Key to *Heterotheca* of Arizona, based on Guy Nesom's treatment of *Heterotheca* section *Chrysanthe* (Phytoneuron 2020-68). Written by Patrick J. Alexander, 23 Jan 2022.

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 species is widespread and variable. It is sometimes split into two or more species, but I do not think this is tenable. It is found in much of Arizona, most abundantly from the Prescott area and southeastward.

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 Arizona.

1 Plants perennial; lower cauline leaves sessile or petiolate but not auriculate-clasping; pappus present on ray and disk flowers

3 Leaves prominently glandular; eglandular pubescence often present as well, but sparser than the glands and not at all obscuring them; leaves green

4 Stems eglandular; heads not subtended by leafy bracts

5 Stem pubescence dimorphic, 2-storied: an overstory of long, spreading trichomes and an understory of much shorter spreading, ascending, or sometimes loosely appressed trichomes; phyllaries without scarious margins, or the inner phyllaries with narrow and indistinct scarious margins ..... *Heterotheca hirsutissima*

Found in northeastern Arizona. In its typical form the leaves of this species are loosely strigose and a little grayish, glandular but not conspicuously so. Some plants, though, have leaves more prominently glandular and with sparse eglandular pubescence. These plants can sometimes be confused with more hirsute-stemmed, wider-leaved forms of *Heterotheca polothrix*.

5 Stem pubescence monomorphic, hirsute to loosely strigose; phyllaries with white or occasionally purplish, scarious margins ..... *Heterotheca incensa*

Nesom reports this species in adjacent Utah, but not in Arizona. It is included here in case it may be found along the northern edge of the state.

4 Stems glandular, usually with eglandular pubescence as well; heads subtended by leafy bracts or not

5 Stems and leaves strigillose, eglandular pubescence minute and tightly appressed; plants of east-central Arizona, on and a little north of the Mogollon Rim ..... *Heterotheca nitidula*

Though usually included with the prominently bracted plants of *Heterotheca fulcrata* s.l., the bracts do not seem to be a reliable feature of this species. There may be a single large, leafy bract immediately subtending the head or the cauline leaves may simply diminish in size up the stem, the uppermost relatively small & narrow, a few mm to 1 cm below the head. When present, the subtending bracts are usually sparsely but prominently ciliate. The strigillose pubescence of the leaf surfaces is usually sparse enough to place these plants in my first lead of couplet 1. Sometimes the eglandular pubescence is a little denser and the glandular pubescence sparser, so *Heterotheca nitidula* is found under the second lead as well.

5 Stems and leaves sparsely strigose to hirsute or villous; plants throughout the state, rarely around the Mogollon Rim in east-central Arizona

6 Stems and leaves both prominently hirsute; leaves with long-ciliate margins; plants of central Arizona from the Pinal Mountains north to the Payson area ..... *Heterotheca marginata*

This species will usually key under the second lead of couplet 2. Plants are usually on rock outcrops and have long, mostly unbranched stems with numerous, small, ascending leaves. The heads are usually subtended by short, linear to linear-lanceolate bracts, but these are often very inconspicuous or absent.

6 Plants not as above: either the leaves or the stems not prominently hirsute, or the leaves not with long-ciliate margins, or plants not in central Arizona

7 At least some of the heads subtended by leafy bracts equalling or exceeding the phyllaries

8 Capitular bracts coarsely ciliate on the margins with stiffly spreading, pustulose-based trichomes; surfaces of the bracts sparsely hirsutulous; bracts concolorous, not bulged outward basally ..... *Heterotheca arizonica*

A species found from central to southeastern Arizona, usually in rocky areas at lower elevations. Some plants seem intermediate between this species and *Heterotheca marginata*.

8 Capitular bracts not ciliate or weakly ciliate with generally thin, ascending trichomes; surfaces of the bracts loosely strigose; bracts usually paler and bulged outward at the base ..... *Heterotheca fulciens*

This is the common member of the *Heterotheca fulcrata* complex in montane woodlands and forests, on most of the Mogollon Rim and northward. Plants are more often inconspicuously glandular, but since the eglandular pubescence is often sparse as well this species is included under both leads of couplet 3.

7 Heads not subtended by leafy bracts

9 Plants stipitate-glandular throughout; plants of southeastern Arizona ..... *Heterotheca viscida*

A distinctive plant of rocky sites in Cochise and Santa Cruz counties, though it might occasionally be confused with plants of *Heterotheca arizonica* in which the capitular bracts are inconspicuous or absent from some of the heads. The leaves are typically oblong, coarsely ciliate on the margins but with few or no eglandular trichomes on the surfaces.

9 Glands sessile throughout, or occasionally stipitate in part; plants of central to northern Arizona

9 Phyllaries densely glandular and without eglandular trichomes ..... *Heterotheca cinerascens*

Found in northwestern Arizona, mostly north of the Grand Canyon on sandstone. This species is sometimes difficult to distinguish from *Heterotheca polothrix*. Plants are usually in many-stemmed clumps with small, closely-spaced, oblanceolate leaves that are widely spreading to reflexed basally but bent upwards about midlength. Eglandular pubescence of both stems and leaves is usually puberulent to hirsutulous.

9 Phyllaries with eglandular pubescence and sessile-glandular or not

10 Plants in many-stemmed clumps, the leaves small, oblanceolate and widely spaced (internodes often longer than the leaves; leaves sparsely strigose ..... *Heterotheca polothrix*

Widespread in northeastern Arizona and westward to the northwestern corner of the state. Usually on sandstone, sparsely leafy with the internodes longer than the leaves. The stems are often strigose along with the leaves but can be sparsely hirsute.

10 Plants few-stemmed, the leaves large, oblong to elliptic, closely spaced and overlapping; leaves hirsute-strigose to hirsute ..... *Heterotheca marcbakeri*

This is a poorly known species and apparently rare. In general appearance is resembles *Heterotheca fulciens*, but without capitular bracts

3 Leaves usually glandular, but inconspicuously so; eglandular pubescence more abundant than the glands and generally obscuring them to some degree; leaves usually grayish to silver

11 Stems and leaves both prominently hirsute; leaves with long-ciliate margins

12 At least some of the heads subtended by ovate to elliptic or oblanceolate bracts equalling or exceeding the phyllaries; plants of southeastern Arizona, southern Graham County and southward ..... *Heterotheca fulcrata*

This species has often been treated broadly, to include practically any *Heterotheca* with capitular bracts. Plants with sparser eglandular pubescence may occasionally be difficult to distinguish from *Heterotheca arizonica*.

12 Heads ebracteate or with linear to linear-lanceolate bracts usually shorter than the phyllaries; plants of central Arizona from the Pinal Mountains north to the Payson area ..... *Heterotheca marginata*

Plants are usually on rock outcrops and have long, mostly unbranched stems with numerous, small, ascending leaves.

11 Plants not as above; either the stems or the leaves not prominently hirsute, or the leaves not with long-ciliate margins

13 Some or all of the heads subtended by leafy bracts equalling or exceeding the phyllaries

14 Stems and leaves both strigillose; spreading trichomes limited to sparse, long, spreading cilia often on the leaf margins and, occasionally, very sparse long, spreading trichomes on the stems ..... *Heterotheca nitidula*

Although I do not like to rely on capitular bracts for this species at couplet 13, neither do I wish for it to appear in triplicate. *Heterotheca nitidula* is easily recognizable once its aquaintance has been made, so I hope the reader comes to know it first by plants that key more easily.

14 Stems and leaves loosely strigose, sericeous, or hirsute

15 Leaves silver, the surfaces densely long-sericeous ..... *Heterotheca rutteri*

This is a narrowly distributed species found in Santa Cruz County, adjacent parts of Cochise and Pima counties, and adjacent Mexico. Nesom quotes Semple, "It is one of those species that once seen is never confused with another taxon," but also mentions occasional plants that are greenish rather than silvery.

15 Leaves green or grayish, loosely strigose to hirsute

16 Stems with dimorphic, 2-storied pubescence: a hirsute-villous overstory and a puberulent, minutely glandular understory; capitular bracts usually hirsutulous to hirsute on the surfaces and with long, coarse, stiffly spreading cilia on the margins; plants of southeastern Arizona ..... *Heterotheca fulcrata*

16 Stems hirsute to villous, usually eglandular; capitulate bracts loosely strigose to hispido-strigose on the surfaces, margins eciliate or with thin, ascending cilia; plants of central and northern Arizona ..... *Heterotheca fulciens*

This is the common member of the *Heterotheca fulcrata* complex in montane woodlands and forests, on most of the Mogollon Rim and northward. Plants are usually minutely glandular on the stems and at least the adaxial leaf surfaces, but the leaves are often sparsely pubescent and green as well, so this species is included under both leads of couplet 3.

13 Heads not subtended by leafy bracts

17 Stem pubescence dimorphic, 2-storied: an overstory of long, spreading trichomes and an understory of much shorter spreading, ascending, or sometimes loosely appressed trichomes; leaves sessile-glandular, the glands only partially obscured by eglandular pubescence ..... *Heterotheca hirsutissima*

This species is found in northeastern Arizona. Plants are usually ± hemispherical, the central stems erect and the outer stems sprawling, and the leaves grayish-green.

17 Stem pubescence mostly or exclusively strigose; leaves eglandular or the glands wholly obscured

18 Plants tall (usually > 40 cm), caespitose, stems mostly erect or ascending; leaves mostly elliptic to oblong, usually spreading at base though often curved upward distally ..... *Heterotheca zionensis*

Found in about the northeastern half of Arizona. Plants are typically large and silvery, sometimes reaching 150–200 cm under good conditions. The stems are strigose and sometimes have a sparse overstory of long, spreading trichomes.

18 Plants short (usually < 30 cm), more or less rhizomatous to decumbent, often forming low mounds or loose mats with most of the stems becoming erect distally; leaves mostly oblanceolate, ascending their entire lengths, sometimes twisted ..... *Heterotheca pedunculata*

Found in about the northeastern quarter of Arizona. Plants are often silvery, like *Heterotheca zionensis*, but low-growing, with longer peduncles and fewer heads on each stem. Stems are strigose and rarely have any long, spreading trichomes.