

Key to *Heterotheca* of Utah, based on Guy Nesom's treatment of *Heterotheca* section *Chrysanthae* (Phytoneuron 2020-68).
 Written by Patrick J. Alexander, 24 Jan 2022. My usage of the term "hispid-strigose" may benefit from a definition: having short, coarse trichomes that are \pm perpendicular from the leaf or stem surface at the base but curved antrorsely to become \pm parallel to the surface at the tip.

- 1 Plants annual or biennial; lower cauline leaves petiolate and the bases of the petioles auriculate-clasping; pappus absent on ray flowers, present on disk flowers
 - 2 Distal cauline leaves ovate to broadly lanceolate, auriculate-clasping at base; plants usually branching below the inflorescence *Heterotheca subaxillaris*
 This widespread and variable species barely enters the southwestern corner of Utah. It is sometimes split into two or more species, but I do not think this is tenable.
 - 2 Distal cauline leaves oblong to lanceolate, sessile but not auriculate-clasping at base; plants usually unbranched below the corymbiform inflorescence *Heterotheca grandiflora*
 In the Flora of North America treatment, Semple indicates that this species is rare and probably introduced in Utah.
- 1 Plants perennial; lower cauline leaves sessile or petiolate but not auriculate-clasping; pappus present on ray and disk flowers
 - 3 At least some of the heads subtended by leafy bracts equalling or exceeding the phyllaries
 - 4 Capitular bracts not differentiated from the cauline leaves; rays drying purplish, usually fading orange in life; phyllaries usually purplish or purple-rimmed; plants often forming dense cushions *Heterotheca jonesii*
 This is a narrowly-distributed species on sandstone, in the vicinity of Zion National Park and in nearby parts of Iron, Kane, and Garfield counties. In its typical, cushion-forming aspect it can hardly be confused with any other *Heterotheca*. However, occasional taller plants muddy the waters enough that this feature can't be relied on in a key.
 4. Plants not as above: capitular bracts usually differentiated from the cauline leaves; rays not drying purplish and never orange in life; phyllaries usually green; plants never cushion-forming
 - 5 Stems glandular (and with eglandular pubescence)
 - 6 Phyllaries eglandular; base of each capitular bract pale and bulged outward; glands of the distal stems and peduncles usually inconspicuous and mostly obscured by eglandular trichomes *Heterotheca fulciens*
 This is a montane species primarily in southwestern Utah. Nesom shows it reaching as far north as northwestern Emery County. It is apparently more common in Arizona to the south.
 - 6 Phyllaries glandular, though perhaps minutely so; bases the capitular bracts neither conspicuously paler nor bulged outward; glands of the distal stems and peduncles generally prominent, at most partially obscured
 - 7 Eglandular pubescence of stems loosely strigose to villous-hirsute with mostly ascending trichomes; capitular bracts not ciliate *Heterotheca depressa*
 Found in Utah mostly in the foothills of the northern Wasatch Range, Cache and Rich counties. Plants in Utah may or may not have capitular bracts; plants to the north typically do not. Nesom indicates that the southern populations are also more glandular than usual for the species.
 - 7 Eglandular pubescence of stems hirsute to hirsute-villous with spreading to deflexed trichomes; at least some of the capitular bracts coarsely ciliate *Heterotheca hirsuta*
 Montane plants of northern Utah, principally in the Wasatch Range and Uinta Mountains. This is a widespread and variable species. The Utah plants appear to be at the more glandular end of variation in this species as well as *Heterotheca depressa*. Occasional plants may be entirely devoid of eglandular pubescence, making the two species difficult to distinguish. I believe such plants have to be included under *Heterotheca hirsuta*.
 - 5 Stems eglandular
 - 8 Stems sparsely to densely hirsute or hirsute-villous, the trichomes predominately spreading to deflexed
 - 9 Stems slender, lax; stems and leaves both sparingly hirsute; capitular bracts not much differentiated from the cauline leaves *Heterotheca postpetrinis*
 This species is known only from the type collection, south of Moab in the Behind the Rocks Wilderness Study Area. Its appearance in life is unknown, but judging from the specimens and location it is likely a many-stemmed, sprawling plant on cliffs or other shaded rock outcrops.
 - 9 Stems robust, erect to ascending; stems hirsute to hirsute-villous, often densely so; leaves loosely strigose to hispid-strigose; capitular bracts clearly differentiated from the cauline leaves *Heterotheca fulciens*
 Nesom indicates that the stems are usually minutely glandular, so this species is found in both leads of couplet 5.
 - 8 Stems densely strigose, occasionally with a few longer, spreading trichomes *Heterotheca schneideri*
 This is an alpine and subalpine species primarily found in the San Juan Mountains of southwestern Colorado. There are subalpine / alpine plants in the La Sal and Abajo Mountains that look much like this species to me, but Nesom assigns these plants to *Heterotheca pedunculata* and does not report *Heterotheca schneideri* in Utah. When in doubt between the two,

finding the plants to be minutely glandular on either the adaxial leaf surfaces or on the peduncles might resolve the question in favor of *Heterotheca schneideri*. Or it might not!

- 3 Heads ebracteate, or occasionally a few heads with a long, linear bract not much larger than the outer phyllaries
 - 10 Cauline leaves silver, densely strigose or sericeous; leaf surfaces glandular or not, but if glandular then the glands mostly or entirely obscured
 - 12 Plants tall (usually > 30 cm), caespitose, stems mostly erect to ascending; inflorescences corymboid, often dense and compact early in development but in time usually becoming diffuse, with many heads on spreading branches
 - 13 Plants silver below the inflorescences but becoming greener above; adaxial surfaces of most cauline leaves silver, glandular but the glands obscured, the distalmost cauline leaves and bracts densely and conspicuously glandular and only sparsely strigose or hirsutulous; stem pubescence 2-storied below the inflorescences, with an overstory of long, spreading trichomes above a dense, short, silver understory, but becoming uniformly hirsutulous to hirsute above, the trichomes predominately spreading; phyllaries glandular and with sparse, ascending to occasionally spreading, eglandular trichomes as well *Heterotheca utahensis*
Found in about the northern third of the state around the Wasatch and Uinta Mountains. Nesom associates sericeous leaves with *Heterotheca zionensis* and long, spreading trichomes on the stems with *Heterotheca utahensis*, but so far as I can tell the main stems and most of the cauline leaves are indistinguishable between the two. These features become useful on the distalmost leaves and in the inflorescences.
 - 13 Plants silver throughout; adaxial leaf surfaces silver throughout the plant, eglandular or the glands obscured; stem densely strigose, silvery, often with a sparse overstory of long, spreading hairs below the inflorescence; in the inflorescence the short, silver hairs often ascending rather than appressed and the long, spreading overstory absent or nearly so; phyllaries eglandular, with short, ascending trichomes like those of the peduncles
..... *Heterotheca zionensis*
This species is widespread across much of Utah. I differ a little from Nesom in the characters separating *Heterotheca zionensis* from *Heterotheca utahensis*, as described above. The cauline leaves of both species are typically oblong to elliptic and spreading to deflexed at least at the base, and outside the range of *Heterotheca utahensis* this is often a useful feature for separating *Heterotheca zionensis* from others with which it might be confused.
 - 12 Plants short (usually > 30 cm); plants usually more or less rhizomatous or decumbent, often forming low mounds or loose mats with the stems ascending to erect distally; inflorescences with few heads, these mostly on long, erect or strongly ascending peduncles *Heterotheca pedunculata*
This species is found across about the eastern half of Utah. Occasional plants may appear intermediate between it and *Heterotheca zionensis*, but most of the confusion surrounding this species involves *Heterotheca inflata* and affiliates, all with leaves glandular at least adaxially while those of *Heterotheca pedunculata* are eglandular on both surfaces.
 - 10 Cauline leaves green or grayish, with varying pubescence: sparsely strigose, evenly and loosely strigose, hispid-strigose, or hirsute; at least the adaxial leaf surfaces evidently glandular, the glands unobscured to partially obscured
 - 13 Stems glandular (and with eglandular pubescence)
 - 14 Stem pubescence dimorphic, 2-storied: an overstory of long, spreading to deflexed trichomes and an understory of short, ascending to spreading trichomes *Heterotheca utahensis*
See couplet 13, above.
 - 14 Stem pubescence not dimorphic, sparsely strigose to hispid-strigose or hirsutulous
 - 15 Phyllaries glandular and without eglandular pubescence; stems hirsutulous *Heterotheca cinerascens*
Found at rocky sites throughout the western half of Utah. Plants are usually many-stemmed and bushy, with small, closely-spaced, oblanceolate leaves that are widely spreading to reflexed basally but bent upwards about midlength.
 - 15 Phyllaries glandular or not, but with eglandular pubescence; stem pubescence not hirsutulous
 - 16 Plants caespitose, many-stemmed and bushy; leaves small and widely spaced leaves (internodes usually \pm equal to longer than the leaves); leaves sparsely strigose, trichomes appressed *Heterotheca polothrix*
Found across the southeastern half of Utah, mostly on sandstone. Although distinctive in its typical form, *Heterotheca polothrix* apparently intergrades with every other *Heterotheca* in its range.
 - 16 Plants sometimes many-stemmed but if so sprawling rather than bushy; leaves few and more closely spaced (internodes much shorter than leaves); leaves loosely strigose to hispid-strigose, trichomes ascending but not appressed *Heterotheca depressa*
This plant can also be found under couplet 7.
 - 13 Stems eglandular
 - 17 Stem pubescence dimorphic, 2-storied: an overstory of long, spreading to deflexed trichomes and a much shorter, hirsutulous to hispid-strigose or loosely strigose understory *Heterotheca hirsutissima*

Nesom does not report this species in Utah, but it is found in adjacent Arizona, Colorado and New Mexico. I include it in case it may cross the state line.

- 17 Stems hirsute to hispid-strigose or loosely strigose; trichomes often variable in length or orientation (tending, especially, to become shorter and more strongly ascending distally) but not in two distinct classes

18 Leaves strigose to loosely strigose; phyllaries minutely glandular and finely but loosely strigose; involucre 9-16 mm wide on pressed specimens *Heterotheca inflata*

A plant of southeastern Utah, in Grand and San Juan counties, mostly on sandstone. These last two species are probably the most confusing in Utah. I am not very confident that they are good species or can be distinguished reliably from each other, from *Heterotheca polothrix*, or from *Heterotheca pedunculata*. Lumping them with one or more of these other species would not resolve the issue. What else one might do with these plants, though, I do not know.

18 Leaves hispid-strigose to hirsute; phyllaries eglandular or distally glandular and hispid-strigose; involucre 7-10 mm wide on pressed specimens *Heterotheca incensa*

Relatively widespread in Utah, from the east side of the Uinta Mountains southwest to Kane County. As mentioned immediately above, I find this species and *Heterotheca inflata* confusing.