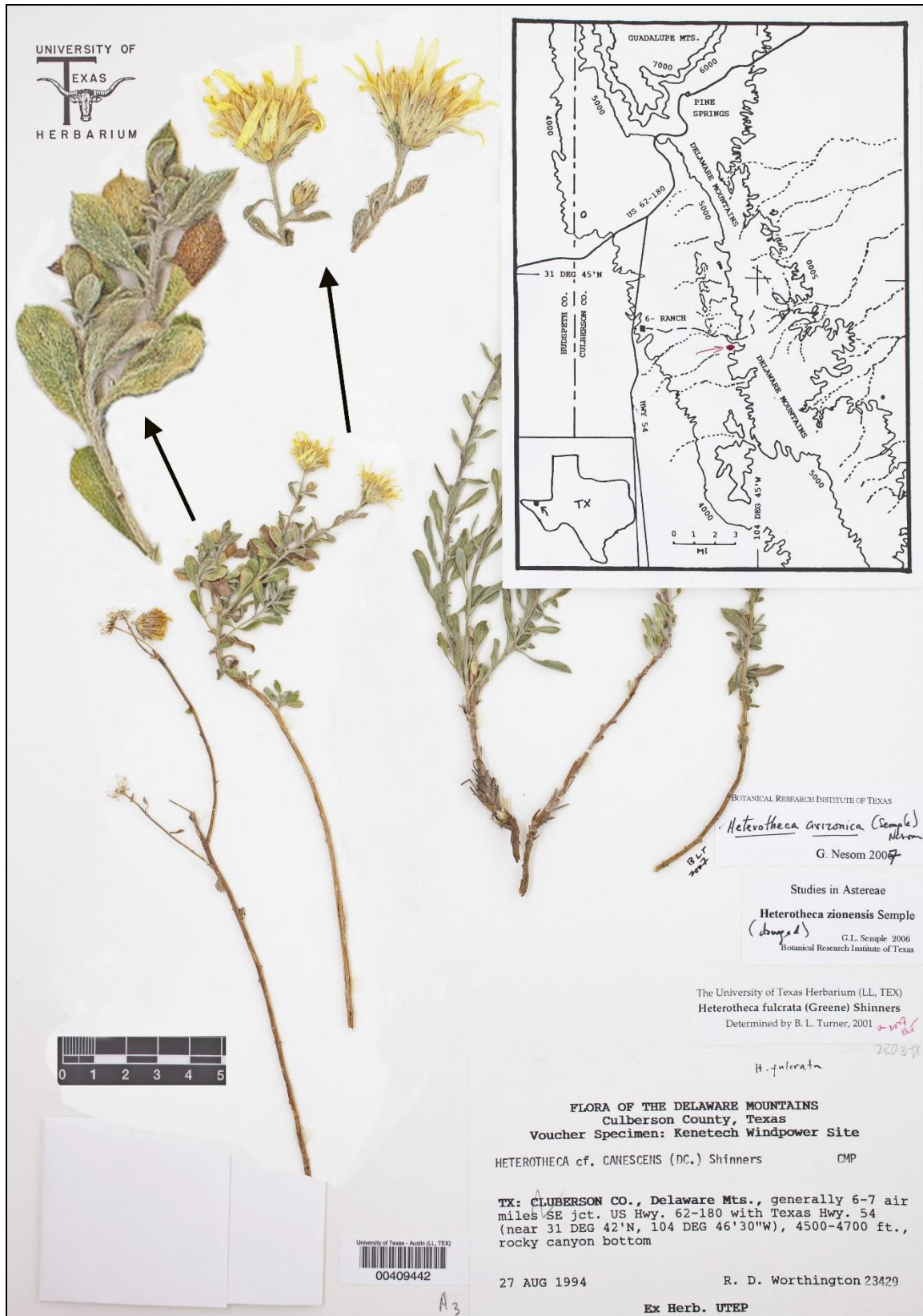


Figure 87. *Heterotheca loboensis*, Delaware Mountains in Culberson Co. Texas. Worthington 23429 (TEX). Stem height apparently reduced because of drought or stem damage but other features are typical.



Figure 88a. *Heterotheca loboensis*, east of Van Horn in Hudspeth Co. Texas. Powell 2782 (TEX). Early season form before full development of the inflorescence. Influence of *H. zionensis*?



Figure 88b. *Heterotheca loboensis*, west side of Guadalupe Mts at 5800 ft, Otero Co., New Mexico. Fletcher 2472 (UNM).



Figure 89. *Heterotheca loboensis*, Elephant Mesa in Brewster Co., Texas. Johnston 6424 (LL). Peduncles relatively short but other features are more typical. Influence of *H. fulcrata*? (see text comments).





Figure 90. *Heterotheca loboensis* (x *H. fulcrata*?), Hurd's Draw in Culberson Co., Texas. Janszen 40 (TEX). Stems decumbent-ascending, branches relatively few (but axillary buds prominent — early season?), small, marginally short-ciliate subpeduncular bracts present.

**22. HETEROTHECA ZIONENSIS** Semple, Brittonia 39: 384. 1987. *Chrysopsis zionensis* (Semple) S.L. Welsh, Utah Fl. (ed. 3, rev.), 159. 2003. **TYPE: Utah.** Washington Co.: W of Leeds of Silver Reef Road, 3.2 km into Dixie Natl Forest, juniper-sage-yucca, in soft and loose red sand soil, forming dominant local ground cover, 11 Sep 1985, *J. Semple & S. Heard* 7859 (holotype: NY image!; isotypes: ASU!). Distribution also to DAO, UTC, and WAT as cited by Semple (1996).

*Heterotheca zionensis* in characteristic form is identified by its stiffly erect habit, heads in a corymboid arrangement and without capitular bracts, and closely strigose-sericeous, usually silvery (but sometimes more gray) stems, leaves, and phyllaries. Surfaces usually eglandular but sometimes sessile-glandular (under the strigose-sericeous layer). Stem vestiture usually 1-storied (strigose) but sometimes with a much longer, spreading, overstory. Leaves ascending or commonly spreading to deflexed, mostly oblong to oblong-oblancheolate or elliptic with base attenuate to rounded or truncate, sometimes subclasping; axillary fascicles of small leaves usually are evident. Involucres (5–)6–9 mm wide. Ray flowers (10–)12–20. Chromosome numbers, **2n=18** (*Semple* 7914, 9018, 10508, 10509; Coconino, Gila, Dona Ana cos., respectively; 8884, Utah Co., Utah; *Ward* 81-550, Dona Ana Co.), **2n=36** (5531, 9017, 9022, 9023, 9024, 10493 from Navajo Co.; 9017 from Coconino Co.; 8875 from Wasatch Co., Utah). The tetraploid count of *Semple* 8875 is from Midway in Wasatch Co., an area from which I have otherwise seen only collections of *H. utahensis*.

Occasional plants (sometimes perhaps grazed or otherwise damaged) of *Heterotheca zionensis* sometimes are reduced in height and leaf size (vs. the consistently shorter *H. pedunculata*, with which it might be confused in the small region of sympatry) but still distinct in their silvery vestiture, stems arising from the caudex in a dense cluster, and clustered heads.

The range of *Heterotheca zionensis* runs from southwestern Texas through southern New Mexico into Arizona and southern Utah (Garfield, Kane, San Juan, Washington, Wayne cos.). From there it continues, though apparently in less abundance, into north-central and northwest Utah and into northwestern Colorado. In northern Utah, *H. zionensis* is sympatric with plants recognized here as *H. utahensis*. The two are similar in habit and both have been identified by Semple as *H. zionensis*, but they are distinct in vestiture and apparently maintain their identities while occurring in close proximity. Apparent intermediates have been collected but are relatively uncommon: *Semple* 8875 occurs in an area where *H. utahensis* is common; *Semple* 8884 perhaps shows influence of *H. utahensis*; *Semple* 5757 (*E. utahensis*), perhaps shows influence of *H. zionensis*.

a. Stems with closely appressed, 1-storied vestiture, rarely with longer, spreading hairs; leaves usually densely silvery-sericeous, rarely with more reduced vestiture; phyllaries narrowly elliptic-lanceolate to narrowly triangular, closely strigose, eglandular, narrowly elliptic-lanceolate **22. Heterotheca zionensis**

a. Stems with strigose-hirsute to hirsute, 2-storied vestiture; leaves not silvery sericeous, with non-glandular vestiture not obscuring the surfaces; phyllaries narrowly triangular to linear-triangular, loosely strigose, sessile-glandular at least distally ..... **23. Heterotheca utahensis**

**Collections examined of *H. zionensis* in the northernmost portion of its range.**  
**Colorado.** Moffat Co.: US Hwy 40, 30 Aug 1930, *Baker* 4833 (LL, RM); 20 mi E of Dinosaur near Skull Creek, clay soils, mixed shrub-*Atriplex*-*Oryzopsis* community, 12 Aug 1973, *Higgins* 8240 (NY); Pat's Hole, near the confluence of Green and Yampa rivers, dry sandy soil, 4500 ft, 8 Jul 1945, *Porter* 3635 (SMU). **Idaho.** Franklin Co.: 1 mi SE of Cleveland, dry slopes, sagebrush-grass, 26 Jul 1952, *Baker* 9532 (ID! image!, SRP image!, WTU-3 sheets). **Utah.** Davis Co.: Antelope Island [SE part of Salt Lake near SL City, a peninsula at low lake levels], 4900 ft, 16 Sep 1980, *Clark* 4468 (BRY); Antelope Island, 8 Jul 1880, *Jones s.n.* (POM-2 sheets); Antelope Island State Park, W-facing slope 4900 ft, 9 Oct 1983, *Jones* 763 (BRY). Salt Lake Co.: City Creek Canyon, open places, 7 Oct 1905, *Garrett* 1703 (NY); near Salt Lake City, dry waste ground, 6 Sep 1906, *Garrett* 2061 (NY);

between Big and Little Cottonwood canyons, 9 Oct 1909, *Garrett 2653* (LL); Camp Willams Training Area, Traverse Mtn Range, lake terrace, 1494 m, 28 Aug 1993, *Hysell 495* (NY); City Creek Canyon, 6000 ft, Jul 1875, *Jones s.n.* (NY); Little Cottonwood Canyon, along Hwy 152 below Brighton, Storm Mtn quartzite outcrops, Gambel oak, 20 Aug 1983, *Shultz 7233* (NY); Big Cottonwood Canyon, Rte 190 pull-off at "Storm Mtn Quartzite" marker, 1775 m, 29 Jul 2009, *Vincent 14537* (NY). Utah Co.: Vernal-Manila Hwy, *Garrett 7526* (UT image! and as cited by Semple 1996). Utah Co.: Mt. Timpanogos, Grove Creek canyon, mouth of canyon, dry, rocky soil, 5400 ft, *Allred 366* (BRY); Provo, along Iriquois St., below Rock Canyon flood control dam, ca. 5400 ft, 12 Sep 1983, *Baird 216* (BRY); Provo, dry, gravelly places, sand dunes, 4500 ft, 25 Jun 1925, *Cottam 275* (BRY); East Bench of Provo, dry hillside, 4600 ft, 29 Aug 1932, *Harrison 6123* (BRY); Rock Canyon, dry, rocky slope, 4500 ft, 4 May 1935, *Harrison 7552* (BRY); S of Provo Canyon, inside 1st RH bend of Squaw Peak Road, grassy slope with *Rhus trilobata*, 18 Sep 1980, *Jeppsen 158* (BRY); Utah Hwy 92, 2 km E of Utah Hwy 74 in Alpine, gravel beach and road from dam above, 17 Sep 1987, **2n=18**, *Semple & Chmielewski 8884* (BRIT, BRY, MO, UC); SE of Ironton, steep, W-facing slope, 2 Sep 1965, *Welsh 5105* (BRY); Diamond Fork Canyon, ca. 5 mi E of US Hwy 50-6, disturbed, S-facing, gravelly slope, *Artemisia* community, 30 Aug 1967, *Welsh et al. 6640* (BRY). Wasatch Co.: Luke's Hot Pot, Midway, 22 Jul 1927, *Harris C27312* (MO, POM); along East Abish loop road, ca. 16 mi ESE of Heber City, 7710 ft, 5 Aug 2008, *Herrin 248* (BRY); Utah Hwy 220 near intersection with Lime Canyon Road [in Midway], on hot springs margins, in "Hot Pots," 17 Sep 1987, *Semple & Chmielewski 8875*, **2n=36** (BRY, MO). Wayne Co.: Boulder Mtn to Burr Trail to Notom Road, SE of Oak Creek Campground, mountain meadow, 8800 ft, 24 Jul 1973, *Harrison 1275* (BRY); Anderson Bottom, Green River, ca. 3950 ft, 11 Oct 1983, *Welsh 22617* (BRY). Weber Co.: Roy, weed in fields and waste places, sandy, 4200 ft, 19 Jul 1972, *Clark 2238* (BRY); Willard Bay State Park along bay levy, 10 Aug 2000, *Spencer 1565* (NY).

A collection from Mohave Co., Arizona, identified and mapped here as *Heterotheca zionensis*, has the stem and leaf aspect and vestiture of the species, but phyllaries are sessile-glandular, without non-glandular hairs — it perhaps shows genetic influence of *H. cinerascens* where the ranges of the two species meet. Mohave Co.: Ariz 389, 6 mi from Utah border, common along roadside, 5100 ft, 5 Aug 1970, *Holmgren 4661* (ID, RSA, TEX). Collections of typical *H. zionensis* also have been made from Mohave Co.: e.g., Cottonwood Canyon, 23 Jun 2004, *Higgins 25811* (BRY); Cottonwood Canyon, 5 Sep 1978, *Gierisch 4472* (BRY-2 sheets); base of Black Rock Mtn, NE of Jacobs Well, 6 Aug 1980, *Bundy 171* (BRY).

*Heterotheca zionensis* is adventive in some areas of the city of Santa Fe, New Mexico, where it grows conspicuously and abundantly along street medians and sides (pers. observ.).

Apparent hybrids between *Heterotheca zionensis* and *H. fulciens* have been collected in the Flagstaff area, where both occur abundantly in typical form: *Nelson 63653* (RM) and *Nelson 70314* (RM) have the habit and appressed leaf vestiture of *H. zionensis* but have small capitular bracts and spreading stem vestiture; *Hartman 80060* (RM) has the habit of *H. zionensis* but very small capitular bracts and general vestiture of *H. fulciens*.

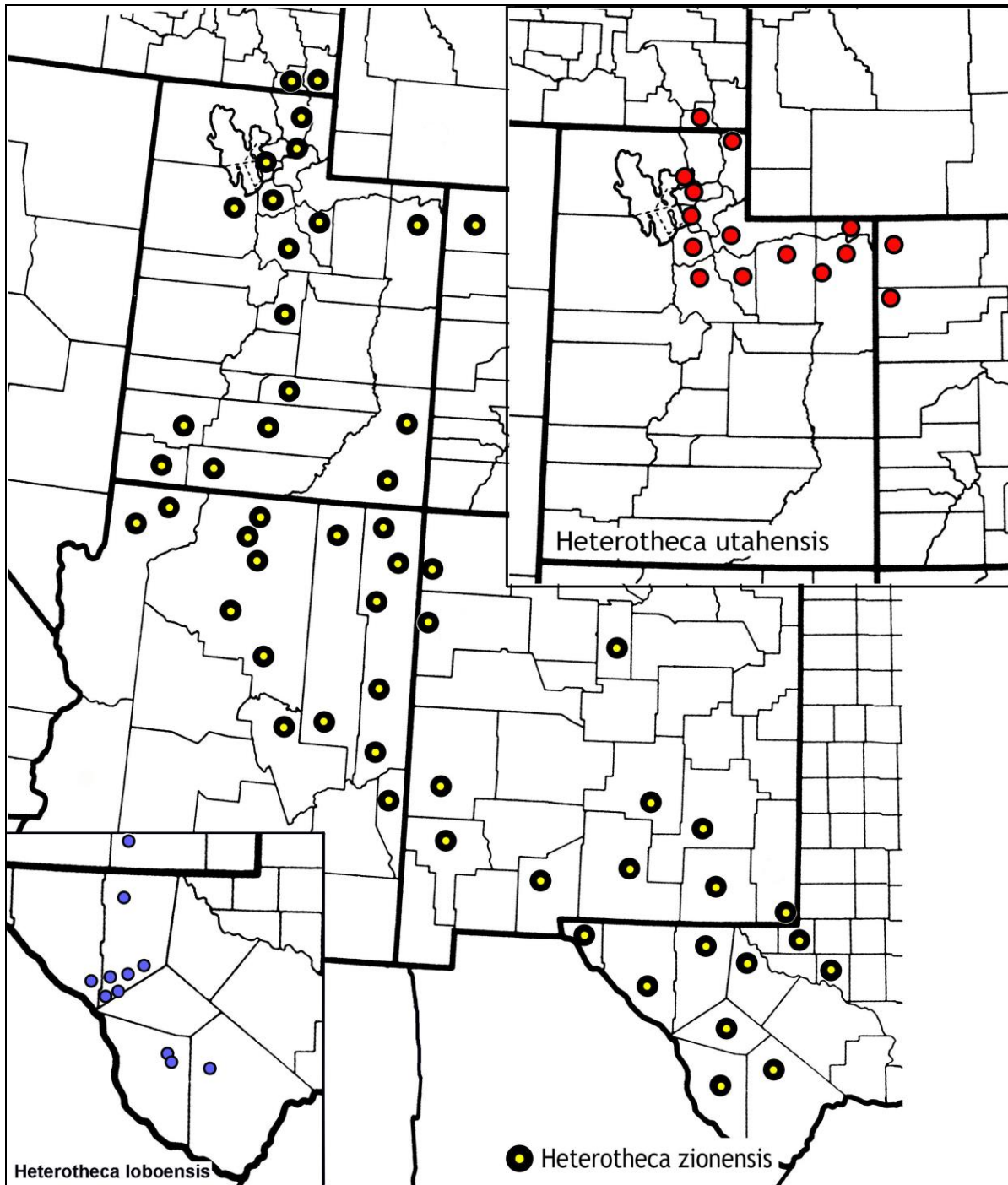


Figure 91. Distribution of *Heterotheca zionensis*, *H. utahensis*, and *H. loboensis*. New Mexico locality is in Chavez Co., at northwest end of Guadalupe Mts., see text and detailed map in Fig. 84.

Figure 92. *Heterotheca zionensis*, Washington Co., Utah. Higgins 14007 (BRY).



Figure 93. *Heterotheca zionensis*, Coconino Co., Arizona. Baker 12670 (ASC).



Figure 94. *Heterotheca zionensis*, Kane Co., Utah. Fertig 27837 (UT).



Figure 95. *Heterotheca zionensis*, Navajo Co., Arizona. Lehto et al. L19002 (ASU).





Figure 96. *Heterotheca zionensis*, San Juan Co., New Mexico. Harris s.n. (UNM). Low habit and rhizome-like caudex branches are unusual, perhaps in response to damage from grazing.

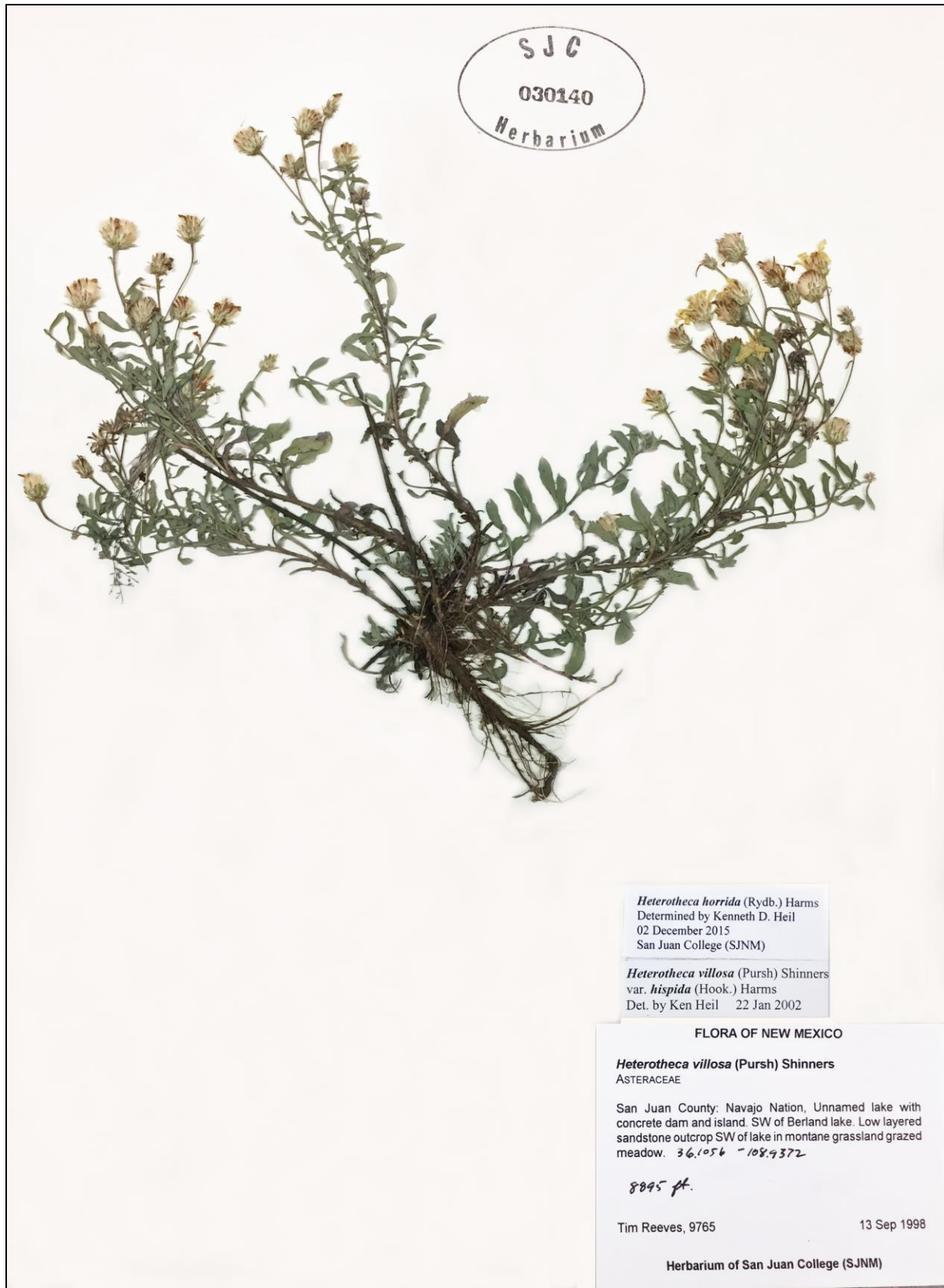


Figure 97. *Heterotheca zionensis*, San Juan Co., New Mexico. Reeves 9765 (SJNM). Relatively sparse vestiture results in greener color. Depressed habit probably from grazing.

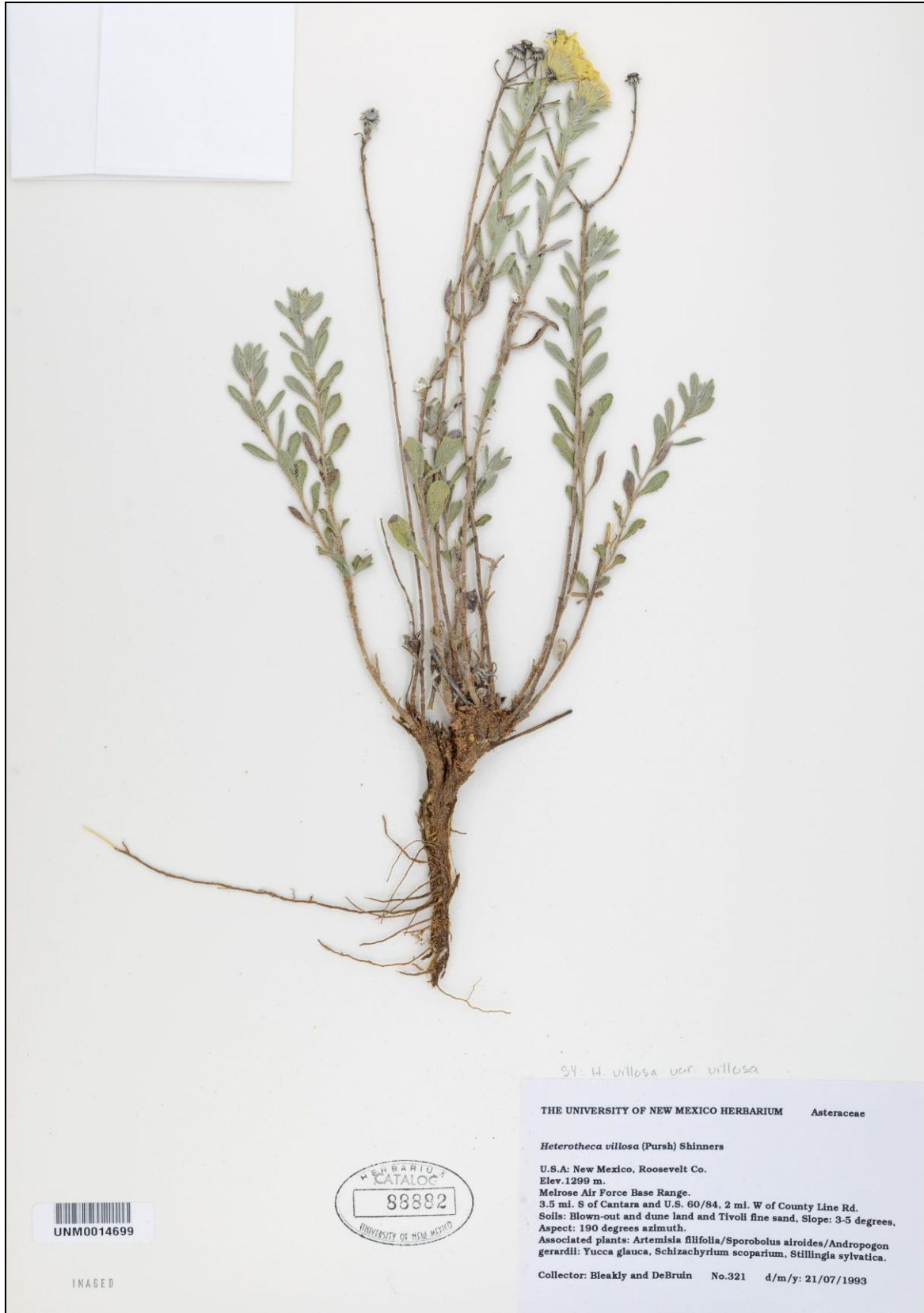


Figure 98. *Heterotheca zionensis*, Roosevelt Co., New Mexico. Bleakly & DeBruin 321 (UNM). Influence of *H. angustifolia*?



Figure 99. *Heterotheca zionensis*, Brewster Co., Texas. Warnock W279 (TEX).

**23. HETEROTHECA UTAHENSIS** Nesom, **sp. nov.** **TYPE: Utah.** Utah Co.: Lakeview [part of Orem], crest of partially stabilized sand dune, 4500 ft, 24 Jun 1938, *B.F. Harrison* 8387 (holotype: UC!).

Similar to *Heterotheca zionensis* in its relatively tall and erect stems often with prominent axillary fascicles of leaves, its oblong to oblong-elliptic, strigose leaves, and its heads in a corymboid arrangement, without capitular bracts; different in its (a) consistently 2-storied stem vestiture, the longer hairs spreading to deflexed, the shorter spreading to ascending, (b) leaves rounded or obtuse to truncate (vs. attenuate) at base, (c) leaf surfaces less densely strigose (not silvery-sericeous) and minutely but prominently and densely sessile-glandular (visible through the non-glandular hairs), and (d) achenes less densely sericeous and with finer hairs.

**Perennials** from a thick, woody taproot. **Stems** numerous from the base, (12–)20–80 cm, vestiture strigose-hirsute to hirsute, 2-storied, overstory spreading to slightly deflexed, shorter understory spreading to loosely strigose, surface usually prominently sessile-glandular and visible through non-glandular hairs. **Leaves** usually densely arranged and even-sized, ascending or commonly spreading to deflexed, mostly oblong to oblong-elliptic or oblong-oblongate to elliptic, 10–30(–40) x 4–13 mm, mid and distal cauline usually narrowed to a subpetiolate base, not clasping or subclasping, distally becoming epetiolate with base rounded to truncate, sometimes subclasping, apex mostly truncate to rounded, sometimes acute, often apiculate; axillary fascicles of small leaves prominent and consistently produced. **Heads** usually numerous in a corymboid arrangement, without capitular bracts, peduncles relatively short, (2–)5–15(–30) cm. **Involucres** 7–10 mm wide (pressed); phyllaries sparsely loosely strigose, commonly purple-tipped, outer often sessile-glandular at least distally, inner 7–8 mm long, narrowly triangular to linear-triangular. **Ray flowers** 12–25. **Chromosome number**,  $2n=36$  (*Semple & Chmielewski* 8887, Utah Co., Utah).

*Heterotheca utahensis* is endemic to northern Utah and immediately adjacent Idaho and Colorado. *Heterotheca zionensis* and *H. utahensis* perhaps are closely related evolutionarily but plants of intermediate morphology are not common, suggesting that an isolating mechanism is in effect. I identified the BRY sheet of *Spencer 1565* from Weber County as *H. utahensis* but the NY sheet as *H. zionensis*. The 'utahensis' entity is limited in geography (it does not occur over most of the range of *H. zionensis*), further indicating its genetic distinction.

**Additional collections examined.** **Colorado.** Moffatt Co.: "Western Colorado, along Hwy 40," 30 Aug 1930, *Baker 4833a* (LL, RM; Semple annotated the LL specimen as *H. zionensis* with the following comment: "like N Utah 4x plants" ... "? Introduced from Provo-St. Lake UT area."); along Yampa Rd, 2-3 mi SE of Hwy 40 bridge SE of Maybell, brushland area with narrow riparian corridor, 4 Aug 1991, *Keil 22511* (OBI); "14" at Disappointment Draw, sagebrush, 6000 ft, 19 Jun 2002, *Tilley 2823* (BRY). Rio Blanco Co.: ca. 18 mi E of Dinosaur, salt desert shrub community, 5640 ft, 10 Aug 1979, *Welsh & Moore 312* (BRY). **Idaho.** Franklin Co. Maple Grove Hot Springs, Oneida Reservoir, ca. 21 mi NE of Preston, travertine, 4900 ft, 9 Jul 1961, *Bright 61-46* (RM); Franklin Basin, White Canyon, 8300 ft, 30 Jul 1958, *Cottam et al. 15304* (BRY). **Utah.** Box Elder Co.: 8 mi S of Brigham City, US 89 and 91 S of Willard, more or less disturbed ground on dry, open slope between mtn and road, ca. 4350 ft, 18 Aug 1963, *Rosbach 5560* (WTU). Daggett Co.: Near mouth of Cart Creek, woodland, 5500 ft, 29 Jul 1929, *Hutchings 117* (RM); ca. 8.5 air mi S of Manila, ca. 4.5 road mi W of Utah Hwy 44 on both sides of Forest Rd 539, sagebrush and pine, 7780-7900 ft, 30 Jun 1994, *Refsdal 1404* (RM); Flaming Gorge Natl Rec Area, Carter Creek, ca. 8.1 air mi S of Manila on N side of Utah Hwy 44, pine-juniper, 7200-7300 ft, 2 Sep 1995, *Refsdal 7857* (RM). Davis Co.: Davis County Watershed Terraces on Bountiful Peak, 8 Sep 1972, *Allan 224* (BRY); Goat Ranch, N of Rock Creek-Bountiful, 5000 ft, 25 Jun 1959, *Cottam et al. 15570* (DS, RSA, UT); U.P. right-of-way, Farmington, introduced and locally common in dry sandy soil, 13 Jul 1951, *Holmgren 8258* (CAS, DS, RM, RSA, UC, WS, WTU); Union Pacific right-of-way, 3/4 mi S of Farmington, 16 Jul 1951, *Kendrick K-1* (RM-2 sheets); 2 mi N of Farmington Jct, US Hwy 89, frequent on sandy benches with scrub oak, 7 Sep 1940, *Maguire 20117* (WTU). Duchesne Co.: Along Big

Cottonwood draw–Boneta, 26 Jul 1981, *Brotherson 3356* (BRY); 5.5 mi due NW of Altamont, juniper-sagebrush, glacial outwash, 6940

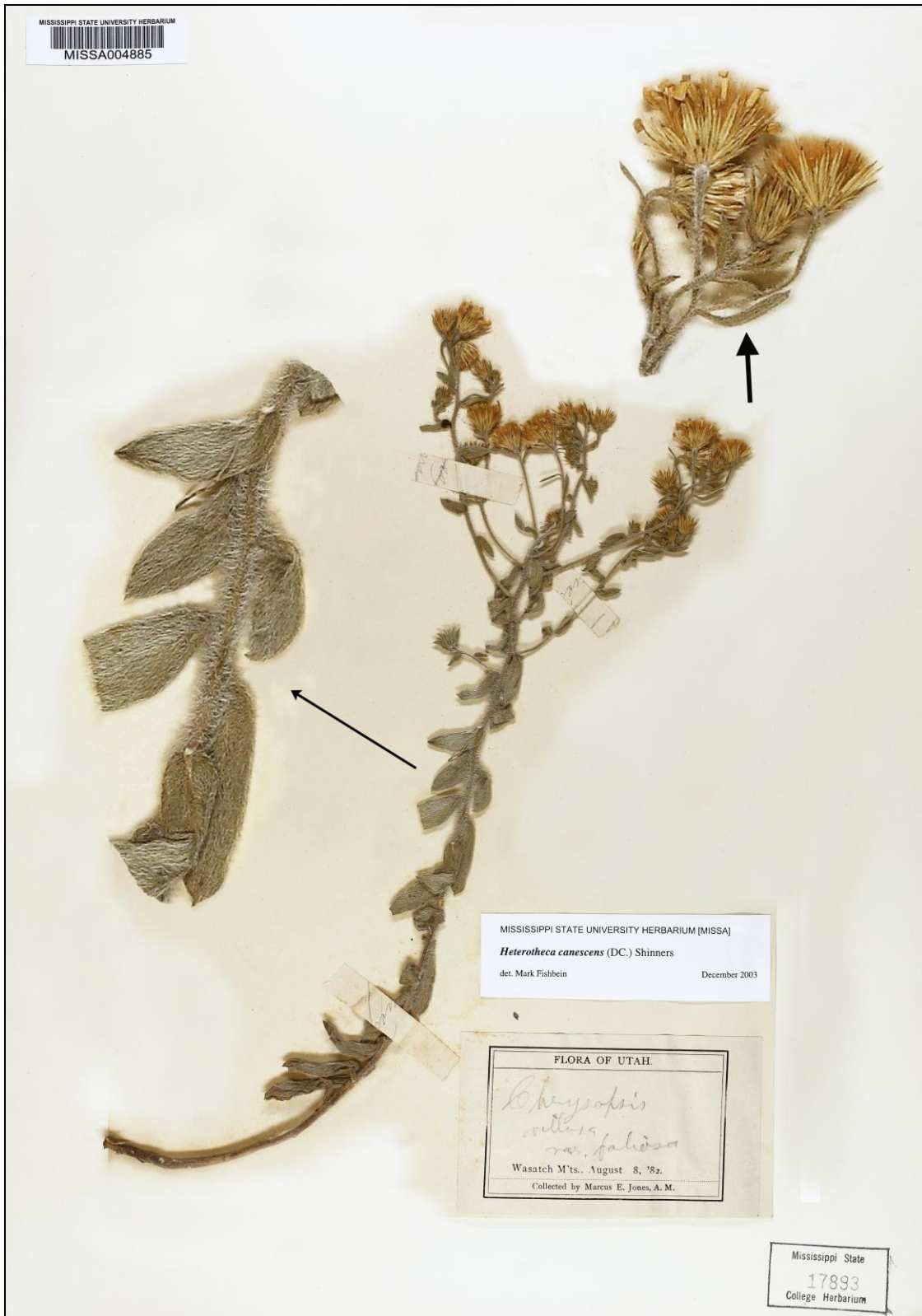


Figure 100. *Heterotheca utahensis*. Salt Lake Co., Utah. *M.E. Jones s.n.* (MISSA).



Figure 101. *Heterotheca utahensis*, Salt Lake Co., Utah. Garrett 6980 (KANU).



Figure 102. *Heterotheca utahensis*, Salt Lake Co., Utah. Garrett 6980 (UT 0119750).





Figure 103. *Heterotheca utahensis*, Davis Co., Utah. Cottam et al. 15570 (UT).

ft, 24 Jul 1984, *Goodrich 20987* (BRY); Uintah Mts, Hells Canyon, 28 mi from Duchesne, lodgepole pine-aspens, 8800 ft, 21 Jul 1989, *Goodrich 22968* (BRY). Rich Co.: Bear Lake, [ca. 6500 ft], 14 Aug 1933, *Flowers F1683* (LL). Salt Lake Co.: Red Butte Canyon, E of Salt Lake City, disturbed flat area near road opposite main reservoir, 5400 ft, 19 Jul 1968, *Arnow 2117* (BRY); Traverse Mts, Corner Canyon, rocky S-facing slope, 5000 ft, 7 Aug 1988, *Arnow 6501* (MO); Fort Douglas, 27 Sep 1909, *Clemens s.n.* (RM, UC); Little Cottonwood Canyon, 9 Oct 1909, *Clemens s.n.* (CAS, UC); near Salt Lake City, 7 Oct 1905, *Garrett 1709* (DS, RM); E of Draper, foot of hillsides, 21 Jun 1934, *Garrett 6619* (DS, SMU); Salt Lake City, 4400 ft, 16 Sep 1934, *Garrett 6847* (UC); Salt Lake City, Lindsay's Garden, 4700 ft, 17 Jul 1935, *Garrett 6980* (KANU, UT); Salt Lake City, 17 Jul 1880, *Jones s.n.* (POM); Alta, 7400 ft, Aug 1879, *Jones 1383* (NY); Wasatch Mts, 8 Aug 1882, *Jones s.n.* (MISSA image!); near Salt Lake City, 5 Aug 1872, *Redfield 2974* (MO); Little Cottonwood Canyon, along Hwy 152 below Brighton, outcrop of quartzite, scrub oak (*Q. gambelii*), 20 Aug 1983, *Shultz 7233* (CAS); Cottonwood Canyon, near Salt Lake, 7 Sep 1896, *Stokes s.n.* (DS); 1/3 mi up Big Cottonwood Canyon, 5300 ft, 4 Oct 1955, *Vickery 364* (WTU). Summit Co.: Near Echo Reservoir, 28 Jul 1938, *Garrett 7888* (SMU). Uintah Co.: Fort Duchesne, 1913, *Carter 48* (RM); Red Wash just NW of mouth of Split Mtn Canyon, above Island Park, 5200 ft, 10 Jun 1935, *Graham 9174* (MO); at overlook of Dry Fork Canyon along Red Cloud Loop, aspen-lodgepole pine, 2 Sep 1967, *Welsh & Moore 6747* (BRY). Utah Co.: NE corner of old cemetery [other loc. data not specified], 3900 ft, 14 Jun 1940, *Bird 13B* (BRY); Provo, sand dunes, 4500 ft, 16 Jul 1925, *Cottam 275* (BRY); Thistle, 25 Jun 1918, *Eastwood 7701a* (CAS); W bank of Provo River, 10 mi N of Provo, dry gravelly soil in clearing, 4500 ft, 29 Jul 1949, *Galway 2258G* (BRY-2 sheets, UC); Provo, dry hillside, 12 Jun 1925, *Garrett 3311* (RM); sand dunes W of Provo, 25 Jun 1925, *Garrett 3350* (RM); Lakeview, crest of partially stabilized sand dunes, 4500 ft, 24 Jun 1938, *Harrison 8387* (BRY); Provo [Slate Canyon, gravel], 6000 ft, 10 Jul 1894, *Jones 5613* (MO-2 sheets, NY, POM, UC); shore of Lake Provo, several large populations, common locally in disturbed areas, 11 Sep 1985, *Semple 5757* (BRIT, BRY, MO, UC); 5 km N of University Parkway on UT Hwy 189, just N of Drew Center St., abundant along road between 4000-5000 University Ave, 17 Sep 1987, *Semple & Chmielewski 8887*, **2n=36** (BRIT, MO, UC); Provo Canyon, below Springdale, 23 Jul 1909, *Smith 1926* (DS). Wasatch Co.: Near Midway, 6 Jul 1905, *Carlton & Garrett 6693* (RM); near Deer Creek around edge of sagebrush, dry soil, 5300 ft, 10 Oct 1964, *Foster 210* (BRY); Low Pass Creek, 20 mi E of Heber City, crack of S-facing slab of sandstone with scattered doug fir, juniper, aspen, 8850 ft, 20 Aug 1981, *Goodrich 16104* (BRY); 2 mi W of Heber City on US Hwy 40, steep road embankment, 30 Aug 1981, *Semple 5760* (BRY, MO). Weber Co.: Peterson, Weber River, Devils Gate, 6500 ft, 18-24 Jul 1902, *Pammel & Blackwood 3914* (MO); Willard Bay State Park, along bay levy, 10 Aug 2000, *Spencer et al. 1565* (BRY); North Taylor Canyon, ridge, talus, 30 Nov 1933, *Stewart 40* (RM).

**24. HETEROTHECA PEDUNCULATA** (Greene) Nesom, **comb. nov.** *Chrysopsis pedunculata* Greene, Pittonia 4: 154. 1900. *Heterotheca villosa* var. *pedunculata* (Greene) Harms ex Semple, Brittonia 39: 383. 1987. **LECTOTYPE** (Semple 1987): **Colorado**. Archuleta Co.: Pagosa Springs, 20 Jul 1899, *C.F. Baker 651* (NDG 53927 image!; isolectotypes: E, F, GH, JE, K, MO-Fig. 109, NDG 53926, NY-Fig. 110, P, RM-2 sheets!, RSA-2 sheets!, UC, US). Images! of all types. See Figs. 74, 75.

*Chrysopsis bakeri* Greene, Pittonia 4: 154. 1900. **LECTOTYPE** (Semple 1987): **Colorado**. Archuleta Co.: Near Pagosa Peak, 9000 ft, 23 Aug 1899, *C.F. Baker 649* (NDG 53928 image!; isolectotypes: E, GH, MO!, NDG 53768, NDG 53769, NMC, POM!, RM-2 sheets!, UC!, US). Images! of all types except MO.

*Heterotheca pedunculata* is recognized by its heads without prominent capitular bracts, stems and leaves eglandular and strigose with short, thin-based, closely appressed hairs (sometimes with a sparse, spreading or ascending overstory), and ascending leaves usually oblanceolate and narrowed to a subpetiolar base. Involucres 9–15 mm wide (pressed). Phyllaries narrowly elliptic-lanceolate to narrowly ovate-lanceolate. Rays 10–16. Plants commonly arise from rhizome-like caudex branches and often are collected without a taproot. Semple (1996, p. 124) also saw *H. pedunculata* as a distinct entity: "Semple (1990) included [*Heterotheca villosa* var. *pedunculata*] among tentative synonyms of

var. *villosa*, but the results of multivariate analyses conducted since then indicate that it is sufficiently distinct from var. *villosa* to warrant recognition even when only nondiagnostic traits are used in the discriminant analysis."

A collection of (apparently) *Heterotheca pedunculata* from south-central New Mexico would be far out of range, perhaps reflecting a labeling error: Doña Ana Co.: on the mesa W of the Organ Mts, 4000 ft, 1 Oct 1907, *Wooton s.n.* (DS-2 sheets). It may be an convergent plant of *H. zionensis*, which is known from Doña Ana County by numerous collections.

Tetraploid chromosome counts by Semple for *Heterotheca pedunculata* have been made from Colorado (Archuleta and Montezuma cos.) and Utah (San Juan and Summit cos.). Diploid counts have been made from Colorado (La Plata Co. — 1 population, possibly a hybrid with *H. hirsutissima* — and Montezuma Co. — 1 population, seemingly identical to the tetraploid population from the same area) and from Utah (San Juan Co.).

A population system of plants identified here as *Heterotheca pedunculata* is abundant on the Uncompahgre Plateau in Montrose County at 7900–9450 feet and adjacent Mesa County and Ouray County; e.g., Figs. 120, 121; collections of these are cited below). These plants are consistent in their eglandular, closely strigose leaves, antrorsely but loosely appressed stem vestiture usually with an overstory of long, spreading hairs, and consistent production of a woody or lignescent taproot (the latter more similar to *H. inflata* than to typical *H. pedunculata*). They also differ from typical *H. pedunculata* in their larger leaves, leafy peduncles, and slightly larger heads — the aspect in the field is different from typical *H. pedunculata*.

My personal collections of these "Uncompahgre variants" are identified and distributed as *Heterotheca pedunculata* "perhaps with influence of *H. inflata*"; some other similar collections were annotated as *H. inflata* before I was clear on the nature and geography of the variants. Their morphological distinction is somewhat subtle but it is consistent and geographically coherent — a formal name for these plants appears to be justifiable.

The same variant also occurs at elevations up to 12,000 feet in the nearby La Sal Mountains and Abajo Mountains of Grand and San Juan counties, Utah (e.g., Figs. 122, 123), where some have been identified by Semple (1996) as *Heterotheca pumila* or "aff. *H. pumila*." The leafy peduncles are similar to *H. pumila* but the plants are eglandular, lack capitular bracts, and are out of geographic range for *H. pumila*. I found no *H. pumila* in either of these two areas (pers. observations and collections, 2017).

### ***Heterotheca pedunculata*, "Uncompahgre variant"**

**Colorado.** Mesa Co.: Off Uranium Road, ca. 2 mi W of Divide Road, mesa and meadow, scattered aspen, 8870 ft, 8 Jul 1994, *Lyon 5626* (RM). Montrose Co.: Dry Creek Trail (Forest Trail 114), along trail and adjoining area, ca 18.5 air mi SW of Montrose, roadside in mixed aspen/coniferous forest, 8840–9520 ft, 6 Jul 2011, *Brummer 4781* (RM); ca. 17.5 road mi SW of Montrose on Road 90, NE of Rim Road jct, ca. 3 mi N of boundary of Uncompahgre Natl Forest (where road becomes numbered as "540"), Gambel's oak, sage, *Erigeron speciosus*, *Heliomeris*, 8300 ft, scattered along road banks and woods edge, 19 Aug 2017, *Nesom het17-21* (4 dups); ca. 21 road mi SW of Montrose on Rd 90 (FS Rd 540), ca. 1 mi above (W of) Uncompahgre Natl Forest boundary, just E of jcts to Naturita (FS Rd 540) and to the Dave Wood Rd (Co Rd 402), meadows and openings in aspen-ponderosa pine-fir, 9450 ft, very abundant, full flower, 19 Aug 2017, *Nesom het17-22* (7 dups); Columbine Pass on Divide Rd (FS 540 = Co. Rd 402), NNE of Nucla and Naturita, aspen-spruce-fir-ponderosa pine, 9300 ft, abundant in openings and along roadside, 19 Aug 2017, *Nesom het17-23* (3 dups); ca. 5 mi SE of Columbine Pass on FS Rd 503 toward Nucla, 1 mi S of Tabeguache Creek crossing, ca. 12 air mi NE of Nucla, ponderosa pine-Gambel's oak, 7900 ft, locally abundant on roadbank and roadside, 19 Aug 2017, *Nesom het17-24* (3 dups); Tabeguache Basin, meadows, 9000 ft, 22 Aug 1913, *Payson 205* (RM-2, NY-Fig. 121); 25 mi SW of Montrose, Uncompahgre Plateau, open meadow among spruce, 9500 ft, 5 Sep 1936, *Rollins 1599* (LL, MO, NY-Fig.

120, RM-2 sheets). Ouray Co.: Above East Fork Spring Creek, off of Forest Rd 532, 3.1 road mi N of Divide or Forest Rd 402, ca 17 air mi SSW of Montrose, subalpine meadow, 8810-9100 ft, 24 Jul 2011, *Brummer 5939* (RM); San Juan Mountains, Uncompahgre Natl Forest, Cimarron Ridge, Lou Creek Pass, ridge just S of Lou Creek Pass then W on Lou Creek Pass Trail to ridge above Kennedy Mine, ca 11 air mi NNE of Ridgway, moist meadow in aspen/spruce/fir mix, 9656-11031 ft, 22 Jul 2012, *Brummer 10245* (RM).

Other plants of *Heterotheca pedunculata* with loosely strigose stem vestiture occur in scattered localities and may reflect independent hybrid origins, e.g., Gunnison Co., Roger's, 9000 ft, 14 Aug 1901, *Baker 794* (RM, see Fig. 114; "Roger's" was a stop on the Delta & Rio Grande Railroad, ca. 3 mi W of Crested Butte along what is now Colo Hwy 12 beside Coal Creek). In Ouray Co., some plants of relatively typical *H. pedunculata* have larger heads on long, few-bracteate peduncles — these also may reflect genetic influence of *H. inflata*, but relatively large-headed *H. pedunculata* also occurs within scattered populations elsewhere in its southern range.

*Heterotheca pedunculata* reaches its southeastern limit in New Mexico. Colfax Co.: 7 mi W of Gladstone, prairie area, roadside, edge of asphalt, [ca. 6100 ft], 14 Jul 1972, *Harms 19111* (KANU, Fig. 118); Vermejo Park Ranch, roadside 0.2 air mi E of Upper Underwood Lakes, near jct with small unnamed side road, dry rocky meadow on S-facing slope on edge of *Pinus aristata* woodland, uncommon, 10,000 ft, 4 Aug 2008, *Legler 10327* (COLO, RM, UNM — Figs. 115, 116, 117). San Miguel Co.: Upper Pecos River, near Willow Creek, 7820 ft, riparian, 7 Aug 1992, *Kirchner 005-F15* (UNM image!).



Figure 104. *Heterotheca pedunculata*, Montezuma Co., Colorado, near Cortez. Photo by Al Schneider, 31 May 2004. Spreading stem hairs are a sparse "overstory" above the closely appressed, strigose layer that give stems and leaves the silvery color.



Figure 105. *Heterotheca pedunculata*. Mineral Co., Colorado, along the East Fork San Juan River. Photos by Rich Haswell, September 2020.

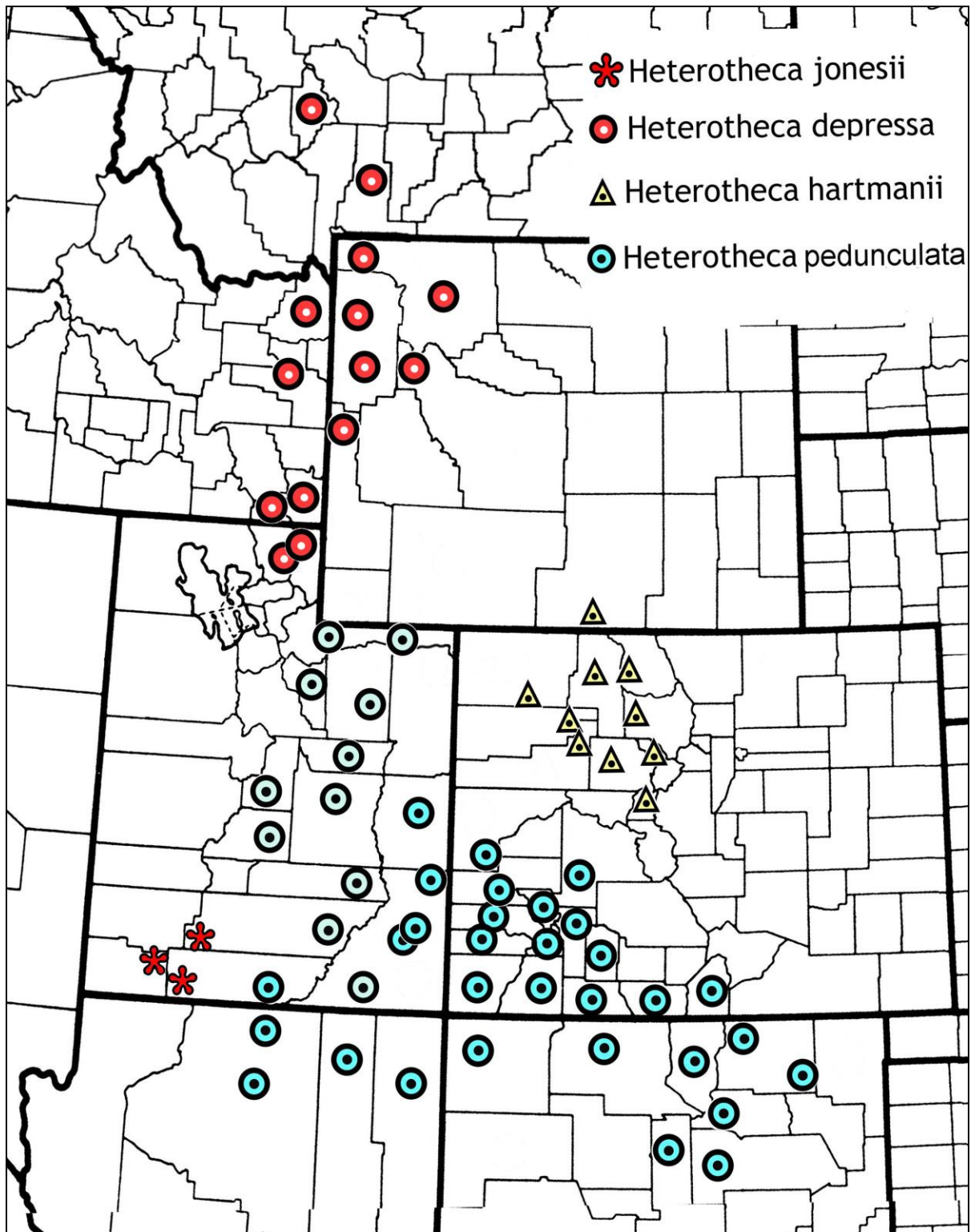


Figure 106. Distribution of *Heterotheca* species. Symbols for *H. pedunculata* with lighter blue perhaps are a different species, yet undescribed. Also see text for comments on the "Uncompahgre variant" of *H. pedunculata*.

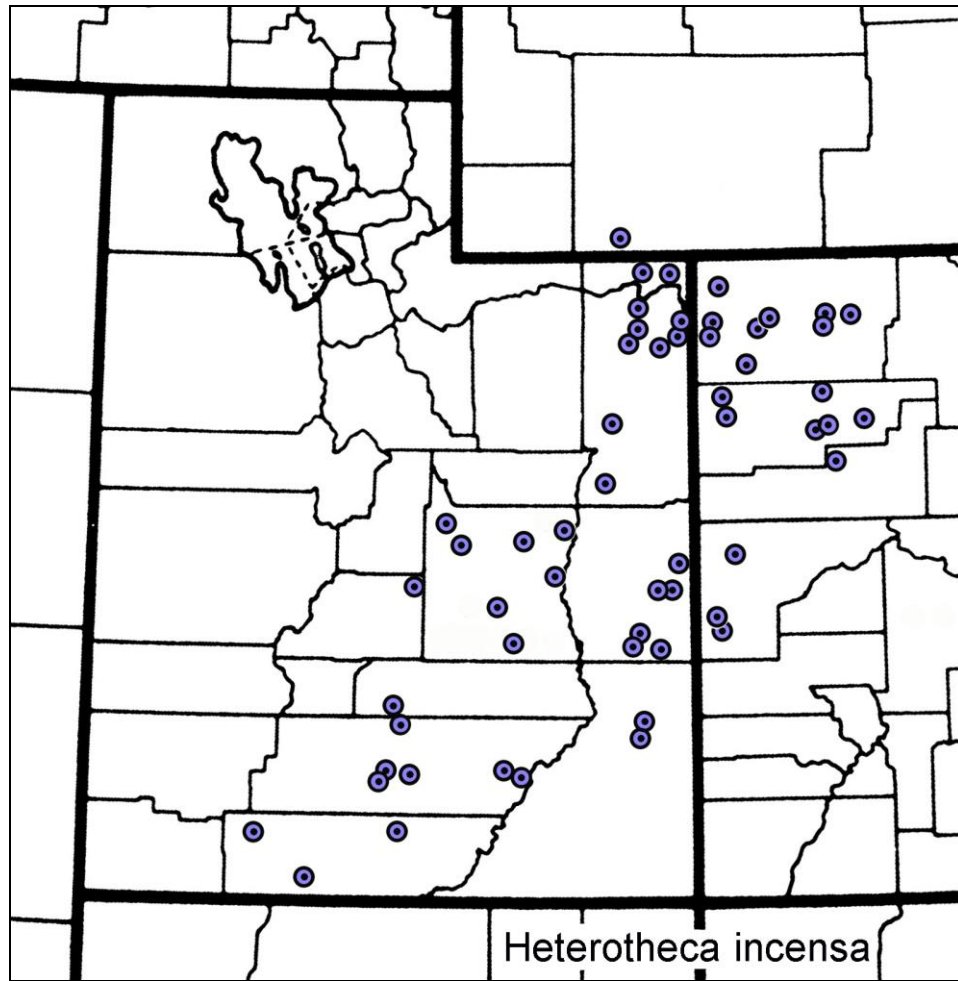


Figure 107. Distribution of *Heterotheca incensa*.

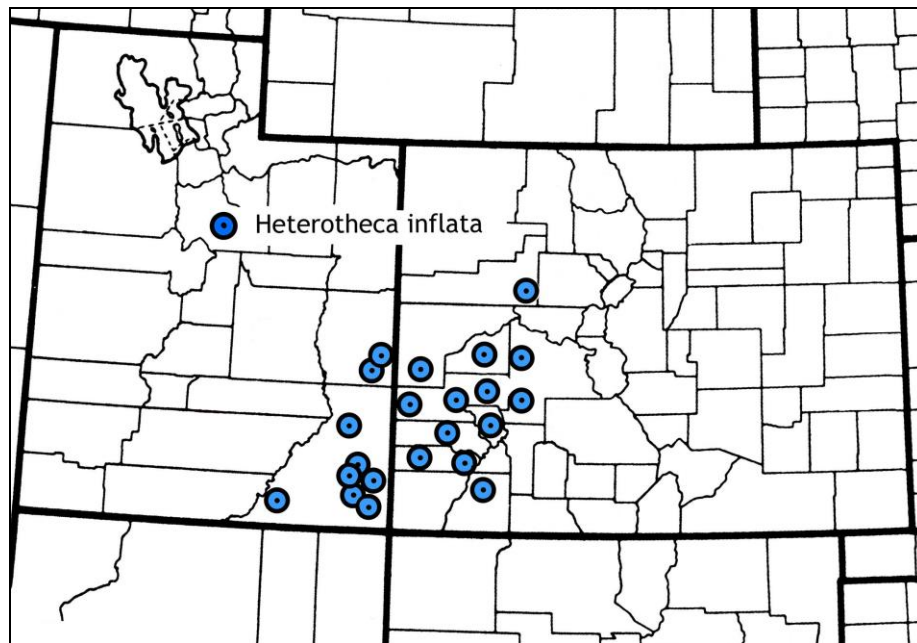


Figure 108. Distribution of *Heterotheca inflata*.

Figure 109. *Heterotheca pedunculata*, isolectotype (MO).





Figure 110. *Heterotheca pedunculata*, isolectotype (NY).



Figure 111. *Heterotheca pedunculata*, Archeluta Co., Colorado. Harms 2050 (KANU).



Figure 112. *Heterotheca pedunculata*, Archuleta Co., Colorado. Harms 2053 (KANU).



Figure 113. *Heterotheca pedunculata*, Archuleta Co., Colorado. Rink 2352 (ASC). Clustered heads is an atypical feature of *H. pedunculata* (perhaps resulting from stem damage?).



Figure 114. *Heterotheca pedunculata*, perhaps with influence of *H. inflata*. Gunnison Co., Colorado, Baker 794 (RM).



Figure 115. *Heterotheca pedunculata*, Colfax Co., New Mexico. Legler 10327 (COLO). Perhaps a distinctive variant.



Figure 116. *Heterotheca pedunculata*, Colfax Co., New Mexico. Legler 10327 (RM).



Figure 117. *Heterotheca pedunculata*, Colfax Co., New Mexico. Legler 10327 (UNM).





Figure 118. *Heterotheca pedunculata*, Colfax Co., New Mexico. Harms 19111 (KANU). The label says "Union Co." but "7 mi W of Gladstone" is within adjacent Colfax County, several miles west of the Union County line, at about 6100 feet elevation. Vestiture and relatively long peduncles without capitular bracts place this plant with *H. pedunculata* but the degree of branching and narrow leaves are unusual, perhaps reflecting genetic influence of *H. canescens* or *H. angustifolia*.



Figure 119. *Heterotheca* aff. *pedunculata*, Ouray Co., Colorado. Wetter 633 (NY). The closely strigose vestiture and long-pedunculate heads without capitular bracts are typical of *H. pedunculata*, but the narrow leaves and congested stems at the base are not. The collector's note that plants were "forming large mats."



Figure 120. *Heterotheca pedunculata*, Montrose Co., Colorado. "Uncompahgre variant" (see text), Rollins 1599 (NY).



University of Colorado Herbarium (COLO)  
 00098491

Annotation Label  
*Heterotheca pumila*,  
 probably a high-altitude microrace of *H. villosa* sens. lat., characterized by  
 comparatively glabrate foliage and single terminal heads.  
 Det. W. A. Weber, September 16, 1996

Montrose Co

PLANTS OF SOUTHWESTERN COLORADO.  
 FROM THE ROCKY MOUNTAIN HERBARIUM.  
 University of Wyoming, Laramie.

No. 205.

*Chrysopsis pumila* Greene.

Open meadows. Alt. 9,000 ft.  
 Tabeguache Basin, Aug. 22, 1913.  
 Collector: Edwin Payson.

7899

HERBARIUM  
 UNIVERSITY OF  
 COLORADO

County  
 Voucher

Figure 121. *Heterotheca pedunculata*, Montrose Co., Colorado. "Uncompahgre variant," Payson 205 (NY).



Figure 122. *Heterotheca pedunculata*, San Juan Co., Utah, La Sal Mts. "Uncompahgre variant," Franklin 4289 (NY).



Figure 123. *Heterotheca pedunculata*, San Juan Co., Utah, S side of Abajo Peak on Abajo Peak Road, 0.8 road mi below the peak, ca. 10,700 ft, at Nesom *het17-6*. Photos by Nesom, 15 August 2017. These plants are part of the "Uncompahgre variant" population system (see text).

In early phases of this study, I identified plants of *Heterotheca depressa*, *H. hartmanii*, and *H. incensa* as part of a variable *H. pedunculata*. Each of the three, however, proved to be morphologically and geographically discrete and distinct from *H. pedunculata*. *Heterotheca inflata* apparently also is closely related to *H. pedunculata* and *H. orsoensis* probably is most closely related to *H. depressa*. The following key separates these species but there is significant parallel variability and use of the map (Fig. 71) will be central toward understanding concepts of the entities defined here.

**25. HETEROTHECA INFLATA** Nesom, **sp. nov.** **TYPE: Colorado.** Delta Co.: Gunnison Watershed, Cedar Edge [= Cedaredge], 7000 ft, 24 Jun 1901, *C.F. Baker 241* (holotype: MO!; isotypes: K image!, POM!). *Baker 241* (and also *Baker 103* and *123*) was annotated by E.L. Greene as a new species with the epithet "incana" but the name was never published. A near topotype is *Nesom het17-19* (cited below).

Similar to *Heterotheca hirsutissima* in its spreading stem vestiture and heads without capitular bracts but distinct in its larger heads (involucre 9–16 mm wide) on thicker, longer, bracteate peduncles and its consistently sessile-glandular leaves. *Heterotheca inflata* is further distinguished by its hirsute to hispid-hirsute leaves with arching-ascending hairs, moderately finely hirsute and minutely sessile-glandular phyllaries, and 12–22 ray flowers.

**Plants** taprooted, not rhizomatous. **Stems** ascending to erect-ascending from the base, 10–45 cm tall, green or purplish, vestiture hirsute to hispid-hirsute, or sometimes hairs spreading below but ascending on distal 1/3, 1- or 2-storied. **Leaves** cauline (basal usually withered by flowering) or basal and cauline, basal sessile, petioloid-attenuate, cauline oblanceolate, subpetiolate, spreading to ascending, often twisted, blades mostly (1–)2–5 cm x (2–)3–12 mm, relatively even-sized up to the peduncles, surfaces strigose-hirsute to loosely strigose, usually prominently sessile-glandular, margins and petioles not prominently ciliate. **Heads** solitary on few-bracteate or leafy-bracteate peduncles (2–)4–10 cm long (or longer when stem unbranched) or sometimes appearing loosely corymboid on long, sometimes stiffly divaricate peduncles, without capitular bracts; involucre (7–)9–16 mm wide; phyllaries sparsely strigose to strigose-hirsute, minutely sessile-glandular, scarious-margined, inner (5–)7–10 mm long. **Ray flowers** mostly 12–22, laminae (1–)2–3 mm wide. Chromosome numbers,  $2n=18$  (*Raven 13044*, Delta Co., Colo.; *Semple 8812*, La Plata Co., Colo.),  $2n=36$  (*Semple & Heard 7788*, Delta Co., Colo.; *Semple 8815*, San Juan Co., Utah). The epithet ("inflata") alludes to the prominent heads (like balloons) on long, bracteate peduncles.

Flowering May–Sep, lower-elevation populations begin flowering in May and Jun and with a wet summer may produce a new flush of buds and flowers in Aug; desert grassland, salt desert shrub, riparian, juniper-grassland, juniper-Gambel's oak, pinyon-juniper, sagebrush, ponderosa pine, granite outcrops and slopes, sandstone, loess, clay flats, meadows, roadsides and roadbanks; 4500–8000 (–8800) ft.

The geographic range of *Heterotheca inflata* lies within that of *H. pedunculata* but populations of the two apparently are separated ecologically, with *H. inflata* in drier habitats, usually at lower elevations. The two are similar in general aspect (relatively few heads, lack of capitular bracts) but *H. pedunculata* tends to be rhizomatous and has larger heads, eglandular leaves, and leaves and stems (at least distally) strigose with closely appressed hairs, often silvery-sericeous. A hybrid population system may exist along along the crest of the Uncompahgre Plateau (Montrose, Mesa, and Ouray counties, especially abundant in at 7900–9450 feet — see details under *H. pedunculata*, where collection data for these are cited). These plants are consistent in their eglandular, closely strigose leaves; stem vestiture characteristically is antrorse but loosely appressed and usually with an overstory of long, spreading hairs; production of a strongly woody or lignescent taproot is more similar to *H. inflata* than to typical *H. pedunculata*. My personal collections of these have been identified and distributed as *H. pedunculata*, perhaps with influence of *H. inflata*; others were annotated as *H. inflata*.

The diagnosis contrasts *Heterotheca inflata* with *H. hirsutissima* because of their similarity in spreading stem vestiture and lack of capitular bracts, but the evolutionary relationship of *H. inflata* may be closer to *H. pedunculata*.

**Additional collections examined. Colorado.** Delta Co.: Cactus Park, ca 25 air mi WNW of Delta, pinyon/juniper in sandstone canyons, 6340-6400 ft, 8 Aug 2010, *Brummer 1807* (RM); Dominguez Canyon, middle section of trail to Cactus Park Trail junction, ca 20 air mi NNW of Delta, desert grassland and shrubland with scattered pinyon and juniper in wide sandstone canyon, 4950-5700 ft, 25 May 2011, *Brummer 3088* (RM); Gunnison Gulch Trailhead area, NE of Bennetts Basin, ca 18.5 air mi W of Delta, pinyon/juniper woodland on sandstone mesa, 7060-7300 ft, 10 Jun 2011, *Brummer 3793* (RM); Unaweep Canyon, Jacks Canyon Road, near old quarry, above Unaweep Canyon, ca 14.5 air mi SW of Whitewater, in sandstone derived soils on granite outcrop, 7000-7100 ft, 17 May 2012, *Brummer 7662* (RM); mesa above Farmers Canyon, W of Jacks Canyon Road, ca 14 air mi SW of Whitewater, pinyon/juniper woodland, 7360-7520 ft, 17 May 2012, *Brummer 7702* (RM); above Milbern Bench, E of Ninemile Road, ca 3 air mi SW of Whitewater, juniper grassland, 5200-5320 ft, 17 May 2012, *Brummer 7725b* (RM); Oak Mesa, S slopes off BLM road from NE end of Coal Road, at Jay Creek crossing, ca 6.5 air mi NNE of Hotchkiss, meadow area in pinyon/juniper, 7300-7520 ft, 5 Jun 2012, *Brummer 8477* (RM); North Fork Valley, Gunnison National Forest, Hubbard Creek Trail N of Juanita Junction, ca 8.5 air mi NNW of Paonia, along trail in mixed mountain shrub community, 6497-6957 ft, 14 Jun 2012, *Brummer 8718* (RM); Tabeguache Trail or SS Road, just NW of Dominguez Canyon and SE of Gibbler Gulch, ca 25 air mi WNW of Delta, sandstone pavement in ponderosa pine, 7159 ft, 14 Sep 2012, *Brummer 11932* (RM); Horse Mesa, ca 22 3/4 air mi NNW of Delta, sagebrush meadow in pinyon/juniper, 7317 ft, 14 Sep 2012, *Brummer 11970* (RM); Little Dominguez Canyon from Poison Canyon to the bend on the E side of Star Mesa, ca 16.5 air mi WNW of Delta, sandy soil in sparse pinyon/juniper/shrub/rock mix. 5039-5240 ft, 17 Sep 2012, *Brummer 12065* (RM); Youngs Peak and lower intrusive mtn immediately SE, adjacent to Crawford, pinyon-juniper, 6600-7400 ft, 20 May 1997, *Hartman 56661* (RM); ca. 5 mi N of Paonia, 1785 m, locally common roadside weeds, 2 Jul 1999, *King & Garvey 10956* (BRIT, MO); Hwy 133, 0.2 mi S of jct with Hwy 87 in Paonia, 5650 ft, roadside with *Grindelia*, just into flower (again), few plants, 18 Aug 2017, *Nesom het17-18* (unicate); 3.8 mi N of Cedaredge (Main Street) on Hwy 65 at jct with Ute Trail Road, oak-juniper-pine, 6970 ft, abundant along roadsides with *Grindelia*, 2nd flush of flowering, 18 Aug 2017, *Nesom het17-19* (15 dups); slopes of Grand Mesa, 8000 ft, 21 Jul 1936, *Ramaley 15424* (RM); 13.8 mi NW of Delta on Hwy 50, clay flats, 2 Jun 1958, *Raven 13044* (UC); Landsend, sagebrush, 24 Jun 1938, *Read R-377* (RM); 9.7 km N of Main St., Cedaredge on Colo Hwy 65, stoney (pumice) roadside, juniper-Gambel oak, 8 Sep 1985, *Semple & Heard 7788* (UC). Garfield Co.: 6 mi E of Glenwood Springs, 5900 ft, 21 Jun 1945, *Smith & Harrington 1114* (ASC). Gunnison Co.: Curecanti Natl Rec Area, ca. 1.2 air mi W of Co. Rd 26, ca. 3 air mi S of Blue Mesa Reservoir, ca. 3.9 air mi SE of Sapinero, sagebrush, 7480-8360 ft, 16 Jun 1999, *Arnett 4238* (RM); Roger's, 9000 ft, 14 Aug 1901, *Baker 794* (RM-2 sheets); Soap Creek, dry rocky soil, 7520 ft, 16 Jul 1961, *Hall 554* (BRY); ca. 1.5 air mi NNE of Cimarron, slope down to Gunnison River, S-facing steep slope, 8400-8800 ft, 20 Jun 1997, *Taylor 1674* (RM). La Plata Co.: N of Durango on US Hwy 550, red sandstone slopes by road, 15 Jun 1987, *Semple 8812*, 2n=36 (COLO, MO). Mesa Co.: Grand Junction, 4500 ft, 17 May 1898, *Crandall s.n.* (RM); campsite beside East Creek, 2.2 mi S of jct Hwys 141 and 50, 18 May 1973, *LeDoux et al. 667* (BRY); mesa N of Cave Canyon, ca. 5.5 air mi S of Gateway, pinyon-juniper-sagebrush, 7000 ft, 23 Jun 1994, *Lyon 4941* (RM); 9 mi NE of Gateway, along West Creek, ca. 8 air mi E of Utah border, riparian community of cottonwood and squawbush, loamy gravel, 5400 ft, 18 Jun 1983, *Neese 13669* (BRY, RM); 0.6 mi NW of Colorado River in McDonald Creek drainage, ca. 11 air mi SW of Mack, sandy soil, junipers, 4500 ft, 16 Jun 1983, *Neese & Abbott 13598* (BRY); 1 mi N of Gateway General Store on Hwy 141, area of juniper-sage, 4650 ft, common along roadside, 2nd flush of flowering, 19 Aug 2017, *Nesom het17-29* (3 dups); hills S of Grand Junction, 18 Jun 1926, *Osterhout 6555* (RM); Colorado Natl Monument, among pinyons and junipers, sandy loam, 6500-6700 ft, 24 Jun 1938, *Pennell & Schaeffer 22145* (PH); along State Hwy 141, above East Creek, 4.2 mi W of jct with US Hwy 50, sandy soil at base of large boulders with *Juniperus osteosperma*, 4800 ft, 2 Jun





Figure 124. *Heterotheca inflata*, Delta Co., Colorado, 3.8 mi N of Cedaredge (Main Street) on Hwy 65, at Nesom het17. Photo by Nesom, 18 August 2017.



Figure 125. *Heterotheca inflata*, Garfield Co., Colorado, west of Delta on Hwy 92. Photo by Nesom, 18 August 2017.



Figure 126. *Heterotheca inflata*, Delta Co., Colorado. King & Garvey 10056 (NY).



Figure 127. *Heterotheca inflata*, Delta Co., Colorado. Siplivinsky 1457 (COLO).

Figure 128. *Heterotheca inflata*, Dolores Co., Colorado. Bye 1223 (COLO).



Figure 129. *Heterotheca inflata*, La Plata Co., Colorado. Semple 8812 (COLO).



Figure 130. *Heterotheca inflata*, San Juan Co., Utah. Windham 90-209 (UT).

1983, *Wilken & Kelly 13969* (BRY). Montezuma Co.: Mesa Verde Natl Park, Wetherill Mesa, 9 Jun [no year], *Erdman 13* (WTU). Montrose Co.: Deer Run, 4700 ft, 11 Jun 1901, *Baker 103* (POM, RM-2 sheets, UC); Black Cañon, 7000 ft, 12 Jun 1901, *Baker 123* (MO, POM, RM-2 sheets, UC-2 sheets); Escalante Creek, ca 17.5 air mi WSW of Delta, pinyon-juniper in sandstone canyon, 5600-6000 ft, 4 Aug 2010, *Brummer 1547* (RM); mesa area W of Linscott Canyon, ca 10 air mi SW of Montrose, pinyon/juniper on sandstone mesa, 7380-7400 ft, 4 Aug 2010, *Brummer 1581* (RM); Monitor Mesa, ca 16.5 air mi SW of Delta, pinyon/juniper on sandstone mesa, 6680-7200 ft, 13 Aug 2010, *Brummer 2034* (RM); Freshet Draw, W of Happy Canyon, ca 6 air mi SSW of Montrose, pinyon/juniper forest on sandstone mesa, 6280-6330 ft, 29 May 2011, *Brummer 3315* (RM); hills SE of Cedar Creek, ca 10 air mi SE of Montrose, pinyon/juniper with scattered mountain shrubs, 6580-7800 ft, 21 Jun 2011, *Brummer 4267* (RM); Sawmill Mesa Road, ca 15 air mi SW of Delta, pinyon/juniper woodland with sagebrush and desert grassland openings on sandstone mesa top, 7040 ft, 8 Jul 2011, *Brummer 4840* (RM); Roubideau Creek, above junction with Potter Canyon to 2 trail mi upstream, ca 11 1/4 air mi SW of Delta, riparian area in desert canyon, 5240-5400 ft, 19 May 2012, *Brummer 7811* (RM); mesa SE of Cushman Creek, off of Tabeguache Trail, ca 14.5 air mi ESE of Montrose, in pinyon/juniper, 6900-7200 ft, 2 Jun 2012, *Brummer 8325* (RM); hillsides SW of Waterdog Basin, ca 11.5 air mi SE of Montrose, pinyon/juniper, 7780-8160 ft, 11 Jun 2012, *Brummer 8658* (RM); 7N Mesa, off of Forest Road 525 near The Saddle, ca 16 air mi SW of Delta, sparse pinyon/juniper/rock mix, 6861 ft, 18 Jun 2012, *Brummer 9061* (RM); Sawmill Mesa, NW of Stone Basin, ca 15 air mi SW of Delta, grassy swale in sagebrush, 6270-6300 ft, 25 Aug 2012, *Brummer 11401* (RM); Roubideau Canyon; middle canyon just NW of Camel Back, ca 17 air mi NW of Montrose, low elevation riparian area, 5600-5640 ft, 19 Sep 2012, *Brummer 12097* (RM); near Cerro Summit ca. 200 ft higher, US Hwy 50, 49.4 mi SW of Gunnison and 14.3 mi E of jct US 50 and Colo 90 with US 550 in Montrose, gambel oak, maple in draws, aspen and sagebrush on ridges, 7650-7850 ft, 16 Jun 1968, *Cox et al. 201* (MO); La Sal Creek, 2 mi E of Utah line, abundant in sandy places, 9 Jul 1939, *Cutler 2634* (DS); Coal Canyon, ca. 6.5 mi NE of Nucla, 7000 ft, 31 Aug 1988, *Kass 2796* (BRY); Black Canyon of the Gunnison Natl. Monument, southern rim, ca. 2400 m, locally common, 1 Jul 1999, *King & Garvey 10948* (BRIT, MO); San Miguel Canyon, confluence of San Miguel and Dolores rivers, ca. 6.5 air mi WNW of Uravan on S side of Colo Hwy 141, sandstone ledges, pinyon-juniper, 5300 ft, 9 May 1993, *Lyon 711* (RM); Long Park, Horsethief Spring, ca. 5 air mi NE of Uravan, sandstone, pinyon-juniper, 6250 ft, 26 May 1993, *Lyon 1241* (RM); ca. 20 air mi WNW of Nucla, adjacent to Colo Hwy 90, ca. 2 road mi SW of Paradox, pinyon-juniper and yucca, 6000 ft, 1 Jun 1994, *Moore 1958* (RM); ca. 18 air mi NW of Naturita, ca. 2.5 air mi S of Bedrock, E side of Dolores River Canyon, pinyon-juniper, 5000 ft, 17 Jun 1995, *Moore 5517* (RM); ca. 21 air mi WNW of Naturita along LaSal Creek at the Cliff Dwellers Mine, Co. Rd X4, SE of Colo Hwy 90, 5600 ft, 17 Jun 1995, *Moore 5553* (RM); ca. 13 road mi SW of Montrose on Road 90, NE of Rim Road jct, pinyon-juniper-sage-rabbitbrush, 7500 ft, abundant along roadsides and scattered through woods, 2nd flush of flowering just beginning, 19 Aug 2017, *Nesom het17-20* (5 dups); ca. 12.5 mi SE of Columbine Pass on FS Rd 503 toward Nucla, ca. 4 air mi NE of Nucla, pinyon pine-juniper-Gambel's oak, 6750 ft, common in meadow and openings, 19 Aug 2017, *Nesom het17-25* (2 dups); ca. 16 mi SE of Columbine Pass on FS Rd 503 toward Nucla, ca. 5 mi NE of Nucla, sagebrush-juniper, 6300 ft, abundant along roadside in red, rocky soil, 2nd flush of flowering, 19 Aug 2017, *Nesom het17-26* (4 dups); 1.5 mi W of Nucla on "W 10th Ave" = CC Road = Calamity Road, ca. 1.5 mi E of jct with Hwy 141, sagebrush and scattered juniper, 5550 ft, abundant on roadsides, 2nd flush of flowering, 19 Aug 2017, *Nesom het17-27* (6 dups); 19 mi S of Gateway on Hwy 141, 5 mi S of Mesa Co. line, narrow, steep-walled canyon of the Dolores River, riparian vegetation, 4750 ft, common along roadside, 2nd flush of flowering, 19 Aug 2017, *Nesom het17-28* (4 dups); between Buckeye and LaSal guard stations at jct road to Paradox, ponderosa pine, 5500 ft, 1 Jul 1954, *Sharsmith 4442* (WTU); Hwy 347, ca. 1 mi S of entrance to Black Canyon Natl Mon, pinyon-juniper, ca. 8000 ft, 29 Jun 1984, *Stein & Neill 1823* (RM); Black Canyon of the Gunnison, 3 mi WNW of Dawson's cabin, granite, 6600 ft, 7 Jun 1936, *Rutter 68* (UC); Paradox, dry rocky hills, 5000 ft, 21 Jun 1912, *Walker 148* (DS, RM). Ouray Co.: Billy Creek State Wildlife Area, junction of Brook Creek and Billy Creek, ca 15 1/4 air mi SE of Montrose, salt desert shrub in bottom land, 6857 ft, 13 Sep 2012, *Brummer 11861* (RM); mts E of Colona, open stony slope, 8000 ft, 29 Aug 1920, *Payson 2338* (RM). San Miguel Co.: Disappointment Valley, ca. 13 air mi NE of Dove Creek on Mineral Mtn on Co. Rd K20, pinyon-juniper, 6400-6800 ft, 6 Jun 1995, *Moore 5116* (RM);



Disappointment Valley, ca. 15 air mi NE of Dove Creek Co. Rd 19Q, Dawson Draw, pinyon-juniper, 6100–6700 ft, 21 Jun 1995, *Moore 5854* (RM). **Utah. Grand Co.:** Dolores Triangle, T22 S, R25E, S33, blackbrush community, 1500 m, 15 May 1997, *Atwood 22222* (BRY); La Sal Mts, Dolores Point, ca. 11 mi NE of Mt. Waas, 7520 ft, pinyon-juniper-sagebrush, 25 Aug 1985, *Franklin 2384* (BRY, infl more like *H. pedunculata*); NE of Moab, Negro Bill Canyon, sandstone outcrops, juniper-sage, 4360 ft, 19 May 1986, *Franklin 3146* (RM); SE end of Castle valley, 14.5 mi E of Moab, Gambel oak, sage, pinyon-juniper, 6800 ft, 5 Jun 1986, *Franklin 3430* (BRY); Fisher Valley at mouth of Cottonwood Canyon, E side of Fisher Creek, base of cliff, 5600 ft, 25 May 2004, *Hufford 4229* (WS); slopes above Buckhorn Draw, granitic slopes, juniper and *Purshia*, 4900 ft, 26 May 1994, *Lyon 3439* (RM, mixed collection with *H. polothrix*); Buckhorn Draw, streambed, dry, sandy wash, pinyon-juniper, 4600 ft, 26 May 1994, *Lyon 3495* (RM); Stinking Spring, ca. 6.5 mi up Onion Creek from Hwy 128, 5150 ft, 25 May 1977, *Mikus 543* (BRY); near Moab by the old river bridge, 6 Apr 1988, *Trotter s.n.* (BRY). **San Juan Co.:** Dodge Point, ca. 8 mi S of Monticello, Allan Farm, 27 Aug 1972, *Allan 216* (BRY); Dugway on E side of Navajo Mtn, ponderosa pine-*Arctostaphylos*, 14 Jul 1971, *Atwood et al. 2978* (BRY); Mile 28 along San Juan River, desert shrub, sandy/rocky soil, 6 May 1997, *Atwood et al. 21860* (BRY); Devil's Canyon campground, 1 Sep 1946, *Cottam 9527* (BRY); Roan Bailey Mesa, red Entrada sandstone, 1900 m, 19 Jun 1985, *Higgins 15813* (BRY); Flat Inn Mesa, sandy soil, 5500 ft, 17 Jul 1939, *Range Survey s.n.* (BRY); along road between Moab and Monticello, ca. 1500 m, 22 Jul 1911, *Rydberg & Garrett 9120* (RM); S of Monticello, meadow, 2100 m, 24 Jul 1911, *Rydberg & Garrett 9144* (RM); 21.2 km NNE of Blanding on US Hwy 163, open ground and fine loess roadcut, 15 Jun 1987, *Semple 8815* (BRY); Cliff Dwellers Pasture, ca. 15 mi WSW of Monticello, rock outcrops and loose soil below head of box canyon, juniper-yucca-manzanita, 7400 ft, 27 Jun 1984, *Tuhy 1531* (BRY); Windwhistle Campground 6 mi W of Hwy 191, desert, 6200 m, 29 May 1996, *Walker s.n.* (UTC image!); Cedar Mesa, N Fork Road Canyon, Cedar Mesa sandstone, sandy soil on floodplain bench near *Populus fremontii*, *Fraxinus anomala*, *Amelanchier utahensis*, 5640 ft, 31 May 1999, *Yeatts 4260* (KHD image!).

**26. HETEROTHECA DEPRESSA** (Rydb.) Dorn, Vasc. Pl. Wyoming (ed. 1), 295. 1988. *Chrysopsis depressa* Rydb., Mem. New York Bot. Gard. 1: 381. 1900. *Heterotheca villosa* var. *depressa* (Rydb.) Semple, Novon 4: 53. 1994. **TYPE: Wyoming.** Teton Co.: Yellowstone National Park, Lower Geyser Basin, 7000 ft, 4 Aug 1897, *P.A. Rydberg* and *E.A. Bessey 5067* (holotype: NY image!; isotypes: NEB image!, NY image!, US image!).

**Plants** taprooted, not rhizomatous. **Stems** numerous, 12–30 cm, erect to erect-ascending, crowded from a woody caudex, strigose to moderately villous-hirsute with loosely spreading-ascending to irregularly spreading hairs, vestiture essentially 1-storied or with a few longer hairs, eglandular to sparsely and minutely sessile- or stipitate-glandular. **Leaves** cauline (basal not persistent), uncrowded and evenly distributed, oblanceolate, 15–40 x 3–9 mm, proximal subspatulate, spreading to closely ascending, loosely strigose to sparsely moderately hirsute-strigose on both surfaces with ascending hairs, eglandular or sparsely to densely sessile-glandular. **Heads** solitary or in a loose to compact corymboid arrangement, peduncles (0.2–)1–5(–25) cm, without capitular bracts or sometimes with 1–2 lanceolate capitular or subcapitular bracts about as long as the involucre. **Involucres** (5–)7–9 mm wide (pressed); phyllaries elliptic-lanceolate to narrowly obovate-lanceolate, inner (4–)6–7 mm long, sparsely strigose to hirsute-strigose, eglandular to sparsely sessile-glandular, margins scarious and often purple-tinged. **Ray flowers** 8–14. **Chromosome numbers:**  $2n=18$  (Teton Co.: *Semple & Zhang 10434, 10438*),  $2n=36$  (Teton Co.: *Semple & Brouillet 7217*);  $2n=36$  (Cache Co., Utah: *Windham 91-245*).

Flowering (Jun–)Jul–Aug. Sandy open slopes, sandy bottoms, banks, and terraces of rivers and creeks, gravelly sand bars and gravel flats, river cobblestone, calcareous ridges and outcrops, quartzite, cliffs and ledges, dry rocks, open, rocky slopes and ridges, roadsides, abandoned railway grades, travertine, geyserite, dry soil near hot springs, sagebrush, lodgepole pine burns, subalpine fir, spruce-subalpine fir, limber pine; 5000–9600 ft; Utah, Idaho, Montana (the two Montana collections, see Fig. 132, appear to be adventive along the highway), and Wyoming.

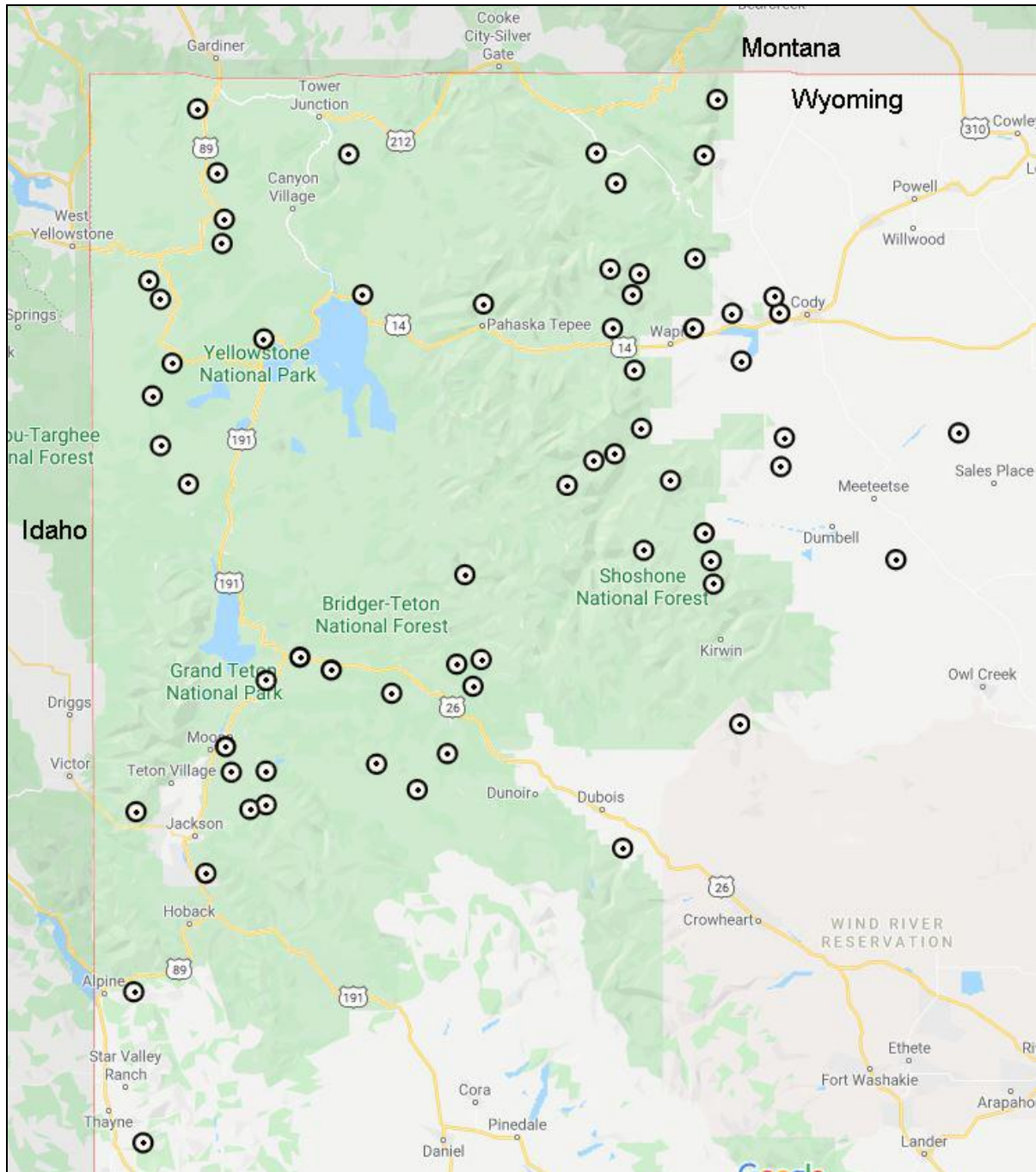


Figure 131. Distribution of *Heterotheca depressa* in Wyoming. The overall distribution (Wyoming, Montana, Idaho, Utah) is shown in Map 11 and Fig. 106.

The type of *Heterotheca depressa* was collected in close vicinity of hot springs and geyser basins in Yellowstone National Park. The caudex branches/proximal portions of the stems sometimes become elongate and rhizome-like (or at least decumbent), resulting in a mat or broad cushion (hence Rydberg's epithet) with crowded leaves. Other plants growing in the travertine and geyserite tend to have the same growth form, e.g., *Blake 10416* (LL), *Blake 10427* (LL), *Blake 10458* (LL), *Jepson 2537* (JEPS), *Sargent s.n.* (BRY), *Thompson 14164* (LL), *Treakle 255* (POM), but others from around the hot springs are erect or intermediate in habit, e.g., *Rose 32388* (CAS) from "rocky slopes, Old

Faithful" and *Van Dyke s.n.* (CAS) from "Mammoth Hot Springs." The erect form is more abundant in the immediate area, and in agreement with Dorn (2001), Evert (2010), and others, it is regarded here as characteristic of the species. In earlier phases of the present study, I identified the erect plants as "*H. pedunculata* N form." In the Yellowstone area, *H. depressa* is sympatric with only *H. hispida* (in Park Co.) and *H. hirsuta*, both of which are immediately distinct in morphology.

Earlier in this study, I identified and annotated collections from Bear River and Franklin cos., Idaho, and Cache Co., Utah, as an undescribed species with the epithet "orsoensis." Further along, it became more evident that their separation from typical *Heterotheca depressa* was essentially arbitrary. Plants from the southern part of the range ("orsoensis") sporadically develop capitular bracts and have glandular leaf surfaces, but similar variation occurs in the region of typical geography, and analogous variation, especially in vestiture, occurs in other species. Perhaps collections will be made in Caribou Co., Idaho, to show a more continuous distribution of *H. depressa*. but as of this date, I have not seen a collection of any *Heterotheca* species from that county.

**Collections examined. Idaho.** Bear Lake Co.: "Blooming Lake" [= Bloomington Lake], 5 Aug 1939, *Davis 1651* (IDS-2, LL); Bear Lake, 6 Aug 1898, *Mulford 327* (MO). Bonneville Co.: South Fork Snake River, T3N R41E S9, cobbly dry floodplain, 5035 ft, 4 Aug 1993, *Merigliano s.n.* (ID). Franklin Co.: 1 mi SE of Cleveland, dry slopes, sagebrush-grass, 26 Jul 1952, *Baker 9532* (ID image!, SRP image!); 5 mi S of Ashton, lava reefs along Snake River, 18 Jul 1945, *Christ 14971* (WS); Bear River Range, 12 mi E of Preston, Upper Cub River drainage, Hillyards Canyon, quartzite (limestone outcrop upslope), open, rocky slope within subalpine fir forest, with *Agastache urticifolia*, *Sedum debile*, *Potentilla glandulosa*, 7700 ft, 18 Aug 1984, *Johnson & Brunsfeld 2237* (CIC image!, ID image!); Bear River Range, ca 0.5 mi W of Gibson Basin, ca 9 mi W of Fish Haven, rocky-gravelly ridgecrest soil, dolomite, with *Pinus flexilis*, *Linanthastrum nuttallii*, *Leucopoa kingii*, *Lomatium graveolens*, 9000 ft, 17 Jul 2002, *Mancuso 2342* (CIC image!, ID image!); Bear River Range, Cache NF, Upper Logan River area, ridge W of Gibson Basin, ca. 8.5 mi W of Fish Haven, SE-facing slope and ridgeline, gravelly soil and ledges on dolomite outcrops, with *Artemisia tridentata*, *Castilleja applegatei*, *Agropyron spicatum*, *Leucopoa kingii*, *Lomatium kingii*, 9000 ft, 17 Jun 1990, *Moseley 1765* (ID image!); Bear River Range, Franklin Basin, N end [label says "Oneida Co." but the loc. apparently is in Franklin Co.], 7800 ft, 24 Jul 1910, *Smith 2275* (RM, UTC image!). Franklin Co.: Franklin Basin, White Canyon, 8300 ft, 30 Jul 1958, *Cottam et al. 15304* (UT); Bear River Range, 12 mi E of Preston, Upper Cub River drainage, Hillyards Canyon, open, rocky slope within subalpine fir forest, quartzite, 7700 ft, 19 Aug 1984, *Johnson & Brunsfeld 2237* (ID); Bear River Range, ridge ca 0.7 mi N of Cub Peak, ca 11 air mi W of St. Charles, Cache National Forest, in open, rocky, dry, forb and low shrub-dominated community, quartzite, 8850 ft, 19 Jul 1990, *Mancuso 279* (ID); Bear River Range, ca. 9 mi W of Fish Haven, ca. 0.5 mi W of Gibson Basin, rocky-gravelly ridgecrest soil, dolomite, 9000 ft, 17 Jul 2002, *Mancuso 2342* (ID); Bear River Range, ca. 8.5 mi W of Fish Haven, upper Logan River area, ridge W of Gibson Basin, SE-facing slope and ridgeline, dolomite, gravelly soil and ledges on outcrops, 9000 ft, 17 Jul 1990, *Moseley 1765* (ID). Fremont Co.: St. Anthony city park, on rocks, 13 Jul 1937, *Cronquist 685* (IDS image!, UC); cliffs above Henry's Fork of Snake River at Lower Falls, 5500 ft, 13 Jul 1939, *Cronquist 1653* (MO, RM); Stage Station, Snake River, 3 Aug 1885, *Letterman 24* (MO); Fremont County Burning Project, lava reefs, sagebrush, 5000 ft, 20 Jul 1948, *Lingenfelter 557* (RM); Targhee Natl Forest, Island Park Plateau, road to rocks, St. Anthony, 4 Jul 1901, *Merrill & Wilcox 794* (RM); Fremont County Burning Area (T10N R40E), rocky reefs, sagebrush, 5500 ft, 20 Jul 1934, *Pechanec 34-45* (RM); Targhee Natl Forest, Robinson Creek just N of Horseshoe Lake, Site 65, Island Park Geothermal Study Area, dry thin soil in crevices of boulders (southerly exposure), *Pinus flexilis*, 1870 m, 27 Aug 1977, *Whitehead 1063* (IDS image!); Targhee Natl Forest, 3 km E of US Hwy 191 on Anderson Mill Canyon Road, Site 79, Island Park Geothermal Study Area, dry thin soil in crevices of boulders (southerly exposure), *Pinus flexilis*, 1830 m, 10 Sep 1977, *Whitehead 1175* (IDS image!); Targhee Natl Forest, dry rocky area between Sardorus Hill Road and Snow Creek Canyon, Site 130, Island Park Geothermal Study Area, dry thin soil in crevices of boulders (southerly exposure), *Pinus flexilis*, 1710 m, 23 Jul 1978, *Whitehead 1503* (IDS image!).



Figure 132. *Heterotheca depressa*, Broadwater Co., Montana, in a ruderal habitat and perhaps adventive at the northernmost known extent of its range. Typical morphology. Booth c82 (KANU).



Figure 133. *Heterotheca depressa*, Fremont Co., Idaho. Whitehead 1503 (IDS).



Figure 134. *Heterotheca depressa*, Fremont Co., Idaho. Whitehead 1175 (IDS).



Figure 135. *Heterotheca depressa*, Fremont Co., Idaho. Christ & Ward 14971 (NY).



Figure 136. *Heterotheca depressa*, Franklin Co., Idaho. Moseley 1765 (ID).





Figure 137. *Heterotheca depressa*, Bear Lake Co., Idaho. Mancuso 279 (ID).



Figure 138. *Heterotheca depressa*, Cache Co., Utah. Snell 1049 (WTU).

**Montana.** Broadwater Co.: 2 mi S of Townsend, scattered plants in disturbed area along roadside, 20 Aug 1950, *Booth c82* (KANU image!, WTU). Park Co.: 5 mi W of Livingston, sandy road cut, 5 Aug 1941, Booth C82 (ID). **Utah.** Cache Co.: Tony Grove Lake, 8300 ft, 15 Aug 1938, *Cronquist 1088* (IDS image!, MO); Wasatch-Cache Natl Forest, vicinity of Tony Grove lake, ca. 0.75 mi N of parking area along Trail to Naomi Peak, on sandy soil over rocky ledges, ca. 8500 ft, 9 Jun 1997, *Leidolf 2171* (BRIT); head of Tony Grove Basin, rocky slopes and ledges, 8100 ft, 18 Aug 1938, *Maguire 16107* (WTU); Wasach-Cache Natl. Forest, Bear River Range, Franklin Basin, 1.5 air mi W of Logan River, ridge NW of Crescent Lake, head of Crescent Lake Canyon, SE-facing slope, Swan Peak Quartzite, 9000 ft, 18 Aug 1981, *Neely 666* (UTC image!); South Tony Grove Lake on Tony Grove Smithfield Trail, 9500 ft, 26 Aug 1927, *Price 62* (RM); Tony Grove Lake, 9600 ft, 26 Aug 1927, *Price s.n.* (ID image!, WTU); Cache Natl Forest, trail to Mount Naomi, 1/2 mi N of Tony Grove Lake, spruce-subalpine fir, ca. 8700 ft, 12 Sep 1980, *Shaw 2645* (BRY); 0.5 mi N end of Tony Grove Lake, dry rocky places, 8200 ft, 6 Aug 1938, *Snell 1049* (PH, WTU-2 sheets); NW of Tony Grove Lake, Bear River Range, ca. 1.3 km S of the summit of Mt. Magog, thin soil over limestone, E-facing slope, montane conifer forest, 8625 ft, 20 Aug 1991, *Windham 91-245*, **n=18II** (MO). **Wyoming.** Many collections (RM! and others) from northern Lincoln Co., Park Co., and Teton Co.

**27. HETEROTHECA INCENSA** Nesom, **sp. nov.** **TYPE:** **Utah.** Daggett Co.: Flaming Gorge National Recreation Area, ca 1 air mi W of Flaming Gorge Dam, Cart Creek drainage into Flaming Gorge, dry pinyon-juniper uplands with clay soils, sandstone bluffs, and steep slopes, 6160-6600 ft, 23 Jun 1994, *C.H. Refsdal 1133* (holotype: RM, Fig. 143).

Distinct in its combination of caespitose habit, equably leafy stems, hirsute and 1-storied stem vestiture, leaves sessile-glandular adaxially, heads on leafy peduncles (short branches), lack of capitular bracts, and ovate-lanceolate to triangular phyllaries with scarious margins.

**Plants** taprooted, without rhizomes or elongate caudex branches. **Stems** 8–30(–50) cm, crowded from the caudex apex, erect to ascending-erect, simple or few-branched usually at midstem or above, often purplish proximally, vestiture hirsute with spreading to sharply upward-arching hairs to loosely strigose (1-storied) with loosely ascending hairs, often with a mix of spreading and loosely ascending hairs, usually all spreading on the distal half, eglandular; axillary buds (as small leaf tufts) present and usually conspicuous. **Leaves** cauline (basal withered by flowering), proximal attenuate to a petiole-like base, becoming epetiolate distally with truncate to rounded base and relatively even-sized to near the heads, oblong- to elliptic-lanceolate to oblanceolate or narrowly oblong-oblanceolate, ascending, largest at midstem, midcauline 8–40 x 2–6(–8) mm, narrowly attenuate to a petiolar region, petioles most pronounced proximally, becoming epetiolate distally, surfaces sparsely to moderately strigose-hirsute to hirsute with arching hairs, consistently sessile-glandular adaxially, glandular or eglandular abaxially, margins not ciliate or with cilia thicker-based but only slightly longer than other hairs. **Heads** solitary or in a loosely paniculate or loosely corymboid arrangement, peduncles leafy-bracteate and indistinct or sometimes ebracteate and 5–35 cm long, capitular bracts absent. **Involucres** 7–10 mm wide (pressed), phyllaries narrowly elliptic-lanceolate to ovate-lanceolate, strigose-hirsute to short hirsute-villous, eglandular or distally glandular, inner (5–)6–8 mm long, margins scarious-rimmed. **Ray flowers** 10–17, laminae 1.5–2.0 mm wide. **Chromosome numbers**,  $2n=18$  (*Semple 5764, 5768*, Moffat Co.),  $2n=36$  (*Windham 96-154*, Daggett Co.).

Flowering May–Aug(–Sep). Sandstone outcrops and crevices, canyon bottoms, sandy floodplains and flats, roadside, roadbanks, clay soil, sagebrush, juniper, pinyon-juniper, pinyon-juniper with ponderosa pine, ponderosa pine, lodgepole pine; (4500–)5200–8400(–9000) ft.

*Heterotheca incensa* is abundant in the Flaming Gorge area (whence the epithet) of Daggett Co., Utah, extending into adjacent Sweetwater Co., Wyoming, Uintah Co., and northwestern Colorado, and southward through Utah. In its northern range, it occurs sympatrically with *H. utahensis*, although the latter apparently is less common in the area — *H. utahensis* is distinct in its taller, more strictly erect, and thicker stems, consistently hirsute stem vestiture of longer and more

distinctly 2-storied hairs, larger and more oblong, often epetiolate leaves, and heads characteristically in a more compactly corymboid arrangement.

**Additional collections examined.** **Colorado.** Garfield Co.: East Fork of Middle Stewart Gulch, 2 2/3 miles S of Rio Blanco County line, SE-facing slope, loam, with *Artemisia* and grasses, 2438 m, 12 Jul 1982, *Popp & Waters 82-370* (MESA). Mesa Co.: Ca. 5 air mi NE of Gateway, dry wash and adjacent hillsides with pinyon and juniper, 5500 ft, 16 May 1994, *Lyon 3150* (RM); near Colorado River opposite Fruita, limestone knoll, 5100-5300 ft, 24 Jun 1938, *Pennell & Schaeffer 22164* (PH); Gateway Palisade Natural Area, N of Gateway between Hwy 141 and Dolores River, The Palisade, flat mesa summit in rocky, gritty soil, 7045 ft, 21 Jun 2007, *Yeatts 5495* (COLO, KHD); Gateway Palisade Natural Area N of Gateway between Hwy 141 and Dolores River, E of Mesa Co road 4.2 on W side of the Palisade, base of N-facing Wingate cliff of peninsula fin extending W from main Palisade ridge, in rock crevices and on narrow ledges in thin soil just below vertical pour-off, 6173 ft, 30 Aug 2010, *Yeatts 5953* (BRY, COLO, KHD); Gateway Palisade Natural Area, N of Gateway between Hwy 141 and Dolores River, 1.15 mi SE of Palisade summit, gravelly drainage bank and low bench in pine-juniper, 4840 ft, 10 Oct 2015, *Yeatts 6349* (KHD). Moffat Co.: 1 mi E of Sunbeam, xeric hillside facing Yampa River to the N, 28 Jul 1933, *Hanna 1324* (MO); Sunbeam, S of Yampa River, sagebrush slope, 28 Jul 1933, *Hermann 5346* (MO); ca. 31.5 air mi WNW of Maybell, northern toe slopes of Douglas Mtns, 1.3 road mi S of jct (Greystone) with Co Rd 10 on Douglas Mountain Blvd (Co Rd 60), E side of rd, crevices of sandstone bedrock, pinyon-juniper-sagebrush-ponderosa pine, 6913 ft, 10 Jun 2013, *Johnson 2402* (BRY, OBI); Dinosaur Natl Monument, 0.5 mi SSW of Hackings Springs, *Pinus edulis*, *Juniperus osteosperma*, and *Artemisia tridentata*, 8000 ft, 28 Jun 1988, *Kelley 88-81* (COLO); 10.5 km W Craig on US 40, sagebrush, 3 Oct 1982, *Lane 2985* (COLO); Blue Mtn, Round Top, E-facing slope, among limestone ledges, 8600 ft, 30 Jun 1960, *MacLeod 24A* (COLO); Douglas Mtn, Whisky Spring house area, N slope, 7500 ft, 11 July 1960, *MacLeod 180A* (COLO); 6 mi SW of Greystone, Douglas Mtn, near Lower Whisky Spring at Whisky Springs Ranch, NE-facing slope with cheatgrass and wild rose bushes, 7525 ft, 30 Jul 1964, *MacLeod 281* (COLO); 6 mi SW of Greystone, Douglas Mtn, at Whisky Springs Ranch, NE-facing slope with sagebrush and serviceberry, 7520 ft, 4 Jul 1964, *MacLeod 283* (COLO); Dinosaur Natl Monument, Bull Canyon, 0.8 mi SE of Yampa River, pinyon-juniper, 5840 ft, 2 Sep 1988, *Naumann 290* (COLO); Dinosaur Natl Monument, Indian Water Canyon, ca 1 mi S of East Cactus Flat, S of Old Chuckwagon Road, gravels and cracks of sandstone of drainage with *Pinus*, *Juniperus*, and *Artemisia*, 6300 ft, 18 May 1987, *Neely 4049* (COLO, RM); Dinosaur Natl Monument, E. Fork Sand Canyon, W of the Billiard Table, sandy soils of gentle N exposure in wash with *Sarcobatus*, *Artemisia tridentata*, *Clematis*, and *Senecio*, 5500 ft, 30 May 1987, *Neely 4149* (COLO, NY); Dinosaur Natl Monument, Pool Canyon, 0.2 mi E of Utah border, canyon bottom with *Pinus*, *Juniperus*, *Rhus*, and *Symphoricarpos*, 6160 ft, 1 Jun 1987, *O'Kane 2996* (COLO, RM); Dinosaur Natl Monument, first major draw E of Big Joe Draw, N of Starvation Valley, bottom of draw with *Pinus* and *Juniperus*, 6660 ft, 25 Jun 1987, *O'Kane 3147* (COLO, RM); Pat's Hole, near confluence of Greene and Yampa rivers, dry sandy soil, 4500 ft, 8 Jul 1945, *Porter 3635* (MO, RM, SMU, TEX, WTU); Dinosaur Natl Monument, Hells Canyon, sandy flats, 21 Jun 1948, *Rodeck 4439* (COLO, WTU); E of Elk Springs on Hwy 40, juniper-sage, 30 Aug 1981, *Semple 5764*, **2n=18** (COLO-2 sheets, NY); E of Elk Springs on Hwy 40, 30 Aug 1981, *Semple 5768*, **2n=18** (ASU, COLO, MO, UTC); Dinosaur Natl Monument, ca. 2 mi E of Dinosaur, near jct of US Hwy 40 and park road to Echo Canyon, 5934 ft, 30 Jul 2009, *Urbatsch 10372* (LSU); SE slope of Cold Spring Mountain on primitive road to Little Joe Basin between Bull Canyon and Irish Canyon, gypsum hills and alkaline flats, 27 Jun 1965, *Weber & Salamun 12662* (COLO). Rio Blanco Co.: Buford, 7200 ft, 23 Aug 1910, *Duce 382* (COLO); Aldrich Lake, meadow, 22 Jul 1937, *Johnson s.n.* (COLO); 3 mi N of jct of No Name Ridge and Piceance Creek, frequent on sandy loam of W facing slope, 7775 ft, 30 Jun 1982, *O'Kane & Riefler 82-498* (COLO); Meeker, 9 Aug 1910, *Robbins 7156* (COLO); ca 17 air mi E of Meeker, Flat Tops/White River Plateau, ridge between Big Beaver and Fawn Creeks, rocky, gentle S-facing slope, 8500 ft, 14 Aug 1990, *Vanderhorst 1723* (COLO); 4 mi W of Rangely on the N side of White River, white sandstone cuesta, rock crevices 5250 ft, 15 Jun 1978, *Weber & Wingate 15398* (COLO, CS). **Utah.** Daggett Co.: Hideout Canyon Campground, S exposure W in Spring Canyon, 6000 ft, 22 Aug 1956, *Cottam 14536* (UT); Green River, 6100 ft, 11 Jun 1959, *Flowers et al. 216* (UT); head of Cart Creek, Ashley Forest, 5500 ft, 29 Jun

1929, *Garrett s.n.* (BRY); Uintah Mts, along Spring Creek on road from Manila to Vernal, xeric hillside, 11 Jul 1933, *Hanna 1269* (MO); Uintah Mts, Greens Lakes, open yellow pine, 9000 ft, 11 Jul 1933, *Hanna 1292* (MO); N slope Uinta Mountains, Ashley Natl Forest, Dripping Spring, ca 2 air mi SE of Dutch John, pinyon-juniper with some ponderosa pine and stream bottoms, 6000-6200 ft, 24 May 1994, *Hartman 45327* (MO, RM); Sheep Creek Gorge, dry sagebrush slope, 7300 ft, 11 Jul 1933, *Hermann 4743* (MO); Green Lakes, yellow pine-sagebrush slope, 7500 ft, 11 Jul 1933, *Hermann 4801* (MO); Uintah Mts, S shore of East Green Lake, mountain meadow, 7400 ft, 11 Jul 1933, *Hermann 15155* (RM); Carter Creek, 8000 ft, 4 Jul 1944, *Jensen s.n.* (WS, WTU; dups at IDS and UC are *H. elata*); 2 mi E of Dutch John, dry slopes at Dripping Springs Campground, 4 Jun 1986, *McNeilus s.n.* (TENN); Doud Mtn overlook, ca. 4 mi N of Rte 44, dry slopes, 2 Jul 1986, *McNeilus s.n.* (TENN); near bottom of Sears Canyon, Taylors Flat, 5750 ft, 15 Jun 1978, *Neese 5659* (BRY); N slope Uinta Mountains, Flaming Gorge Natl Recreation Area, ca 2 air mi W of Red Canyon Visitor Center along Carter Creek, SE side of Carter Creek drainage into Flaming Gorge, willows dominant, 6000-6400 ft, 23 Jun 1994, *Refsdal 1149* (RM); N slope Uinta Mountains, Flaming Gorge National Recreation Area, ca 2 air mi S of Dutch John on the E side of the Green River, S of Flaming Gorge Dam, pinyon-juniper woodlands, some riparian areas, and W-facing red sandstone cliffs, 5600 ft, 11 Jul 1994, *Refsdal 1652* (RM); Flaming Gorge Natl Recreation Area, Red Canyon Visitor Center, ca 10 air mi SE of Manila, ridgetop with sagebrush and juniper on sandstone-gravelly soil, 7400 ft, 11 Jul 1994, *Refsdal 1661* (RM); Three Corners, ca. 20 air mi ENE of Dutch John, 8400-8520 ft, 5 Jul 1995, *Refsdal 4935* (BRY); Clay Basin, ca 7.5 air mi NE of Dutch John., S aspect, spring, dark humus soils, gravelly sagebrush, 6760-6840 ft, 5 Jul 1995, *Refsdal 4965* (BRY, RM); N slope Uinta Mountains, Ashley Natl Forest, Burnt Creek, ca 10.8 air mi SSE of Manila, S side of Utah Hwy 44, dry upland, ponderosa pine, red soils with clay, 7900-8000 ft, 21 Aug 1995, *Refsdal 7552* (RM); N slope Uinta Mountains, Ashley Natl Forest, East Fork Eagle Creek, ca 9.6 air mi SE of Manila, 1.4 mi W of Red Canyon Road on both sides of Forest Road 529, upland, lodgepole pine, 7700-8080 ft, 2 Sep 1995, *Refsdal 7808* (RM); N slope Uinta Mountains, Ashley Natl Forest, Carter Creek, ca 8.1 air mi S of Manila on N side of Utah Hwy 44, upland, ponderosa pine, scattered juniper, mostly clay soils, 7200-7300 ft, 2 Sep 1995, *Refsdal 7857* and *Refsdal 7868* (RM); 4.2 km N of Dutch John, US-191, pinyon pine-juniper scrub, 16 Sep 1987, *Semple & Chimielewski 8870* (BRY, MO); 18.2 km S of Dutch John, US-191, lodgepole pine woods, 16 Sep 1987, *Semple & Chimielewski 8871* (BRY, MO); ca. 7 mi due SE of Manila, N flank of Boars Tusk Ridge, 6300 ft, 27 Jun 1978, *Welsh & Moore 18697* (BRY, RM); ESE of Dutch John near Green River on rim of Swallow Canyon, ca. 6.39 km SSE of Whisky Spring, N-facing slope with *Artemisia*, *Pinus*, and *Juniperus*, rocky sandstone soil, 5950 ft, 22 May 1996, *Windham 96-154*, *n*=18 (UT). Emery Co.: Cedar Mountain SW of Recreation Area, 30 Jul 1975, *Albee 692* (UT); Temple Mountain, dry slopes, 31 May 1962, *Allman s.n.* (BRY); Desolation Canyon, Green River, valley bottom, 4800 ft, 10 May 1999, *Atwood 24448* (NY); San Raphael Swell-East Ferron, dry wash, 5500 ft, 6 Jun 1932, *Cottam 5269* (UT); NW of Huntington along Hwy 31, Manti-La Sal Natl Forest, narrow canyon with Huntington Creek on S side, ca. 6000 ft, 31 Jul 2004, *Estes et al. 6616* (APSC); 4.6 mi S of Calf Creek Canyon on road to I-70, barren knolls with scattered juniper and *Ephedra*, 5200 ft, 31 May 1981, *Hreha 285* (UT); San Rafael Swell, head of Black Dragon Canyon, mixed desert shrub, Navajo sandstone, 4600 ft, 24 May 1989, *Kass 2984* (NY); Calf Springs Wash, sandy canyon bottom, 11 May 1940, *Maguire 18330* (NY); Range Creek Canyon, S end of Cherry Meadow in floodplain of Lighthouse Canyon, E of Range Creek, piney covered knoll in sagebrush flat, 5680 ft, 16 Jun 2006, *RCC 2006-30* (UT); Range Creek Canyon, ca. 0.9 mi S of jct Turtle Canyon and Range Creek roads, BLM, sandy loam with *Tamarix* and *Populus*, 4660 ft, 29 Jun 2007, *RC 2007-27* (UT); CC Price River, 21 mi SE of Huntington, pinyon-juniper, 7600 ft, 22 Aug 1977, *Welsh 16168* (NY). Garfield Co.: Calf Canyon, 15 mi S of Boulder, sandy bottom, 3500 ft, 7 Aug 1952, *Cottam 13444* (UT); ca. 1/2-3/4 mi N of Escalante River, along Sand Creek, 5280 ft, 31 May 1989, *Hodgson 5621* (DES); 1 mi S of Hell's Backbone Bridge, Navajo Sandstone outcrops along road, 5 Aug 1981, *Hreha 322* (UT); end of Long Neck Mesa between Deer Creek and Slickrock Canyon, E of Boulder, sandy soil pocket in slickrock, 6350 ft, 19 Sep 2010, *Licher 2966* (ASC); 5 mi N of Escalante, along Lower Pine Creek at the Lower Box Trailhead, riparian on Navajo sand, ca. 6400 ft, 15 Jun 2011, *Madsen 5683* (KANU); Cons Hole at the head of South Fork Oak Creek, Navajo Sandstone, ponderosa pine/manzanita community, 7700 ft, 12 Jun 2012, *Madsen 6007* (KANU); Escalante River, between Death Hollow and Sand Canyon, scattered pinyon pine and juniper, sandy soils above

riverbed, 15 May 1984, *Neely 1954* (COLO). Grand Co.: Moab, 4000 ft, 8 May 1933, *Cottam 5573* (UT); NE of Moab, ca. 2 mi E of Hwy 163 along Hwy 128, Navajo Sandstone, along road, 14 May 1981, *Hreha 166* (UT); ca. 40 mi NE of Moab, Rio Mesa Center, Utah Bottoms along Dolores River, top of mesa on E side of campground, rocky, sandy soil, 1302 m, 22 May 2016, *Kilbane 11* (UT); Porcupine Ridge, Sand Flat Road, red sandy soil, 30 Jun 1967, *Pederson 108* (UT); Grand River crossing, opposite Moab, 1200 m, 30 Jun 1911, *Rydberg & Garrett 8355* (UT); bank of Colorado River at Dewey, sandy soil among rocks, 4500 ft, 23 May 1953, *Vickery 243* (UT); S side of Colorado River ca. 3/4 mi below the Dewey bridge, talus slope, 4100 ft, 23 May 1953, *Vickery 298* (UT); 3.5 km N of Dewey Bridge, along fence line on N-facing hillside near State Rte 128, near dry river bed, 4254 ft, 21 May 1994, *Woodford s.n.* (UT). Kane Co.: Ca. 7 mi N of Kanab and 1.6 mi E of US Hwy 189, Kanab Creek NE of road to John R Flat within Best Friends Animal Sanctuary, banks of sandy terrace above active floodplain, openings in *Populus-Salix*, 5200 ft, 14 Aug 2008, *Fertig 24255* (UT); N of Kanab, White Cliffs, Best Friends Animal Sanctuary, base of cliffs and lower terrace at confluence of Three Lakes Canyon and Kanab Creek, white sandy soil over Navajo Sandstone bedrock on W- and S-facing slope and terrace, pinyon pine-juniper, 5235 ft, 2 Jun 2011, *Fertig 26536* (ASC); Glen Canyon NRA, ca. 60 mi down Hole-in-the-Rock Road from Escalante, juniper, 4285 ft, 20 May 2003, *Hill 96* (ASC); Grand Staircase Escalante Natl Monument, beach above Escalante River, S side ca. 2.5 mi S of Boulder Creek confluence, sandy wash bottom at base of sandstone cliff, 5150 ft, 16 Sep 2004, *Licher 909* (ASC); 15 mi NW of Orderville, left fork of headwaters of Virgin River, open places on dry slopes around yellow pine, 6600 ft, 15 Jun 1940, *Maguire 18858* (NY). San Juan Co.: Ca. 45 km S of Moab, sandy desert slopes overlooking Hook and Ladder Gulch to the south, 1800 m, 6 Sep 1987, *Cronquist 12077* (UT); from Moab, S on Hwy 191 to Road 131 (Needles Overlook Rd), roadsides, mixed grassland and shrub, sand, 1790 m, 28 Sep 2013, *Johnson 47* (UT). Sevier Co.: Ca. 10 mi due W of Emery on Old Woma Plateau, aspen comm, silty loam soil, 8230 ft, 17 Jul 1980, *Neese & White 9202* (NY). Uintah Co.: Brush Creek near Vernal, dry, rocky hillsides, 8000 ft, 15 Sep 1936, *Andrews & Noble s.n.* (WTU); Elk Horn Ranger Station, rocky soil, sagebrush, 8000 ft, 27 Jul 1928, *Christensen C-4* (RM); 25 mi N of Vernal, lower aspen belt, S slopes, 7000 ft, 27 Jun 1935, *Cottam 6017* (UT); Dinosaur Natl Monument, Split Mountain Gorge Campground, sandy flood plains, 1600 m, 23 Jun 1948, *Dever & Wolf 5093* (COLO); Vernal-Manila hwy, roadside, 21 Aug 1938, *Garrett 7526* (UT); along Vernal-Manila road N of Vernal, 7400 ft, 4 Sep 1935, *Graham 10186* (MO); ca. 10 mi S of Bonanza on Utah Uwy 45, common on sandy soil, 5600 ft, 25 Jul 1965, *Holmgren 2264* (ID, KANU, NCSC, NY); ca. 50 mi SE of Ouray, near Flat Rock Mesa, sandstone outcrop with pockets of reddish soil, pinyon-juniper, 7200 ft, 30 Jun 1980, *Hreha UB-14* (UT); Dry Fork Canyon, ca. 18 mi N of Maeser, *Juniper-Stipa-Amelanchier*, stony slopes, 7200 ft, 22 Jun 1979, *Neese et al. 7815* (RM); top of Blue Mtn, head of Stuntz Draw, crevices of sandstone bedrock in mesic drainage bottom, 7680 ft, 7 Jul 1982, *Neese 11890* (BRY); between K Ranch and Jensen, 18 Jun 1925, *Osterhout 6409* (RM); ca 17 air mi SE of Dutch John, 4.9 mi W of Colorado on both sides of Crouse Creek Road, steep creek side, *Acer*, 6150-6200 ft, 3 Aug 1994, *Refsdal 2452* (RM); ca 19 air mi SE of Dutch John, 6.3 mi SW of the Green River on Crouse Creek Road at the head of Crouse Canyon, flats at the head of the canyon, big sagebrush, juniper, and *Salix* in stream, 6350 ft, 3 Aug 1994, *Refsdal 2476* (RM); Browns Park, Sears Canyon, ca 12.5 air mi SE of Dutch John, red sandy soils, sandstone cliffs, juniper/pinyon pine, cottonwood., 6200-6420 ft, 31 Jul 1995, *Refsdal 6342* (RM); 16 km S of Daggett Co., 27 km N of Vernon intersect. with US Hwy 40 on US Hwy 191, sandstone outcrop with juniper, 16 Sep 1987, *Semple & Chmielewski 8873* (BRY, MO); ca. 5.8 mi NE of Jensen, Green River Campground, between road and Green River or along the edge of the river, 1500 m, 29 Jul 2009, *Urbatsch 10397* (LSU); along US Hwy 40, ca. 16 air mi SE of jct with US Hwy 191, roadside, 1668 m, 29 Jul 2009, *Urbatsch 10403* (LSU); Flynn's Point, Diamond Mtn, NE of Vernal, 7300 ft, 25 Jun 1980, *Williams 80-141-1* (RSA); North-South Canyon ca. 1 mi E of jct of roads to Split Mountain Gorge and Dinosaur Natl Monument Hqs., 22 Jun 1948, *Wolf & Dever 5063* (COLO). Wayne Co.: Dixie Natl Forest, Fish Creek Cove [ca. 2.5 mi NW of Grover, toward Teasdale], 38 13.98' N, 111 24.93' W, base of Navajo Sandstone cliffs on sand in an open ponderosa pine community, 7200 ft, 12 Aug 2004, *Madsen & Merkley 1964* (BRY, ID, UNM); ca. 2.3 mi S of Grover on Hwy 12 toward Boulder, ca. 0.5 mi S of Dixie Natl Forest boundary (within the NF), area of pinyon pine-juniper-ponderosa pine, locally abundant at base of roadside cut through white Navajo sandstone, E side of road, 7850 ft, 15 August 2017, *Nesom het17-1* (BRIT + 6 dups); 3.1 mi S of Grover on Hwy 12 toward Boulder, ca. 1.3 mi

S of Dixie Natl Forest boundary (within the NF), ca. 0.5 mi N of jct with Happy Valley Road, area of ponderosa pine with scattered juniper and small douglas fir, scattered but abundant in sand among basalt boulders, high white Navajo sandstone cliffs to immediate east, E side of road, 8100 ft, 15 August 2017, *Nesom het17-2* (BRIT + 7 dups); Utah Hwy 12, ca. 5 km by road S of Grover, 7900 ft, open ponderosa pine slopes, one plant seen in bud, 16 Jun 1987, *Semple 8822* (BRY); Utah Hwy 12, ca. 5 km by road S of Grover, 7900 ft, 18 Aug 1987, *Semple 8897* (BRY). **Wyoming. Sweetwater Co.:** Red Creek Basin, rocky clay slope with *Juniperus osteosperma*, 6700 ft, 3 Jul 1999, *Dorn 8012* (RM); US Hwy 191, 8.9 km NE of Utah state line, roadside, 28 Aug 1995, *Semple & Zhang 10440* (BRIT); NE slopes and draws of Richards Mtn, ca. 2 air mi NW of Richards Gap, ca. 37 air mi SSW of Rock Springs, sandy draw, 6850-7500 ft, 5 Jul 1996, *Ward 1994* (RM); Washakie Basin, from Cooper Ridge to Salt Creek, E of the confluence of Pretty Water and Salt Wells creeks, ca. 21 air mi SSE to Rock Springs, sandy rocky slopes, 6705-6880 ft, 5 Jul 1996, *Ward 2140* (RM).



Figure 139. *Heterotheca incensa*, Wayne Co., Utah (site of *Nesom het17-1*). Abundant plants along Hwy 12 in loose sand directly derived from Navajo Sandstone. Photo by Nesom, 15 August 2017.



Figure 140. *Heterotheca incensa*, Wayne Co., Utah, 2.3 mi S of Grover on Hwy 12 toward Boulder, at Nesom het17-1. Photo by Nesom, 15 August 2017.





Figure 141. *Heterotheca incensa*, Wayne Co., Utah, near locality of *Nesom het17-1*. Scattered plants in sandy soil of ponderosa pine woods. Photo by Nesom, 15 August 2017.



Figure 142. *Heterotheca incensa*, Wayne Co., Utah, near locality for *Nesom het17-1*. Semple 8822 (BRY). Early season (mid-June) plant, before upper branching and inflorescence development.



Figure 143. *Heterotheca incensa*, Daggett Co., Utah. Refsdal 1133 (RM). Holotype.

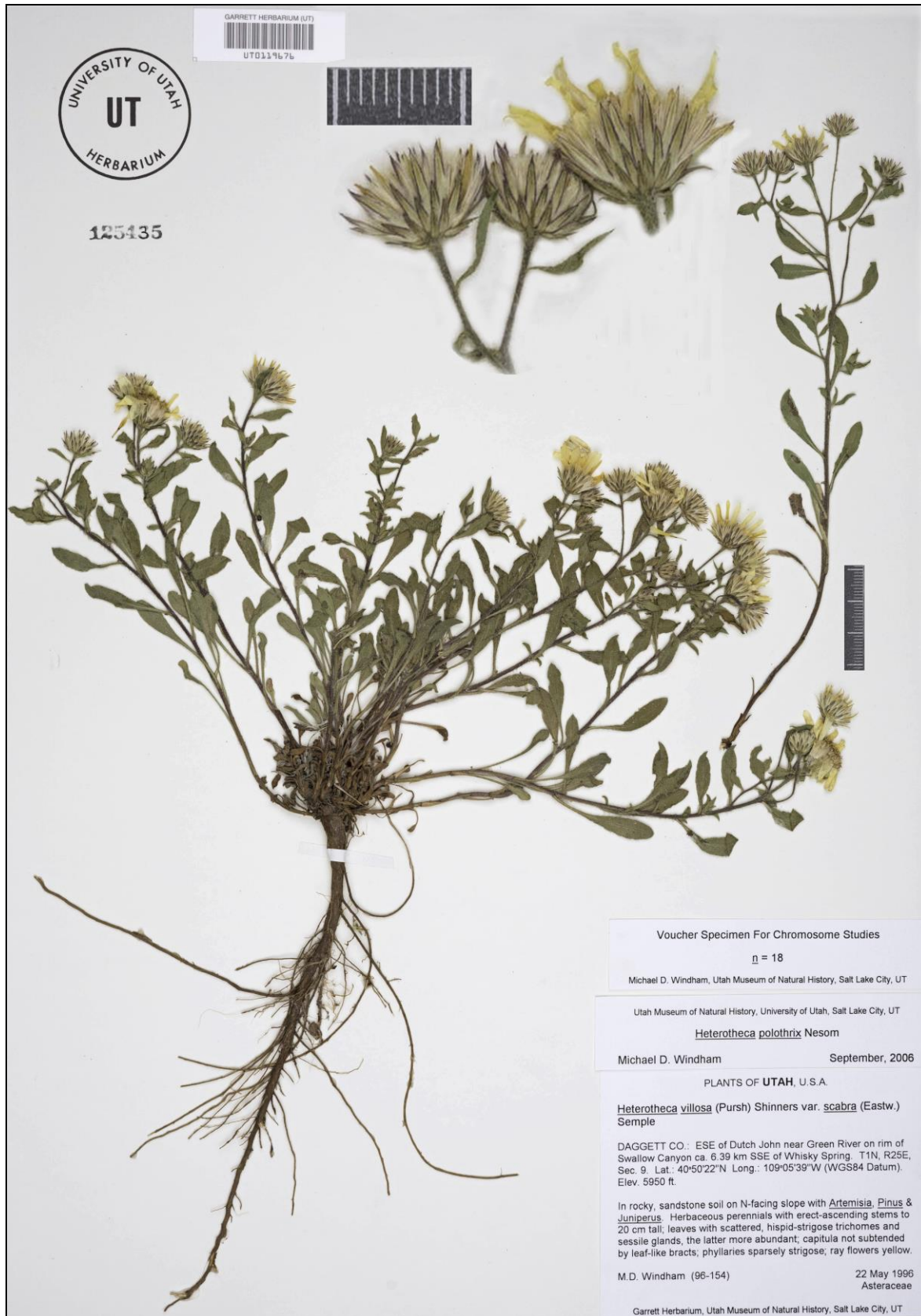


Figure 144. *Heterotheca incensa*, Daggett Co., Utah. Windham 96-154 (UT).



Figure 145. *Heterotheca incensa*, Daggett Co., Utah. Cottam 14536 (UT).



Figure 146. *Heterotheca incensa*, Daggett Co., Utah. McNeilus s.n. (TENN).



Figure 147. *Heterotheca incensa*, Uintah Co., Utah. Holmgren 2264 (KANU). Stiff, many-branched stems and relatively small, spreading leaves — a distinctive form needing further study, also occurring in Grand Co.



Figure 148. *Heterotheca incensa*, Uintah Co., Utah. Holmgren 2264 (KANU).



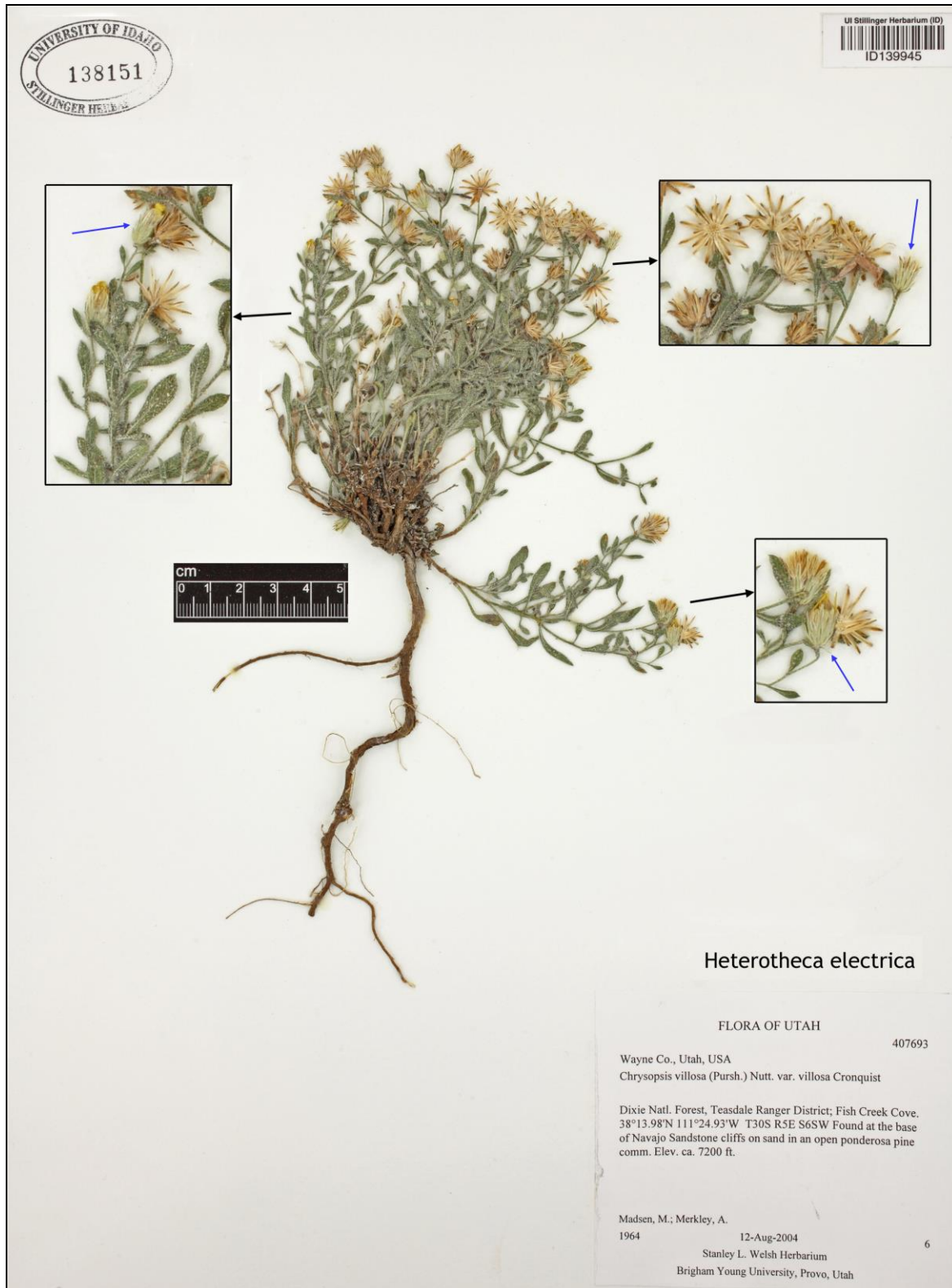


Figure 149. *Heterotheca incensa*. Wayne Co., Utah. Madsen & Merkle 1964 (ID). Blue arrows point to heads in flower, very small and few-flowered, perhaps due to drought; vestiture hispid-hirsute. The population apparently was consistent in this feature (see duplicate in Fig. 149). Collection is from near Grover, in the vicinity of typical plants.



Figure 150. *Heterotheca incensa*. Wayne Co., Utah. Madsen & Merkle 1964 (BRY).