Key to *Heterotheca* of Wyoming, based on Guy Nesom's treatment of *Heterotheca* section *Chrysanthe* (Phytoneuron 2020-68). Written by Patrick J. Alexander, 26 Feb 2022.

1 Stem pubescence mostly appressed to strongly ascending, sometimes with a sparse overstory of long, spreading trichomes
- 2 Some or all of the heads subtended by leafy bracts equalling or exceeding the phyllaries
  - 3 Leaves glandular
    - 4 Phyllaries with narrowly acute apices; distal cauline leaves and bracts usually with ciliate margins, at least toward the base; distal cauline leaves with long-attenuate bases, oblanceolate to spatulate ..... *Heterotheca pumila*
      Barely entering southeastern Wyoming in the Sierra Madre and Medicine Bow Mountains. The capitular bracts are usually oblanceolate, often ciliate toward the base. Some plants may be intermediate between this and *Heterotheca resinolens*.
    - 4 Phyllaries with blunt, rounded apices; distal cauline leaves and bracts usually not ciliate; distal cauline leaves sometimes weakly attenuate basally, oblanceolate to narrowly elliptic ..... *Heterotheca depressa*
      See below, first lead of couplet 7.
  - 3 Leaves eglandular
    - 5 Heads solitary or few and on long peduncles in a loosely corymboid inflorescence; plants of the Sierra Madre in Carbon County ..... *Heterotheca hartmanii*
      This species is peripheral in Wyoming, found primarily in northwestern Colorado. Although superficially similar to *Heterotheca villosa*, it is more likely affiliated with *Heterotheca depressa* and *Heterotheca pedunculata*.
    - 5 Heads in a closely corymboid inflorescence; plants northeast or east of the Sierra Madre
      - 6 Leaf surfaces finely to loosely strigose, the trichomes not stiff and pustulose-based; cauline leaves usually broadly oblanceolate and with rounded apices ..... *Heterotheca villosa*
        Prior to Nesom's revision, this has been treated as a very widespread, polymorphic species found throughout western North America and eastward through much of the Great Plains and Midwest. *Heterotheca villosa* sensu stricto is restricted to the northern Great Plains, including the eastern third or so of Wyoming.
      - 6 Leaf surfaces strigose with long, stiff, pustulose-based trichomes; cauline leaves usually narrowly oblanceolate, the apices acute ..... *Heterotheca angustifolia*
        See below, first lead of couplet 8.
- 2 Heads not subtended by leafy bracts, or rarely with a lone, linear bract shorter than the phyllaries
  - 7 Plants short (usually <30 cm); stems usually decumbent or sprawling, becoming erect only distally, the plants sometimes forming low mounds or loose mats; cauline leaves conspicuously glandular on the surfaces; phyllaries with scarious, white to purplish margins ..... *Heterotheca depressa*
    Plants of northwestern Wyoming southwestward along the edge of the state. Most plants of this species should key here, but occasional plants have capitular bracts or spreading pubescence on the stems.
  - 7 Plants tall (usually >40 cm); stems mostly erect; cauline leaves eglandular or glandular but the glands mostly obscured by strigose pubescence; phyllaries without scarious margins or these very narrow and translucent
    - 8 Leaves strigose with stiff, pustulose-based trichomes; plants of the eastern edge of Wyoming ..... *Heterotheca angustifolia*
      Nesom does not report this species in Wyoming, but it is found in adjacent counties of Nebraska and South Dakota. I include it and the following two species in case they may cross the border.
    - 8 Leaves strigose but the trichomes neither stiff nor pustulose-based; plants of far southwestern Wyoming
      - 9 Plants silver below the inflorescences, greener above; adaxial surfaces of most cauline leaves silver, glandular but the glands obscured; distalmost cauline leaves and bracts densely & conspicuously glandular, 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, becoming uniformly hirsutulous to hirsute with spreading trichomes above; phyllaries glandular and sparsely pubescent ..... *Heterotheca utahensis*
        Nesom does not report this species in Wyoming, but it is found in adjacent counties of Colorado and Utah.
      - 9 Plants silver throughout; adaxial leaf surfaces silver throughout the plant, eglandular or glands obscured; stems densely strigose, silvery, often with a sparse overstory of long, spreading hairs below the inflorescence; in the inflorescence the short, silver hairs are ascending rather than appressed and the long overstory is absent or nearly so; phyllaries eglandular, with short, ascending trichomes like those of the peduncles ..... *Heterotheca zionensis*
        Nesom does not report this species in Wyoming, but it is found in adjacent counties of Colorado and Idaho.

1 Stem pubescence predominately spreading
- 10 Stem pubescence dimorphic, 2-storied: an overstory of long, spreading trichomes and an understory of much shorter spreading, ascending, or sometimes loosely appressed trichomes

11 Heads subtended by ovate to oblong bracts exceeding the phyllaries ..... *Heterotheca resinolens*
Plants of montane woodlands & forests in the Sierra Madre and Medicine Bow Mountains. Plants are generally erect, few-stemmed, with large green leaves. The pubescence at mid-stem is usually, perhaps always, of the 2-storied type similar to *Heterotheca hirsutissima*, but the overstory becomes sparser in the basal third of the stem, sometimes disappearing entirely. The more basal cauline leaves, also, are often attenuate to subpetiolar while those at mid-stem and above apparently never are. Though Nesom describes the leaf surfaces as "sessile-glandular with little other vestiture", so far as I can tell they are usually rather densely pilose with short, fine, clear, ± velvety trichomes.

11 Heads ebracteate or, occasionally, with a lone linear bract shorter than the phyllaries

12 Phyllaries glandular; most cauline leaves ± silvery, densely strigose on the surfaces, glandular but the glands mostly obscured, the distalmost leaves and bracts becoming greener, less densely pubescent, and prominently glandular ..... *Heterotheca utahensis*
See above, first lead of couplet 9.

12 Phyllaries eglandular; cauline leaves not silvery, usually somewhat grayish, loosely strigose or hispido-strigose on the surfaces, glandular and the glands not much obscured ..... *Heterotheca hirsutissima*
Plants of southeastern Wyoming, in the plains and foothill woodlands. This species can be difficult to distinguish from *Heterotheca hispida*, though that species usually has small capitular bracts and this one does not.

10 Stem pubescence not dimorphic; often varying in length but without a distinct overstory of much longer trichomes

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

14 Capitular bracts mostly ovate to oblong, the larger bracts 1.5–2.5 times longer than wide; cauline leaves oblong, 2–3 times longer than wide, abruptly narrowing at the base rather than attenuate; leaf and bract surfaces finely pilose ..... *Heterotheca resinolens*
See above, first lead of couplet 11.

14 Capitular bracts mostly oblanceolate to narrowly elliptic, ≥ 2.5 times longer than wide; cauline leaves oblanceolate to narrowly elliptic (2.5–)3–6 times longer than wide, bases either attenuate to subpetiolate or abruptly narrowing; leaf and bract surfaces variously pubescent but not finely pilose

15 Short (usually < 20 cm) plants of alpine or subalpine habitats, generally ± hemispherical or forming low mounds, at least the outer stems usually decumbent to ± prostrate ..... *Heterotheca pumila*
See above, first lead of couplet 4.

15 Taller (> 20 cm) plants of lower elevations, stems ascending to erect

16 Margins of distal cauline leaves and bracts with long, coarse, stiffly spreading cilia; capitular bracts usually exceeding the phyllaries; stems and phyllaries glandular ..... *Heterotheca hirsuta*
Found more or less throughout Wyoming. Usually easy to recognize by the combination of capitular bracts narrow but prominent and both the bracts and distal cauline leaves green, prominently ciliate, the surfaces glandular and with eglandular pubescence relatively sparse and inconspicuous, msotly spreading. Occasional plants may be very densely glandular but nearly without eglandular pubescence, and in these plants the cilia may be very reduced or even absent.

16 Margins of distal cauline leaves & bracts not ciliate or with a few relatively short and weak cilia toward the base; capitular bracts usually equalling or shorter than the phyllaries; stems and phyllaries eglandular ..... *Heterotheca hispida*
Found in most of Wyoming, except the southwest. The capitular bracts are usually present but short and narrow. The leaves are usually hispido-strigose and eglandular, though Nesom mentions a glandular-leaved form in Carbon County & adjacent parts of surrounding counties.

13 Heads not subtended by bracts, or occasionally with one or two linear bracts shorter than the phyllaries

17 Phyllaries with scarious, white to purplish margins; leaves glandular at least adaxially

18 Phyllaries with rounded apices; leaves strigose to hispido-strigose on the surfaces; stems usually somewhat decumbent or sprawling, the plants often forming low mounds or loose mats ..... *Heterotheca depressa*
See above, first lead of couplet 7. Stem pubescence is usually strongly ascending to appressed, rarely spreading; most plants should be found under the first lead at couplet 1.

18 Phyllaries with narrowly acute apices; leaves hirsute to hispido-strigose on the surfaces; stems erect or ascending, plants more upright ..... *Heterotheca incensa*
Peripheral in southwestern Wyoming, in the Flaming Gorge area. The narrowly triangular to lanceolate, acute, scarious-margined phyllaries are distinctive.

17 Phyllaries without scarious margins; leaves usually eglandular ..... *Heterotheca hispida*
See second lead of couplet 10 above. This species usually has evident but short & narrow capitular bracts. The glandular-leaved form apparently does not occur with *Heterotheca depressa* or *Heterotheca incensa*, so geography may be useful in uncertain cases.