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# AJO PEAK TO TINAJAS ALTAS: A FLORA OF SOUTHWESTERN ARIZONA
## Part 21. EUDICOTS: ASTERACEAE – ASTER FAMILY

**RICHARD STEPHEN FELGER**
Herbarium, University of Arizona
Tucson, Arizona 85721
&
International Sonoran Desert Alliance
401 W Esperanza Ave
Ajo, Arizona 85321
*Author for correspondence: rfelger@email.arizona.edu

**SUSAN RUTMAN**
90 West 10th Street
Ajo, Arizona 85321

## ABSTRACT

A floristic account is provided for the aster or daisy family as part of the vascular plant flora of the contiguous protected areas of Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge, and the Tinajas Altas Region in the heart of the Sonoran Desert in southwestern Arizona. This is the largest family in the flora area; the modern flora includes 106 taxa in 65 genera, with only 9 non-native species. The fossil record is rich; at least 30 species are known from fossils, including at least four taxa no longer present in the area. Fifty-seven (59 percent) of the composite taxa are annuals (ephemerals), most of which are cool-season (winter-spring) species. Non-native taxa are remarkably few (9 species; 3 of them are not established as reproducing populations) and none are invasive. This is the twenty-first contribution for this flora series published in Phytoneuron and also open access on the website of the University of Arizona Herbarium (ARIZ).

Asteraceae (comps) and Orchidaceae (orchids) are the two largest families of vascular plants. Comps include about 1620 genera and 25,040 species, or about 9% of the world flora (Stevens 2012). Mexico contains nearly 10% of the world's species of comps and North America north of Mexico has a similar diversity. The family is especially well developed and diverse in semi-arid regions of the world. The worldwide success of the composite family in terms of taxonomic and ecological diversity is due in large part to the evolutionary plasticity of the capitulum (flower head) as a functional flower (Jeffrey 2009) and the highly developed and efficient chemical defenses against herbivores (e.g., Cronquist 1981). Indeed, while studying Sonoran Desert composites one is impressed by the prevalence and diversity of glands on the stems, leaves, and especially youngest growth and exposed surfaces of phyllaries and corollas. These glands occur in combination with a great diversity of hairs (trichomes).

This contribution is the final installment for the vascular plant flora of the contiguous protected areas of Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge, and the Tinajas Altas Region in the heart of the Sonoran Desert in southwestern Arizona (Figure 1). The previously published parts are listed on the last page of this publication. The first article in this series includes maps and brief descriptions of the physical, biological, ecological, floristic, and deep history of the flora area (Felger et al. 2013a). This flora includes the modern, present-day taxa as well as fossil records from packrat middens. This flora is specimen-based; we have seen nearly all specimens cited.

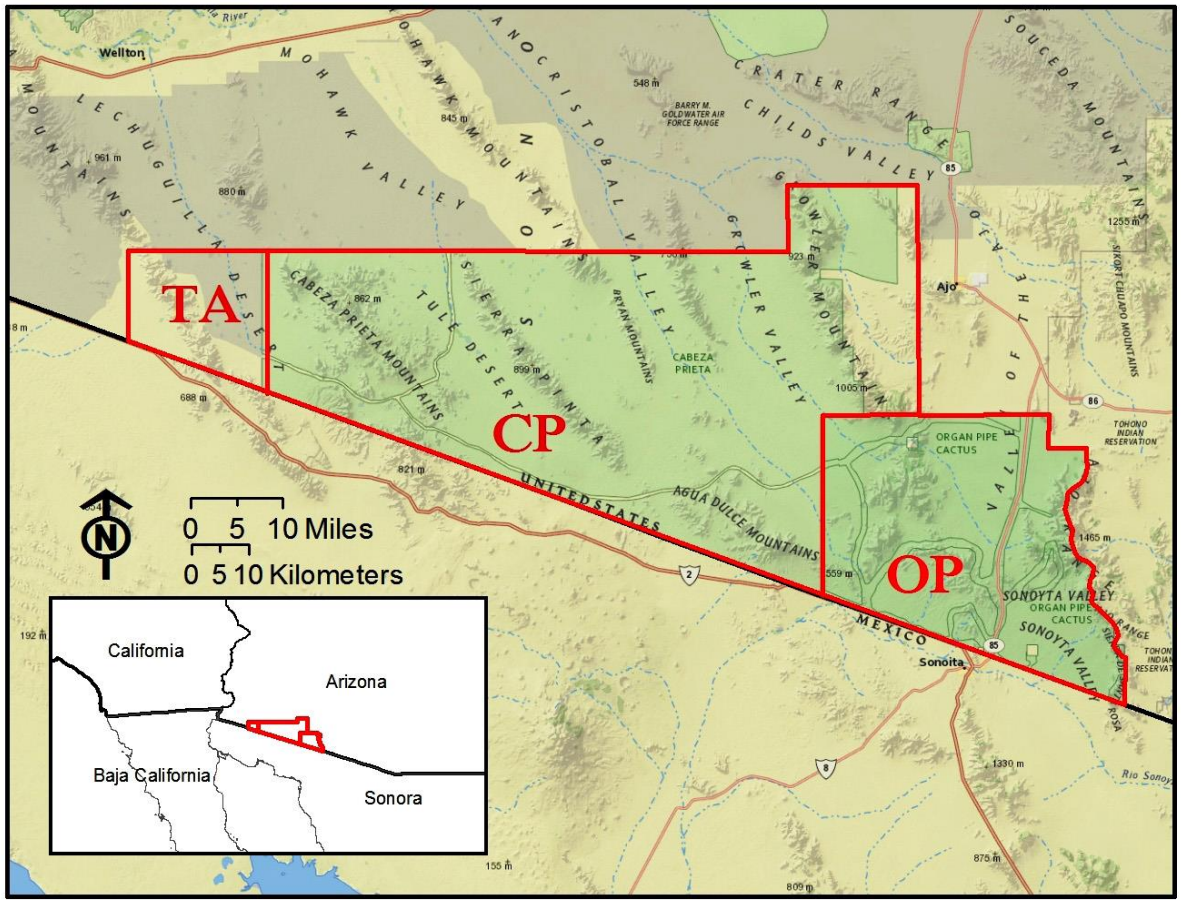


Figure 1. Flora area in southwestern Arizona. OP = Organ Pipe Cactus National Monument; CP = Cabeza Prieta National Wildlife Refuge; TA = Tinajas Altas Region. Green shading indicates approximate boundaries of federally designated wilderness.

Explanation of the format for the flora series is provided in part 3 (Felger et al. 2013b). Vernacular, or common names, when known or deemed worthwhile, are given in English, Spanish (shown in italics), and the Hia-Ced O'odham dialect, respectively. Non-native taxa in the flora area are marked with an asterisk (*) and non-natives not established as reproducing populations are marked with two asterisks (**). Fossil specimens are indicated with a dagger symbol (†) and fossils of taxa no longer present in the flora area are marked with two dagger symbols (††). All specimens cited are at the University of Arizona Herbarium (ARIZ) unless otherwise indicated by the abbreviations for herbaria at Cabeza Prieta National Wildlife Refuge (CAB), Organ Pipe Cactus National Monument (ORPI), and the standardized abbreviations for herbaria (Index Herbariorum, Thiers 2016). All photos and scans are by Sue Rutman and all line art is by Lucretia Breazeale Hamilton (1908–1986) unless otherwise stated.

Area designations are: OP = Organ Pipe Cactus National Monument, CP = Cabeza Prieta National Wildlife Refuge, TA = Tinajas Altas Region. Baja California refers to the northern state and Baja California Sur to the southern state of the peninsula, and Baja California Peninsula refers to both states or when the specific state is not known. The identification keys are for the modern flora; taxa not established as reproducing populations or no longer occurring in the flora area are not included in the keys. Descriptions and keys pertain to taxa and populations as they occur in the flora area.

**Asteraceae in Southwestern Arizona**

Annuals, herbaceous perennials, and shrubs (elsewhere sometimes vines and small trees). Leaves highly variable, simple but often deeply lobed to highly dissected; stipules none (sometimes with stipule-like leafy appendages at leaf bases, e.g., *Verbesina encelioides*). Individual flowers (florets) usually small, highly variable; bisexual, staminate, or pistillate; pistillate florets either fertile (producing fruit) or sterile (asexual, or neuter, not producing fruit). Florets organized into a head (capitulum) surrounded by bracts (phyllaries) forming the involucre (or phyllaries rarely absent, e.g., *Stylocline*). Heads usually on a peduncle (stem supporting the flower head) with few to many florets. Composites in the flora area as well as the Sonoran Desert Region have four kinds of florets:

1. Disk florets: Corollas tubular, (3- or 4-) 5-lobed, radially symmetric or rarely slightly bilaterally symmetric; usually bisexual or sometimes functionally staminate (the stigma present but fruit not produced). Many comps have only disk florets (discoid heads), e.g., *Baccharis*, *Bebbia*, *Palafoxia*, and *Peucephyllum*; others have disk florets in the center of the flower head and surrounded by ray florets.

2. Ray florets: Corollas with a short tube below a limb, the limb (ray or ligule) strap-shaped (extended on one side, the floret thus bilaterally symmetric) and usually 3-toothed or 3-veined, or rarely the limb greatly reduced or absent (the florets eligulate, e.g., *Erigeron canadensis*). Ray florets pistillate and fertile (producing fruit) or sterile, and surrounding (exterior to) the disk florets: e.g., *Baileya*, *Encelia farinosa*, and *Geraea*.

3. Ligulate florets: Florets bisexual; all florets in the head of the same kind, although the inner ones often smaller, the florets usually numerous in each head. Corollas tubular below, with a 5-toothed limb (ligule or "ray"), the floret thus bilateral: e.g., *Malacothrix*, *Rafinesquia*, *Stephanomeria*, and *Uropappus*.

4. Bilabiate florets: Florets bisexual; all florets in the head of the same kind. Corollas 2-lipped, the inner (toward center) lip 2-lobed, the outer lip 3-lobed, the floret thus bilateral: *Acourtia* and *Trixis*.

Calyx modified as the pappus or sometimes absent. The pappus diverse, often represented by awns, bristles, hairs, or scales, and variously smooth, scabrous, or feathery (plumose). Stamens (4) 5, inserted on the corolla, the anthers usually united around the style, the filaments not fused (filaments fused and anthers separate in *Ambrosia* and *Xanthium*) or stamens absent from unisexual pistillate flowers. Ovary inferior, the style solitary and often ringed at the base by a nectary, the stigma 2-branched. Fruit 1-seeded, referred to here as an achene, although technically a cypsela.

This is the largest family in the flora area as well as the Sonoran Desert and globally. The 106 taxa (Table 1; excluding taxa not established and fossils no longer present) in the modern flora area represent 15% of the total flora, a percentage comparable to that of the flora of adjacent northwestern Sonora (Felger 2000). At least 30 species are known from the fossil record, four of which are known from the flora area only by fossils. Non-native taxa are remarkably few (9 species) and none are invasive. Three of the non-natives are not established as reproducing populations.

Table 1. Local distributions of composite taxa for the flora in southwestern Arizona. † = Modern taxa also represented by a fossil specimen; †† = fossil taxa not found in the modern flora area; * = non-native taxa; ** = non-natives not established (not reproducing) in the flora area. OP = Organ Pipe Cactus National Monument; CP = Cabeza Prieta National Wildlife Refuge; TA = Tinajas Altas Region. S = Summer/warm-season ephemerals; W = cool-season/winter-spring ephemerals; NS = non-seasonal ephemerals and NS/P = non-seasonal ephemerals sometimes becoming perennials; PR = perennials. Localities and growth forms in parentheses are ones that are rare or seldom found (probably not reproducing), or known only from fossils and not part of the modern flora, and are not counted in the totals.

| TAXON | REGION | | | GROWTH FORM | | | |
|---|---|---|---|---|---|---|---|
| | Organ Pipe | Cabeza Prieta | Tinajas Altas | Ephemerals | | | Perennial |
| | | | | Summer | Winter | Non-seasonal | |
| *Acamptopappus sphaerocephalus* | OP | | | | | | PR |
| *Acourtia nana* | OP | | | | | | PR |
| *Acourtia wrightii* | OP | CP | | | | | PR |
| *Adenophyllum porophylloides* | OP | CP | | | | | PR |
| *Ageratina paupercula* | OP | | | | | | PR |
| *Ambrosia ambrosioides* | OP | CP | TA | | | | PR |
| †*Ambrosia confertiflora* | OP | CP | TA | | | | PR |
| *Ambrosia cordifolia* | OP | | | | | | PR |
| †*Ambrosia deltoidea* | OP | CP | (TA) | | | | PR |
| †*Ambrosia dumosa* | OP | CP | TA | | | | PR |
| *Ambrosia dumosa* × *A. ilicifolia* | | | TA | | | | PR |
| †*Ambrosia ilicifolia* | | CP | TA | | | | PR |
| *Ambrosia monogyra* | OP | CP | | | | | PR |
| †*Ambrosia salsola* | OP | CP | TA | | | | PR |
| *Artemisia dracunculus* | OP | | | | | | PR |
| †*Artemisia ludoviciana* | OP | | (TA) | | | | PR |
| (††*Artemisia tridentata*) | (OP) | | | | | | (PR) |
| *Baccharis brachyphylla* | OP | CP | TA | | | | PR |
| *Baccharis salicifolia* | OP | CP | | | | | PR |
| *Baccharis sarothroides* | OP | CP | TA | | | | PR |
| †*Bahiopsis parishii* | OP | CP | TA | | | | PR |
| *Baileya multiradiata* | OP | CP | | | | NS | |
| *Baileya pleniradiata* | OP | CP | TA | | | NS | |
| †*Bebbia juncea* | OP | CP | TA | | | | PR |
| †*Brickellia atractyloides* | | CP | TA | | | | PR |
| *Brickellia californica* | OP | | | | | | PR |
| †*Brickellia coulteri* | OP | CP | | | | | PR |
| *Brickellia frutescens* | OP | | | | | | PR |
| (†*Brickellia* sp.) | (OP) | | | | | | (PR) |
| (††*Calycoseris parryi*) | (OP) | | (TA) | | (WI) | | |
| *Calycoseris wrightii* | OP | CP | TA | | WI | | |
| (***Carthamus tinctorius*) | (OP) | | | | (WI) | | |
| **Centaurea melitensis* | OP | CP | | SU | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| †*Chaenactis carphoclinia* | OP | CP | TA | | WI | | |
| †*Chaenactis stevioides* | OP | CP | TA | | WI | | |
| †*Cirsium neomexicanum* | OP | | | | WI | | |
| *Diaperia verna* | OP | CP | | | WI | | |
| (*Dicoria canescens*) | | (CP) | | | (WI) | | |
| *Dieteria asteroides* | OP | | | | | NS/P | |
| *Eclipta prostrata* | OP | | | | | NS | |
| †*Encelia farinosa* | OP | CP | TA | | | | PR |
| *Encelia farinosa* × *E. frutescens* | OP | | TA | | | | PR |
| *Encelia frutescens* | OP | CP | TA | | | | PR |
| †*Ericameria cuneata* | OP | CP | (TA) | | | | PR |
| †*Ericameria laricifolia* | OP | | (TA) | | | | PR |
| (††*Ericameria teretifolia*) | (OP) | | (TA) | | | | (PR) |
| (†*Ericameria* sp.) | (†OP) | | | | | | (PR) |
| **Erigeron canadensis* | OP | CP | | SU | | | |
| *Erigeron lobatus* | OP | CP | TA | | | NS | |
| *Eriophyllum lanosum* | OP | CP | | | WI | | |
| *Gaillardia arizonica* | OP | CP | | | WI | | |
| *Gamochaeta stagnalis* | OP | | | | WI | | |
| †*Geraea canescens* | OP | CP | TA | | WI | | |
| *Gutierrezia arizonica* | OP | CP | | | WI | | |
| †*Gutierrezia sarothrae* | OP | CP | | | | | PR |
| †*Gymnosperma glutinosum* | OP | CP | TA | | | | PR |
| (***Helianthus annuus*) | (OP) | | | (SU) | | | |
| *Helianthus niveus* | | CP | | SU | | | |
| (††*Heterotheca* sp.) | | | (TA) | | (W/P) | | |
| *Hymenothrix wislizeni* | OP | CP | | | W/P | | |
| *Hymenoxys odorata* | | CP | | | WI | | |
| *Isocoma acradenia* | OP | CP | | | | | PR |
| *Koanophyllon palmeri* | OP | | | | | | PR |
| **Lactuca serriola* | OP | CP | TA | | | NS | |
| *Laënnecia coulteri* | OP | CP | TA | SU | | | |
| *Leucosyris arida* | OP | CP | | | | NS/P | |
| *Leucosyris carnosa* | OP | | | | | | PR |
| *Logfia arizonica* | OP | CP | TA | | WI | | |
| *Logfia depressa* | OP | CP | | | WI | | |
| *Logfia filaginoides* | OP | CP | TA | | WI | | |
| *Machaeranthera tagetina* | OP | | | | | NS | |
| *Malacothrix fendleri* | OP | CP | | | WI | | |
| *Malacothrix glabrata* | OP | CP | | | WI | | |
| *Malacothrix sonorae* | OP | CP | | | WI | | |
| *Monoptilon bellioides* | OP | CP | TA | | WI | | |
| **Oncosiphon piluliferum* | OP | CP | | | WI | | |
| *Packera quercetorum* | OP | | | | | | PR |
| *Palafoxia arida* | OP | CP | TA | | WI | | |
| *Parthenice mollis* | OP | | | SU | | | |
| *Pectis cylindrica* | | CP | | SU | | | |
| *Pectis linifolia* | OP | | | SU | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Pectis papposa* | OP | CP | TA | SU | | | |
| *Perityle ajoensis* | OP | | | | | | PR |
| †*Perityle emoryi* | OP | CP | TA | | WI | | |
| (††*Perityle* sp.) | (OP) | | | | (WI) | | |
| †*Peucephyllum schottii* | | CP | TA | | | | PR |
| *Pleurocoronis laphamioides* | OP | | | | | | PR |
| *Pleurocoronis pluriseta* | | CP | TA | | | | PR |
| (†*Pleurocoronis* sp.) | | | (TA) | | | | (PR) |
| *Pluchea odorata* | OP | | | SU | | | |
| *Pluchea sericea* | OP | | | | | | PR |
| †*Porophyllum gracile* | OP | CP | TA | | | | PR |
| *Prenanthella exigua* | OP | CP | TA | | WI | | |
| *Psathyrotes ramosissima* | | CP | TA | | WI | | |
| *Pseudognaphalium canescens* | OP | | | | | | PR |
| *Psilostrophe cooperi* | OP | CP | | | | | PR |
| *Rafinesquia californica* | OP | CP | | | WI | | |
| †*Rafinesquia neomexicana* | OP | CP | TA | | WI | | |
| *Senecio flaccidus* | OP | | | | WI | | |
| *Senecio lemmonii* | OP | CP | | | W/P | | |
| *Senecio mohavensis* | OP | CP | TA | | WI | | |
| **Sonchus asper* | OP | CP | TA | | WI | | |
| **Sonchus oleraceus* | OP | CP | TA | | WI | | |
| *Stephanomeria exigua* | OP | | | | WI | | |
| *Stephanomeria pauciflora* | OP | CP | TA | | | | PR |
| *Stephanomeria schottii* | | CP | | | WI | | |
| *Stylocline gnaphaloides* | OP | | | | WI | | |
| *Stylocline micropoides* | OP | CP | TA | | WI | | |
| †*Thymophylla concinna* | OP | CP | | | WI | | |
| *Thymophylla pentachaeta* | OP | CP | | | | | PR |
| *Townsendia annua* | OP | | | | WI | | |
| *Trichoptilium incisum* | OP | CP | TA | | WI | | |
| †*Trixis californica* | OP | CP | TA | | | | PR |
| *Uropappus lindleyi* | OP | CP | | | WI | | |
| (***Verbesina encelioides*) | (OP) | | | | | (NS) | |
| *Xanthisma gracile* | OP | | | SU | | | |
| †*Xanthisma spinulosum* | OP | CP | TA | | | | PR |
| *Zinnia acerosa* | OP | | | | | | PR |
| Totals: 106 | 97 | 74 | 43 | 10 | 39 | 8 | 49 |

Approximately 57 taxa (59%) of the composite species in the flora area are annuals, mostly short-lived annuals or ephemerals. Desert annuals that complete their life cycle within a single season are termed ephemerals, and those with longer life spans are termed annuals, although the distinctions can be subjective. Three general kinds of ephemerals are distinguished: (1) Winter-spring ephemerals grow during the cooler seasons and may flower during late fall, winter, or spring. The majority of ephemerals (39 taxa) in the flora area are cool-season, or winter-spring ephemerals. (2) Hot weather or summer ephemerals usually germinate with the first substantial summer thunderstorms. Some may also grow with early fall rains (such as hurricane-fringe storms) while the soil and air temperatures are still high, allowing quick maturity. (3) Non-seasonal ephemerals grow with sufficient soil moisture at any time of the year. Most of the remaining local composites are

herbaceous perennials or small shrubs, and a few such as *Ambrosia monogyra*, *Baccharis salicifolia*, *B. sarothroides*, *Peucephyllum schottii*, and *Pluchea sericea* are woody shrubs reaching 1.5–3 m in height. Three small composite shrubs are important and widespread components of the local desert vegetation: *Ambrosia deltoidea, A. dumosa,* and *Encelia farinosa*.

Most composites in this flora are insect-pollinated. Approximately 52 species have yellow flowers, e.g., *Encelia farinosa, Baileya* spp., *Geraea canescens,* and *Pectis papposa.* Twenty-nine species have white to pinkish flowers, e.g., *Rafinesquia neomexicana,* and some are generally nocturnal or crepuscular, e.g., *Stephanomeria* spp. There are only a few species with blue, lavender, or pink flowers, e.g., *Cirsium neomexicanum*, *Pluchea odorata*, and *P. sericea*. Some have blue, purple, or pink rays but yellow disk flowers, e.g., *Erigeron lobatus*, *Dieteria asteroides*, *Leucosyris arida*, and *Machaeranthera tagetina*. The Ambrosiinae, e.g., *Ambrosia,* are wind-pollinated, with corollas absent from female flowers and reduced on male flowers. Others, such as the filaginoids (*Diaperia, Logfia,* and *Stylocline*), have minute flowers with reduced corollas and apparently are selfing (at least within a single flower head). Other apparently selfing comps in the flora area include *Pectis cylindrica* and *Uropappus lindleyi*.

The composite genera in the flora of southwestern Arizona are classified in the following higher taxa (adapted from Barkley et al. 2006):

**SUBFAMILY ASTEROIDEAE**

**Tribe Anthemideae**
- *Artemisia*
- *Oncosiphon*

**Tribe Astereae**
- *Acamptopappus*
- *Baccharis*
- *Dieteria*
- *Ericameria*
- *Erigeron*
- *Gutierrezia*
- *Gymnosperma*
- *Heterotheca*
- *Isocoma*
- *Laënnecia*
- *Leucosyris*
- *Machaeranthera*
- *Monoptilon*
- *Townsendia*
- *Xanthisma*

**Tribe Eupatorieae**
- *Ageratina*
- *Brickellia*
- *Koanophyllon*
- *Pleurocoronis*

**Tribe Gnaphalieae**
- *Diaperia*
- *Gamochaeta*
- *Logfia*
- *Pseudognaphalium*
- *Stylocline*

**Tribe Heliantheae**

**Subtribe Ambrosiina**e
- *Ambrosia*
- *Dicoria*
- *Parthenice*

**Subtribe Baerinae**
- *Eriophyllum*

**Subtribe Chaenactidinae**
- *Chaenactis*
- *Hymenothrix*
- *Palafoxia*
- *Peucephyllum*

**Subtribe Ecliptinae**
- *Eclipta*
- *Encelia*
- *Geraea*
- *Verbesina*
- *Zinnia*

**Subtribe Gaillardinea**
- *Baileya*
- *Gaillardia*
- *Hymenoxys*
- *Psathyrotes*
- *Psilostrophe*
- *Trichoptilium*

**Subtribe Helianthinae**
- *Bahiopsis*
- *Helianthus*

**Subtribe Galinsoginae**
*Bebbia*
**Subtribe Pectidinae**
*Adenophyllum*
*Pectis*
*Porophyllum*
*Thymophylla*
**Subtribe Peritylinae**
*Perityle*
**Subtribe Plucheeae**
*Pluchea*
**Subtribe Senecioneae**
*Packera*
*Senecio*
**SUBFAMILY CARDUOIDEAE**
**Tribe Cynareae**
*Carthamus*
*Centaurea*
*Cirsium*
**SUBFAMILY CICHORIOIDEAE**
**Tribe Cichorieae**
*Calycoseris*
*Lactuca*
*Malacothrix*
*Prenanthella*
*Rafinesquia*
*Sonchus*
*Stephanomeria*
*Uropappus*
**SUBFAMILY MUTISIOIDEAE**
**Tribe Mutisieae**
*Acourtia*
*Trixis*

## Key to the Genera

♦**1. Plants with milky sap**; all florets bisexual and ligulate, the ligules 5-lobed, similar in shape (inner florets often smaller), and strap-like or ray-like.

2. Pappus of lanceolate, papery scales, cleft at apex with the midrib extending into a slender bristle, the bristle not plumose…….... **Uropappus**
2. Pappus of slender feathery or thread-like (capillary) bristles (if expanded and scale-like at base, then the apex plumose).

3. Pappus bristles plumose.

4. Heads medium to large, the larger phyllaries (13) 17–22 mm long; ligules of larger (outer) florets usually 15–30 mm long; achenes tapering into a slender beak; pappus bristles (6) 9.5–14 mm long…….. **Rafinesquia**
4. Heads small, the phyllaries 6–10.5 mm long; ligules 6–12 mm long; achenes columnar (not tapering), ending abruptly (truncate); pappus bristles 2.2–8 mm long……. **Stephanomeria**

3. Pappus bristles thread-like (capillary), smooth to barbellate but not plumose.

5. Achenes beaked, the beak slender like a wire and about as long as, or longer than, body of achene…….... **Lactuca**
5. Achenes not beaked (sometimes narrowed to a neck but the neck not slender like a wire and much shorter than the achene body).

6. Achenes flattened, rounded at apex; stems leafy, at least below; leaf margins bristle-tipped or not……. **Sonchus**
6. Achenes cylindrical, truncate at apex; stem leaves absent, few, or much reduced; leaf margins not bristly.

7. Florets 3 or 4 per head, the phyllaries 4–5 mm long…….. **Prenanthella**
7. Florets 10 or more, the phyllaries more than 7 mm long.

8. Plants without tack-shaped hairs, the involucres and new growth moderately woolly; achenes 1.8–2.4 mm long, cylindrical (without a neck)…….. **Malacothrix**
8. Upper part of plants including involucres with conspicuous tack-shaped glands, otherwise glabrous or nearly so; achenes 7 mm long, narrowed to a slender neck just below pappus……. **Calycoseris**

**♦1. Sap not milky;** florets not strictly ligulate; heads with (1) ray and disk florets, the rays sterile or pistillate, usually 3-toothed or 3-lobed, or (2) disk or disk-like florets only, the corollas showy to reduced or lacking (florets sometimes enclosed in burs), or (3) bilabiate (2-lipped) florets only.

**⊙9. Vegetative parts (herbage and phyllaries) conspicuously resinous-glutinous**, sticky and aromatic (these plants also key out elsewhere).

10. Monoecious, male and female flower heads on the same plant, the florets of each flower head of a single sex, the female flowers enclosed in burs or nut-like structures……... **Ambrosia**
10. Dioecious, male and female flower heads on separate plants, or the flower heads with male and female or bisexual florets, flowers not in burs or nut-like structures.

11. Annuals (stems and leaves glandular-sticky, phyllaries mostly equal in length and glandular, flowers dull whitish, achenes 1 mm long;)}……..... **Laënnecia**
11. Herbaceous perennials or shrubs.

12. Leaves pinnately 2- or 3-times dissected nearly to the midrib……... **Hymenothrix**
12. Leaves with entire margins or sometimes lobed but not pinnately dissected.

13. Leaves filiform, terete or nearly so, not lobed, less than 2 mm wide.

14. Woody shrubs usually 1 m or more tall; flowers heads 1+ cm long, solitary and sessile at stem tips……. **Peucephyllum**
14. Small shrubs or subshrubs mostly 1 m or less tall; flower heads 4–6 mm long.

15. Flower heads 5–6 mm long; heads with 12–22 flowers; achenes 3.5–4 mm long. ……...**Ericameria laricifolia**
15. Flower heads 4–5 mm long; heads with 8–12 flowers; achenes 1.8–2 mm long. …….. **Gutierrezia sarothrae**

13. Leaves not filiform or terete, 2 mm or more wide, or if very narrow then at least some leaves toothed or lobed and the blades flattened or at least not terete.

16. Heads with small ray florets as well as disk florets; pappus none…… **Gymnosperma**
16. Heads of disk florets; pappus conspicuous.

17. Plants often 1–2+ m tall; male and female flowers on separate plants; flowers dull whitish……... **Baccharis**
17. Plants not more than 1 m tall; flowers bisexual and yellow……..... **Isocoma**

**⊙9. Vegetative parts not conspicuously resinous-glutinous and sticky**.

18. Heads of bilabiate florets only; achenes expanded at apex into a disk bearing numerous pappus bristles.

19. Perennial herbs; leaves usually 2 cm or more in width, often firm, spinescent-toothed, largely semi-persistent, often not losing their shape when dry; flowers lavender to pinkish. …… **Acourtia**
19. Small shrubs; leaves usually less than 1.5 (2) cm wide, thin and soft, not spinescent-toothed, shriveling when dry; flowers yellow…… **Trixis**

18. Heads with ray and disk florets, or only disk or disk-like florets, the florets not bilabiate; achenes various.

■**20. Heads of disk and ray florets,** the rays usually obvious (taxa with small, inconspicuous, or early-deciduous rays will key out in either choice).

21. Perennials (dwarf shrubs) with conspicuous white rays…….. **Zinnia**
21. Ephemerals or perennials, the rays not white, or if white then not perennials.

✪**22. Pappus none** (caution: refers to absence of pappus at top of achene; do not confuse hairs on side of achenes with the pappus).

23. Leaves opposite; ray white, minute, and numerous……..……..... **Eclipta**
23. Leaves alternate (sometimes opposite below in *Helianthus*).

24. Leaves essentially glabrous (minutely scabrous), usually resinous; stems slender and woody; heads 1.5 mm wide…….... **Gymnosperma**
24. Leaves hairy, not resinous; herbaceous or if slightly woody then stems not slender; heads more than 10 mm wide.

25. Larger leaves basal, near ground; rays persistent; achenes more or less cylindrical and ribbed……..... **Baileya**
25. Leaves terminal or along stems; rays not persistent; achenes flattened or 4-angled and not ribbed.

26. Weak-wooded shrubs; leaves mostly crowded (close together) at stem tips; herbage, especially stem tips, white woolly; achenes flattened, the margins outlined with white hairs; pappus absent……...……...… **Encelia farinosa**
26. Ephemerals or herbaceous perennials; leaves scattered along stems; achenes angular or only slightly compressed, the margins undifferentiated; pappus of 2 or more deciduous scales. ……..... **Helianthus**

✪**22. Pappus present**, at least on disk achenes.

27. Rays with (2) 3 (4) terminal teeth or lobes.

28. Most leaves with slender lobes (less than 1 mm wide); flower heads (receptacle) globose to conical…… **Hymenoxys**
28. Leaves not lobed or lobes more than 1 mm wide; flower heads (receptacle) not globose or conical.

29. Plants stinky; leaves grayish, opposite below, alternate above, larger leaves with stipule-like leafy appendages near the petiole base; disk achenes enclosed in chaffy bracts; pappus none on ray achenes, of 1 or 2 short awns on disk achenes……....**Verbesina**

29. Plants not stinky; leaves green or grayish, alternate, without stipule-like appendages; achenes not enclosed in chaffy bracts; pappus of scales.

30. Leaves green, disk achenes not enclosed in chaffy bracts; rays not persistent …… **Gaillardia**
30. Leaves grayish (plants densely white-hairy); rays persistent..... **Psilostrophe**

27. Rays entire, not cleft into lobes.

31. Rays white, pink, or lavender (not yellow); disk yellow.

32. Rays white or pink (mostly cool-season ephemerals).

33. Rays white.

34. Plants glabrous.

35. Plants (especially leaves and phyllaries) with dark-colored, oval or round oil glands…….. **Thymophylla concinna**
35. Plants without oil glands.

36. Leaves 1–2 mm wide; achenes densely hairy throughout, and with bulbous-tipped hairs……. **Gutierrezia arizonica**
36. Plants essentially glabrous; leaves more than 10 mm wide; achenes with hairs at margins and not bulbous tipped…… **Perityle emoryi**

34. Plants pubescent.

37. Plants white-woolly; leaves linear to narrowly oblanceolate, entire. ……..…… **Eriophyllum**
37. Plants green, with scattered short hairs; leaf blades palmately toothed to lobed……..……... **Perityle emoryi**

33. Rays pink

38. Leaves 0.7–3.5 mm long; rays curling (rolling) in with age; achenes 1.5 mm long, with straight hairs; pappus of golden-brown scales and bristles, not barbed. ……..…. **Monoptilon**
38. Leaves 1–2 cm long; rays remaining straight (not rolling); achenes 2–3 mm long, with knob-tipped hairs; pappus bristles white and barbed…… **Townsendia**

32. Rays lavender or purple.

39. Plants dotted with conspicuous oil glands; leaves opposite; florets purplish and inconspicuous; rare in the flora area……..….. **Pectis linifolia**
39. Plants without oil glands; leaves basal or alternate; not rare.

40. Larger leaves petioled; rays more than 80…..……..….. **Erigeron lobatus**
40. Leaves petioled or sessile; rays fewer than 40.

41. Leaves petioled or sessile; rays 8–16; disk achenes covered with white hairs…… **Machaeranthera**
41. Leaves petioled or sessile; rays 20 or more.

42. Leaves sessile; rays more than 30; ray and disk achenes with a pappus of many bristles…….. **Dieteria**
42. Leaves sessile or larger ones petioled; rays 20–35+; ray achenes without a pappus……..**..... Leucosyris arida**

31. Ray and disk florets/corollas yellow.

43. Plants dotted with conspicuous oil glands; glabrous or essentially so.

44. Leaves opposite; entire except marginal bristles near leaf base……..……. **Pectis**
44. Leaves opposite or alternate; pinnately lobed; without marginal bristles.

45. Leaves mostly alternate; leaf segments needle-like; phyllaries separate (at least with age); rays yellow-orange…….. **Adenophyllum**
45. Leaves mostly opposite (upper ones may be alternate); leaf segments not sharp-pointed; inner phyllaries united most of their length; rays yellow.
…….**..... Thymophylla pentachaeta**

43. Plants without oil glands; mostly pubescent and often glandular-pubescent.
.

46. Heads medium-size to large, usually (2) 3–5 cm wide including rays; receptacles with chaffy bracts subtending and partly enclosing disk florets.

47. Phyllaries margins conspicuously ciliate with long white hairs; winter-spring ephemerals……..…… **Geraea**
47. Phyllaries not ciliate; non-seasonal ephemerals or shrubs.

48. Much-branched subshrubs or shrubs; heads including rays not more than 3.5 cm wide; phyllaries not leafy, 5 × 1.5–2 mm; rays 1.2–1.5 cm long.
**..... Bahiopsis**
48. Few-branched herbaceous perennials or rarely ephemerals; heads including rays (3.5) 4–9 cm wide; phyllaries leaf-like, 8–10 × 1.8–3.5 mm; rays mostly 2–3 cm long.……. **Helianthus**

46. Heads small to medium-size, mostly less than 2.5 cm wide; receptacles without chaffy bracts (disk florets not subtended by bracts).

49. Pappus of many, slender and soft (capillary) white bristles.

50. Terminal leaf lobe much broader and larger than the lateral lobes; calyculus inconspicuous or absent……**.... Packera**
50. Leaves simple or with slender lobes, the terminal lobe not larger than lateral lobes; phyllaries equal, and with an outer series of smaller, accessory bracts (the calyculus)…….... **Senecio**

49. Pappus various, not of many, soft, slender, white bristles.

51. Plants densely white-hairy; rays persistent……..... **Psilostrophe**
51. Plants not densely white-hairy; rays not persistent.

52. Herbage glutinous, glandular punctate with dot-like glands the same color as the herbage; flower heads 4–5 mm wide, in dense clusters. …….. **Gutierrezia sarothrae**
52. Herbage not glutinous and not glandular punctate; flowers heads 1.5–3.5 cm wide, solitary or few on a stem…… **Xanthisma**

■**20. Heads of disk florets only**, outer florets without an obvious ligule or ray, or if ray florets present then disk-like (inconspicuous or reduced, or lacking a well-developed ligule—eligulate; if in doubt about presence of rays then take this choice).

53. Heads unisexual; female florets enclosed in a bur or woody, winged involucre or nut-like structure…… **Ambrosia**
53. Heads not unisexual (or some heads of *Dicoria* with male flowers only); female florets not enclosed in burs or as above.

54. Ephemerals or perhaps biennials (*Cirsium*); plants thistles or somewhat thistle-like, the heads and leaves spinescent (rarely not spiny in some cultivars of *Carthamus*).

55. Stems shiny white, not winged; pappus none…… **Carthamus**
55. Stems green and not shiny, winged with decurrent leaf bases; pappus bristles well developed.

56. Plants commonly more than 1 m tall; lower leaves mostly 20–40 cm long; flower heads more than 3.5 cm wide, the flowers pale lavender…… **Cirsium**
56. Plants generally less than 0.6 m tall (to 1 m when shaded and well watered); lower leaves 5–15 cm long; heads 2.5–2.8 cm wide, the flowers bright yellow…… **Centaurea**

54. Ephemerals or perennials; heads and leaves not spinescent; plants not thistle-like.

❖**57**. **Plants tomentose, white-woolly**.

58. Herbaceous perennials; leaves bicolored (greener above), and especially the lower leaves with a few large lobes……. **Artemisia ludoviciana**
58. Ephemeral or herbaceous perennials; leaves similar (or nearly so) in color on both surfaces, entire or lobed.

59. Stems thick; leaves obviously petioled, the blades as wide as or wider than long, thick, and with conspicuously incised veins…….... **Psathyrotes**
59. Stems not noticeably thick; leaves sessile or the petioles inconspicuous, short, or winged, the blades longer than wide, not noticeably thick, the veins inconspicuous.

60. Leaves coarsely toothed; individual flowers small but readily visible, bright yellow; achenes more than 2 mm long…….. **Trichoptilium**
60. Leaves entire; individual flowers minute, inconspicuous and dull-colored; achenes 1 mm or less in length.

61. Herbaceous perennials also flowering in first season, mostly more than (15) 20 cm tall. …… **Pseudognaphalium**

61. Small cool-season ephemerals, usually less than 15 (20) cm tall ("fuzzy little comps").

62. Pappus none……. **Diaperia**
62. Pappus present.

63. Majority of bracts on flower head not directly associated with florets; all florets with a pappus; wet soil at waterholes…….. **Gamochaeta**
63. Majority of bracts on head partially or completely enclosing a floret; outer florets without a pappus; widespread, desert habitats and dry watercourses.

64. Inner florets all bisexual, the achenes usually developing and with copious pappus (averaging more than 12 bristles per floret); receptacle often flat-topped ……**.....**…… **Logfia**
64. Inner florets all staminate, the achenes not developing and their pappus none or vestigial; receptacle often conical or cylindrical……**..... Stylocline**

❖**57. Plants glabrous or hairy but not woolly**.

65. Tall annuals or weakly-wooded shrubs; outer or all florets subtended by chaffy bracts of the receptacle, the bracts folded around the achenes and falling with them.

66. Annuals; pappus none.

67. Plants not notably tall, less than 1 m tall; leaves 3–6 cm long, opposite below, alternate above**..... Dicoria**
67. Tall annuals, mostly more than 1 m tall; leaves more than 10 cm long, all alternate. …… **Parthenice**

66. Perennial subshrubs; pappus present.

68. Leaves alternate; achenes 7–10 mm long, the margins with long white hairs; pappus none. …… **Encelia frutescens**
68. Leaves opposite, or the upper ones alternate; achenes 2–4 mm long, the margins ciliate or not but not with long white hairs; pappus present.

69. Achenes 2.8–4 mm long, the margins ciliate; pappus of lacerate and aristate scales, not plumose……... **Bahiopsis**
69. Achenes 2.3–3 mm long; pappus of plumose (feathery) bristles…….. **Bebbia**

65. Annuals, herbaceous perennials, or shrubs; receptacle naked, without chaffy bracts.

70. Plants glaucous, the herbage bluish green.

71. Plants rhizomatous; not aromatic, lacking oil glands; flowers bright yellow. …….. **Leucosyris carnosa**
71. Plants not rhizomatous; pungently aromatic, the leaves and bracts with conspicuous, elongated oil glands; flowers whitish to pinkish…….. **Porophyllum**

70. Plants not glaucous, the herbage not bluish green.

**★72. Ephemerals or annuals** (borderline cases key out in both couplets**)**

73. Spring ephemerals; leaves 1–3-times pinnatisect (pinnately divided to midrib).

74. Flower heads 10–17 mm long and longer than wide; phyllaries 5–10 mm long; flowers white to pale pinkish; pappus of papery scales…… **Chaenactis**
74. Flower heads 5–8 mm long, globose; phyllaries 3 mm long; flowers bright yellow; pappus of a minute crown…….. **Oncosiphon**

73. Ephemerals or perennials; leaves entire or margins lobed or parted halfway or less to midrib.

75. Leaf surfaces mostly grayish or grayish green with coarse, grayish or white hairs; achenes at least 4 mm long…….. **Palafoxia**
75. Leaf surfaces usually green; glabrous or the hairs not as in *Palafoxia*; achenes 3.2 mm or less in length.

76. Leaves opposite (plants flowering in first year)…….. **Ageratina**
76. Leaves alternate.

77. Delicate spring ephemerals; leaves very thin, the lower surfaces usually purple; flowers yellow; phyllaries 6–7.5 mm long; achenes 2.8–3.2 mm long; pappus of numerous soft bristles…….. **Senecio mohavensis**
77. Ephemerals/annuals, summer or non-seasonal, mostly robust and not delicate; leaves not noticeably thin and not purplish; flowers white, lavender or greenish; phyllaries 2.5–5.5 mm long; achenes 0.8–1.3 mm long.

78. Ephemerals; phyllaries 2.5–3.5 mm long; flowers whitish; weeds mostly in disturbed habitats……..…… **Erigeron canadensis**
78. Annuals (sometimes surviving more than one year); longer phyllaries 4–5.5 mm; phyllaries and flowers rose-lavender; mostly natural, wetland habitats (Quitobaquito). …….. **Pluchea odorata**

**★72. Shrubs or subshrubs (**or dwarf shrubs or subshrubs), the vegetative parts usually present all year.

79. Achenes without a pappus…… **Artemisia dracunculus**
79. Achenes with pappus.

80. Leaves petioled, junction of blade and petiole abrupt and well marked, the petiole usually more than ⅓ as long as blade (at least among the lower leaves); or if the petiole shorter, then the blade spinose-toothed (*Brickellia atractyloides*) or broadly spatulate (*Ericameria cuneata*).

81. Leaf blades broadly spatulate…….. **Ericameria cuneata**
81. Leaf blades not broadly spatulate.

82. Pappus bristles of two kinds: broadly membranous-margined bristles and slender, barbellate bristles……. **Pleurocoronis**
82. Pappus bristles uniform, slender (capillary), and not barbellate, the margins not differentiated, or pappus none.

83. Flower heads 4–6 mm long; achenes 1–2 mm long.

84. Heads pedicelled, with 10–30 florets; achenes 1.1–1.3 mm long…….. **Ageratina**
84. Individual heads sessile or subsessile or sometimes short-pedicelled (mostly with several heads crowded in small clusters), with 3–6 florets; achenes (1.5) 2 mm long. ……..…... **Koanophyllon**

83. Flower heads 8–15+ mm long; achenes 3–4 mm long.

85. Flower heads 10–15+ mm long; phyllaries striated; flowers pale yellowish or purplish; achenes prismatic, covered with short brownish hairs, the pappus of many white (capillary) bristles…….……... **Brickellia**
85. Flower heads 8–10 mm long; phyllaries not striated; flowers yellow-orange; achenes flattened, the body blackish at maturity with thickened yellowish-white margins, the pappus none or with 1 or 2 slender awns…….. **Perityle ajoensis**

80. Leaves sessile or the blade gradually narrowed to an indistinct petiole less than 1/6 length of leaf, the blade entire to toothed but not spinose.

86. Leaves widest towards the tip (oblanceolate)…….. **Acamptopappus**
86. Leaves linear to narrowly elliptic or lanceolate, widest near the middle.

87. Flower heads 10–15 mm long.

88. Leaves conspicuously resinous and densely crowded at stems tips like a miniature fir-tree (internodes scarcely discernable); heads sessile, mostly solitary at stem tips; phyllaries not conspicuously graduated (similar in size in an inner series, plus an outer series of few, narrower and sometimes shorter phyllaries); flowers bright yellow……... **Peucephyllum**
88. Leaves not resinous (or not conspicuously so), not crowded, the internodes apparent; flower heads stalked; phyllaries conspicuously graduated (imbricated); flowers whitish to lavender or pale yellow.

89. Herbage minutely pubescent but not glandular; leaves essentially sessile; achenes 3.5 mm long…… **Brickellia frutescens**
89. Herbage densely pubescent with stalked glandular hairs; leaves with a long, slender petiole and an arrow-shaped blade sometimes greatly reduced and indistinct; achenes 2.5–3 mm long……. **Pleurocoronis pluriseta**

87. Flower heads 4–8 mm long.

90. Flower heads 6–8 mm long; phyllary margins fringed; flowers yellow; achenes 2.3–4 mm long.

91. Phyllaries with a prominent resin pocket; achenes 2.3–2.5 mm long. …….. **Acamptopappus**
91. Phyllaries lacking a resin pocket; achenes 3–4 mm long……... **Koanophyllon**

90. Flower heads 4–7 mm long; flowers whitish to pinkish; phyllary margins not thin and fringed; achenes 1–1.7 mm long.

92. Herbage yellow-green to dull green, essentially glabrous or with short, inconspicuous hairs; flower heads unisexual (male and female flowers on separate plants); flowers whitish……. **Baccharis**
92. Herbage densely silvery hairy; heads with both male and female florets; flowers pinkish…… **Pluchea sericea**


Figure 2. (A) *Acourtia nana*, Highway Tank, between Ajo and Why, 13 May 2015. (B) *Acourtia wrightii*, Ajo Scenic Loop, Little Ajo Mts, 17 May 2015. (C) *Ambrosia ambrosioides*, Estes Canyon, 17 May 2015. (D) *Ambrosia confertiflora*, near N end of Ajo Mountain Drive, 17 May 2015. (E) *Ambrosia cordifolia*, Estes Canyon, 17 May 2015. (F) *Ambrosia deltoidea*, Ajo, 12 May 2015. (G) *Ambrosia dumosa*, Ajo, 12 May 2015. (H) *Bahiopsis parishii*, foothills of Diablo Mts, Ajo Mountain Drive, 17 May 2015. (I) *Baileya multiradiata*, Ajo Cemetery, 13 May 2015.


Figure 3. (A) *Bebbia juncea* Estes Canyon, 17 May 2015. (B) *Brickellia coulteri*, Diablo Mts on Ajo Mountain Drive, 17 May 2015. (C) *Centaurea melitensis*, Ajo Way and Sandario Road, 16 Apr 2015. (D) *Chaenactis stevioides*, Ajo, 13 May 2015. (E) *Encelia farinosa*, Ajo, 12 May 2015. (F) *Encelia frutescens*, Ajo, 12 May. (G) *Geraea canescens*, El Huerfano, Sonora, 18 May 2015. (H) *Gutierrezia arizonica*, valley E of Childs Mt, 12 May 2015. (I) *Helianthus niveus*, dunes 25 mi S of Sonoyta on Mex Hwy 8, 18 May 2015.


Figure 4. (A) *Hymenothrix wislizeni*, wash crossing Hwy 85, E of Why at mile 68, 18 May 2015. (B) *Isocoma acradenia*, Quitobaquito, 28 May 2015. (C) *Lactuca serriola*, Ajo, 12 May 2015. (D) *Laënnecia coulteri*, valley E of Childs Mt, 12 May 2015. (E) *Leucosyris arida*, floodplain of Rio Sonoyta near El Huerfano, Sonora, 18 May 2015. (F) *Leucosyris carnosa*, Quitobaquito, 28 May 2015. (G) *Palafoxia arida*, dunes 25 mi S of Sonoyta on Mex Hwy 8, 18 May 2015. (H) *Parthenice mollis*, Estes Wash, 30 Sep 2014. (I) *Perityle emoryi*, Aguajita, 18 May 2015.


Figure 5. (A) *Pluchea sericea*, Aguajita Wash near international boundary, 18 May 2015. (B) *Porophyllum gracile*, foothills of Diablo Mts, N end of Ajo Mountain Drive, 30 Sep 2014. (C) *Psilostrophe cooperi*, Ajo, 12 May 2015. (D) *Rafinesquia neomexicana*, roadside ditch on Hwy 86 mile 62, 5 Apr 2015. (E) *Sonchus asper*, Alamo, 4 Apr 2015. (F) *Sonchus oleraceus*, Ajo Community Garden, 23 Mar 2015. (G) *Stephanomeria exigua*, Hwy 86, mile 125, 16 Apr 2015. (H) *Stephanomeria pauciflora*, Ajo, 13 May 2015. (I) *Stylocline micropoides*, Hwy 86, mile 62, 5 Apr 2015. (J) *Thymophylla pentachaeta*, Ajo, 13 May 2015. (K) *Trichoptilium incisum*, granite foothills of western Puerto Blanco Mts, 5 Mar 2015. (L) *Trixis californica*, Ajo Scenic Loop, Little Ajo Mts, 13 May 2015. (M) *Uropappus lindleyi*, 4 Apr 2015. (N) *Xanthisma spinulosum*, Ajo, 12 May 2015. (O) *Xanthisma gracile*, Kitt Peak Road, 23 May 2015.

**Acamptopappus**

Mojave and Sonoran deserts; 2 species. Astereae.

**Acamptopappus sphaerocephalus** (Harvey & A. Gray) A. Gray var. **sphaerocephalus**
Rayless goldenhead. Figure 6.

Small shrubs, moderately glutinous and glabrous except the leaf margins. Leaves alternate, 0.5–2 cm long, narrowly lanceolate or narrowly obovate or spatulate, the margins entire or ciliate with short, thick white hairs. Flower heads rounded, 6–8 mm wide, of yellow disk florets; phyllaries as broad as long, with a prominent resin pocket, the margins broadly membranous and fringed. Achenes 2.3–2.5 mm long, obconic, and densely covered with white hairs; pappus of white, moderately flattened and persistent bristles. Flowering at least in April and early May.

Gravelly flats and slopes; apparently rare in the Ajo Mountains, where it has been documented three times but not since 1942. Is it still present in the flora area?

Variety *sphaerocephalus* occurs in Arizona, mostly east and north of the flora area, and is documented in mountains in Yuma County. Also California, Nevada, and Utah. Another taxon, var. *hirtellus* S.F. Blake, in California and Nevada and perhaps Arizona, is distinguished by pubescence.

**OP**: Ajo Mts, *Taylor & Vorhies 18 Apr 1924*. Walls Well, *Nichol 28 Apr 1939*. Alamo Canyon, 2000 ft, *Tinkham 18 Apr 1942*.

Figure 6. *Acamptopappus sphaerocephalus* var. *sphaerocephalus*. Big Water, Kane Co., Utah, 18 May 2014, photos by Max Licher.

**Acourtia**

Herbaceous perennials. Leaves spinescent-toothed. Phyllaries firm, in 2–4 rows. Florets bilabiate (2-lipped and ray-like), all alike, and bisexual. Achenes elongated (linear-cylindrical to fusiform), often glandular, apex often expanded into a disk bearing a pappus of numerous barbellate bristles.

Southwestern U.S. to Central America; 41 species. A genus segregated from *Perezia*. Molecular evidence indicates *Acourtia* is most closely related to *Trixis* and not to *Perezia* (Kim et al. 2002), a genus now restricted to South America. Mutisieae.

1. Plants usually less than 20 cm tall; leaves rounded, about as wide as long; flower heads solitary at branch tips…… **Acourtia nana**
1. Plants usually more than 40 cm tall; leaves ovate, longer than wide; flower heads numerous, in panicles…….... **Acourtia wrightii**

**Acourtia nana** (A. Gray) Reveal & R.M. King
[*Perezia nana* A. Gray]
Desert holly. Figure 7.

Small herbaceous perennials from knotty, rhizomatous rootstocks, and often with tufts of brownish hairs at the lowermost and usually buried nodes. Stems mostly to 20 cm or less. Leaves mostly 2–6 per stem and held upright, sessile, more or less orbicular, firm and holly-like, 1–5 cm long, with coarse spinescent teeth, and semi-persistent even when dry. Flower heads solitary at stem tips, pinkish and attractively scented. Phyllaries in 4 rows (appearing graduated), green and often reddish tipped, the larger phyllaries to 12 mm long. Achenes 5–7 mm long, slender and cylindrical; pappus of many capillary white bristles 11–17 mm long. Flowering April to May with sufficient rains.

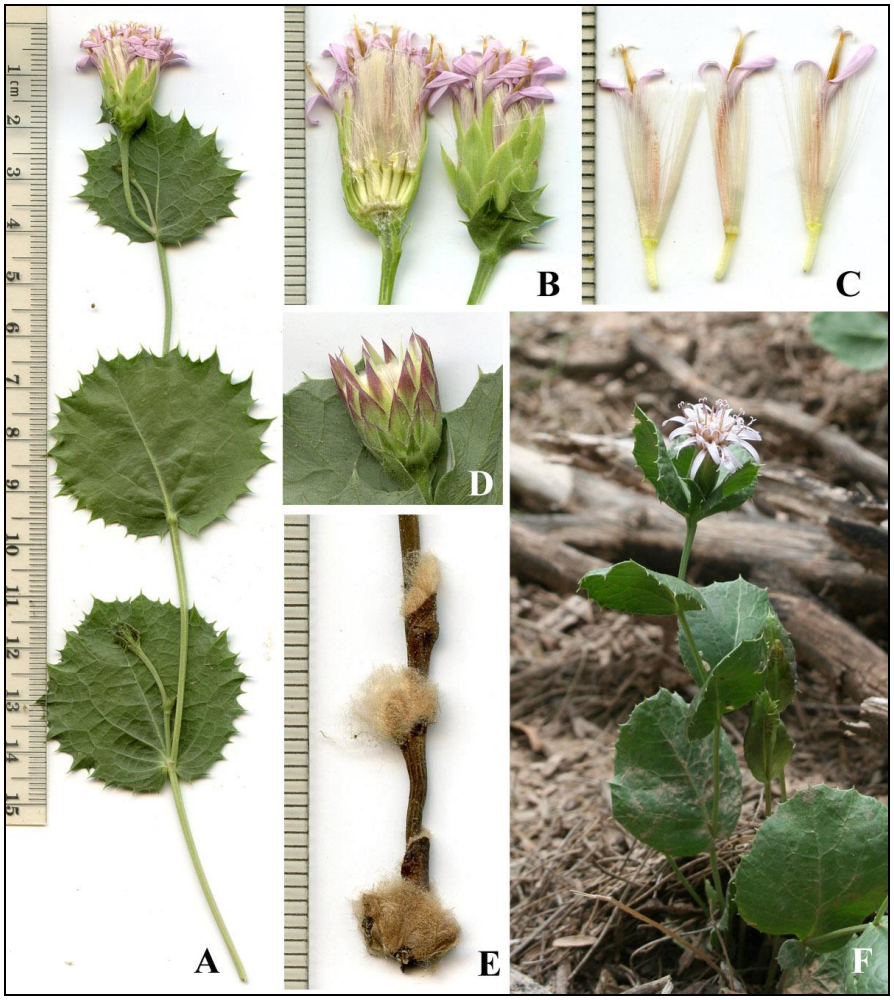


Figure 7. *Acourtia nana*. Highway Tank, S of Hwy 85 between Why and Ajo: (A–C) 8 Aug 2014; (E) 31 Jul 2014. Beneath *Prosopis velutina*, ditch to S of Hwy 86, mile 62, east of Why: (D) 1 Aug 2014; (F) 16 Aug 2006.

Localized in widely scattered places in Organ Pipe, often beneath shrubs and desert trees such as mesquites and *Condalia* in valley bottoms, lower bajadas, and washes. Common in the Valley of the Ajo near Cherioni Wash where it can be found under nearly every tree.

Arizona to Texas and northern Mexico; deserts and especially in mesquite grassland.

**OP**: Headquarters, *Supernaugh 1 May 1948* (ORPI). Cuerda de Leña Wash at N boundary, 13 Sep 1978, *Bowers 1537* (ORPI). Estes Canyon (Bowers 1980). Valley of the Ajo, sandy loam flat, 7 Oct 2006, *Rutman 2006-1007-1*.

**Acourtia wrightii** (A. Gray) Reveal & R.M. King
[*Perezia wrightii* A. Gray]
Brown-foot. Figure 8.

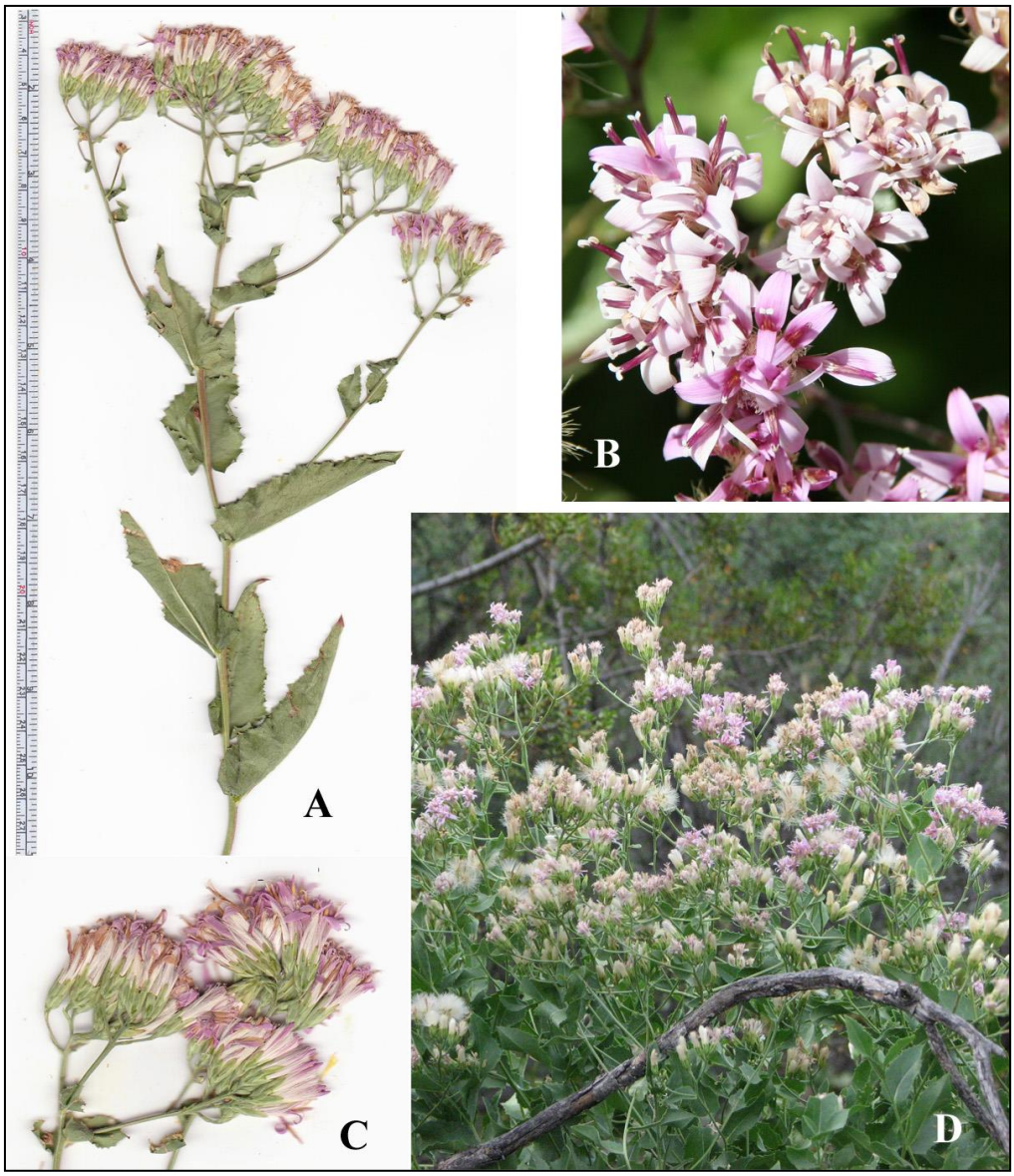


Figure 8. *Acourtia wrightii*. (A & C) Alamo Canyon, 21 May 2010. (B) Estes Canyon, 18 Mar 2005. (D) Riparian area south of the mine pit, Little Ajo Mts, 29 Sep 2007.

Herbaceous perennials with leafy stems sometimes to 1 m tall from hard, knotty bases with brown wool. Leaves mostly 8–12.5 × 3–5.5 cm, glandular-sticky, sessile, ovate to lanceolate, coarsely and irregularly toothed, the bases clasping the stem. Inflorescences branched with many-headed clusters of lavender-pink flowers. Phyllaries in 2 or 3 rows, thin, green to pink-tinged, the margins often membranous-ciliate, the larger phyllaries 6.5–7.5 mm long. Achenes 5.5–6.5 mm long, densely glandular; pappus of many white capillary bristles 7.5–9.5 mm long. Flowering mostly March and April and September–November.

Along small to large washes and canyons, and on rocky slopes. Eastern portion of Cabeza Prieta and scattered across Organ Pipe (except the southwestern margin) but most common in the eastern portion of the Monument and especially in larger mountains.

Central Mexico to southwestern United States but not in California.

**OP**: Alamo Canyon, *Nichol 4 May 1939*. N border of Monument, 11 Sep 1943, *Clark 10983* (ORPI, UNM). Bull Pasture Trail, 9 May 1979, *Bowers 1702*. Puerto Blanco Drive near milepost 3, *Beale 28 Mar 1988* (ORPI). Growler Wash, *Wirt 13 Oct 1988* (ORPI).

**CP**: Heart Tank, *Monson 10 Sep 1959* (CAB). 2 mi W of Little Tule Well on Charlie Bell Road, 18 Aug 1992, *Felger 92-652*. Charlie Bell Road 0.4 mi W of E Refuge boundary, 9 Apr 1993, *Felger 93-306*.

**Adenophyllum**

Southwestern United States to Central America; 10 species. A genus segregated from *Dyssodia*. Astereae, Pectidinae.

**Adenophyllum porophylloides** (A. Gray) Strother
[*Dyssodia porophylloides* A. Gray]
Dogweed. Figure 9.

Herbaceous or suffrutescent perennials, pungently aromatic with conspicuous maroon oil glands. Branches opposite below, usually alternate above, the foliage sparse. Leaves mostly alternate, the lower ones reaching 3+ cm long, pinnately 3–5 lobed, the lobes slender and with coarsely toothed margins; upper leaves often entire. Flower heads mostly 2 cm long. Phyllaries distinct to their bases, equal in length, plus a ring of reduced basal accessary bracts; phyllaries with conspicuous maroon oil glands. Disk florets yellow with reddish purple tips, the rays yellow-orange; flowering March and April, and sometimes October to December. Achenes 5 mm long, obconic, blackish; pappus of whitish to tan bristle-bearing scales.

Small arroyos, desert pavements, and rocky slopes in hills and mountains; widely scattered in Organ Pipe and occasional in canyons and arroyos in mountains in Cabeza Prieta. Sometimes forming large, localized populations.

Deserts in Arizona, California, Nevada, both Baja California states, Chihuahua, and Sonora.

**OP**: Senita Basin, 23 Mar 1969, *Lehto 15408* (ASU). Alamo Canyon: 2260 ft, 3 Dec 1977, *Bowers 967*; 2748 ft, 15 Mar 2003, *Rutman 2003-324* (ORPI). N of Visitor Center, 16 Apr 1985, *Van Devender 85-109*. 2.4 mi W of Hwy 85 on Puerto Blanco Road, 6 Apr 1988, *Felger 88-264*. Quitobaquito, 14 Sep 1988, *Felger 88-447*. Puerto Blanco Mts, Red Tanks Wash, 21 Sep 2013, *Rutman 20130921-5*.

**CP**: Agua Dulce Pass, 14 Sep 1992, *Felger 92-735*. Observations: Sheep Mt, N side, mid-elevations to peak, 31 Jan 1992, *Felger*; Cabeza Prieta Tanks, 15 Jun 1992, *Felger*. About ½ mi W of Chico Sunie Well, in drainage, 2 Feb 2003, *Rutman 2003-7*. Valley E of Growler Mts, Pozo Salado, 27 Feb 2007, *Fishbein 5497*.

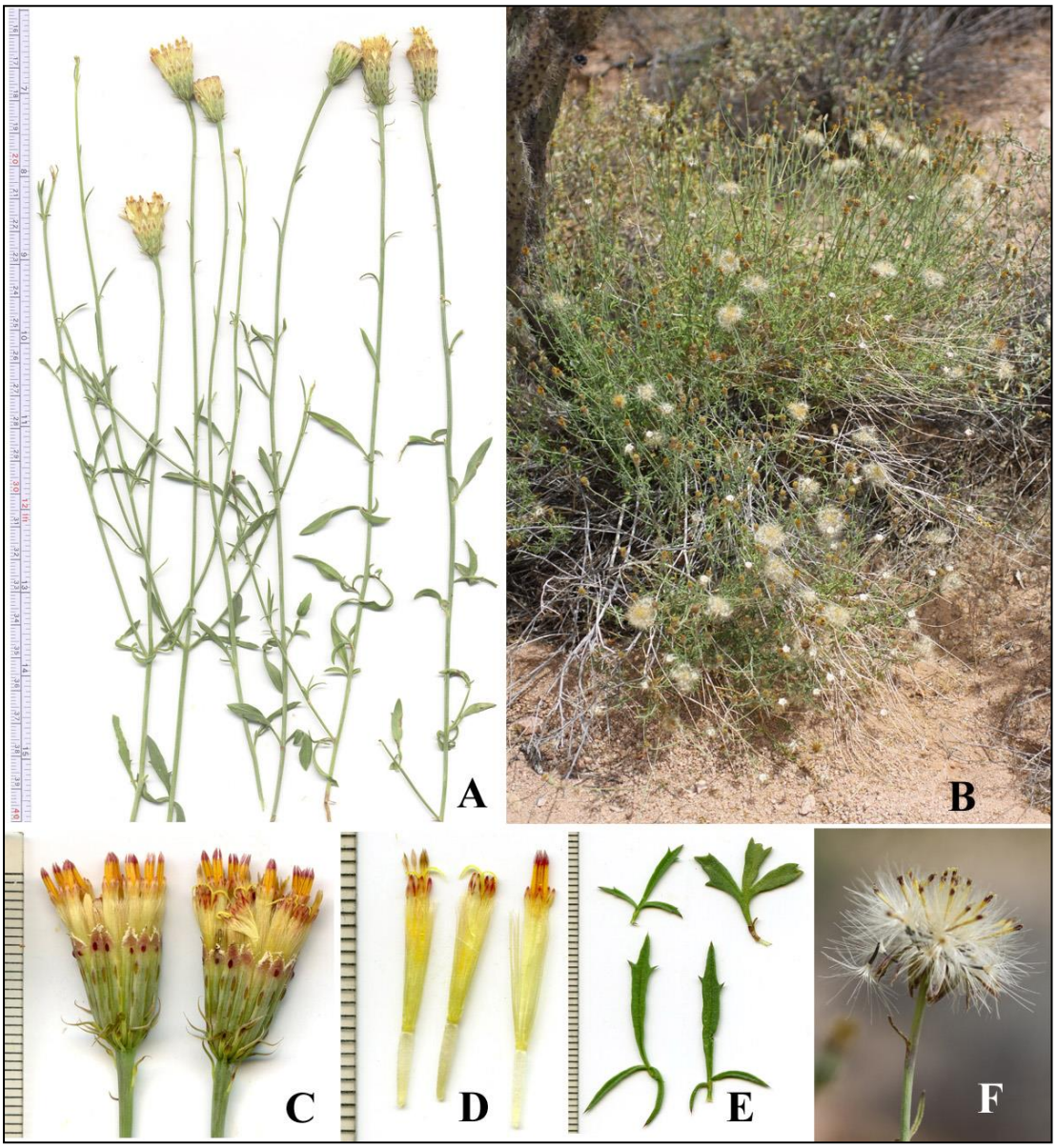


Figure 9. *Adenophyllum porophylloides*. Ajo Scenic Loop, Little Ajo Mts: (A & D) 2 Oct 2013; (C & E) 23 May 2010. (B & F) Senita Basin, 10 May 2010.

**Ageratina**

North America to South America; 250 species. A genus segregated from *Eupatorium*. Eupatorieae.

**Ageratina paupercula** (A. Gray) R.M. King & H. Robinson
[*Eupatorium pauperculum* A. Gray]
Santa Rita snakeroot. Figure 10.

Herbaceous perennials to 40 cm tall from hard, knotty bases, sometimes reproductive in the first year or season. Leaves opposite, 4–9 cm long, petiolate, the blades thin, lanceolate, and with toothed margins. Flowers heads small (ca. 5–6 mm long), rather inconspicuous, numerous in dense clusters, and with disk florets only; flowers dull white; spring months with sufficient soil moisture,

especially March and April. Achenes 6–7 mm long, 5-ribbed, black, and glabrous; pappus of minutely barbed bristles.

Known from the Ajo Mountains by a single record. Members of this genus do not extend closer to the Sonoran Desert. The nearest population is in the Baboquivari Mountains.

Western Mexico northward in the Sierra Madre Occidental to mountains in southern and east-central Arizona. In addition to the key features, the leaves are more herbaceous or "softer" than those of *Koanophyllon palmeri*, with which it might be confused.

**OP**: Main canyon N of Alamo Canyon, under oaks, 3800 ft, 31 Mar 1948, *Darrow & Gould 4686*.


Figure 10. *Ageratina paupercula*. (A) Hartwell Canyon, NW of Sedona, Coconino Co., 21 May 2007, photo by Max Licher (SEINet). (B) Esperero Canyon, Santa Catalina Mts, 27 Mar 2010, photo by Ries Lindley (SEINet).

**Ambrosia** – Bursage, ragweed
[*Franseria*, *Hymenoclea*]

Perennial herbs or shrubs; with sessile or stalked glands. Leaves mostly alternate. Inflorescences spicate to racemose, the heads unisexual with inconspicuous disk florets, wind-pollinated, pappus none, the staminate heads above pistillate heads (or intermixed in *A. dumosa*, *A. monogyra*, and *A. salsola*). Staminate heads with cup- or plate-shaped involucres; the flowers producing large quantities of hay fever–causing pollen; stamens with connate filaments, the anthers separate or weakly joined, corollas inconspicuous. Pistillate heads with 1 to several florets and beaks, each beak representing a floret, the fruiting involucral bracts (phyllaries) hard and developing into a spinescent or bracteate bur or nut-like structure (measurements for burs include the spines), each spine or bract (wing) representing the distal portion of a phyllary; corollas absent. Seeds germinate within the bur.

Mostly in North America, some in Central and South America, some adventive in the Old World; 40 species. Heliantheae, Ambrosiinae.

1. Leaves and leaf segments filiform (thread-like), less than 2 mm wide; burs with flat wings narrowed basally.

2. Shrubs generally taller than wide, the stems erect; wings of fruiting bracts longer than wide; flowering in fall…….. **Ambrosia monogyra**
2. Shrubs about as tall as wide, globose, the stems often spreading; wings of fruiting bracts about as wide as long; flowering in spring……. **Ambrosia salsola**

1. Leaves and leaf segments not filiform, more than 4 mm wide; burs with straight or hooked spines widest at base.

3. Leaves pinnately to tri-pinnately deeply dissected.

4. Herbaceous perennials, the stems dying back to the ground.
…… **Ambrosia confertiflora**
4. Small shrubs, the stems perennial and woody at least at the base…….. **Ambrosia dumosa**

3. Leaf margins variously lobed, ragged, toothed, or rarely nearly entire, but not deeply dissected.

5. Leaves sessile and firm, with spine-tipped teeth…… **Ambrosia ilicifolia**
5. Leaves petioled, the blades "soft" and flexible (except some drought-stressed leaves), marginal teeth, if present, not spine-tipped.

6. Leaf blades broadly ovate and cordate at base, about as wide as long… **Ambrosia cordifolia**
6. Leaf blades lanceolate to narrowly triangular-lanceolate, longer than wide.

7. Long-stemmed shrubs, usually to 1+ m tall; leaf blades mostly 10 or more cm long; burs with hooked spines……. **Ambrosia ambrosioides**
7. Shrubs usually less than 0.8 m tall; leaf blades less than 6 cm long; spines of burs straight (rarely with a few hooked spines near the tip)…….. **Ambrosia deltoidea**

**Ambrosia ambrosioides** (Cavanilles) W.W. Payne
[*Franseria ambrosioides* Cavanilles]
Canyon ragweed; *chicura*; ñuñuvĭ jej. Figure 11.

Shrubs with slender stems often to 1+ m tall. Herbage viscid resinous-glandular (especially when young), and with coarse, mostly spreading, white hairs. Leaves mostly alternate. Petioles 2–4 cm long; leaf blades triangular-lanceolate, often 10–25 cm long, glandular, often studded with small insect galls, the leaf margins ragged-toothed. Tardily drought deciduous, the dry, dead leaves persisting for 1 or 2 seasons; leaves and young stems sometimes frost killed, but the plants quickly recover. Burs resembling a cocklebur (*Xanthium*), 15 mm long, ellipsoid, with hooked spines and sessile and stalked greenish-golden, glistening glands (visible with 10× magnification). Growing with warm weather. Flowering March–May; fruiting in the same season.

Widespread across the flora area; common on floodplains and scour zones of drainages beneath or near desert trees such as ironwood, mesquite, and palo verde. Plants often top-killed by scouring floods, but rapidly recovering.

Northwestern Mexico and southern half of Arizona, and uncommon and probably not native in southern California (see Felger 2000) where it is actively spreading in some places.

The O'odham at Quitobaquito used this plant as a remedy for arthritis: "Make a bed of coals on cleared earth, scrape off coals, put down a layer of this ragweed, then lay the patient over the heated ragweed, and cover the patient with a blanket; it is like a dryland sweat lodge" (Philip Salcido & Delores Lewis in Felger et al. 1992: 17). Local Mexican people chew the leaves to relieve sinus congestion caused by allergic reactions, and this practice has passed into the Anglo community.

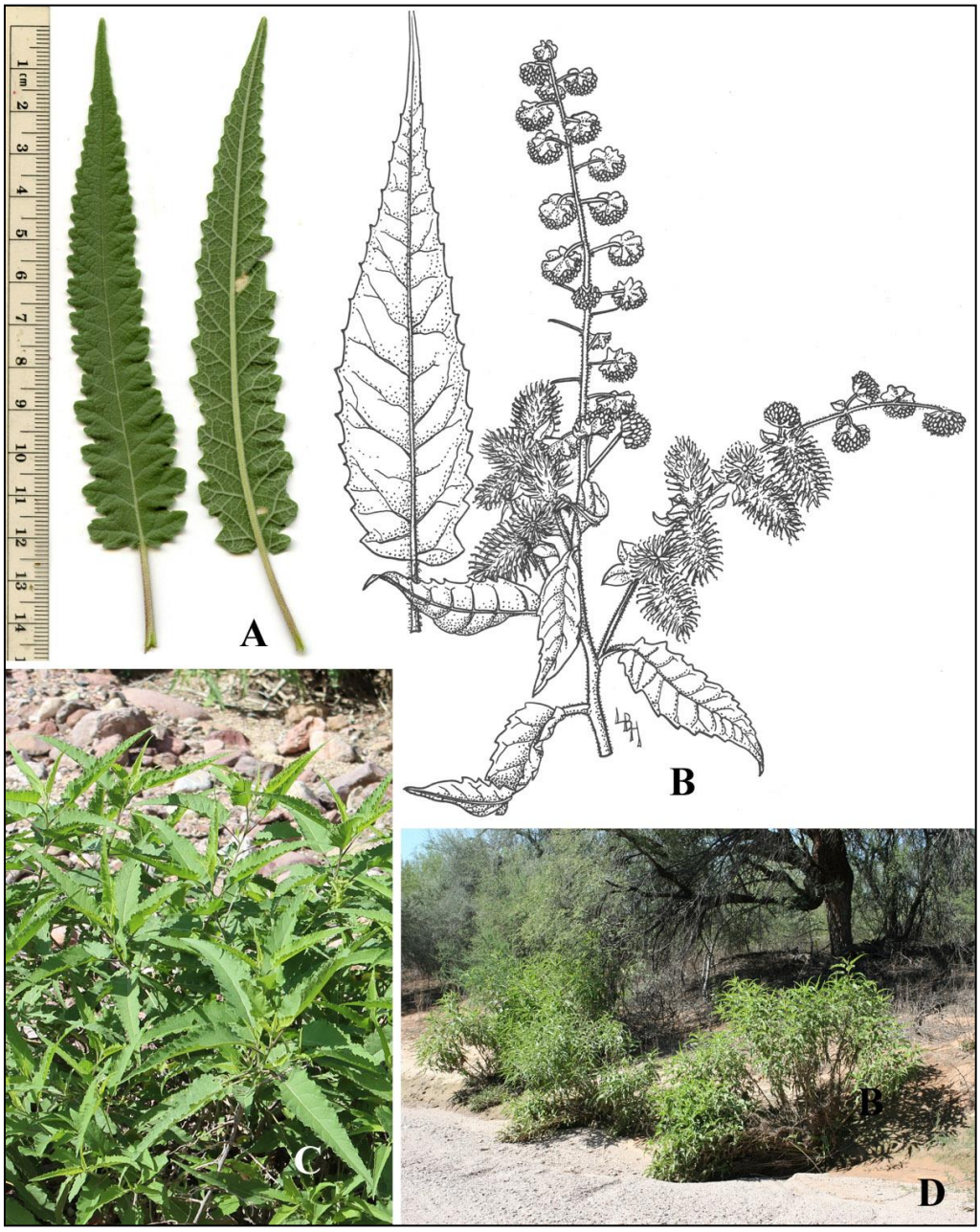


Figure 11. *Ambrosia ambrosioides*. Alamo Canyon: (A) 3 Sep 2014; (C) 9 Sep 2013. (B) By Lucretia Breazeale Hamilton. (D) Kuakatch Wash near Hwy 85, 13 Sep 2008.

**OP**: Quitobaquito, 27 Jan 1894, *Mearns* 2736 (US). Alamo Canyon, *Nichol 26 Mar 1939*. Bates Well, 17 Nov 1939, *Harbison 26163* (SD). Senita Basin, *Warren 10 Apr 1975*.

**CP**: Tule Tank, *Vorhies 11 Apr 1924*. Cabeza Prieta Tanks junction, *Duncan 28 Mar 1970* (CAB). Observations: Buckhorn Tank, Cabeza Prieta Tanks, 14 & 15 Jun 1992, *Felger*. Daniels Wash at Charlie Bell Road, *Balaban 05/03/1996* (CAB).

**TA**: Tinajas Altas, *Van Devender 9–10 Mar 1980*. Coyote Wash at Camino del Diablo, 10 Jan 2002, *Felger*, observation. 2.5 mi SE of Tinajas Altas, 22 Nov 2008, *Felger 08-203*.

**Ambrosia confertiflora** de Candolle
Slim-leaf bursage; *estafiate*; mo'ostalk. Figure 12.

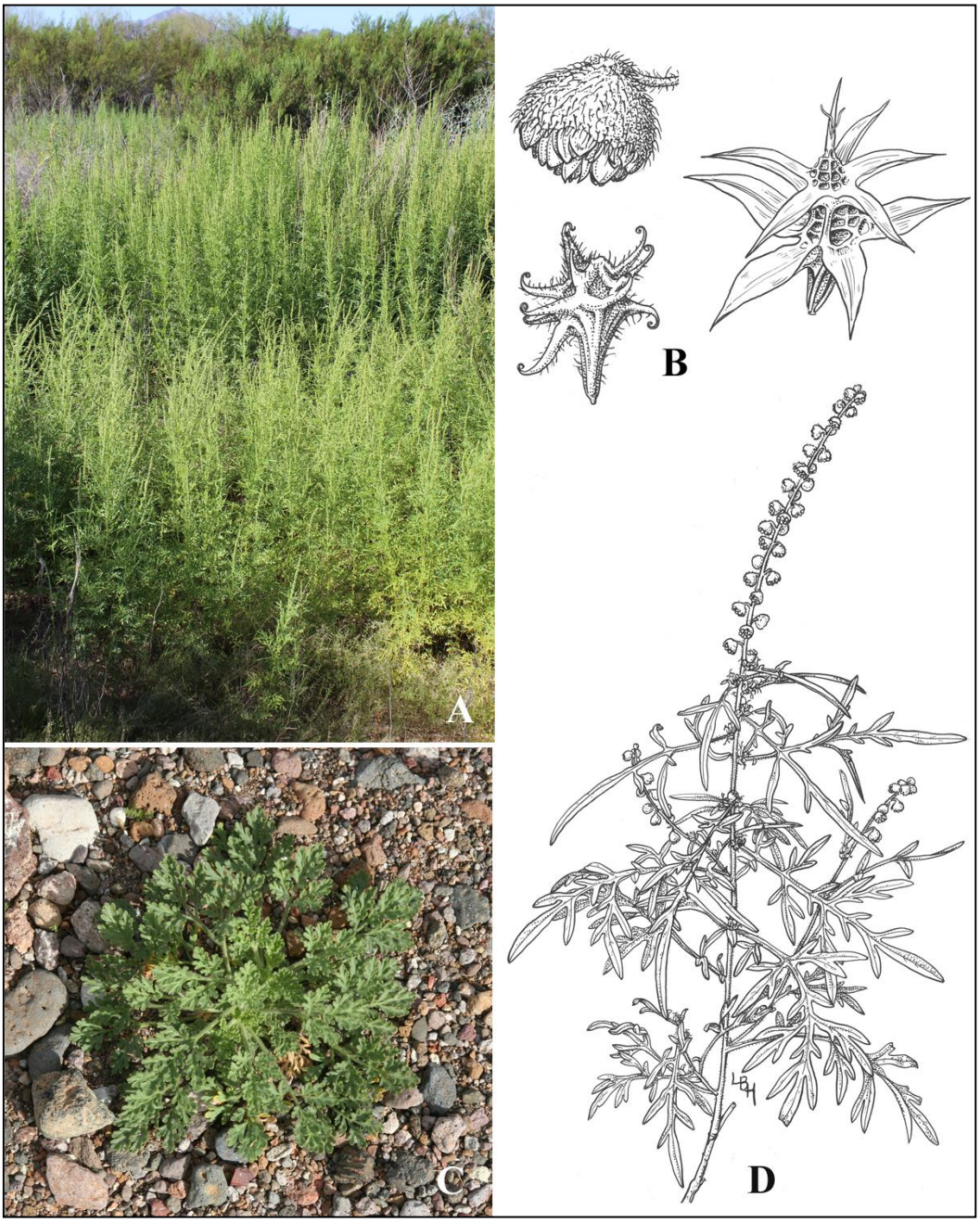


Figure 12. *Ambrosia confertiflora*. (A) Cuerda de Leña at Camino del Diablo, 26 Sep 2013. (B & D) By Lucretia Breazeale Hamilton. (C) Sandy wash bed, Pipeline Road, Sauceda Mts, 4 Mar 2009.

Herbaceous perennials from a hard, knotty base, with stout, deeply buried, woody taproots and spreading by rhizomes. Plants highly variable in size; stems often 40–75 cm tall, erect, and leafy with white, mostly appressed hairs, and sometimes reaching 1–1.5+ m in some major washes; new shoots produced in spring and/or following summer rains; the new shoots can have densely white-hairy stems and relatively large and crowded leaves; generally winter dormant. Leaves mostly alternate, often 6–17 cm long, 2–4 times pinnately divided, and gland dotted. Burs 3–4 mm long with small, straight and hooked spines. Flowering and fruiting mostly September–December, also May and June.

Locally abundant in poorly drained clayish-silty soils such as playas and dirt tanks (charcos), sandy-gravelly and silty soils of washes, and roadsides and other disturbed habitats. Also occasionally to high elevations in the Ajo Mountains in soil pockets on rocky slopes. It has been widespread in the region for more than 29,000 years.

Mainly southwestern United States to central Mexico; often weedy, its range apparently expanding.

**OP**: Bates Well, 17 Nov 1939, *Harbison 26151* (SD). Ajo Mountain Drive, 6.7 mi NE of Visitor Center, 2000 ft, 5 Nov 1977, *Bowers 915*. Cuerda de Leña Wash, 13 Jun 1978, *Bowers 1344*. Quitobaquito, 6 Apr 1988, *Felger 88-271*. Ajo Mt, trail above Bull Pasture, 15 m below crestline, 4090 ft, 10 Apr 2005, *Felger 05-292*. †Alamo Canyon, burs, 8130 to 29,110 ybp (5 samples).
**CP**: Las Playas, *Monson 10 Oct 1963*. Pinta Playa, *Simmons 4 Oct 1964*. Little Tule Well, 12 Jun 1992, *Felger 92-538*. San Cristobal Wash: 14 Sep 1992, *Felger 92-696*; Abundant, in full anthesis, 0.8-1.5+ m tall, 15 Mar 2010, *Felger*, observation. Daniels Arroyo, 27 Sep 1992, *Harlan 340*.
**TA**: †Butler Mts, bur, 10,360 ybp.

**Ambrosia cordifolia** (A. Gray) W.W. Payne
[*Franseria cordifolia* A. Gray]
Heart-leaf bursage. Figure 13.

Shrubs to about 1 m tall. Leaves mostly alternate, tardily drought deciduous; petiolate, the blades rounded to deltate, cordate at the base, often 2–5 cm long, pubescent and gland dotted, the margins coarsely toothed; new growth and young leaves often whitish pubescent. Burs 3–4 mm long, rounded to ellipsoid, tomentose and with stalked glands and straight or hooked spines. Growing and flowering during cooler months; summer dormant.

Ajo and Diablo mountains; often common on rocky slopes and in riparian canyons of the Ajo Mountains.

Southern Arizona, Baja California Sur, southwestern Chihuahua, Sinaloa, Sonora; also disjunct and adventive in Guanajuato, Querétaro, and San Luis Potosí (Rzedowski & G. Calderón de Rzedowski 1998).

**OP**: Alamo Ranch, 18 Mar 1933, *Shreve 6198*. Canyon Diablo, 21 Mar 1935, *Peebles* & *Kearney 10810*. Alamo Canyon: *Nichol 14 Mar 1939*; 3 Dec 1977, *Bowers 975*. Estes Canyon, *Galiano 27 Aug 1986* (ORPI). Arch Canyon, 10 Mar 1983, *Phillips 83-58* (ORPI). Alamo Drive, 3 mi E of Hwy 85, 19 Nov 1993, *Suzan 344* (DES).


Figure 13. *Ambrosia cordifolia*. Estes Canyon: (A) 18 Mar 2005; (B & C) 2 Mar 2008.

**Ambrosia deltoidea** (Torrey) W.W. Payne
[*Franseria deltoidea* Torrey]
Triangle-leaf bursage; *chamizo forrajero;* tadsad, va:gita. Figure 14.

Bushy subshrubs with slender, leafy, few-branched stems; tardily drought deciduous and summer dormant. During drought the stems and remaining leaves become covered with amber-colored resinous-sticky exudate. Leaves mostly alternate, highly variable in size; petioled; leaf blades (8) 12–50 (60) mm long, triangular-ovate, gray- to olive-green, densely short-woolly, especially during drier conditions, with age becoming sticky with glandular exudate, especially on the upper surfaces, matting the hairs so that the leaves appear glabrous. Burs 6.5–11.5 mm wide and about as

long, densely glandular, sparsely pubescent to densely woolly; spines few to many, straight and flattened to sometimes nearly terete, rarely hooked. Flowering and fruiting in spring.

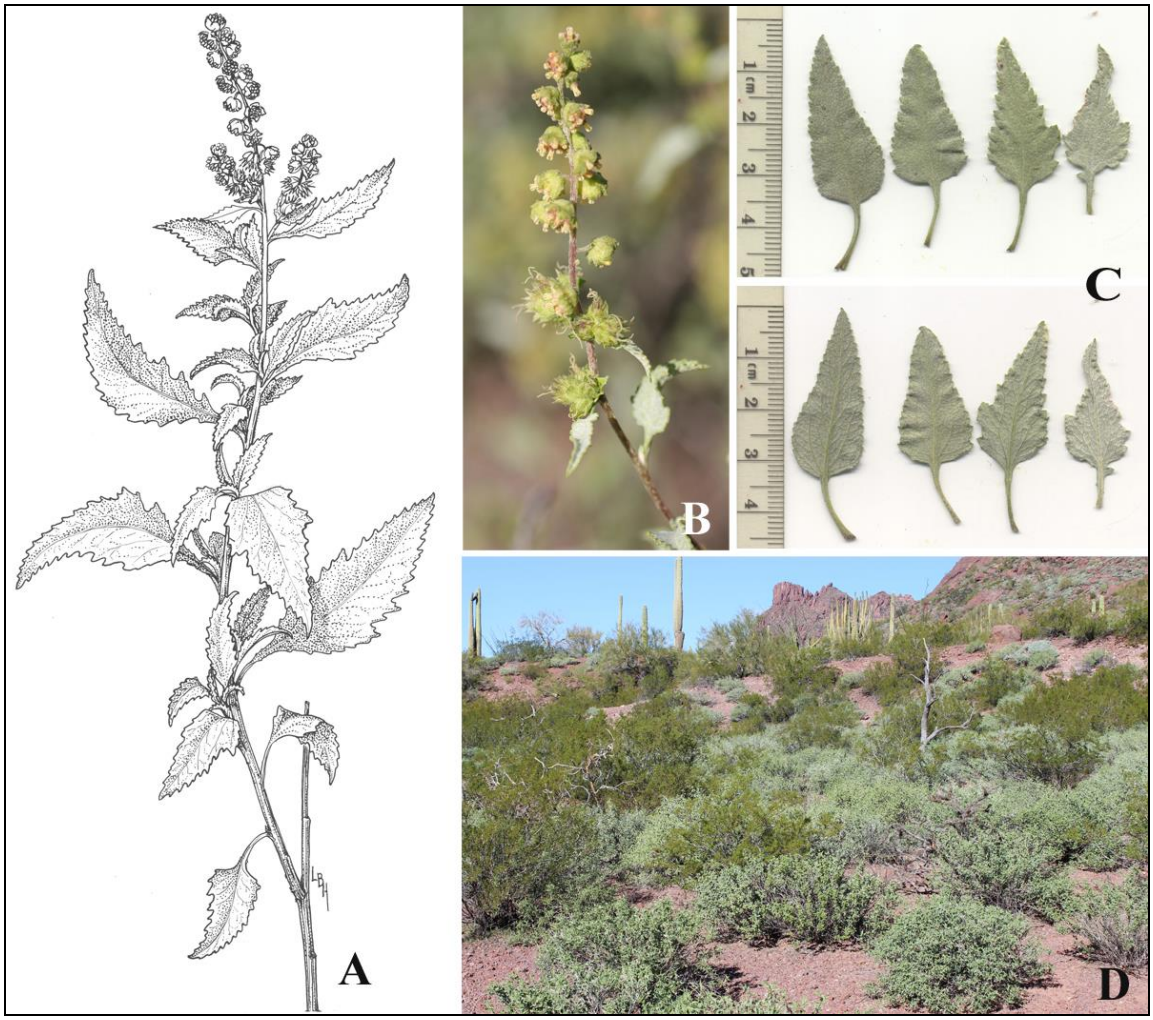


Figure 14. *Ambrosia deltoidea*. (A) By Lucretia Breazeale Hamilton. (B) Near Victoria Mine, 1 Apr 2010. (C) Upper and lower surfaces of leaves, Ajo Scenic Loop, Little Ajo Mts, 26 Mar 2014. (D) Near Alamo Canyon Campground, 12 Jan 2014 (the larger shrubs are *Larrea*).

Maximum densities are often along small drainageways, swales, or arroyos, and at the edges of xeroriparian galleries of ironwood, mesquite, and palo verde along major arroyos. Also rocky slopes, playas, clay soils, and sandy creosotebush flats, from the desert floor to peak elevations. *Ambrosia deltoidea* is one of the most widespread and abundant perennials across the much of Organ Pipe and Cabeza Prieta, but in the more xeric Tinajas Altas Region it is replaced by *A. dumosa*. A single Tinajas Altas collection in 1983 is an interesting anomaly, although, tellingly, it is noted as "rare." In nearby regions, such as northwestern Sonora, *A. deltoidea* likewise does not extend into such extremely xeric areas as does *A. dumosa* (Felger 2000). The only fossil record is from 3500 years ago.

In extreme drought the plants become leafless except for a few small, bud-like terminal leaves encased in resin. Growth ceases during the long, hot summer and the plants become dormant, even during rainy times. If temperatures drop, however, as during unusually cloudy or rainy days in

summer, some new leaves may be produced in a very short time. Luxuriant new growth may begin in mid- to late-September. As with many other major desert perennials, reproduction is episodic, with large cohorts produced under favorable conditions. The abundant rainfall delivered by Hurricane Nora in September 1997 resulted in massive numbers of new *A. deltoidea* and *A. dumosa* plants across much of Cabeza Prieta and western Organ Pipe (see Bowers 2002). These two bursages are among the most ubiquitous desert species of the region. They may live more than a century and take 30–100 years to revegetate areas heavily impacted by people (Artz 1989). During the drought of the early 2000s, widespread mortality of mature *A. deltoidea* occurred in Organ Pipe and Cabeza Prieta. *Ambrosia deltoidea* is the host plant for broomrape (*Orobanche cooperi*) and an important nurse plant for seedlings of many larger perennials such as cacti (e.g., chollas and saguaro). The branches were fashioned into a utility brush (Philip Salcido in Felger et al. 1992).

Central and southwestern Arizona, northwestern Sonora, and the Baja California Peninsula.

**OP**: Quitobaquito, *Nichol 3 Mar 1939*. Bates Well, 23 Apr 1942, *Cooper 546-A*. Pozo Nuevo, 17 Apr 1985, *Bennett 8774* (ORPI). S Puerto Blanco Drive, 1 mi W of Hwy 85 on, 23 Jul 1986, *Felger 86-22*. †Puerto Blanco Mts, on ridge, bur, 3480 ybp.

**CP**: Pinacate Lava Flow, *Duncan 29 Mar 1970* (CAB). Charlie Bell Pass, 3 Apr 1992, *Whipple 3939* (CAB). Bates Well Road at Organ Pipe boundary, 14 Sep 1992, *Felger 92-680*. 2 mi NW of Christmas Pass, *Rutman 18 Feb 2002*.

**TA**: Tinajas Altas, 1200 ft, rare on granite, 0.5 m shrub, *Van Devender 26 Mar 1983*.

**Ambrosia dumosa** (A. Gray) W.W. Payne
[*Franseria dumosa* A. Gray]
White bursage; *chamizo*; tadsad. Figure 15.

Dwarf shrubs, often 30–80 cm tall, many branched, the branches mostly spreading. Twigs and leaves densely pubescent with white hairs, the twigs sometimes spinescent-tipped. Leaves mostly alternate, (4) 10–30 (40+) mm long, tardily drought deciduous and ultimately leafless in extreme drought; petioles prominent, often winged, more so with favorable moisture conditions; leaf blades 1–3 times pinnately dissected into small, somewhat rounded segments variable in shape depending upon moisture conditions, dull green becoming whitish with drier conditions. Male and female heads often intermixed (unique within the genus), each female flower head below a male head. Burs 7–9.5 mm wide, glandular, sometimes with sparse, slender white hairs, the spines straight and flattened. Growing, flowering and fruiting winter and spring, and sometimes in summer.

Valley plains, bajadas, and rocky slopes to the summits of the drier mountains. The fossil record in the region extends to 15,700 years ago.

Along with *A. deltoidea* and *Larrea*, white bursage is one of the most widespread and common perennials in the flora area as well as in the Sonoran and Mojave deserts (see *A. deltoidea*). Southeastern California to Baja California Sur, southern Nevada, extreme southwestern Utah, and Arizona southward to Sonora in the vicinity of Bahía Kino. Raven et al. (1968) reported sympatric diploid, tetraploid, and hexaploid chromosome levels for the species, with hexaploids restricted to California deserts, and diploids and tetraploids in the flora area (also see Seaman & Mabry 1979).

**OP**: "Quitovaquito," 30 Jan 1894, *Mearns 2751* (US). Puerto Blanco Mts, *Nichol 25 Feb 1939*. Armenta Well Road ½ mi W of Hwy 85, 3 Dec 1977, *Bowers 991*. †Puerto Blanco Mts, on ridge, burs, 990 & 2340 ybp.

**CP**: 10 mi E of Papago Well, 25 Mar 1932, *Shreve 5918*. Charlie Bell Well, *Johnson 26 Mar 1960*. San Cristobal Wash, 20 Mar 1992, *Harlan 21*. Papago Well, 26 Feb 1993, *Felger 93-137*. Sierra Pinta, summit, *Cain 15 Nov 2003*.

**TA**: Lechuguilla Desert, Camino del Diablo, 28 Oct 1937, *Gentry 3523* (DES). SE of Raven Butte, bajada, 26 Nov 2004, *Felger 04-07*. 2 mi S of Tinajas Altas, 22 Nov 2008, *Felger 08-194A*. †Butler Mts, twigs, leaves, burs, 740 to 11,250 ybp (7 samples). †Tinajas Altas, leaves, burs, 1230 to 15,680 ybp (11 samples).

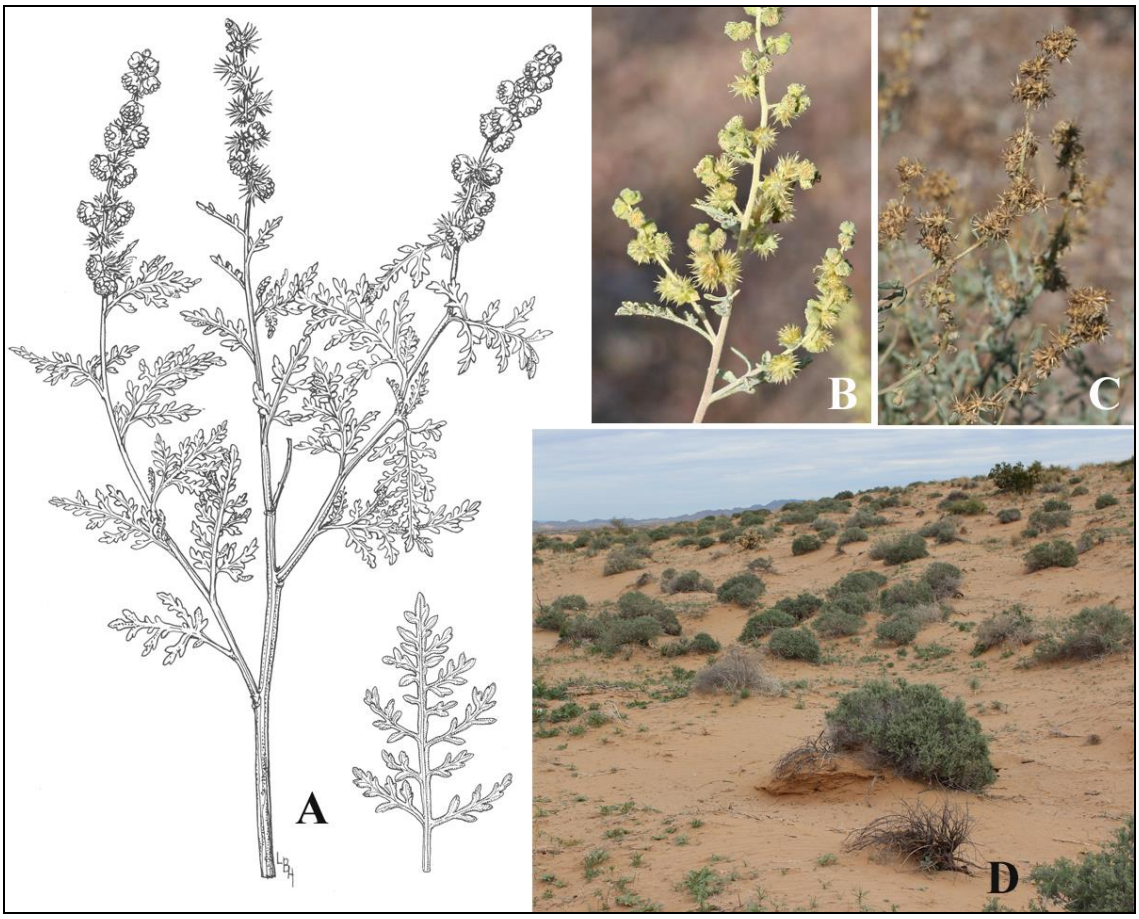


Figure 15. *Ambrosia dumosa*. (A) By Lucretia Breazeale Hamilton. (B) Hwy 85 between Ajo and Why, 8 Apr 2005. (C) Fruiting branches, Alamo Wash, 6 May 2005. (D) Dunes, 15 mi S of Sonoyta, near Mex Hwy 8, Sonora, 6 Feb 2014.

**Ambrosia dumosa** × **A. ilicifolia**

This putative hybrid appears intermediate between the presumed parents. Known in the flora area by a single record.

**TA**: Tinajas Altas, steep slope N of the tinajas, one plant, 20 cm tall with several branches, 19 Mar 1998, *Felger 98-136*.

**Ambrosia ilicifolia** (A. Gray) W.W. Payne
[*Franseria ilicifolia* A. Gray]
Holly-leaf bursage. Figure 16.

Broad, spreading shrubs, often 0.5–1 m tall, sometimes reaching 2 m across. Stems thick but scarcely woody. Leaves mostly alternate, tardily drought-killed to partly evergreen, 3.5–10 cm long, ovate, firm and holly-like, sessile, dry and rough to the touch, and glandular hairy; margins with coarse, spine-tipped teeth; dry dead leaves white and persistent. Burs (10) 15–18 mm long, densely

pubescent with glandular hairs, the spines many, curved and hooked; burs resembling a cocklebur (*Xanthium*). Summer dormant, flowering and fruiting winter and spring.


Figure 16. *Ambrosia ilicifolia*. (A) By Lucretia Breazeale Hamilton. (B & C) Wash at base of granite mountain near Mex Hwy 2, Sierra Nina (Sierra del Águila), Sonora, 17 Mar 2014.

Washes, canyon bottoms and sometimes on rocky slopes in the western part of Cabeza Prieta and in Tinajas Altas. The fossil record in the region extends to 15,700 years ago.

The dry, dead leaves rustling in the wind sound startlingly like a rattlesnake—and sidewinders are sometimes coiled beneath the dense foliage. One June day in 1994 during the bighorn sheep count, Luke Evans was concealed in a blind at Heart Tank: "At about 9:30 a.m. and less than 10 feet away, a healthy bighorn ram, about two years old, put his mouth around a stalk of dry burs and stripped them off with his teeth and chewed them up, munch, munch, munch."

Arid regions of the northern part of the Gulf of California in Sonora and Baja California, and southwestern Arizona and southeastern California.

**CP**: Tule Tank, *Goodding 30 Nov 1938*. Buckhorn Tank, 13 Dec 1970, *Carr 105*. Cabeza Prieta Pass, Cabeza Prieta Mts, 10 Mar 1984, *Hodgson 2727* (DES). Tule Mts, S-facing steep slope, *Rutman 16 Feb 2002*. Eagle Tank, N Pinta Tank, Buckhorn Tank, Cabeza Prieta Tanks, 12–15 Jun 1992, *Felger*, observations.

**TA**: Tinajas Altas, *Vorhies & Taylor 16 Apr 1924*. 1.7 km WNW of Tinajas Altas Peak, 1120 ft, 24 Jan 1999, *Baker 13308* (ASU). †Butler Mts, leaves, 740 to 11,250 ybp (7 samples). †Tinajas Altas, leaves, burs, 1230 to 15,680 ybp (17 samples).

**Ambrosia monogyra** (Torrey & A. Gray ex A. Gray) Strother & B.G. Baldwin
[*Hymenoclea monogyra* Torrey & A. Gray]
Slender burrobush; *jécota*; ʻi:vadhod. Figure 17.

Aromatic, resinous shrubs often 2–2.5 m tall, the branches tall and slender, mostly erect to ascending. Leaves mostly alternate, (1) 2–7+ cm long, soon drought deciduous, linear-filiform or pinnately divided into several filiform segments, the leaves or segments 0.5 mm wide, grooved above (involute), the grooves filled with minute white hairs. Burs 3.5–4 mm wide, each with a single flower enclosed in woody bracts fused at their bases, the bracts with wings in a single whorl, persistent, and papery-membranous. Flowering and fruiting in fall.

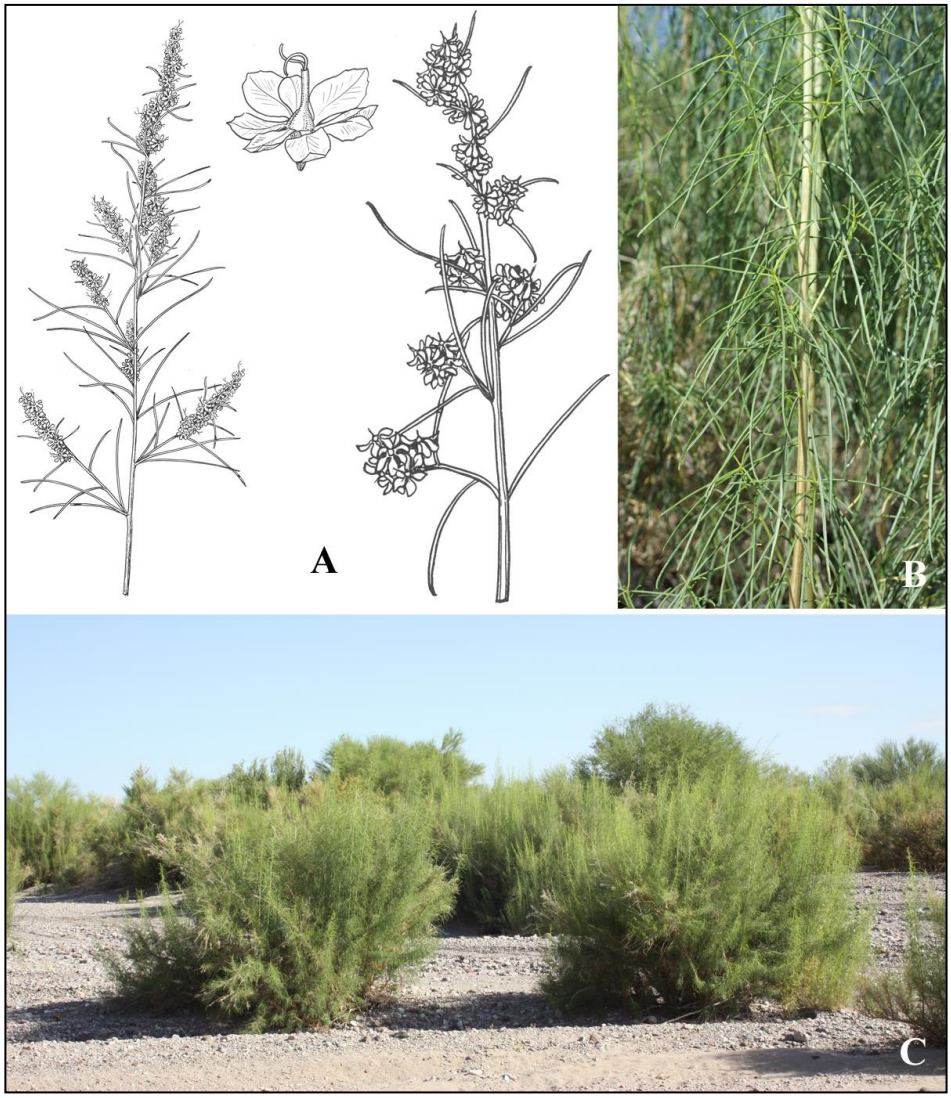


Figure 17. *Ambrosia monogyra*. (A) Young staminate (left) and pistillate (right) flowering branches and pistillate bur (center), by Lucretia Breazeale Hamilton. (B & C) Kuakatch Wash near E boundary of Organ Pipe, 23 May 2010.

Along major washes in Organ Pipe and the eastern margin of Cabeza Prieta. It can quickly recover from droughts or scouring floods.

Southwestern United States and western Mexico to Jalisco.

Teas made from this plant were used by the Seris to reduce swellings and pain in the lungs, and mixed with *Anemopsis* it was used to treat rheumatism (Felger & Moser 1985). The tall, slender branches served Gila River Pimas for roofing and for shelter walls (Rea 1997).

**OP**: Aguajita, 23 Oct 1987, *Felger 87-261*. Growler Wash, *Wirt 13 Oct 1988* (ORPI). Kuakatch Wash near E boundary of Monument, *Rutman 23 Oct 1999* (ORPI).

**CP**: Growler Wash at Organ Pipe boundary, both sides of the boundary, 12 Jun 1992, *Felger 87-261*.

**Ambrosia salsola** (Torrey & A. Gray) Strother & B.G. Baldwin var. **pentalepis** (Rydberg) Strother & B.G. Baldwin
[*Hymenoclea salsola* Torrey & A. Gray var. *pentalepis* (Rydberg) L.D. Benson]
Burrobrush, cheesebush; ʾi:wadhod. Figure 18.

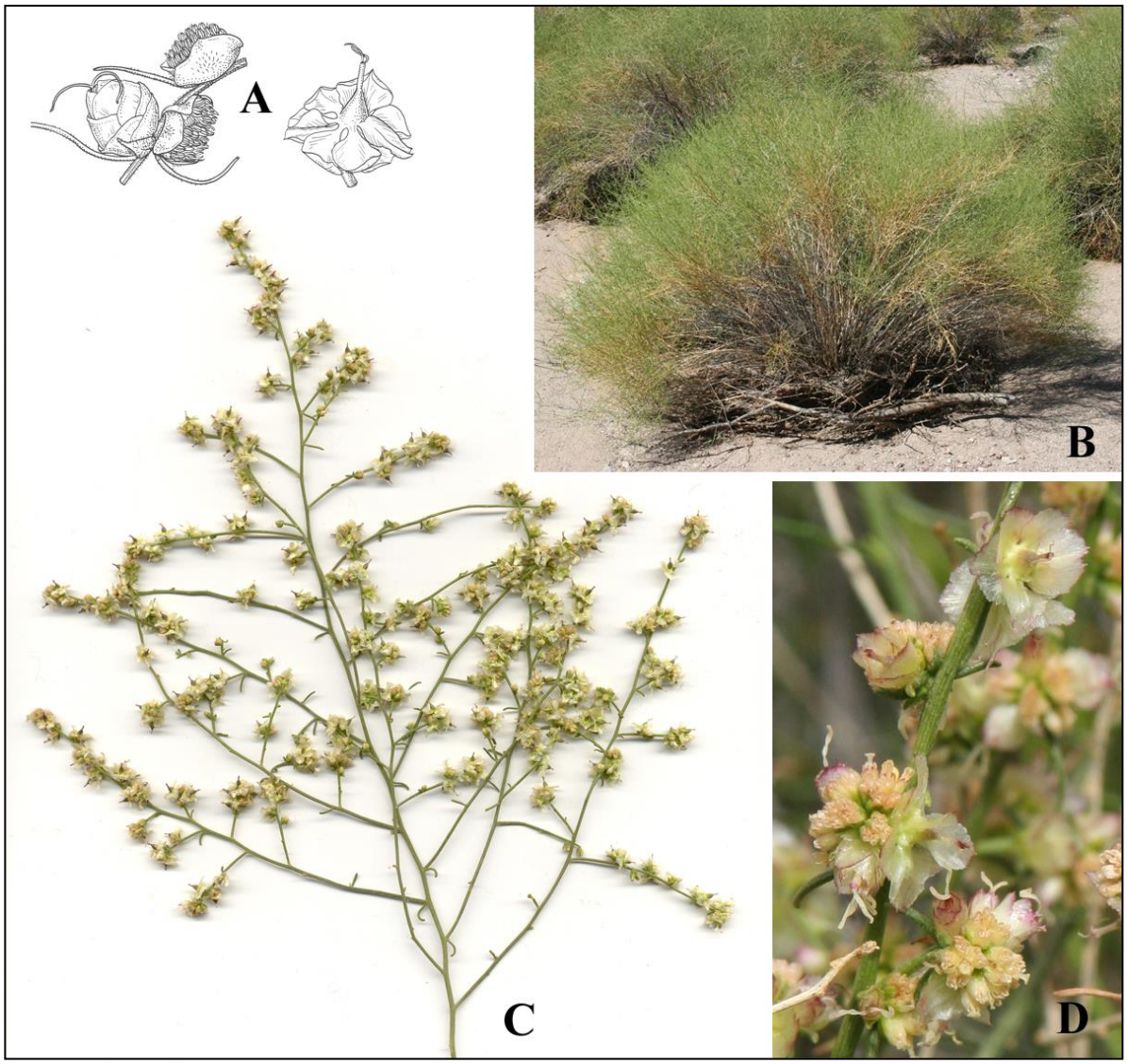


Figure 18. *Ambrosia salsola* var. *pentalepis*. (A) Flowers (left) and fruit (right), by Lucretia Breazeale Hamilton. (B) Growler Wash near Bates Well Road, 8 Oct 2006. Rasmussen Road, Ajo: (C) 25 Mar 2002; (D) 5 Mar 2005.

Aromatic, resinous shrubs to about 1 m tall, usually about as wide as tall, with many slender, spreading, interlacing branches. Leaves mostly alternate, sparsely distributed, 1–7 cm long; mostly falling as the new shoots mature. The larger leaves often with 1–4 linear-filiform segments; the upper leaves reduced and entire; the leaves or segments 0.5–0.7 mm wide, grooved above, with minute hairs as in *H. monogyra*. Burs 5–7 mm wide, with 1 floret, the bracts with wings in 1–several whorls at the middle of the bur, wings mostly 2.7–5 mm wide, about as long as wide, spreading like tiny airplane propellers. Flowering March and April. Wet plants smell like a dead animal.

Widespread and very common, mostly on sandy gravelly soils of washes, floodplains, desert flats and bajadas, and common along roadsides and disturbed habitats. Packrats collected it in Organ Pipe and the Tinajas Altas Region 7600 to 9000 years ago. The 7600-year-old Puerto Blanco Mts midden is on a slope near a high ridge; *A. salsola* does not occur there now but is found in the wash below the midden site.

Baja California and Sinaloa to Utah and Nevada; there are two varieties—var. *pentalepis* is the southern one.

**OP**: Quitobaquito, 3 Feb 1894, *Mearns 2768* (US). Bates Well, *Nichol 26 Apr 1939* (ORPI). 1 mi W of Lukeville, 18 Nov 1991, *Felger*, observation. Kuakatch Wash, W of Armenta Ranch, *Rutman 4 Oct 1995* (ORPI). †Puerto Blanco Mts, on ridge, involucres (burs), 7560 ybp (on a slope and this species now occurs in the wash below the midden site).

**CP**: Bates Wash along Papago Well Road, *Simmons 7 Mar 1963* (CAB). N side of Tule Mts, 2 Feb 1992, *Felger 92-55*. Observations: Buckhorn Tank, 14 Jun 1992, *Felger*; Papago Well, 31 Jan 1992, *Felger*. Heart Tank, 27 Feb 1993, *Felger 93-166*.

**TA**: Tinajas Altas: 17 Mar 1980, *Webster 24245*; 1200 ft, *Lindquist 26 Mar 1983.* †Butler Mts, bur, 8570 ybp. †Tinajas Altas, burs, 8970 ybp.

*Arida*, see **Leucosyris**

**Artemisia** – Sage or wormwood

Herbaceous perennials, usually aromatic and bitter-flavored. Leaves alternate. Inflorescences panicle-like or smaller and contracted. Flower heads small, nodding, with inconspicuous disk florets. The flowers are wind-pollinated and unusually small even for composites. Achenes fusiform; pappus none.

This genus, with perhaps 500 species, ranges across the Northern Hemisphere. Anthemideae.

1. Herbage green, the leaves uniformly green on both surfaces, glabrous or sparsely pubescent. …… **Artemisia dracunculus**
1. Herbage whitish, the leaves bicolored, white-woolly at least on the lower surfaces. …… **Artemisia ludoviciana**

**Artemisia dracunculus** Linnaeus
[*A. dracunculoides* Pursh]
Wild tarragon, tarragon; *estragón*. Figure 19.

Herbaceous perennials or subshrubs sometimes reaching 1.5 m tall, but usually shorter, rhizomatous, with many stems from a woody base, dying back in drought and in freezing weather. Herbage mildly aromatic. Leaves mostly 1–7 cm long, bright green, linear to linear oblong or linear lanceolate; margins entire or larger leaves often with linear lobes. Inflorescences leafy, many-branched panicles with numerous flower heads; the heads 2–3 mm long, globose. Phyllaries green with translucent margins. Achenes 0.5–0.8 mm long. Flowering at least in fall.

Ajo Mountains, mostly at higher elevations and in larger canyons. The nearest populations are in the Quinlan and Baboquivari mountains. *Artemisia dracunculus* in Arizona and Sonora generally occurs above and beyond the desert. Apaches and others gathered the achenes as a food resource.

North America from Alaska and Canada to northern Mexico and in Eurasia. The cultivated culinary herb tarragon is from aromatic Eurasian populations.

Figure 19. *Artemisia dracunculus*. Alamo Canyon above Alamo Well: (A) Reproductive branch, 9 Sep 2013; (B) Reproductive plant, 15 Sep 2013; (C) staminate heads, 3 Sep 2014; (D) Vegetative stem, 6 Feb 2013; (E) Vegetative plant, 1 Feb 2014.

**OP**: Alamo Canyon: Rocky bottoms, 17 Dec 1945, *Goodding 484-45*; South Fork, 690 m, herb to 1.5 m tall, stems branched only at the base, with *Solanum douglasii, Baccharis, Prosopis*, 17 Oct 1987, *Baker 7566* (ASU); In wash, *Wirt 14 Oct 1989*.

**Artemisia ludoviciana** Nuttall subsp. **albula** (Wooton) D.D. Keck
Western mugweed, white sage; *estafiate*. Figure 20.

Herbaceous perennials from rhizomes, the stems slender and arching or nearly straight, 0.5–0.8 m long, dying back in drought and in freezing weather. Herbage usually white woolly. Leaves mostly 3–4.5 cm long (lowermost early-season leaves to 7 cm long), linear to linear-lanceolate, with a few large teeth, woolly on both surfaces, grayish to whitish green, bicolored, and entire and reduced above. Flower heads 3–3.5 mm long, in elongated leafy or bracteate terminal panicles. Phyllaries thin, woolly outside, persistent, outer ones smaller and greener, inner ones 2.5–3.5 mm long, green with broad, translucent-membranous margins. Achenes 0.9–1.3 mm long. Flowering late spring and probably with summer rains.

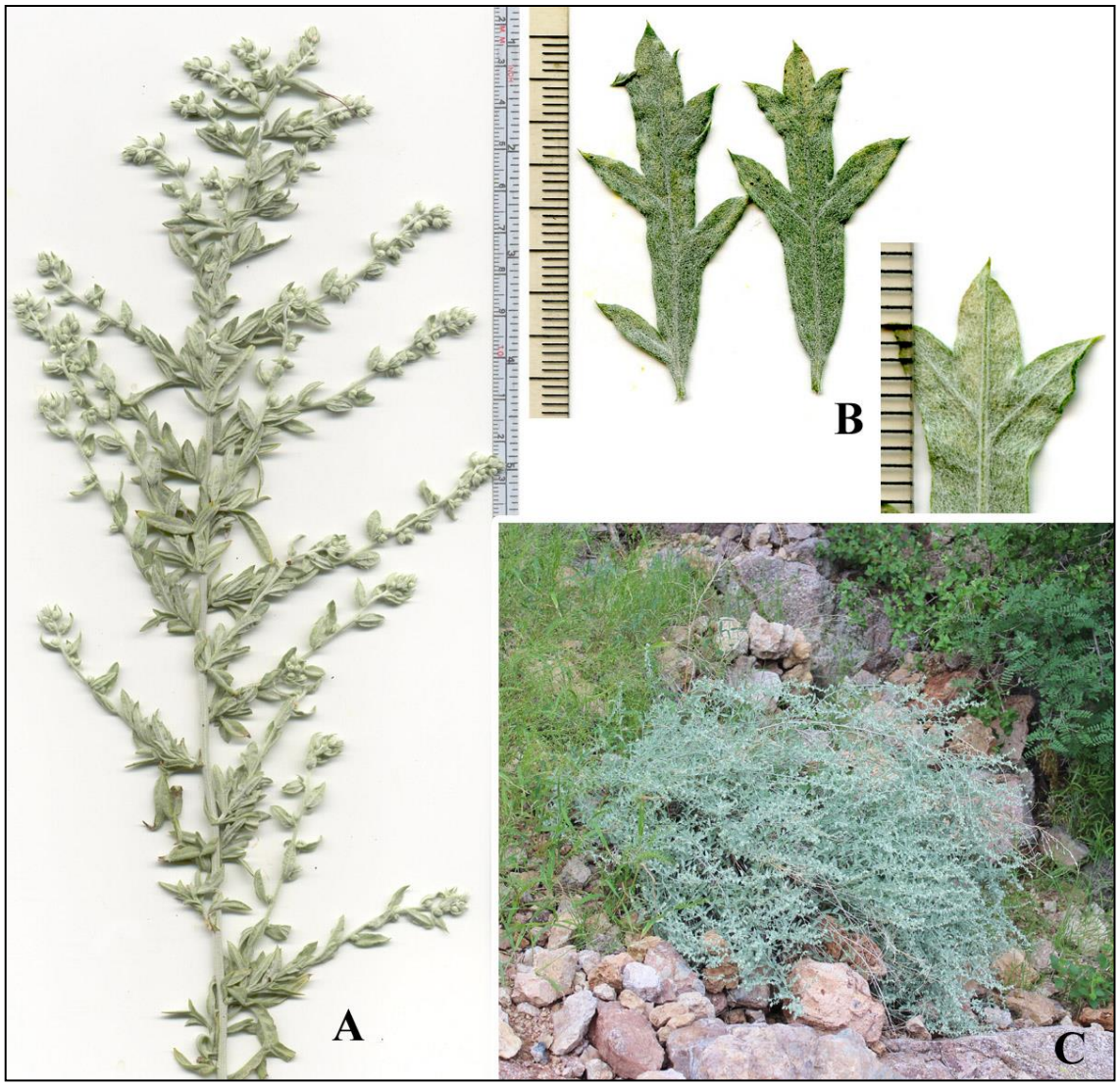


Figure 20. *Artemisia ludoviciana* subsp. *albula*. Alamo Canyon near the well: (A) 10 Sep 2008; (B) Cauline leaves, upper surface (left) and underside of leaf (right), 4 Apr 2015; (C) 19 Sep 2014.

Rocky slopes, canyons, and arroyos in the Ajo and Diablo Mountains, especially at higher elevations. The fossil record extends to 32,000 years in Organ Pipe. It was in the Tinajas Altas Mountains between 11,100 and 18,750 years ago.

This species ranges from Alaska and Canada to northern Mexico; it is highly variable with a confusing array of subspecies and varieties; subsp. *albula* is in southwestern United States and northwestern Mexico.

**OP**: Pitahaya Canyon, *Nichol 23 Feb 1939*. Alamo Canyon, 18 Dec 1939, *Harbison 26269*. Bull Pasture, 5 Nov 1977, *Bowers 943*. Arch Canyon, 2 Dec 1990, *Felger 90-537*. Diablo Mts, 2647 ft, shaded base of N-facing cliff, 22 Sep 2013, *Rutman 20130922-9*. †Alamo Canyon, leaves, 14,500 to 32,000 ybp (3 samples). †Montezuma's Head, leaves, 14,500 ybp.

**TA**: †Tinajas Altas, leaf fragments, 11,040 to 18,700 ybp (4 samples).

††**Artemisia tridentata** Nuttall
Big sagebrush

Shrubs, highly variable in size. Sagebrush species/taxa seem to have been widespread in sub-Mogollon Arizona pinyon-juniper-oak woodlands of the late Wisconsin. Based on the midden leaves it is not possible to determine which member of the *tridentata* complex was present.

Members of the *A. tridentata* species complex presently occur above the Mogollon Rim in Arizona. Bigelow sage, *A. bigelovii* A. Gray, is a small many-stemmed shrub of dry mesas and slopes, often with pinyon. Black sage, *A. nova* A. Nelson, is a subshrub that grows in rockier habitats. Big sagebrush, *A. tridentata*, is a larger shrub characteristic of deeper soils of larger valley bottoms (e.g., Kearney & Peebles 1951).

**OP**: ††Alamo Canyon, wood, leaves, involucres, 14,500 to 32,000 ybp (3 samples). Montezuma's Head, wood, leaves, involucres, 13,500 to 29,110 ybp (4 samples).

*Aster intricatus*, see **Leucosyris carnosa**

**Baccharis**

Shrubs with resinous herbage. Leaves alternate. Male and female flowers on separate plants (those in the flora area); flower heads of white disk florets. Phyllaries graduated. Pistillate pappus of numerous soft capillary bristles; staminate pappus of fewer, firmer bristles. Achenes small, light colored, 5–10-ribbed.

North America to South America, where it is especially diverse; mostly warm temperate, desert, and tropical regions; 350+ species. Astereae.

1. Leaves 5–12 cm long…… **Baccharis salicifolia**
1. Leaves less than 4 cm long.

2. Shrubs usually as broad as or broader than tall; herbage dull green, moderately or not glutinous; twigs brown; achenes 5-ribbed…….... **Baccharis brachyphylla**
2. Shrubs usually taller than wide; herbage yellow-green and glutinous-sticky; twigs green; achenes 10-ribbed…… **Baccharis sarothroides**

**Baccharis brachyphylla** A. Gray
Short-leaf baccharis. Figure 21.

Sprawling shrubs, often 0.5–1.5 m tall or wide, densely branched with broom-like green stems. Herbage scabrous. Leaves 8–12 mm long, narrowly spatulate to linear-lanceolate, entire or larger ones sometimes toothed. Flower head 4–7 mm wide; phyllaries green with broad, scarious margins, the larger phyllaries 4–5 mm long; flowers white. Achenes 2.7–3.5 mm long, reddish brown to reddish, narrowly ellipsoid to cylindrical, 5-ribbed, the pappus bristles 3–7 mm long, white to pale tan. Flowering mostly late spring to early fall.

Margins of gravelly-sandy washes and on rocky slopes; locally common at the eastern margin of Cabeza Prieta and the northwestern portion of Organ Pipe and occasional elsewhere in Organ Pipe. Localized and uncommon at Tinajas Altas where it is seen at higher elevation, generally in canyon bottoms. Flowers often attracting hoards of insects including bombyliids, digger wasps, honey bees, small bees, great purple hairstreak, snout butterflies, and large tarantula hawk wasps.


Figure 21. *Baccharis brachyphylla*. (A, C, & D) Canyon on N side of Little Ajo Mts, 2 Oct 2013; (B) Bates Well Road, N of Bates Well, 26 Sep 2013.

Southeastern California, Arizona, northern Baja California, and Sonora.

**OP**: 5 mi N of Visitor Center in Cherioni Wash, *Warren 10 Nov 1983*. 0.5 mi W of Growler Pass, 8 Mar 2003, *Rutman 2003-271* (ORPI). Bates Mts, drainage N side of northernmost hills, 23 Mar 2003, *Rutman 2003-400* (ORPI). Cuerda de Leña Wash, 0.5 mi S of Organ Pipe northern boundary, xeroriparian, 7 Oct 2006, *Rutman 20061007-17*.

**CP**: 0.8 mi E of Little Tule Well, 12 Jun 1992, *Felger 92-533*. Daniels Arroyo, 18 Jan 2003, *Felger 03-20*.

**TA**: Tinajas Altas: 5 Dec 1935, *Goodding 1186*; Canyon above the tinajas, 26 Oct 2004, *Felger 04-79*. Frontera Canyon, canyon bottom among rocks, *Felger 98-108*.

**Baccharis salicifolia** (Ruiz & Pavón) Persoon

[*B. glutinosa* Persoon, misapplied; the name *B. glutinosa* actually applies to *B. douglasii* de Candolle, an herbaceous perennial]

Seepwillow; *batamote*; susk. Figure 22.

Shrubs to 2+ m tall, glabrous, with leafy stems, the new growth resinous. Leaves 5–8 (12) cm long, lanceolate, willow-like, usually toothed, glandular-punctate, conspicuously glutinous-sticky with a distinctive resinous odor, evergreen or shriveling in drought. Phyllary margins erose-membranous, the larger (inner) phyllaries 2–2.8 mm long; flowers white. Achenes 1–1.1 mm long, 5-ribbed; pappus bristles 4–5.5 mm long. Staminate pappus bristles barbellate or sub-plumose near tip. Mostly growing and flowering during warmer months.

Springs, arroyo bottoms and washes with at least temporary water or wet soil; at a few waterholes, riparian canyons, and wetlands in Organ Pipe and Cabeza Prieta. MacDougal found it at Walls Well in 1907 but it is no longer there; at that time water was pumped for mining and ranching and enough water spilled to support wetland plants such as seepwillow. The involucral bracts are persistent and from a distance can be mistaken for flowers.

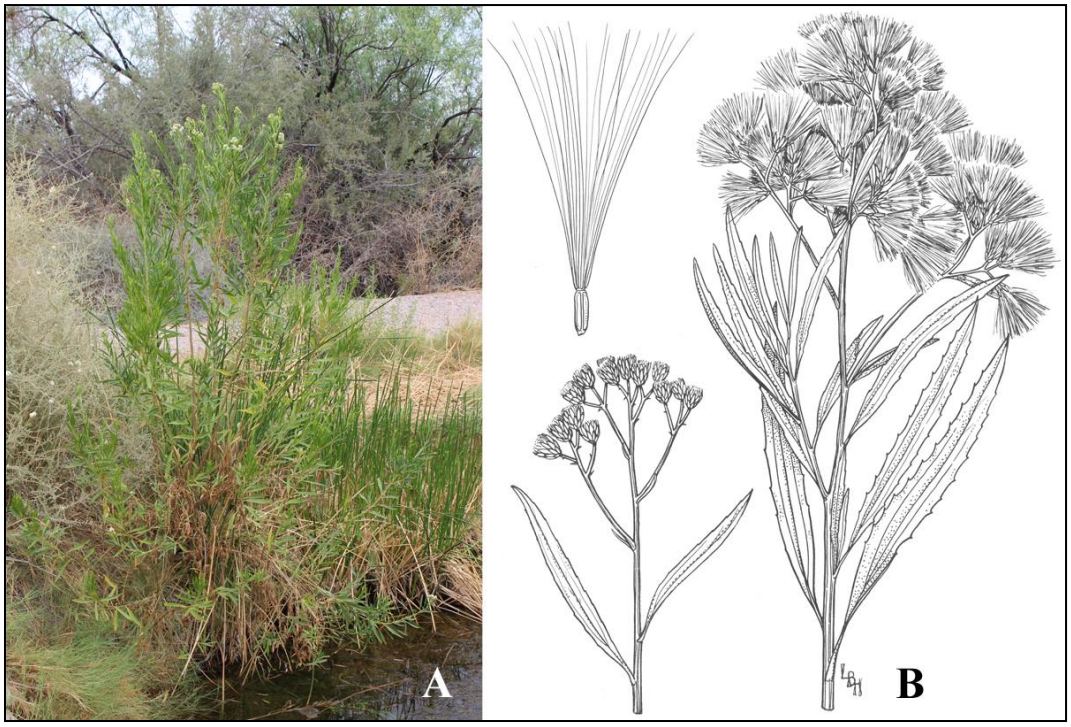


Figure 22. *Baccharis salicifolia*. (A) Quitobaquito, 17 Jul 2013. (B) By Lucretia Breazeale Hamilton.

Southwestern United States to South America.

Yumans cooked the young shoots as an emergency food (Castetter & Bell 1951). The plant was used for many medicinal purposes by different people, including for treating baldness and eye ailments, and for "women's hygiene" (Bean & Saubel 1972; Felger & Moser 1985; Moerman 1998). Gila River Pimas used seepwillow for house walls if arrowweed (*Pluchea sericea*) was not available (the pithy stems of seepwillow were less desirable than those of arrowweed, which are solid; Rea 1997).

**OP**: Quitobaquito: *Nichol 28 Apr 1939*; *Van Devender 30 Aug 1978*. Growler Canyon, 30 Mar 1979, *Bowers*, observation; see *Senecio flaccidus*, *Bowers 1600*). South Alamo Canyon, *Hustafa 24 Jun 1987* (ORPI).

**CP**: Agua Dulce Spring, damp sand at spring, one shrub, 13 Jun 1992, *Felger 92-576*. Redtail Tank, 12 Jun 1992, *Felger*, observation. Cameron Tank, E boundary of Cabeza Prieta, "the pond is ringed with seepwillow and littered with *novellas* left by job-seeking border crossers," 1 Mar 2000, *Malusa*, observation (the pond is on BLM land but some of the seepwillows are on the Cabeza Prieta side of the boundary).

**Baccharis sarothroides** A. Gray
Desert broom; *escoba amarga, romerillo*; susk kuagig. Figure 23.

Shrubs often 2–2.5 m tall, with numerous upright, leafless or sparsely leaved, green, broom-like branches. Twigs angled or striate-ridged. Herbage dotted with short-stalked, glandular hairs producing copious sticky-glutinous exudate that soon covers the hairs and coats the leaf surfaces. Leaves quickly deciduous; new growth with linear to linear-lanceolate leaves reaching 1–3 (4) cm, the larger leaves often minutely toothed (dentate); most leaves much smaller or reduced to scales. Phyllary margins erose to ciliate-membranous, the outer phyllaries broadly ovate, the inner ones linear, 6.5–7.5 mm long. Flowers white; mostly October and November. Achenes 1.5–2.7 mm long, 10-ribbed, the pappus bristles white, 9–11 mm long.

Mostly along large dry watercourses, at some waterholes, and disturbed habitats including roadsides; scarce in Cabeza Prieta, in the eastern margin including Growler Wash and disturbed habitats on Childs Mountain, and more common and widespread in Organ Pipe. Also along Coyote Wash east of Tinajas Altas.

Northwestern Mexico in Baja California, Baja California Sur, Sinaloa, and Sonora and southwestern United States in Arizona, California, Nevada, New Mexico, and western Texas.

The branches were made into brooms by Gila River Pimas (Rea 1997). The Tohono O'odham made arrow foreshafts from the straight stems although creosotebush was preferred (Castetter & Underhill 1935). Tea made from the leaves was taken by Seris as a remedy for colds, to help with weight loss, and as a contraceptive (Felger & Moser 1985). Branches were used to form one layer of the roof on the traditional O'odham dwelling, or *ki*, such as the one located at Armenta Ranch.

**OP**: Quitobaquito, "*romerio*," 5 Feb 1894, *Mearns 2775* (US). Bates Well, *Nichol 26 Apr 1939* (ORPI). Cipriano Well, *Nichol 27 Apr 1939* (ORPI). Alamo Canyon, *Beale 15 Mar 1986* (ORPI). Aguajita, 23 Oct 1987, *Felger 87-269A.*

**CP**: Childs Mt, E. slope, *Simmons 30 Oct 1962*. 1 mi S of Bates Well Road on road to Jose Juan Tank, 14 Sep 1992, *Felger 92-706*. Growler Wash at Organ Pipe boundary, 26 Feb 1993, *Felger 93-78*. Red Tail Tank, 12 Jun 1992, *Felger*, observation.

**TA**: Coyote Water, 25 Oct 2004, *Felger 04-26, 04-27*.

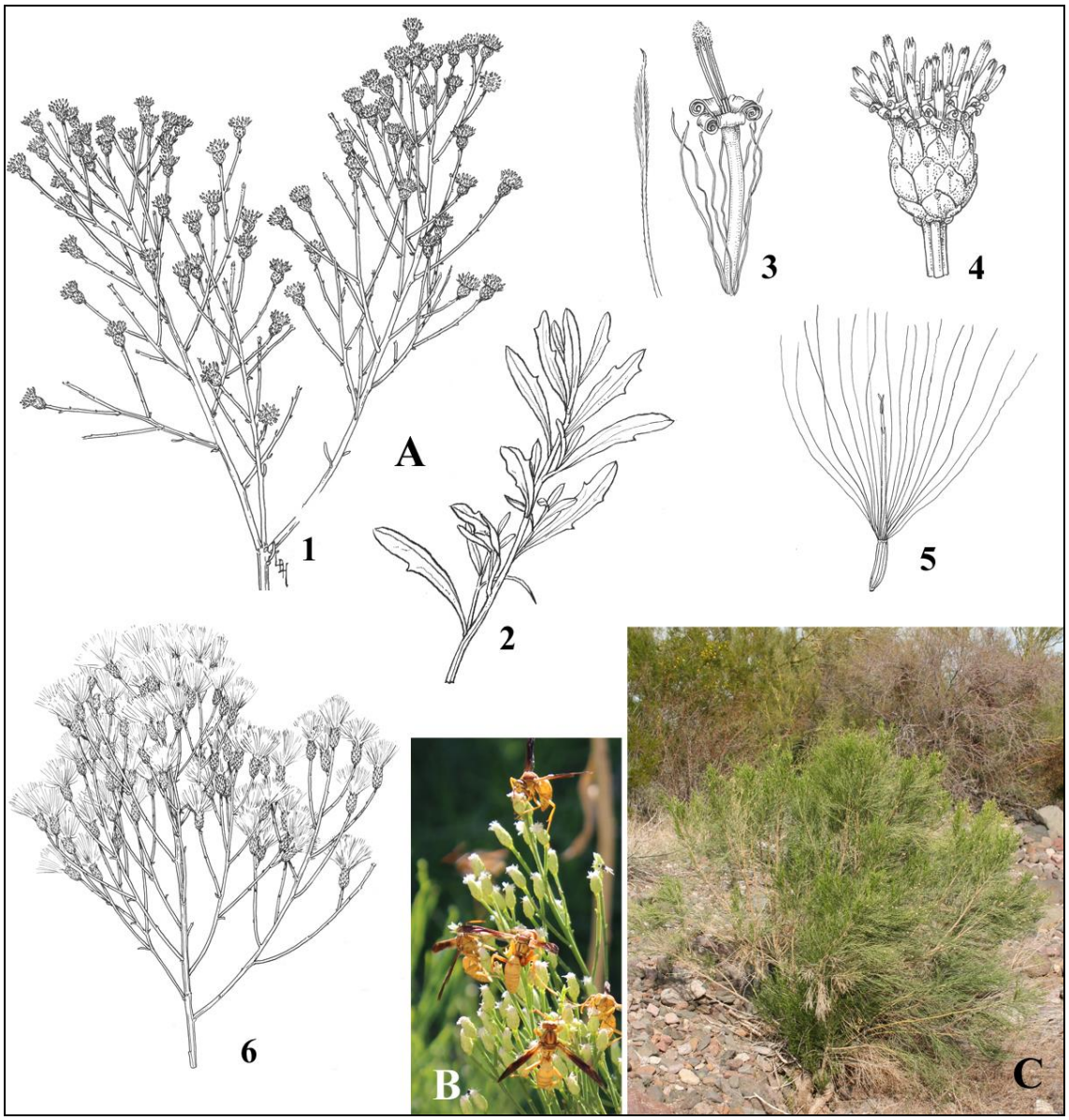


Figure 23. *Baccharis sarothroides*. (A): (1) staminate flowering branch, (2) leafy branchlet, (3) staminate floret, (4) pistillate flower head, (5) pistillate floret, and (6) pistillate flowering branch, by Lucretia Breazeale Hamilton. (B) Wasps on flowers, Alamo Canyon near Alamo Well, 17 Oct 2013. (C) Alamo Wash, 4 Mar 2009.

**Bahiopsis**

Southwestern United States and northwestern Mexico; 12 species. A genus segregated from *Verbesina*. Heliantheae, Helianthinae.

**Bahiopsis parishii** (Greene) E.E. Schilling & Panero
[*Viguiera parishii* Greene. *V. deltoidea* A. Gray var. *parishii* (Greene) Vasey & Rose]
Parish's goldeneye; *ariosa*. Figure 24.

Shrubs to 1.6 m tall with many slender and brittle stems. Herbage and phyllaries with coarse, stiff hairs and sub-sessile glands. Leaves opposite or the upper ones sometimes alternate, (2) 3–5 (7) cm long, petioled, the blades ovate to broadly triangular-ovate. Phyllaries graduated, ovate to

lanceolate and somewhat hardened basally, the larger, inner phyllaries 5.5–10 × 1.5–2 mm and usually abruptly narrowed above. Flower heads with bright yellow ray and disk florets, the rays often 1.2–1.5 cm long, (2-) 3-toothed at tip, soon deciduous. Achenes (2.8) 3.4–4 mm long, obpyramidal, moderately compressed, with ascending to appressed white hairs, the margins ciliate but otherwise not differentiated from the body; pappus of several or more persistent scales, some awn-tipped and others with ragged margins. Flowering after rains, at least March–May and October.

Widespread across the flora area, including canyons, and coarse, well-drained soils of lower bajadas and mountain slopes to the summits, and in larger washes in the eastern part of the flora area. It has been in Organ Pipe mountains for at least 21,900 years.

Deserts in western and central Arizona, western Sonora, Baja California, Nevada, and southeastern California.

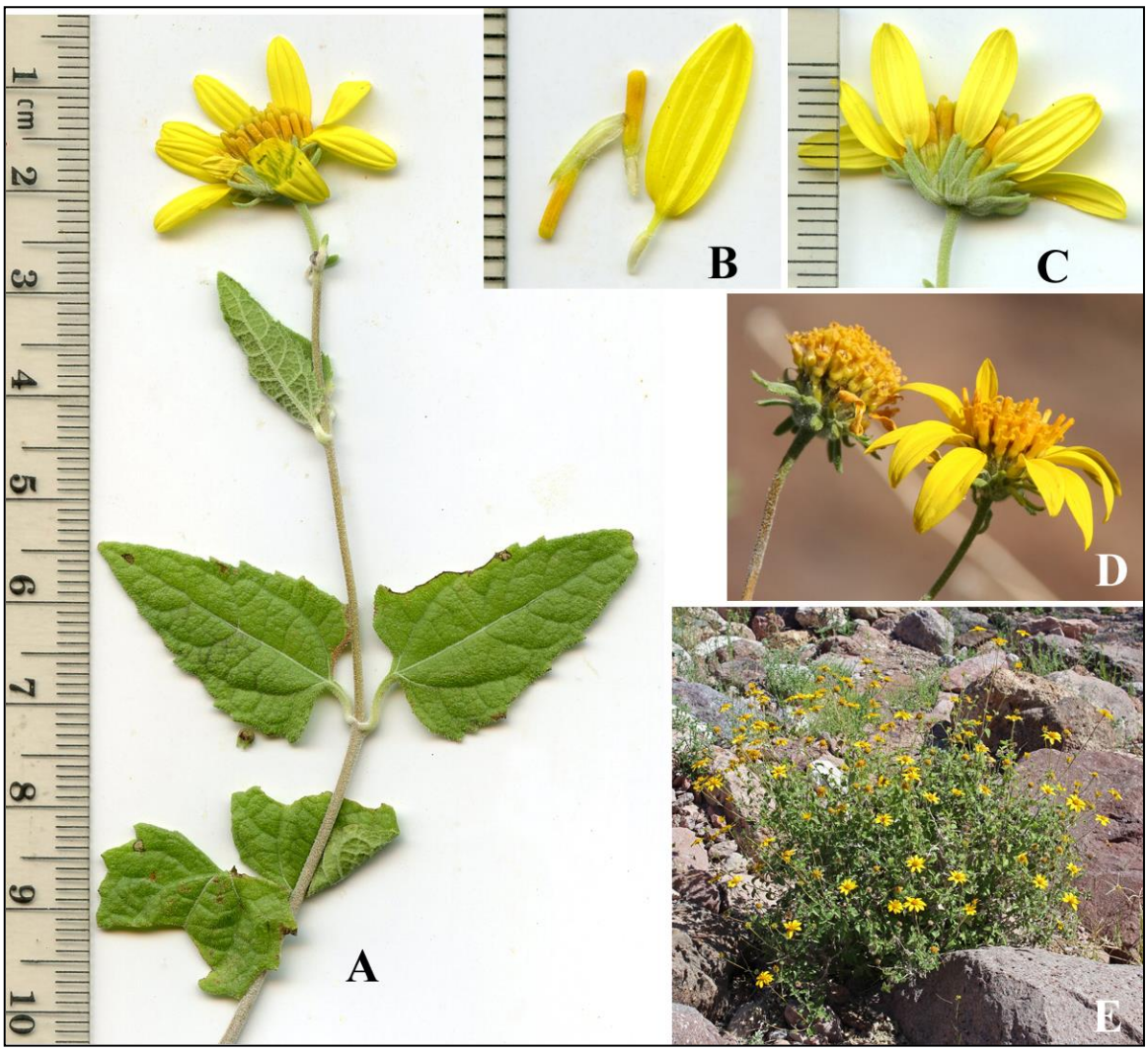


Figure 24. *Bahiopsis parishii*. Bull Pasture Trail: (A–C) 8 Aug 2014; (D) 28 Feb 2009. (E) Alamo Canyon, 26 Feb 2014.

**OP**: Bates Well, 19 Nov 1939, *Harbison 26168*. Canyon Diablo, 21 Mar 1941, *Peebles 10821*. Arch Canyon, 3500 ft, 28 Mar 1965, *Niles 546*. Estes Canyon, *Hesselberg 10 Apr 1966*. Trail from The Cones to

Mount Ajo, 4090 ft, 10 Apr 2005, *Felger*, observation. Puerto Blanco Mts, near N Puerto Blanco Drive, 21 Sep 2013, *Rutman 20130921-14*. †Alamo Canyon, twigs, achenes, 1150 ybp (4 samples). †Montezuma's Head, twigs, achenes, 20,490 & 21,840 ybp. †Puerto Blanco Mts, on ridge, achenes, 3400 to 9860 (5 samples).

**CP**: Pinacate Plateau, Camino del Diablo, Arroyo bank, 28 Oct 1937, *Gentry 3506* (DES). Tule Well region, *Goodding 24 Nov 1934*. Buckhorn Tank, *Monson 22 Dec 1954* (CAB). Childs Mt, 9 Apr 1993, *Felger 93-295*. 1.5 mi S of Heart Tank, *Jansen 23 Jan 2003*. Sierra Pinta, summit, *Cain 15 Nov 2003*. Observations: N side of Tule Mts, 2 Feb 1992, *Felger*; Cabeza Prieta Tanks, Buck Mountain Tank, 14 & 15 Jun 1992, *Felger*.

**TA**: Borrego Canyon, 3 Feb 1990, *Felger*, observation. Tinajas Altas, 26 Feb 2004, *Felger 04-84*.

**Baileya** – Desert marigold; *tecomblate*

Ephemerals or short-lived herbaceous perennials, densely white woolly and with glistening orange glands even on the corollas and achenes. Leaves in basal rosettes and alternate on stems, pinnatifid below, generally reduced above. Phyllaries sub-equal, linear-lanceolate, green beneath the woolly hair. Flower heads on long peduncles or few-leaved stems, with bright yellow ray and disk florets, the ray florets fertile, large and showy, persistent and somewhat papery, bent down in age; disk florets many, fertile. Achenes papillose-hispid, conspicuously ribbed, clavate-cylindrical to moderately compressed laterally, truncate at apex; pappus none. The flowers attract numerous butterflies.

Southwestern United States and northern Mexico, especially in deserts and arid regions; 3 species. Heliantheae, Gaillardinea.

1. Ray florets 5–7; heads 6 mm wide not including rays, mostly loosely cymose. ……... **Baileya pauciradiata**
1. Ray florets 20–50; heads 10 mm or more in width not including rays, mostly single on an elongate peduncle.

2. Stems usually leafy only at base or below the middle; heads usually 3.5–4 cm wide (including rays); achene ribs all more or less similar…….. **Baileya multiradiata**
2. Stems leafy to the middle or above; heads usually 2.4–3.2 cm wide (including rays); achene ribs conspicuously unequal, larger at the achene angles……... **Baileya pleniradiata**

**Baileya multiradiata** Harvey & A. Gray
Many-flowered desert marigold; gi:ko. Figure 25.

Ephemerals to short-lived perennials. Leaves mostly in apparent basal rosettes and below the middle of the stems, the larger leaves 5.5–12 cm long. Flowering stems mostly 20–30 cm tall, with reduced leaves below and leafless above, with 1 head per stem. Phyllaries 5.5–6.5 mm long, linear-lanceolate. Flower heads often 3.5–4 cm wide including rays; the rays many, bright yellow, 15–20 × 5–8 mm, the apex conspicuously 3-toothed. Style branches truncate to slightly rounded at tips. Achenes 3.5–3.8 mm long, the ribs essentially all alike and of relatively low relief. Growing and flowering primarily in spring.

Seasonally common along Hwy 85 and widely scattered in the northern part of Organ Pipe and lower-elevation margins of the Ajo and Santa Rosa mountains, and the eastern part of Cabeza Prieta. Often along roadsides, washes, swales, and bajadas.

Northern Mexico and southwestern United States.

**OP**: 8 mi S of Growler Well, *Nichol 17 Apr 1939*. Alamo Canyon, 2000 ft, *Tinkham 19 Apr 1942*. Bates Well, roadside and desert flats, 12 Mar 2003, *Felger 03-305*. Foothills of Puerto Blanco Mts, 21 Sep 2013, *Rutman 20130921-13*.

**CP**: Bates Well Road at 4.5 mi W of Organ Pipe boundary, 15 Sep 1992, *Felger 92-747*. Daniels Arroyo at Charlie Bell Road, 25 Feb 1993, *Felger 93-74*.

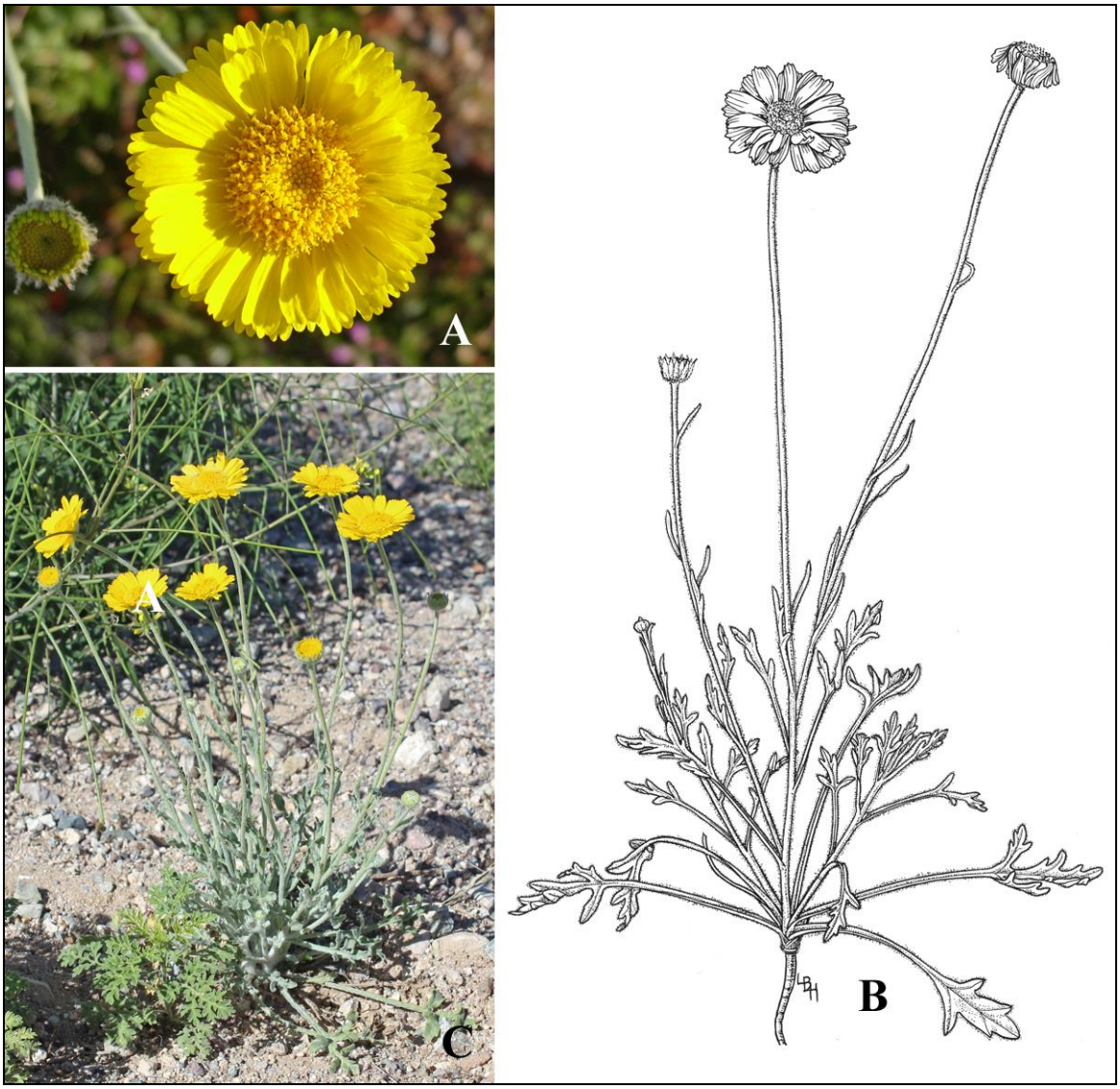


Figure 25. *Baileya multiradiata*. (A) Gu Vo Road near Kuakatch, 6 Feb 2005. (B) By Lucretia Breazeale Hamilton. (C) Ajo, 8 Mar 2015.

**Baileya pauciradiata** Harvey & A. Gray ex A. Gray
Few-flowered desert marigold.

Drought-stunted plants 10–15 cm tall with a single stem, or sometimes many-stemmed to 30 cm tall in seasons of exceptional rainfall. Larger leaves (3) 5–12 cm long. Stems usually several-branched, with several to many heads, the peduncles 1–3.5 cm long. Phyllaries 3.5–4.5 mm long. Heads 1.5–2 cm wide including rays, the rays 5–7 in number, 6–10 × 3.5–7.5 mm; flowers pale yellow (paler than those of *B. pleniradiata*). Achenes 3.5–4.5 (5) mm long, the ribs conspicuous and more or less equal.

Not known from the flora area but might be found along the southwestern margin of the area. Common on sandy soils and dunes across much of the adjacent Gran Desierto in northwestern Sonora (Felger 2000); sometimes growing intermixed with *B. pleniradiata*.

**Baileya pleniradiata** Harvey & A. Gray
Woolly desert marigold. Figure 26.

Plants mostly 10–45 cm tall. Larger leaves mostly 3.5–10 cm long (sometimes 15–30 cm long on especially robust plants). Stems several-branched, mostly with several heads, the flowering stems often 2–14 cm long. Flower heads usually 2.4–3.2 cm wide including rays, or much smaller on drought-stunted plants. Phyllaries 3.5–4.5 mm long. Rays many, pale yellow, 7.5–10 × 3.6–8.5 mm, 3-toothed to rounded-truncate at apex tip. Style branches pointed (acute). Achenes 2.5–3.5 (3.8) mm long, the ribs unequal.

Seasonally common and sometimes abundant on sandy soils including dunes in lowlands from the western part of Organ Pipe to Tinajas Altas.

Sonoran and Mojave deserts in southwestern Arizona, southeastern California, northwestern Sonora, and Baja California.

**OP**: 1 mi E of Quitobaquito, 13 Apr 1941, *McDougall 88*. Between Quitobaquito and Williams Spring, 10 May 1979, *Bowers 1718*. Flats W of Bates Mts, 31 Mar 1978, *Bowers 1171*.

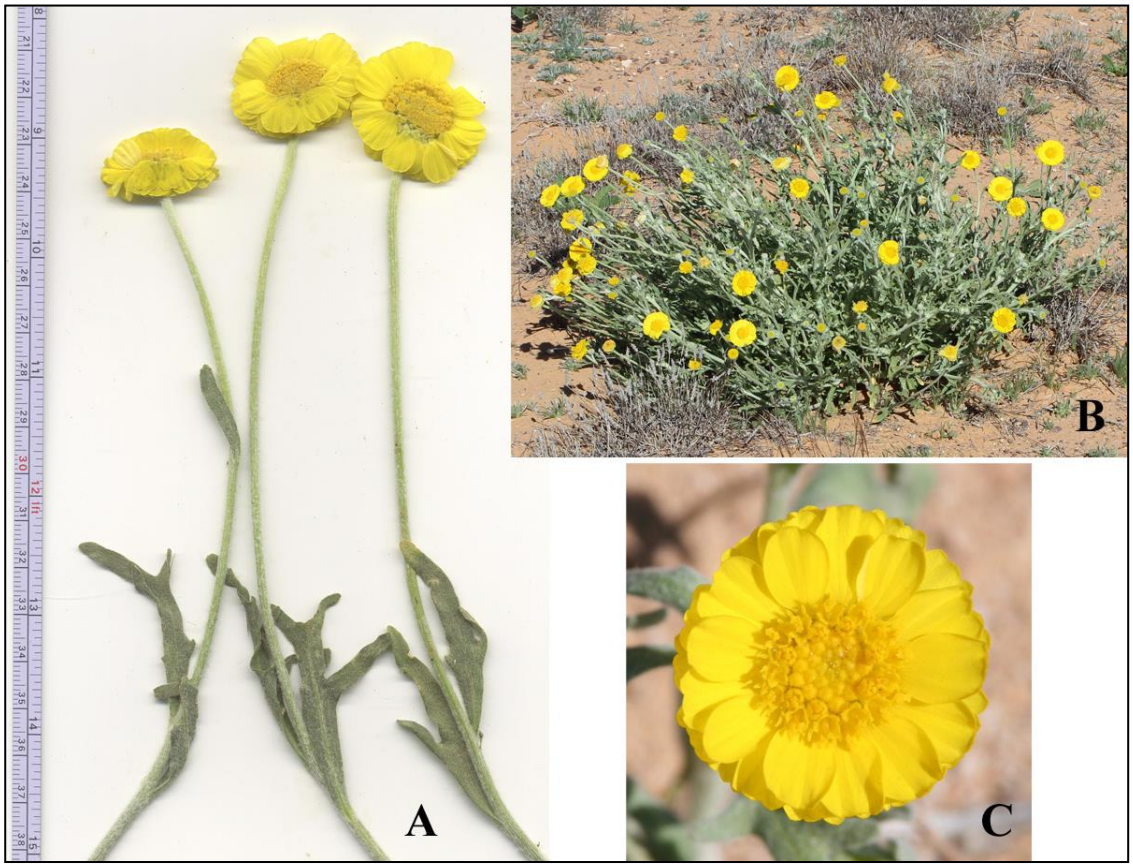


Figure 26. *Baileya pleniradiata*. (A & B) Pinta Sands, Cabeza Prieta, 11 Feb 2014. (C) Dunes S of Sierra Blanca, Pinacate Reserve, Sonora, 17 Feb 2008.

**CP**: Dunes 8 mi NW of Las Playas, Mexican Border, 15 Apr 1941, *Benson 10782*. Papago Well, *Engard 2052* (DES). West Pinta Sands, 27 Nov 2007, *Felger 07-547*.

**TA**: Butler Mts, *Van Devender 27 Mar 1983*. W side of Tinajas Altas Mts, *Felger 05-48*. Frontera Canyon, Mexico border, 18 Mar 1998, *Felger*, observation.

**Bebbia**

Two species; *Bebbia atriplicifolia* (A. Gray) Greene occurs in Baja California Sur. Heliantheae, Galinsoginae.

**Bebbia juncea** (Bentham) Greene var. **aspera** Greene
Sweetbush, chuckwalla delight; hauk ʾuʾs. Figure 27.

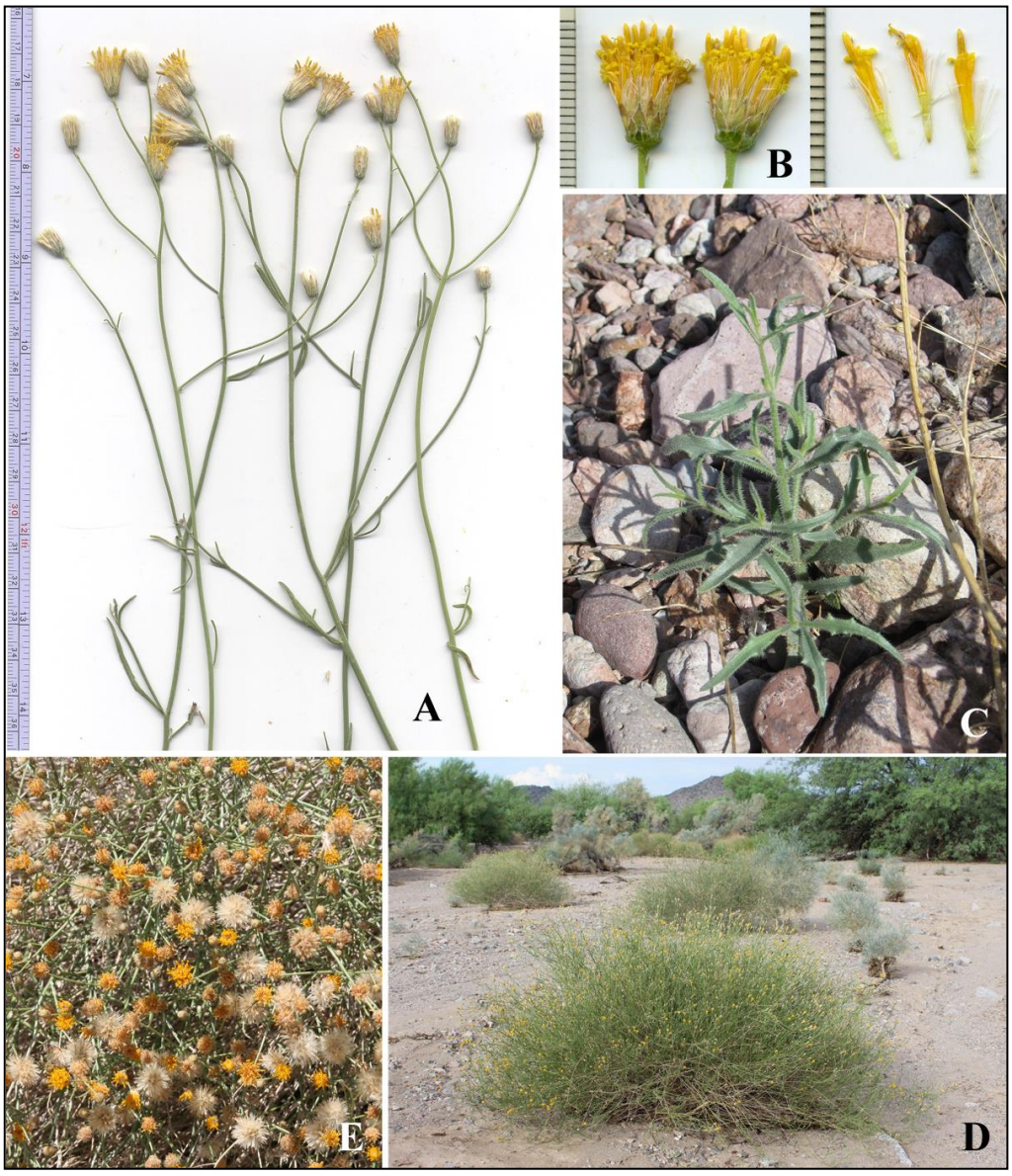


Figure 27. *Bebbia juncea* var. *aspera*. (A) Canyon, N side of Little Ajo Mts, 2 Oct 2013. (B) Estes Canyon, 8 Sep 2014. Alamo Wash near Hwy 85: (C) leaves from new shoot, 21 Jan 2013; (E) 7 May 2006. (D) Aguajita Wash at Mex Hwy 2, Sonora, 2 Aug 2014.

Globose, weakly wooded shrubs or subshrubs, intricately branched with slender, brittle stems. Branches and leaves opposite, or alternate above; herbage scabrous. Foliage sparse, quickly drought-deciduous, plants leafless or nearly so much of the year; leaves mostly sessile, reaching 3–5.5+ cm long, but mostly smaller, linear to linear-oblanceolate, usually entire or the larger leaves with 1–several lobes. Flowers heads on long peduncles or stems, of disk florets, yellow and pleasantly fragrant, attracting numerous butterflies and many other insects. Achenes club-shaped, 2.3–3 mm long; pappus bristles plumose. Flowering response non-seasonal.

Common and widespread nearly throughout the flora area, especially on hot, dry bajadas, washes and canyons, and rocky slopes. It has been in the region for at least 10,800 years.

Southwestern United States and northwestern Mexico. Variety *juncea* occurs on the Baja California Peninsula.

**OP**: Ajo Mts: *Goodding 21 Nov 1934*; *Nichol 3 Jun 1937*. 10 mi S of Bates Well, 5 Mar 1940, *Benson 9907*. Dos Lomitas, 28 Jan 1978, *Bowers 1010*. Aguajita, 6 Apr 1988, *Felger 88-272*. †Puerto Blanco Mts, on ridge, achenes, 7560 to 9070 (3 samples).

**CP**: Heart Tank, *Simmons 2 Oct 1963*. Salazaria Wash, 12 Apr 1992, *Harlan 211*. Christmas Pass, 13 Apr 1992, *Harlan 273*. Observations: Heart Tank, 14 Jun 1992, *Felger*; Childs Mt, 2845 ft, 18 Aug 1992, *Felger*.

**TA**: Tinajas Altas, *Van Devender & Davis 5 Mar 1983*. Camino del Diablo, N of Raven Butte, 25 Oct 2004, *Felger 04-06*. Surveyors Road, E side Tinajas Altas Mts, 22 Nov 2008, *Felger 08-199*. †Butler Mts, achenes, 8160 ybp. †Tinajas Altas, achenes, 4010 to 10,750 ybp (8 samples).

**Brickellia** – Brickell-bush

Small shrubs. Leaves alternate or opposite, and petioled. Flower heads of disk florets. Phyllaries in several series, prominently striated (striped or ribbed), with scarious margins. Achenes slender, 10-ribbed; pappus of many persistent capillary bristles.

Central America and North America; 100 species. Eupatorieae.

1. Leaves oblanceolate, mostly narrowly so, 3 mm or less in width, the margins entire, the leaf blade and petiole not well-differentiated…… **Brickellia frutescens**
1. Leaves broadly ovate with toothed margins, mostly more than 5 mm wide, the petiole and blade conspicuously differentiated.

2. Leaves opposite (sometimes with some alternate leaves), often hastate ("eared" at base).
…… **Brickellia coulteri**
2. Leaves mostly alternate (often sub-opposite on young growth), not hastate.

3. Bark shredding in thin strips; leaves mostly less than 2.5 cm long, the petioles less than ¼ as long as leaf blades; blades rigid, relatively thick, with spinescent teeth; achenes 4–6 mm long.
…… **Brickellia atractyloides**
3. Bark not shredding; leaves mostly more than 2.5 cm long, the petioles ⅓ as long as leaf blades; blades sometimes thick but not rigid, toothed but not spinescent; achenes 3 mm long.
…… **Brickellia californica**

**Brickellia atractyloides** A. Gray var. **atractyloides**
Spiny-leaf brickell-bush. Figure 28.

Subshrubs to about 30 (80) cm tall; stems slender, the bark shredding in thin strips. Herbage, peduncles, and phyllaries short glandular-pubescent or glabrate or glabrous, especially with age. Leaves mostly alternate, mostly 1.5–2.5 cm long, short petioled, the blades broadly ovate to nearly

triangular, firm with stout spinescent teeth; dry leaves moderately persistent. Heads many-flowered, solitary, on stout peduncles 2–5 cm long. Outer phyllaries 3.5–5 mm wide, leaf-like, broadly ovate, the inner phyllaries linear, 12–15 mm long. Flowers pale yellow and purplish. Achenes 4–6 mm long, blackish, with short white hairs; pappus 6–10 mm long. Flowering at least February and March.

Granitic mountains, often in rock crevices and canyon walls; western part of Cabeza Prieta and the Tinajas Altas Mountains; seldom common. Also on extrusive volcanic substrates in the Sauceda Mountains northeast of Organ Pipe. It has been in the Tinajas Altas Mountains for at least 15,700 years.

Western and central Arizona, northwestern Sonora, southeastern California, Colorado, Nevada, and Utah. Also two other varieties.

**CP**: Heart Tank, *Weaver 28 Apr 1970* (ASU). Eagle Tank, 13 Jun 1992, *Felger 92-583*. Tule Mts, N-facing canyon of granite, *Rutman 16 Feb 2002*.

**TA**: Tinajas Altas: *Vorhies 16 Apr 1924*; 29 Mar 1930, *Harrison 6578*. Borrego Canyon, N-facing granitic slope, 16 Jun 1992, *Felger 92-610*. Tinaja Altas Mts, 26 Oct 2004, *Felger 04-88*. †Tinajas Altas, leaves, involucres, achenes, 4010 to 15,680 ybp (13 samples).

Figure 28. *Brickellia atractyloides* var. *atractyloides*. Sedona, Coconino Co.: (A) 21 Apr 2001; (B) 3 Nov 2003. Photos by Max Licher (SEINet).

**Brickellia californica** (Torrey & A. Gray) A. Gray
California brickell-bush. Figure 29.

Shrubs to 1+ m tall, glandular pubescent. Leaves alternate, petioled, the blades often 2–8 cm long, ovate to deltate, the margins crenate to serrate. Inflorescences panicle-like, the flower heads elongated and somewhat cylindrical; phyllaries graduated, green and often purplish, the margins membranous; flowers pale yellow-green, 5.5–8 mm long. Achenes 2.5–3 mm long; pappus of white, barbellate bristles. Probably flowering at various seasons except winter, and especially after summer rains. The leaves are often thicker, larger, and more densely pubescent than those of *B. coulteri*, and not rigid like those of *B. atractyloides*.

Known from the flora area by a single record from the Ajo Mountains. It occurs east of the flora area in Pima County.

Southwestern United States northward to Idaho, and northwestern Mexico.

**OP**: Bull Pasture Trail, 2700 ft, 5 Nov 1977, *Bowers 929* (ORPI).

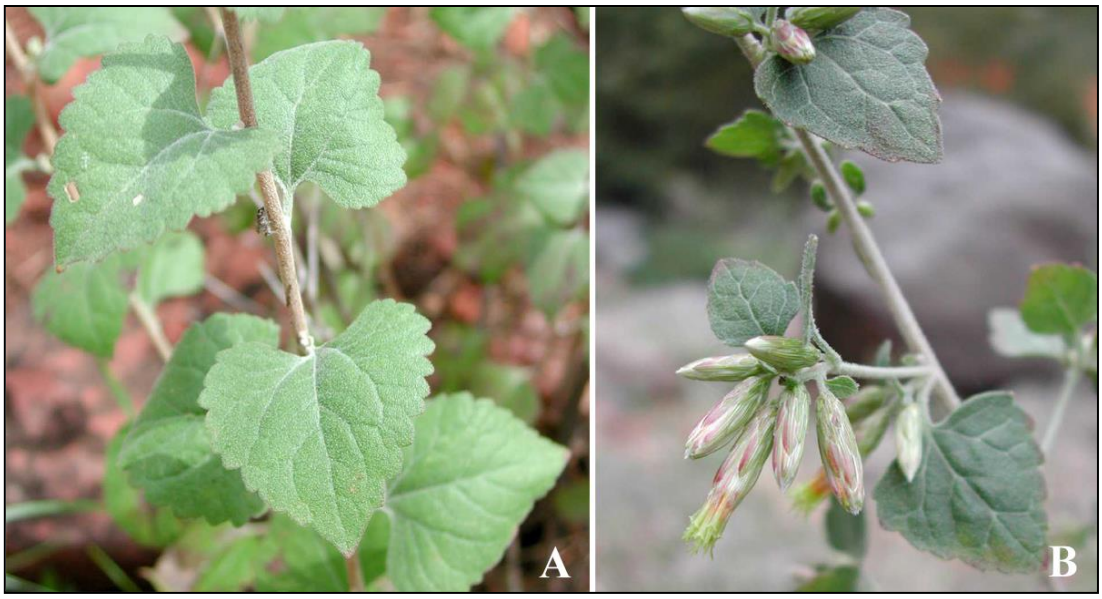


Figure 29. *Brickellia californica*. Sedona, Coconino Co.: (A) 9 Aug 2001; (B) 26 Sep 2002. Photos by Max Licher (SEINet).

**Brickellia coulteri** A. Gray var. **coulteri**
Triangle-leaf brickell-bush; *pachaba*. Figure 30.

Shrubs to 1 (1.5) m tall, with slender, brittle stems, pubescent and often gland-dotted, gradually drought deciduous. Herbage and outer phyllaries with glandular and crinkly white hairs. Leaves mostly opposite, petioled; blades often 3–6+ cm long, reduced above, relatively thin, ovate to triangular, green or purplish green, the base often hastate, the margins coarsely toothed. Flower heads in relatively few-flowered open panicles; heads 10+ mm long, cylindrical to narrowly campanulate. Phyllaries graduated, green to reddish purple, linear-attenuate, conspicuously striate-veined, the longer phyllaries 8–11 mm long. Flowers pale yellowish and purple. Achenes 2.5–4.5 mm long, blackish with short white hairs; pappus of barbellate bristles 5.5–7 mm long. Flowering at various seasons.

Often in washes and canyons in hills, bajadas, valley floors, as well as rocky slopes and mountains; often beneath desert trees such as *Olneya*. Widespread in Organ Pipe and the eastern part of Cabeza Prieta. It was in the Tinajas Altas Mountains from at least 5000 to 11,000 years ago, but there are no records for it there today.

Variety *coulteri* largely in the Sonoran Desert Region in Arizona and northwestern Mexico. Two other varieties in southwestern United States and Mexico.

**OP**: Bates Well, 15 Nov 1939, *Harbison 26143*. Rancho Bonito, 8 Dec 1939, *Harbison 26212* (SD). Arch Canyon, 28 Mar 1965, *Niles 542*. 4 mi N of Visitor Center, *Johnson 10 Nov 1983*. Bull Pasture, 10 Apr 2005, *Felger 05-225* (ARIZ, ASU).

**CP**: Base of Scarface Mt, 1650 ft, *Autenreith 20 Mar 1992* (ASC). Childs Mt, 2240 ft, 9 Apr 1993, *Felger 93-271*. Vicinity of Agua Dulce Pass, 13 Jun 1992, *Felger*, observation.

**TA**: †Tinajas Altas, twigs, involucres, 4490 & 10,950 ybp.

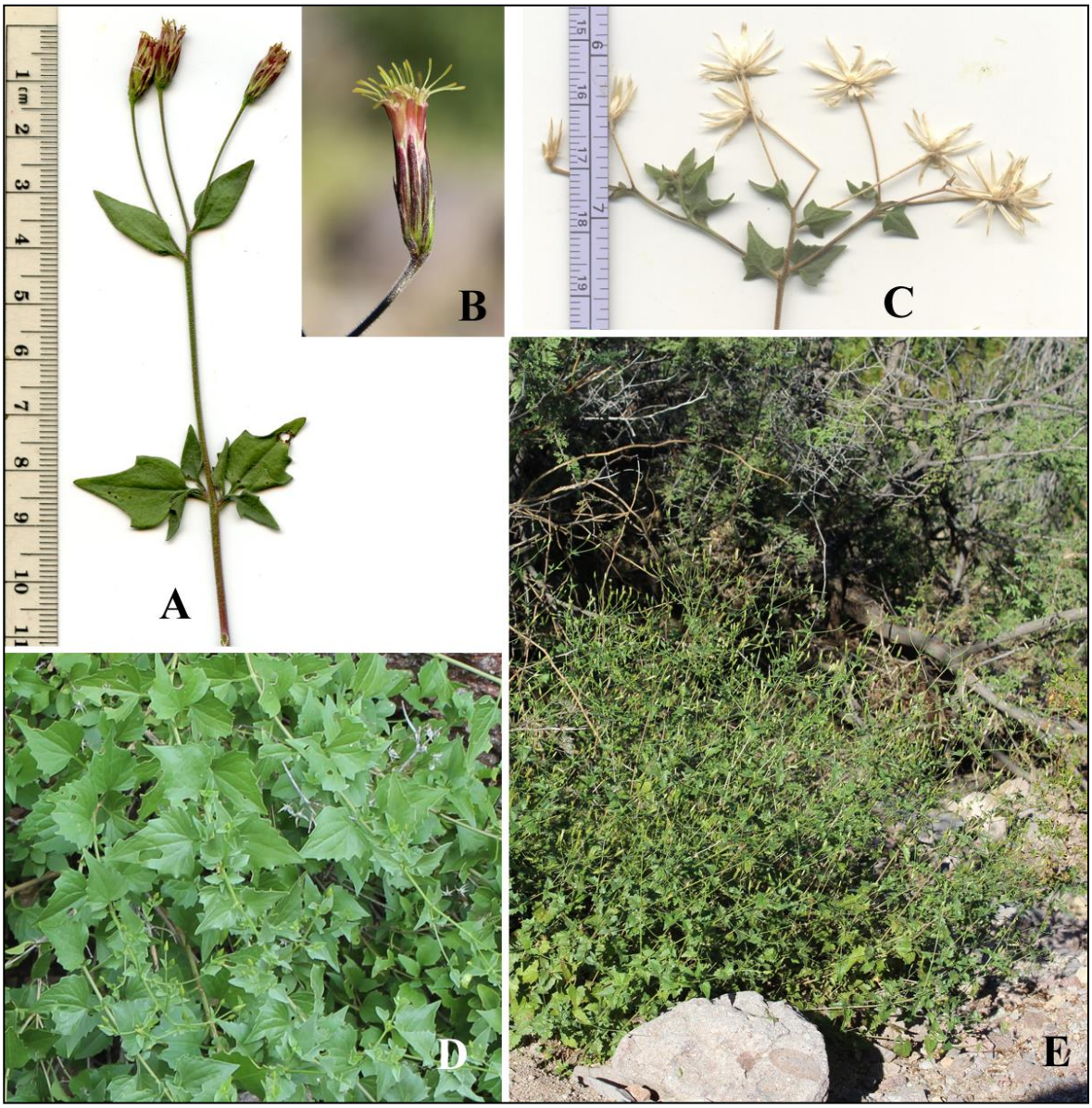


Figure 30. *Brickellia coulteri* var. *coulteri*. Alamo Canyon: (A) 22 Mar 2014; (B) 20 Oct 2013. (C) Victoria Mine, 22 Dec 2013. (D) Estes Canyon, 19 Sep 2014. (E) Chico Sunie Wash near Chico Sunie Village, 30 Oct 2014.

**Brickellia frutescens** A. Gray

Shrubby brickell-bush. Figure 31.

Small aromatic shrubs about 30 cm or more in height; gland-dotted. Leaves alternate, petioles very short, the blades oblong to spatulate, to 1.5 (2) cm long; margins entire. Inflorescences panicle-like, the heads cylindrical, 2 cm long, mostly greenish with small whitish flowers. Phyllaries graduated, often purple-tinged, the margins membranous. Florets purple-green. Achenes 3.5–4 mm long; pappus of white, barbellate bristles. Flowering at least March–May.

Ajo and Puerto Blanco mountains, especially at higher elevations on rocky slopes.

Distribution limited in southwestern Arizona; also southeastern California, southern Nevada, and Baja California.

**OP**: Canyon N of Alamo Canyon, 3000 ft, infrequent on rocky slope, 31 Mar 1948, *Darrow 3841*. Saddle between Boulder and Arch Canyon, 3800 ft, 3 May 1978, *Bowers 1289*. Bedrock tuff, ridgeline NNE slopes of Pinkley Peak, Puerto Blanco Mts, 31 Oct 2003, *Rutman 20031031-20*. Trail from The Cones to Mount Ajo, 4090 ft, 10 Apr 2005, *Felger 05-279*.

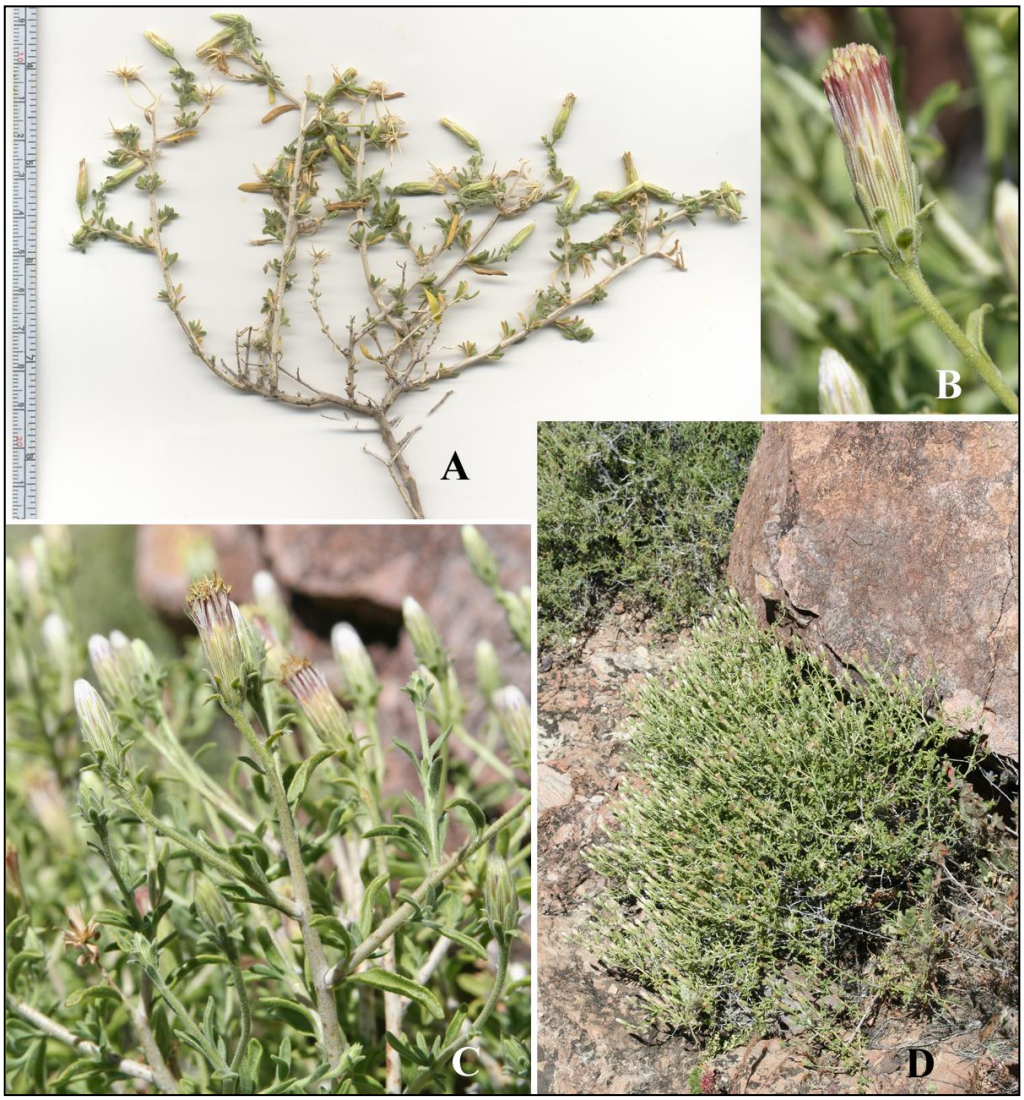


Figure 31. *Brickellia frutescens*. (A) Saddle between Boulder and Arch canyons, 21 Sep 2008. (B, C & D) Above Bull Pasture on trail to Mount Ajo, 10 Apr 2005.

†**Brickellia** sp.

**OP**: †Alamo Canyon, achenes, involucres, 14,500 to 32,000 ybp (3 samples).

**Calycoseris**

A genus of two species. Cichorieae.

**††Calycoseris parryi** A. Gray
Yellow tack-stem

Cool-season ephemerals present in the region more than nine millennia ago. The nearest present-day population occurs in the Sierra Pinacate in northwestern Sonora. Mostly a Mojave Desert species, also in the Sonoran Desert; southern and western Arizona, southeastern California, Nevada, and Utah. This species is distinguished from *C. wrightii* by its yellow rays, deeply grooved achenes and otherwise smooth achene surfaces.

**OP**: †Alamo Canyon, achenes, 9570 ybp.
**TA**: †Tinajas Altas, achenes, 9230 & 9900 ybp.

**Calycoseris wrightii** A. Gray
White tack-stem. Figure 32.


Figure 32. *Calycoseris wrightii*. (A) Ajo, 7 Mar 2015. Sonoyta Valley, S of Diablo Mts on Ajo Mountain Drive: (B) Stalked glands on peduncle, 5 Mar 2005; (C) 29 Feb 2008.

Spring ephemerals with milky sap and conspicuous tack-shaped glandular hairs. Leaves pinnately parted into narrow segments, the early leaves in a basal rosette, 3–10 cm long and often withering by flowering time, the stem leaves alternate and reduced upwards. Flowers nodding in bud, the florets ligulate (ray-like), the rays 10–20+ mm long, white with reddish streaks on the lower surfaces. Achenes 7 mm long, narrowed above into a neck or beak. Pappus bristles white, thread-like, readily deciduous.

Widely scattered across the region on sandy and gravelly, or gravelly-rocky, soils of floodplains, valley plains, dunes, bajadas, canyons, and mountains; not recorded for the westernmost part of Cabeza Prieta although recorded along Coyote Wash in the Tinajas Altas Region.

Southeastern California eastward across most of northern Sonora and Arizona to western Texas, and northward to Nevada and Utah.

**OP**: W base of Ajo Mts, 14 Mar 1941, *Benson 10657*. Sonoyta Hills, 25 Mar 1944, *Clark 11464* (ORPI). Near Dripping Springs, 16 Apr 1952, *Parker 7926*. Wash 2 mi W of Hwy 85 on 2-way Puerto Blanco Drive, 11 Apr 1978, *Bowers 1212*. Upstream from Bates Well, 11 Mar 2003, *Felger 03-287*.
**CP**: Near Charlie Bell Pass, 9 Apr 1993, *Felger 93-340*. Charlie Bell Road at Daniels Arroyo, 10 Apr 1993, *Felger 93-341*. 3 mi N of Tule Well, 11 Apr 1993, *Felger 93-446*.
**TA**: Coyote Water, 21 Feb 2005, *Felger 05-145*.

***Carthamus**

Native to the Mediterranean Region; 14 species. Cynareae.

****Carthamus tinctorius** Linnaeus
Safflower; *cártamo*. Figure 33.

Spring ephemerals in the flora area, glabrous, the stems stout and whitish. Leaves alternate, firm, the margins with spine-tipped teeth or entire. Heads thistle-like, 4–5 cm across, with large, bright yellow-orange disk florets. Achenes 7–7.5 mm long, white and plump; pappus none.

Occasional along roadsides and in disturbed habitats at the southern margin of Organ Pipe; not reproducing. The seeds are from harvested plants on trucks plying nearby Mexico Hwy 2. Safflower is a common oil-seed crop in Sonora.

Native to the Old World.

**OP**: Quitobaquito, 10 May 1979, *Bowers 1717* (ORPI).

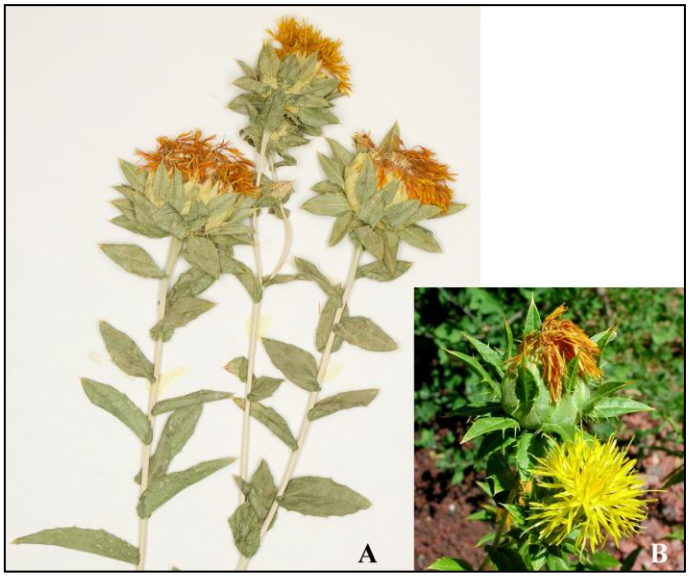


Figure 33. *Carthamus tinctorius*. (A) Buckeye, Maricopa Co., 7 Jun 1975, *Engard 544* (DES). (B) Sedona, Coconino Co., 26 Jun 2001, photo by Max Licher (SEINet).

***Centaurea**

Native to Eurasia and northern Africa; 500 species. Cynareae.

***Centaurea melitensis** Linnaeus

Malta star thistle. Figure 34.

Thistle-like ephemerals, often 50–60 cm tall, or to 1 m or more when well watered and in partial shade. Herbage and phyllaries glandular and grayish with tangled woolly hairs at least when young. Lower leaves in a rosette, pinnatifid, 5–15+ cm long, the stem leaves smaller and with decurrent bases forming narrow wings on the stems. Phyllaries with a stout, straw-colored terminal spine and 2 or 3 pairs of smaller, lateral spines. Flower heads 1.5–2+ × 2.2–2.8 cm including phyllary spines. Flowers bright yellow, with disk florets but the marginal ones often ray-like and sterile; spring and early summer. The first flower heads develop in the rosette stage in early spring before the stems develop. Achenes ca. 2.5 mm long, minutely pubescent; pappus of numerous firm, white bristles.

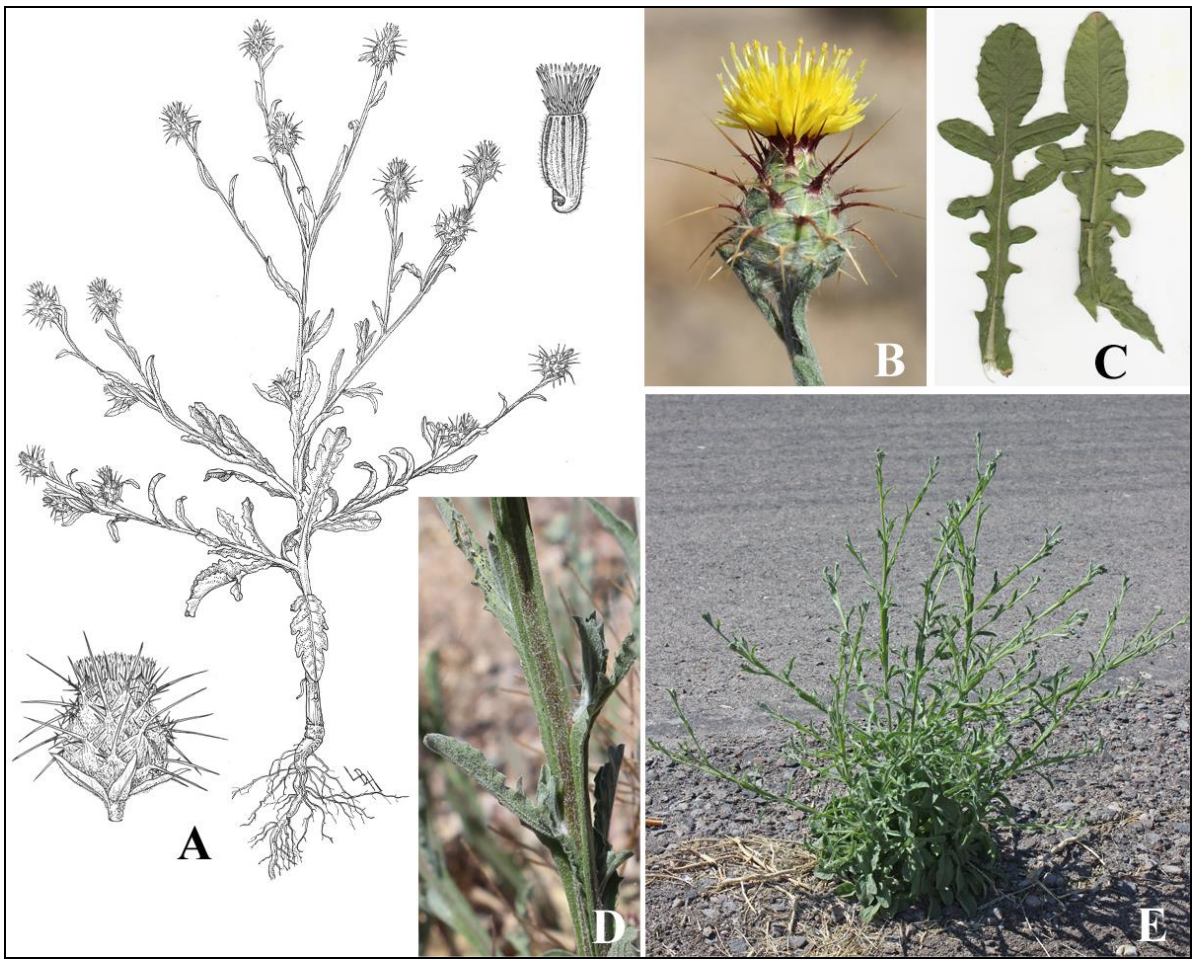


Figure 34. *Centaurea melitensis*. (A) By Lucretia Breazeale Hamilton. Near Ajo Way and Sandario Road, Tucson: (B, D & E) 16 Apr 2014; (C) 11 Apr 2010.

Known from two localities in the flora area where it is locally well established but apparently not spreading. Since the 1990s there has been an active program to eradicate it in Organ Pipe, but it will probably take a number of years to deplete the seed bank.

Scattered in mostly disturbed habitats across the Sonoran Desert. Widespread and weedy in the Americas; native to southern Europe and North Africa.

**OP**: Quitobaquito, old irrigation ditch below the pond, locally common, 19 Jun 1989, *Felger 89-251*.
**CP**: Jose Juan Tank, beneath mesquites (dead plants from previous spring), 14 Sep 1992, *Felger 92-716.*

**Chaenactis**

Spring ephemerals. Leaves alternate, pinnatisect with linear segments. Flower heads of white or pink disk florets, but the marginal florets often enlarged and appearing intermediate between disk and ray florets. Achenes club-shaped; pappus of fringed scales.

North America including Mexico; 18 species. Heliantheae**,** Chaenactidinae.

1. Stems with short white hairs, not cobwebby; phyllaries tips slender and elongated; heads with stout receptacle bristles among the florets; pappus scales 1–3 mm long…… **Chaenactis carphoclinia**
1. Herbage with cobweb-like woolly hairs; phyllary tips blunt; receptacle bristles none; pappus scales 3.5–6.5 mm long……...….... **Chaenactis stevioides**

**Chaenactis carphoclinia** A. Gray var. **carphoclinia**
Pebble pincushion. Figure 35.

Stems to about 25 cm tall, wiry, zigzag, solitary or with several or more branches above. Herbage with short white hairs, sometimes scarcely white woolly; herbage and phyllaries minutely glandular pubescent, or the leaves sometimes only sparsely glandular. Leaves pinnatisect with linear-filiform segments, the larger leaves 3–7 cm long, quickly drought deciduous. Heads rounded, 10–14 mm long; flowers white or pink. Phyllaries 6–10 mm long, extending into a slender, attenuate, bristle-like tip. Receptacle bristles interspersed among the florets. Achenes 3–4 mm long, columnar, blackish; pappus of 4 (5) scales.

Sandy flats, washes, desert pavements, rocky flats, and rocky slopes; often seasonally abundant and widespread, especially in sparsely vegetated places. It has been in Alamos Canyon for more than 1200 years.

Northwestern Sonora and Baja California to Utah and Nevada.

**OP**: Sonoyta Hills, *Clark 11473* (ORPI). 10 mi N of junction of Bates Well Rd and Puerto Blanco Drive, 30 Mar 1978, *Bowers 1118*. ¾ mi W of Bates Well, 23 Feb 2003, *Rutman 2003-186* (ORPI). Santa Rosa Mts, 12 Mar 2003, *Felger 03-352*. †Alamo Canyon, achene slender, 4.7 mm long, blackish, appressed white hairs, with four frayed pappus scales probably originally entire, the longest one 2.5 mm, 1150 ybp.
**CP**: Davidson Canyon, Agua Dulce Mts, 8 Apr 1979, *Lehto L23606* (ASU). Charlie Bell Pass, 3 Apr 1992, *Whipple 3942*. Las Playas, 10 Apr 1993, *Felger 93-383*. Pinta Sands, 11 Apr 1993, *Felger 93-403*.
**TA**: Tinajas Altas, *Van Devender 26 Mar 1983*.

Figure 35. *Chaenactis carphoclinia* var. *carphoclinia*. Aguajita Wash at South Puerto Blanco Drive, 15 Mar 2015.

**Chaenactis stevioides** Hooker & Arnott
Desert pincushion. Figure 36.

Plants often 15–35 cm tall, moderately to densely and minutely glandular pubescent, the herbage, especially when young, sparsely to moderately white-woolly. Leaves pinnatisect with linear segments, the larger leaves 3–10 cm long, quickly drought deciduous. Flower heads 14–17 mm long, rounded, white or cream, the corollas pink in bud. Phyllaries 5–9 mm long, the tips blunt. Achenes 5.5–6 mm long, columnar, blackish; pappus of mostly 4 scales. The plants are generally more robust than those of *C. carphoclinia*. Flowering February into April.

Mostly on sandy flats and silty soils of valley bottoms, also on dunes and rocky slopes. It has been in the region for at least 9950 years.

Southwestern United States to Oregon and Colorado, and Baja California, Baja California Sur, and northern Sonora.

**OP**: Alamo Canyon: *Nichol 14 Mar 1939*; 5 Apr 1978, *Bowers 1197*. E of Quitobaquito, 25 Mar 1944, *Clark 11495* (ORPI). Dripping Springs, Puerto Blanco Mts, 12 Apr 1978, *Bowers 1255*. Growler Canyon, 30 Mar 1979, *Bowers 1598*. NE of Bates Mts, 23 Mar 2003, *Rutman 2003-403* (ORPI). Trail above Bull Pasture, 3220 ft, 10 Apr 2005, *Felger*, observation. †Alamo Canyon, two achenes, slender, 5.5 mm long, blackish, appressed white hairs, with four frayed pappus scales 4 mm long, linear-oblong, probably originally entire, 8130 ybp.

**CP**: 7 mi from Papago Well, 14 Mar 1937, *Harbison 17001* (SD). O'Neill Hills (Simmons 1966). San Cristobal Wash, 20 Mar 1992, *Telewski 4*. Growler Wash, 10 Apr 1993, *Felger 93-369*. Pinta Sands, 11 Apr 1993, *Felger 93-402*.

**TA**: W side of Tinajas Altas Pass, *Lindquist 26 Mar 1983*. †Tinajas Altas, achenes, 9900 ybp.

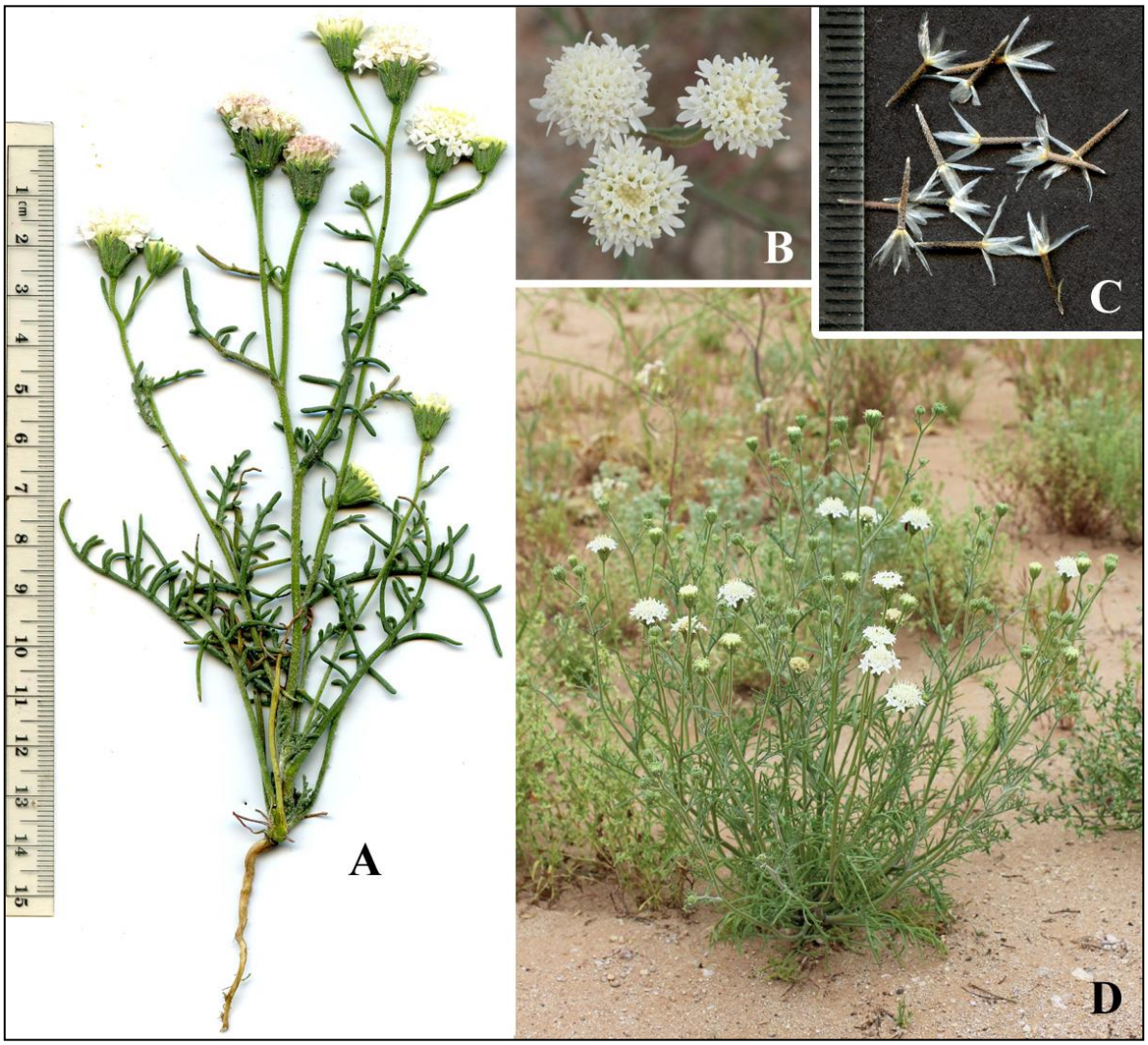


Figure 36. *Chaenactis stevioides*. (A) Ajo, 23 Mar 2015. (B) Upper Sonoyta Valley, southern part of Ajo Mountain Drive, 2 Mar 2008. (C) Hwy 86, 11 mi E of Why, 5 Apr 2015. (D) Large wash crossing Hwy 85 near mile marker 28, 18 Mar 2015.

**Cirsium** – Thistle

North America, Eurasia, and north Africa; 200 species. Cynareae.

**Cirsium neomexicanum** A Gray
New Mexico thistle; *cardo*; gewel. Figure 37.

Prickly thistles to about 1.7 m tall, with a stout, pithy, usually solitary main stem and sparsely branched above. Apparently ephemerals or annuals, or perhaps biennials (generally biennial herbs elsewhere). Beginning as rosette plants during the cool season and flowering in late spring. Rosette leaves to 30 cm long, pinnatifid and coarsely toothed and spiny; stem leaves with decurrent spiny bases forming wings on the stem. Flowers heads about 6+ cm long, the involucre globose, about 2–3 cm long, with spiny phyllaries, the flowers discoid, pale lavender. Achenes with plumose pappus bristles.

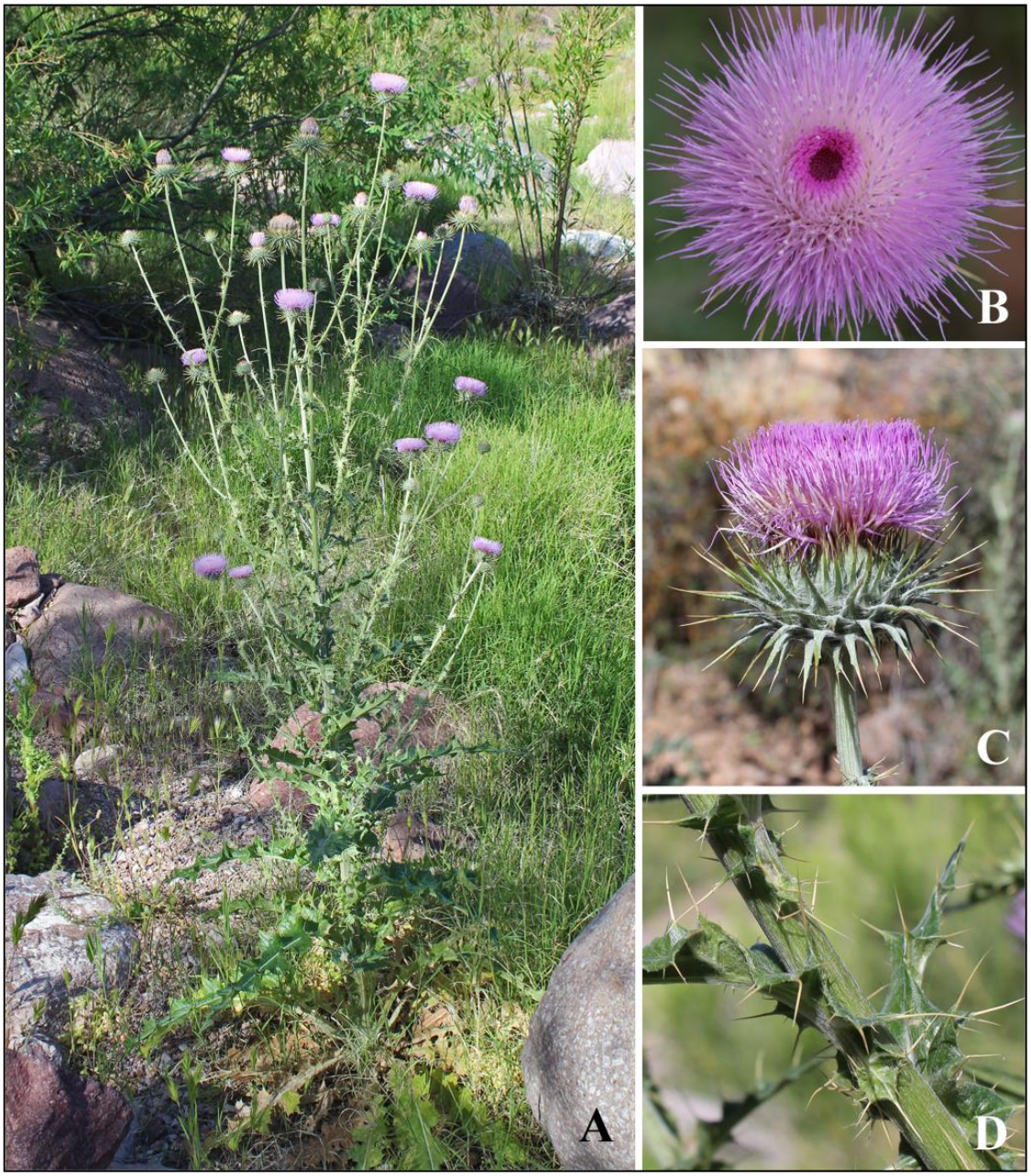


Figure 37. *Cirsium neomexicanum*. Alamo Canyon: (A) 16 Feb 2005; (D) 4 Apr 2015. Bull Pasture: (B) 7 Mar 2014; (C) 18 Mar 2005.

Ajo Mountains, especially at middle to higher elevations; common in Alamo Canyon and the Bull Pasture area. An unidentified thistle, perhaps this species, grew in the Ajo Mountains from 1200 to 20,500 years ago.

Southwestern United States and northwestern Mexico, and entering the Sonoran Desert only at its margins.

**OP**: Alamo Canyon, *Nichol 4 May 1939*. Canyon N of Alamo Canyon, 3000–3800 ft, *Gould 31 Mar 1948*. *Cirsium* cf. *neomexicanum*: †Alamo Canyon, phyllaries, achenes, 1150 to 29,110 ybp (5 samples). †Montezuma's Head, phyllaries, 20,490 ybp.

**Diaperia**

Southern United States and northern Mexico; 3 species. Gnaphalieae.

**Diaperia verna** (Rafinesque) Morefield var. **verna**
[*Evax multicaulis* de Candolle. *E. verna* Rafinesque. *Filago verna* (Rafinesque) Shinners var. *verna*]
Spring pygmy cudweed, rabbit tobacco. Figure 38.

Diminutive, white-woolly spring ephemerals mostly less than 10 cm tall. Leaves alternate, sessile, to about 10 mm long, mostly oblanceolate, and entire. Flower heads rounded, 2–3 mm wide, white-woolly. Achenes 0.7–0.9 mm long; pappus none. Unless closely examined the plants might be confused with other small gnaphalids (*Gamochaeta, Logfia*, and *Stylocline*)—the absence of a pappus is diagnostic.

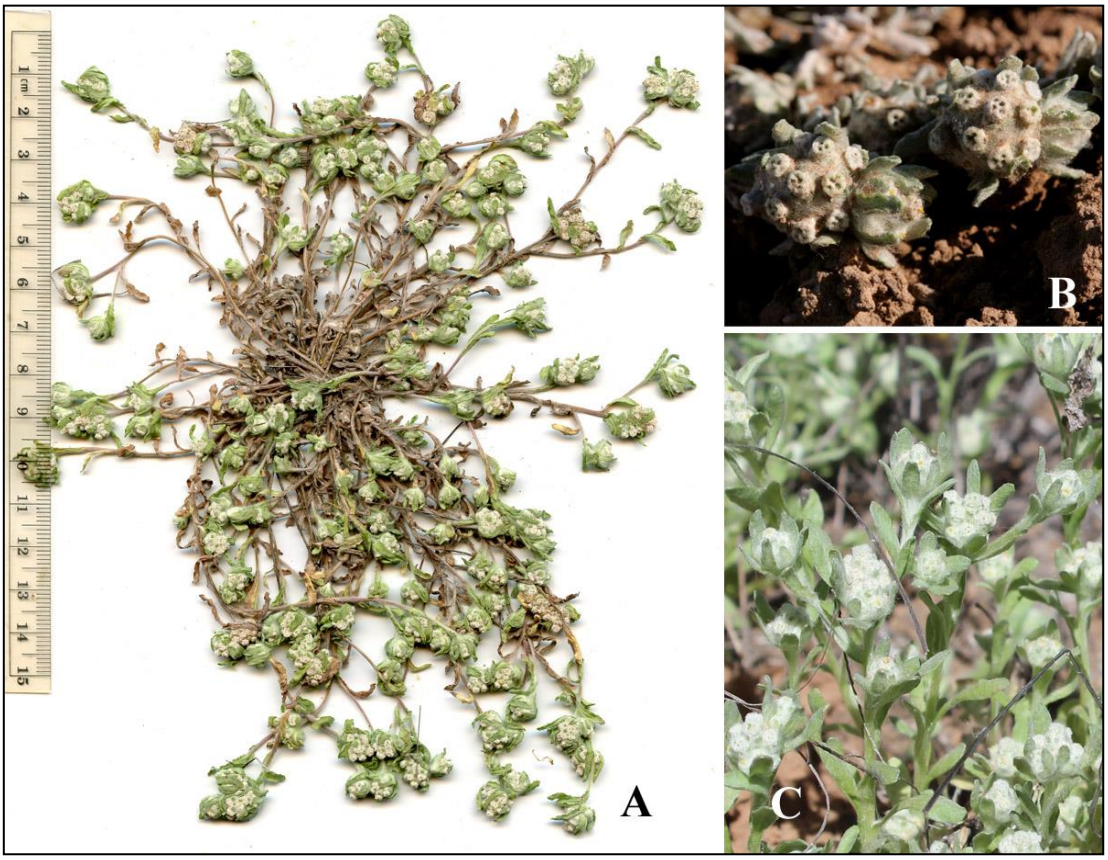


Figure 38. *Diaperia verna* var. *verna*. (A & C) Kuakatch Wash near N boundary of Organ Pipe, 9 Mar 2015. (B) NW of Carlsbad, Eddy Co., NM, 14 Apr 2007, photo by Patrick Alexander.

Southern United States from Arizona eastward, and northern Mexico; another variety occurs in Texas and Alabama.

**OP**: Flat near Kuakatch Wash, W of powerline, 28 Feb 2003, *Rutman 2003-195* (ORPI). Cuerda de Leña Wash near N boundary, 23 Mar 2003, *Rutman 2003-391*. Wash E of Dos Lomitas, 31 Mar 2003, *Rutman 2003-438*. Floodplain near N end of Pozo Nuevo Hills, 11 Apr 2003, *Rutman 2003-452* (ORPI).

**CP**: San Cristobal Wash, 3.2 mi WSW of boundary of Game Range, 1050 ft, wash, mesquite, *Larrea*, 11 Apr 1978, *Reeves 6827* (ASU, det. James D. Morefield 1992, mixed collection with *Filago arizonica*). San Cristobal Wash, 11 Apr 1992, *Steinmann 167*.

**Dicoria**

Dunes in northwestern Mexico and southwestern United States; 5 species. Heliantheae, Ambrosiinae.

**Dicoria canescens** A. Gray subsp. **canescens**
Bugseed. Figure 39.


Figure 39. *Dicorea canescens*. (A) Drawing by Francis Runyan. (B & C) Gran Desierto, near Mex Hwy 2, 5 Mar 2014. (D) Dunes S of Sierra Blanca, Sonora, 18 Feb 2015.

Robust annuals with coarse white hairs, generally growing with cool-season rains, flowering in summer and fall. Herbage gray-green with coarse white hairs; young plants have narrow leaves and the adult plants have broader and shorter leaves. Lower leaves opposite, upper ones alternate; most leaves 3.5–6 cm long, broadly ovate to sub-orbicular and shallowly toothed to nearly entire. Heads of disk florets only; flowers inconspicuous, wind pollinated, the staminate florets with a small corolla, the pistillate florets lacking a corolla. Phyllaries dimorphic; the outer phyllaries small and

reflexed, the inner ones much larger, convex, and loosely enclosing the achenes in an involucre resembling a paper lantern. Achenes 4–5.5 mm long, flat with intricately sculptured margins, seemingly well adapted to wind dispersal; pappus none.

Common on the Mohawk Dunes, near Yuma, and near the flora area in the Gran Desierto of northwestern Sonora. Not recorded from the flora area but possibly occurring west of Tinajas Altas and on dunes in Cabeza Prieta.

Often the most abundant plant on shifting dunes in northwestern Sonora and southwestern Arizona. Northwestern Sonora, northeastern Baja California, western Arizona, southeastern California, southern Nevada, southwestern Utah. Two subspecies and several varieties of questionable significance in the northern part of the range.

**Dieteria**

Western North America and northern Mexico; 3 species. A genus segregated from *Machaeranthera*. Astereae.

**Dieteria asteroides** Torrey var. **glandulosa** (B.L. Turner) D.R. Morgan & R.L. Hartman
[*Machaeranthera asteroides* (Torrey) Greene var. *glandulosa* B.L. Turner]
Fall tansy-aster. Figure 40.

Ephemerals or short-lived perennials, to 80 cm tall. Herbage and phyllaries with gland-tipped hairs. Leaves alternate, sessile, lanceolate to oblanceolate, 2–10 cm long, the margins toothed or smaller leaves often entire. Flower heads hemispheric, the involucres 1–1.5 cm wide, the phyllaries graduated. Disk florets yellow, the rays violet, 1–2 cm long, becoming inrolled. Ray and disk achenes with a pappus of numerous slender, tan bristles 4.5–9 mm long; disk achenes 4.5–5 mm long.

Ajo Mountains to peak elevation.

Variety *glandulosa* occurs in southern Arizona to Utah, New Mexico, and Sonora. Two other varieties in northwestern Mexico and southwestern United States.

**OP**: Alamo Canyon, l8 Dec 1945, *Goodding & Supernaugh 485-45*. Arch Canyon, *Wirt 30 Sep 1989* (ORPI). Bull Pasture Trail: *Cummins 11 Oct 1976*; 5 Nov 1977, *Bowers 955*; 25 Sept 2013, *Rutman 20130925-9*. Puerto Blanco Drive, *Bowers 1756* (ORPI).

*Dyssodia concinna*, see **Thymophylla concinna**

*Dyssodia pentachaeta*, see **Thymophylla pentachaeta**

*Dyssodia porophylloides*, see **Adenophyllum porophylloides**

**Eclipta**

Native in temperate to tropical regions of the New World; 4 species. Heliantheae, Ecliptinae.

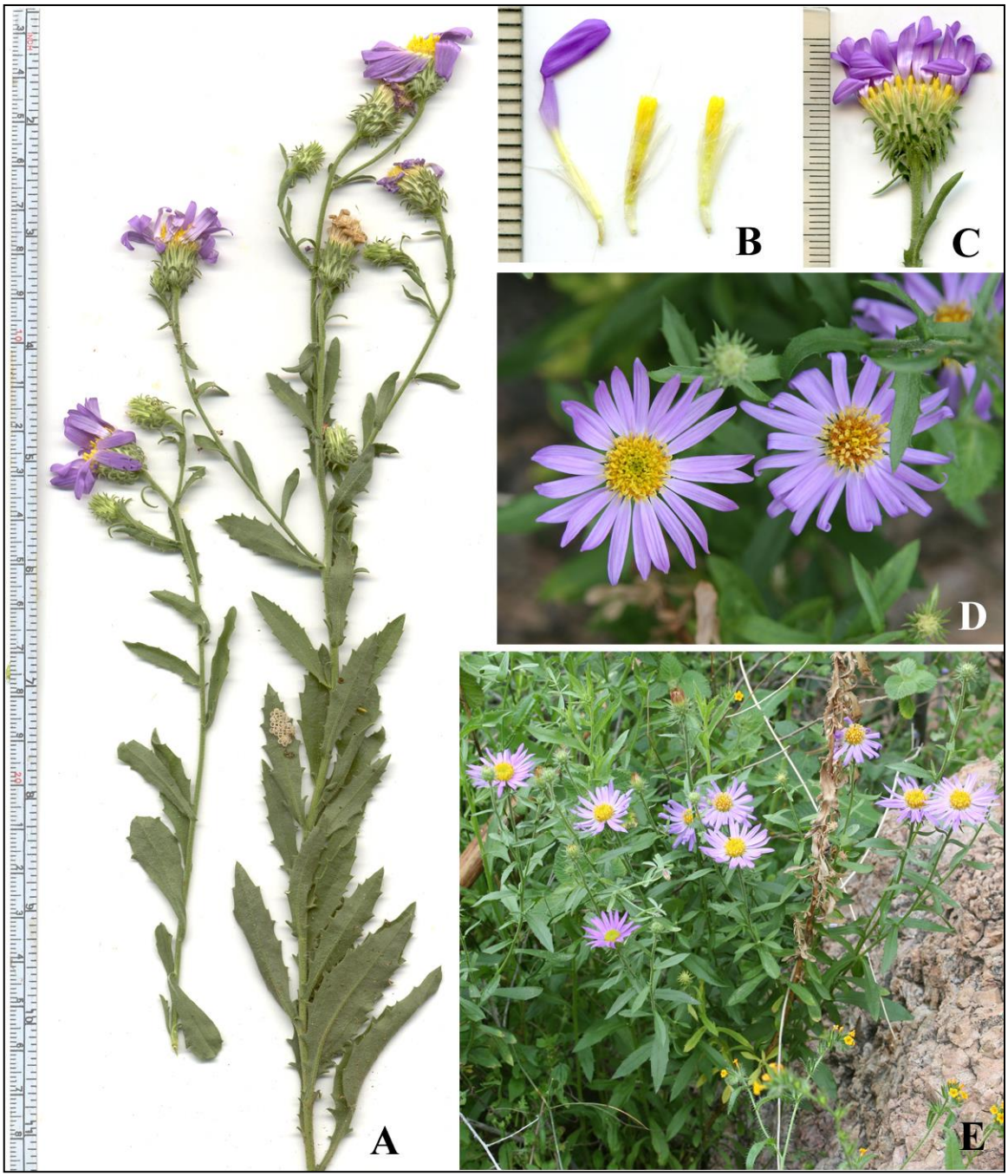


Figure 40. *Dieteria asteroides* var. *glandulosa*. Trail to Bull Pasture: (A) 21 Sep 2008; (B & C) 8 Sep 2014. (D & E) Bull Pasture, 18 Mar 2005.

**Eclipta prostrata** (Linnaeus) Linnaeus
[*E. alba* (Linnaeus) Hasskarl. *E. erecta* Linnaeus]
False daisy; *chile de agua, hierba del tajo*. Figure 41.

Delicate ephemerals, spring to winter, flowering more or less continuously during warm weather and winter dormant, or the plants killed by the first frost. Leaves 5–14 cm long, sessile, mostly narrowly elliptic; margins with few, small teeth. Flower heads 4–7 mm wide, the rays white,

numerous, and minute, the disk florets yellow. Achenes 2.5–3 mm long, 3- or 4-angled, wrinkled and warty; pappus none or rudimentary.

Rooted in water along ditches at Quitobaquito and nearby in wetlands in the Sonoyta region.

Widespread in the Americas and widely naturalized in the Old World.

**OP**: Quitobaquito: Growing along ditches, *Drouet 8 Oct 1960*; Ditches leading from springs to pond, 27 Mar 1966, *Niles 724* (ARIZ, ASU).

Figure 41. *Eclipta prostrata*. NE of Moctezuma, SW base of Sierra la Madera, Sonora, 28 Jul 2011, photos by M. Valenzuela-Yánez (MABA in SEINet).

**Encelia**

Small shrubs, usually pubescent. Leaves alternate. Ray florets sterile or absent; disk florets yellow or brown, and bisexual. Disk florets and achenes enclosed by chaffy bracts. Achenes flat, the margins narrow, white, and long haired; pappus none or of 2 slender awns.

Southwestern United States, Mexico, and South America; 14 species. Heliantheae, Ecliptinae.

1. Leaves and stem tips white-woolly; leaves mostly 3–10 cm long, 1.5–3.5 cm wide; heads usually several or more in broad panicles, the peduncles essentially glabrous; rays well developed. …….. **Encelia farinosa**
1. Leaves and stems rough haired (scabrous); leaves mostly 2–3 cm long, 0.35–0.6 (1) cm wide; heads mostly solitary, the peduncles hairy; rays none or sometime present but reduced. ……... **Encelia frutescens**

**Encelia farinosa** A. Gray ex Torrey
[*E. farinosa* forma *phenicodonta* S.F. Blake. *E. farinosa* var. *phenicodonta* (S.F. Blake) I.M. Johnston]
Brittlebush; *incienso, hierba del bazo, rama blanca*; tohaves. Figure 42.

Shrubs, mostly not long-lived, 0.5–1.6 m tall (excluding inflorescences), with a dense, rounded or hemispherical crown, often aromatic. Leaves drought deciduous or dry leaves semi-persistent, and highly variable with soil moisture, 3–10 cm long including petiole; blades 1.4–3.6 cm wide, mostly ovate, entire or nearly so, often white-woolly (conspicuously greener and thinner when

produced during wet periods, whiter and thicker when produced during dry times). Flowering branches of slender, usually few-branched panicles (8) 20–30 cm tall, usually raised well above the foliage; peduncles glabrate or sparsely woolly, especially near the flower heads. Rays bright yellow, 12–18 mm long, the disk florets yellow or maroon-brown. Achenes 3.5–5 mm long, flat, blackish, the body outlined with long white hairs; pappus none; the flower heads turn downward near the end of anthesis and the seeds ripen in that down-curved position, dumping out the achenes. Massive displays of showy daisy-like flowers during favorable seasons, especially in February and March.


Figure 42. *Encelia farinosa*. (A) By Lucretia Breazeale Hamilton. Estes Canyon: (B) 27 Feb 2014; (E) 18 Mar 2005. Organ Pipe headquarters area: (C) 7 Mar 2009; (D) 18 Jan 2009.

One of the most common shrubs in the region; in many habitats including all slope exposures and to most mountain summits, dry washes, and bajadas; generally not in open creosotebush flats and not on dunes. It has been in the area for more than 37,000 years.

The plants are frost sensitive and sometimes severely nipped by freezing weather; they are fast growing and can recover quickly from drought or freeze damage. Javelinas sometimes eat the flowers. Both color forms, those with brown centers, which have been called var. *phenicodonta*, and ones with yellow centers, occur in southwestern Arizona and northwestern Sonora, often intermixed.

Desert and semi-arid regions in northwestern Mexico and southwestern United States.

The yellowish resin that oozes from wounds in the stems becomes hard when dry, plastic when heated, and was used as glue or sealant for hafting arrows and waterproofing vessels (Felger & Moser 1985; Uphof 1968). Hia-Ced O'odham used it as chewing gum when soft and as bow resin for fiddles when hard (Philip Salcido in Felger et al. 1992). "We'd chew and chew it. . . . That's what the Indians used for gum" (Betty Melvin in Zepeda 1985: 76). The resin was also used for medicinal purposes and burned as incense (Felger & Moser 1985; Uphof 1968).

**OP**: Alamo Canyon, *Nichol 4 May 1939*. Victoria Pass near Burnham's Mine, 8 Apr 1941, *McDougall 55*. 2 mi WSW of Bates Well, 30 Mar 1978, *Bowers 1130*. Arch Canyon, 2550–2900 ft, 11 Mar 1983, *Daniel 2587* (ASU). †Alamo Canyon, leaves and mostly achenes, 1150 to 32,000 ybp (seven samples). †Montezuma's Head, achenes, 20,490 ybp. †Puerto Blanco Mts, on ridge, achenes, modern (30) to 10,540 ybp (20 samples).

**CP**: N side of Tule Mts, 2 Feb 1992, *Felger*, observation. ¾ mi NE of Agua Dulce Pass, *Vetault 17 Mar 1988*. Papago Well, 277 m, 11 Apr 1978, *Lehto L22486* (ASU). El Camino Diablo, 10.3 mi WSW of Papago Well, 12 Mar 1983, *Daniel 2677* (ASU).

**TA**: Tinajas Altas, 5 Dec 1935, *Goodding 2204*. 2.5 mi SE of Tinajas Altas, 22 Nov 2008, *Felger 08-200* (ARIZ, BRIT, DES). †Butler Mts, twigs, leaves, achenes, 740 to 11,250 ybp (7 samples). †Tinajas Altas, leaf fragments, achenes, 1230 to 18,700 (19 samples), & >37,000 ybp.

**Encelia farinosa × E. frutescens**

Several isolated plants of this putative hybrid have been found in Organ Pipe and the Tinajas Altas Region. The leaves are intermediate in shape from the presumed parent species, and the flower heads bear bright yellow rays.

**OP**: 2 mi by road WSW of Bates Well, 30 Mar 1978, *Bowers 1131*.
**TA**: Camino del Diablo, E of Raven Butte, 29 Nov 2001, *Felger 01-585* (ARIZ, ASU).

**Encelia frutescens** (A. Gray) A. Gray
Button encelia, rayless encelia. Figure 43.

Rounded shrubs often 0.9–1.5 m tall. Stems brittle and slender, densely hairy at first, glabrate and whitish with age. Herbage scabrous, the hairs white and often expanded basally. Leaves 17–32 × 3.5–6 (12) mm, sparsely hairy, petioled, the blades green, narrowly ovate to oblong. Flower heads solitary, 1.3–1.6 cm wide, rounded, with bright yellow disk florets, and without rays or occasionally with reduced rays. Achenes 7–10 mm long; pappus none. Flowering in warmer months.

Mostly on sandy loam or sandy soil of valley bottoms, margins of washes, and especially common along roadsides in sandy soil in the Pinta Sands, the western margin of Cabeza Prieta, and the Lechuguilla Valley.

Southeastern California, southwestern Arizona, northeastern Baja California, and northwestern Sonora.

Two varieties are often recognized. Variety *glandulosa* C. Clark occurs in northeastern Baja California. *Encelia frutescens* var. *virginensis* (A. Nelson) S.F. Blake is recognized as *E. virginensis* A. Nelson.

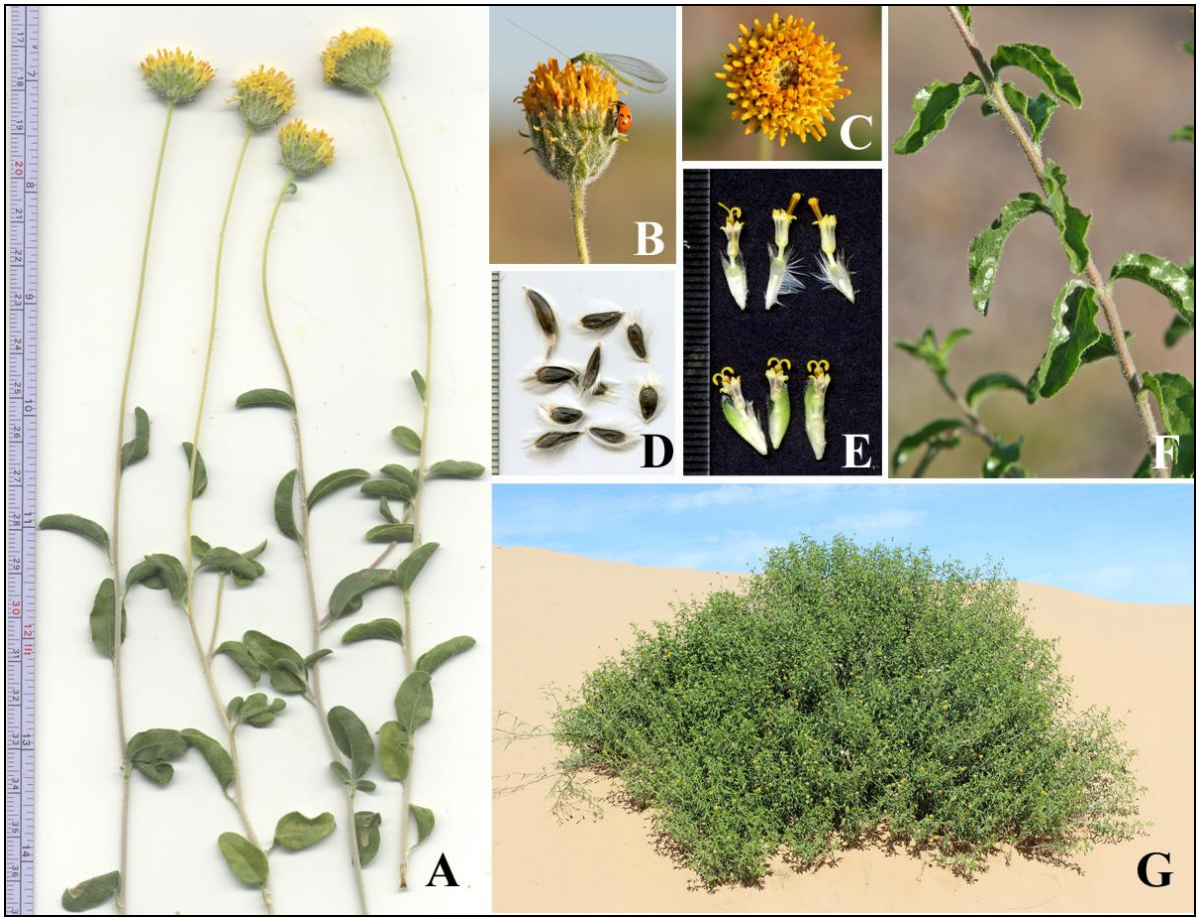


Figure 43. *Encelia frutescens*. Why: (A) 6 Oct 2013; (B & F) 14 Apr 2005; (C) 8 Apr 2005; (D) 12 Sep 2014. (E) Midway Wash near Hwy 85, 18 Mar 2015. (G) Gran Desierto, Mex Hwy 2, W of Pinacate lava field, Sonora, 5 Mar 2014.

**OP**: Quitobaquito, 25 Mar 1944, *Clark 11477* (ORPI). 2 mi WSW of Bates Well, 30 Mar 1978, *Bowers 1130*. Armenta Road, W of Hwy 85, *Rutman 16 Aug 2001* (ORPI).

**CP**: S4, T14S, R13W [NW of Pinacate Lava], 7 Apr 1979, *Lehto L23586* (ASU). Monreal Well, *Edwards 20 May 1978* (ASU). Pinta Sands at W side of Pinacate lava, along Camino del Diablo, 22 Mar 1992, *Telewski 106*.

**TA**: Coyote Water, 25 Oct 2004, *Felger 04-65*. Lechuguilla Valley along Camino del Diablo, immediately W of Cabeza Prieta, 28 Mar 2010, *Felger 10-159*.

**Ericameria**

Woody-based small shrubs, glabrous and resinous with dot-like glands (punctate). Flower heads with disk florets or both ray and disk florets. Achenes ribbed, with many minutely barbed pappus bristles.

Western North America and northern Mexico; 36 species. Astereae.

1. Leaves broadly spatulate (widest toward the tip), more than 3 mm wide; pappus about as long as the corolla…….. **Ericameria cuneata**
1. Leaves linear, less than 2 mm wide; pappus shorter than the corolla…… **Ericameria laricifolia**

**Ericameria cuneata** (A. Gray) McClatchie var. **spathulata** (A. Gray) H.M. Hall
[*Haplopappus cuneatus* A. Gray var. *spathulata* (A. Gray) S.F. Blake]
Wedge-leaf goldenbush. Figure 44.

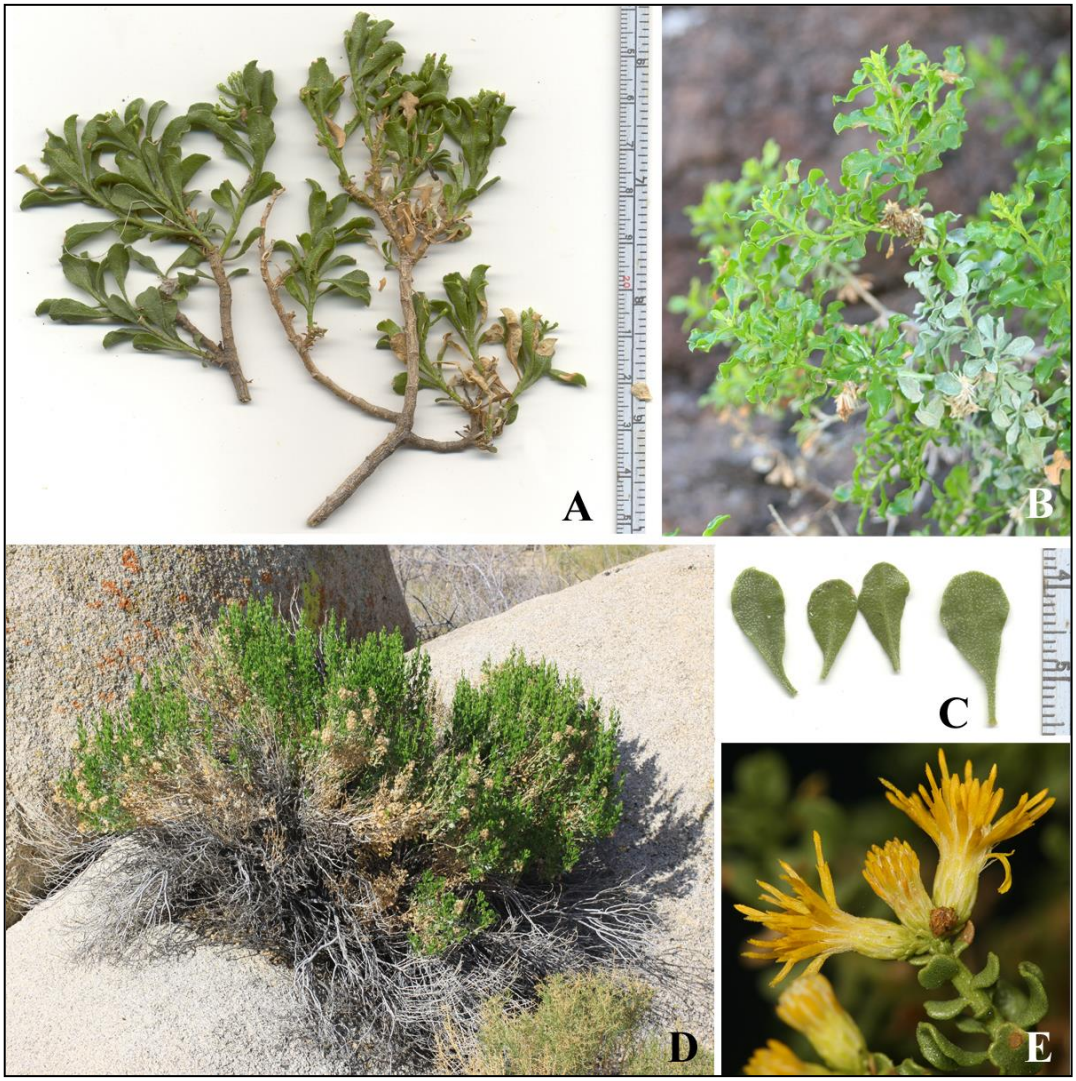


Figure 44. *Ericameria cuneata* var. *spathulata*. (A & C) Upper Estes Canyon, 21 Sep 2008. (B) Alamo Canyon, 12 Mar 2005. (D) Indian Cove, Joshua Tree National Park, CA, 30 Apr 2012. (E) White Mts, base of E side, Deep Springs Valley, Mono Co., CA, 15 Sep 2012, photo by Steve Matson (CalPhotos).

Dwarf shrubs to 80 (100) cm tall. Herbage and phyllaries gland-dotted; leaves petioled, the blades broadly spatulate, often 1–2.5 cm long. Flower heads crowded in short, terminal clusters, with bright yellow disk florets. Achenes 3–3.5 mm long, sub-cylindrical, brown, and with white hairs.

Ajo Mountains, mostly at higher elevations; often growing from crevices in cliffs and rock faces. Also isolated at higher elevation on a north-facing slope in the Growler Mountains in Cabeza

Prieta. It was more widespread during the late Wisconsin, and ranged across the flora area from about 9000 to more than 37,000 years ago.

Southern Nevada, southeastern California, southwestern Arizona and nearby Baja California and Sonora; entering the margins of the deserts.

**OP**: Estes Canyon, 3800 ft, *Henry 6 Nov 1977* (ORPI). Arch Canyon: 3000 ft, 3 Nov 1981, *Phillips 81-477* (MNA); 900 m, 2 Dec 1990, *Felger 90-513*. †Alamo Canyon, leaves, 9570 to 32,000 ybp (4 samples). †Montezuma's Head, leaves, 13,500 to 21,840 ybp (4 samples).

**CP**: Growler Mts, 0.8 mi S and 0.4 mi E Growler Peak, UTM 3567958, 309536, N-facing slope, 24 Mar 2009, *Holm 20090324-5* (ARIZ 310588, 412608; specimens not located, August 2016).

**TA**: †Tinajas Altas, leaves, 8970 to 15,680 ybp (4 samples), & >37,000 ybp.

**Ericameria laricifolia** (A. Gray) Shinners
[*Haplopappus laricifolius* A. Gray]
Turpentine bush. Figure 45.

Shrubs to 1 m tall with dense, bright green, and conspicuously resinous foliage. Herbage gland-dotted. Leaves linear to narrowly oblanceolate, 1–2 cm long, 1–2 mm wide. Flower heads crowded in short, terminal clusters; flowers bright yellow, with disk and ray florets (or rays sometimes absent), flowering October and November. Achenes 3–3.5 mm long, narrowly obconic, brown, densely pubescent with whitish hairs.

Ajo Mountains, especially at higher elevations; canyons, rocky slopes, and cliffs. It seems to have been very common in the late Wisconsin, and ranged across the flora area from about 9000 to 18,700 years ago. It has been in the Ajo Mountains for at least 32,000 years.

Southeastern California (in the eastern, upland part of the Mojave Desert in the summer rain zone) to western Texas and adjacent Sonora and Chihuahua, mostly at elevations above the desert.

**OP**: Pitahaya Canyon, *Nichol 23 Feb 1939* (ORPI). Bull Pasture, *Bezy 25 Oct 1964*. Near top of Ajo Mts, *Dakan 25 Jan 1973* (ORPI). Alamo Canyon, 3 Dec 1977, *Bowers 969*. Near the Arch in Arch Canyon, rooted in bedrock outcrop on steep NE-facing slope, 26 Oct 2003, *Rutman 20031026-12*. †Alamo Canyon, twigs, leaves, 1150 to 32,000 ybp (6 samples). †Montezuma's Head, twigs, leaves, 13,500 to 21,840 ybp (3 samples). †Puerto Blanco Mts, on ridge, leaves, involucres, 14,120 ybp.

**TA**: †Butler Mts, twigs, leaves, involucres, 10,360 ybp (common in this sample). †Tinajas Altas, leaves, 8970 to 18,700 ybp (10 samples).

††**Ericameria teretifolia** (Durand & Hilgard) Jepson
[*Chrysothamnus teretifolius* (Durand & Hilgard) H.M. Hall]
Green rabbit-brush

Small shrubs with crowded, dark green, very slender, resinous leaves, and yellow disk flowers.

Green rabbit-brush was present in Organ Pipe more than 14,000 years ago and in the Tinajas Altas Mountains from 15,000 to more than 37,000 years ago.

The nearest present-day populations are in northwestern Arizona. Also southern California and southern Nevada; western edge of the Sonoran Desert, the Mojave Desert, and extending into pinyon-juniper vegetation.

**OP**: †Puerto Blanco Mts, on ridge, leaves, involucres, 14,120 ybp.

**TA**: †Tinajas Altas, leaves, involucres, 15,050 to 18,700 & >37,000 ybp (4 samples).

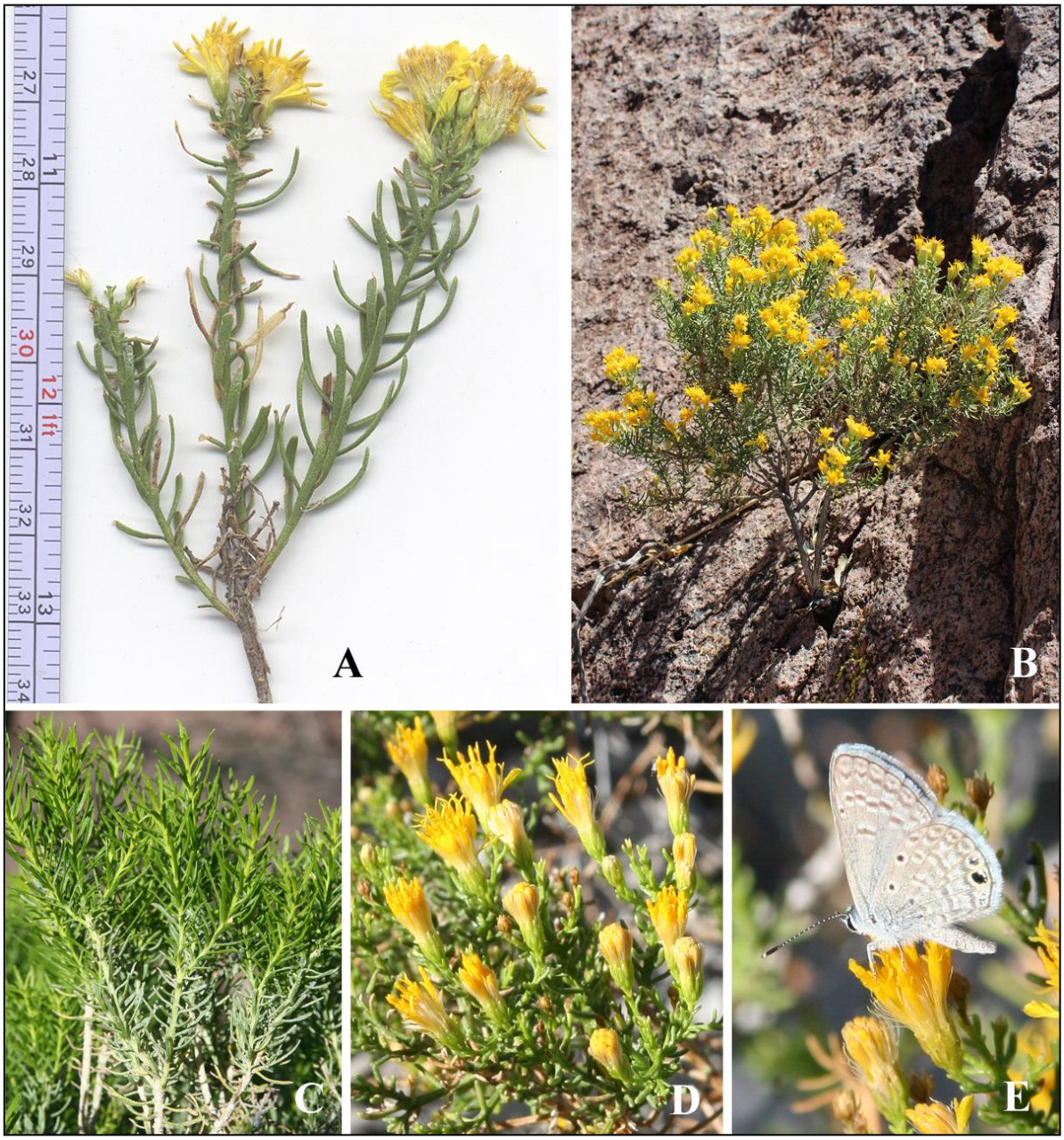


Figure 45. *Ericameria laricifolia*. (A & B) Alamo Canyon above first waterfall, 17 Oct 2013. Above Bull Pasture on trail to Mt Ajo: (C) 12 Mar 2005; (D) 22 Oct 2006; (E) Edward's Blue (*Hemiargus ceraunus*), 22 Oct 2006.

††**Ericameria** sp.
[*Chrysothamnus* sp.]

Shrubs. These Wisconsin-age samples have flower heads that look like one of the northern Arizona species that does not occur in the flora region today.

**OP**: †Alamo Canyon, involucres, 14,500 & 29,110 ybp. Montezuma's Head, involucres, 20,490 ybp.

**Erigeron** – Fleabane. Contributed in collaboration with Walter Fertig.

Ephemerals to short-lived perennial herbs. Leaves alternate. Flower heads usually with many ray and disk florets, the disk florets minute. Achenes with pappus of many slender and often fragile bristles.

Worldwide, mostly temperate regions; 390 species. Astereae.

1. Leaves linear; flower heads upright, to 5 mm wide; all corollas white.…… **Erigeron canadensis**
1. Leaves obovate; flower heads nodding in bud, more than 10 mm wide, disk florets yellow, the rays pale lavender. ……..……..…… **Erigeron lobatus**

***Erigeron canadensis** Linnaeus
[*Conyza canadensis* (Linnaeus) Cronquist]
Horseweed; *cola de caballo, hierba del caballo*. Figure 46.

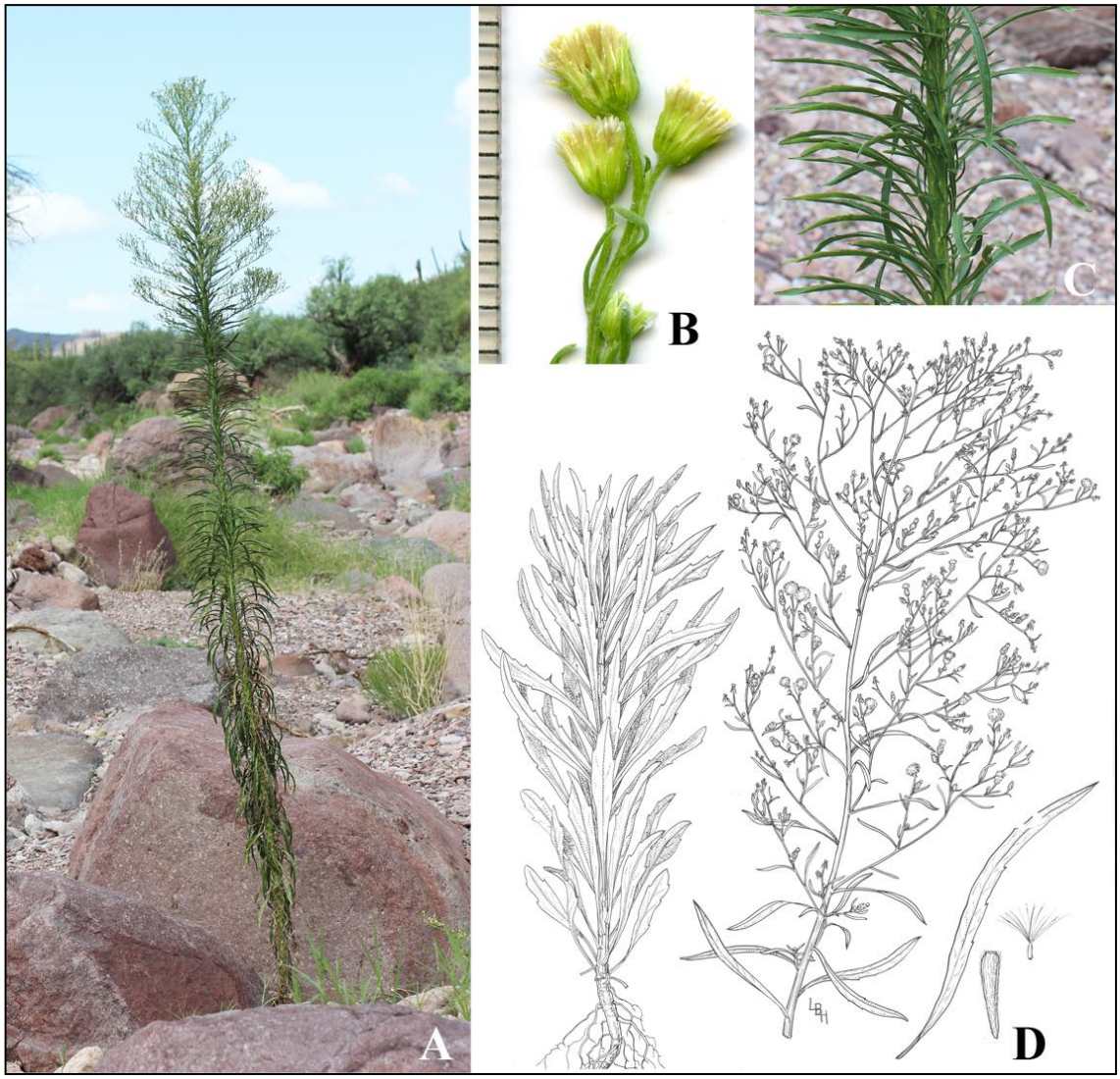


Figure 46. *Erigeron canadensis*. Alamo Canyon near Alamo Well: (A) 9 Sep 2013; (B) 3 Sep 2014; (C) 7 Sep 2013. (D) By Lucretia Breazeale Hamilton.

Weedy, slender, erect ephemerals to 1 (2+) m tall, mostly unbranched except the terminal flowering portion; growing and flowering during warmer months. Herbage sparsely pubescent, the leaves hispid with coarse white hairs mostly along leaf margins. Leaves narrowly lanceolate, larger ones often 3–8 cm × 2–6 mm, sessile but narrowed at base, the margins entire or with a few shallow teeth, and ciliate and strigose all around. Flower heads 2.5–4 mm wide, bearing numerous disk and disk-like (reduced rays) white florets; phyllaries graduated and glabrous. Achenes 1 mm long; pappus slightly more than twice as long as the achenes, minutely barbellate.

Sometimes locally common at charcos, sandy-silty soils at waterholes, and washes where water settles, especially along the Mexico border east of Lukeville, spreading from disturbed habitats and farmland in adjacent Sonora.

A worldwide weed, native to North America but apparently not native in the flora area.

**OP**: 0.5 mi E of Lukeville, 11 Nov 1987, *Felger 87-322*.
**CP**: Jose Juan Represo, 12 Jun 1992, *Felger 92-568*.

**Erigeron lobatus** A. Nelson
Spreading fleabane. Figure 47.

Winter-spring ephemerals and sometimes also in summer, and sometimes persisting as multi-season annuals; single to multiple-stemmed, 5–52 cm tall or long; taproot well developed (even on small plants). Stems slender and flexible. Leaves soft and pale green, obovate; the first leaves generally in a basal rosette; leaves often pinnately lobed, especially on better-watered plants, or entire or with a few coarse teeth, especially on drought-stressed plants; upper stem leaves markedly reduced. Stems, leaves, and phyllaries pubescent with larger, simple white hairs 0.5–1 (2) mm long and often curved upward, and these interspersed with minute stalked and sessile glands. Flower heads nodding in bud, mostly 1.7–2 cm wide including the rays when fully open. Phyllaries many, more or less in 2 whorls, mostly 4–4.5 mm long, the inner ones broader and with membranous margins. Rays 85–110, pale lavender. Disk florets yellow. Achenes 1.3 mm long, pappus of slender (capillary) bristles 2–2.5 mm long as well as shorter, broader, fringed bristles.

Widely scattered across the flora area, in many habitats and various substrates, often localized on clayish or fine-textured, poorly draining soils at waterholes and temporarily wet habitats including washes and playas, and also in canyons and on slopes, and sometimes from cracks in bedrock. The largest population probably occurs at Las Playas and is seen only during seasons of favorable rains.

*Erigeron lobatus* occurs in southeastern Californica, southern and western Arizona, southern Nevada, and northwestern Sonora eastward to the vicinity of Magdalena. It is usually distinguishable from the geographically more widespread *E. divergens* by leaves with rounded lobes, as well as the presence of both stalked glandular hairs and longer and spreading non-glandular hairs.

"*Erigeron lobatus* is characterized by persistent basal and proximal cauline leaves with rounded to acute lobes, vestiture of stipitate glands and sparse, spreading, hispido-pilose hairs, heads on relatively long, ebracteate peduncles, and broad, thin phyllaries. *Erigeron divergens* often is similar; its glandularity is not stipitate and its nonglandular hairs are shorter and denser" (Nesom 2006: 338). *Erigeron divergens* is widespread in Arizona but has not been found in the flora area. Specimens previously attributed to *E. divergens* Torrey & A. Gray within the flora area have been re-determined as *E. lobatus*.


Figure 47. *Erigeron lobatus*. Alamo Canyon: (A) 24 Mar 2008; (C) 12 Mar 2005; (D) 9 Sep 2013. (B) Bull Pasture, 5 Apr 2010.

**OP**: Cipriano Well, *Nichol 27 Apr 1939*. Alamo Canyon: *Nichol 4 May 1939*; 13 Dec 1939, *Harbison 26241* (SD); N fork, 11 Mar 1950, *Supernaugh 436*. Estes Canyon, 25 Feb 1978, *Bowers 1072*. Growler Canyon, 30 Mar 1979, *Bowers 1599*. Dripping Springs, 6 Mar 1988, *Pinkava 14353* (ASU, ORPI). Quitobaquito, 25 Apr 1990, *Felger 90-91*.

**CP**: Mohawk Valley, between Christmas Pass and N Refuge boundary, 13 Apr 1992, *Harlan & Steinmann 266*. San Cristobal Wash, 20 Mar 1992, *Harlan & Telewski 36*. Jose Juan Represo, 12 Jun 1992, *Felger 92-569-A*. Charlie Bell Road near E boundary of Refuge, 9 Apr 1993, *Felger 93-325*. Las Playas, 11 Jan 2002, *Felger 02-31*. Cabeza Prieta Tanks, 15 Jun 1992, *Felger*, observation.

**TA**: Coyote Water, 18 Mar 1998, *Felger 98-118*.

**Eriophyllum**

Western North America and Mexico; 13 species. Heliantheae**,** Baerinae.

**Eriophyllum lanosum** (A. Gray) A. Gray
[*Antheropeas lanosum* (A. Gray) Rydberg]
Woolly daisy. Figure 48.

Small spring ephemerals, conspicuously white-woolly. Stems slender, erect to spreading or decumbent, often 2–12 cm long. Leaves of seedlings and young shoots often opposite, otherwise alternate; leaves linear to narrowly oblanceolate, entire, the larger ones 7–15 mm long. Heads 5–8 mm wide, solitary on slender peduncles; phyllaries in one whorl, densely woolly, 5–6.5 mm long.

Rays 5–7 mm long, pistillate and fertile, white with red stripes below, the disk florets yellow, bisexual and fertile. Achenes 2.5 (3) mm long, slender, blackish with appressed white hairs; pappus of flattened outer scales and longer, awn-like inner bristles.

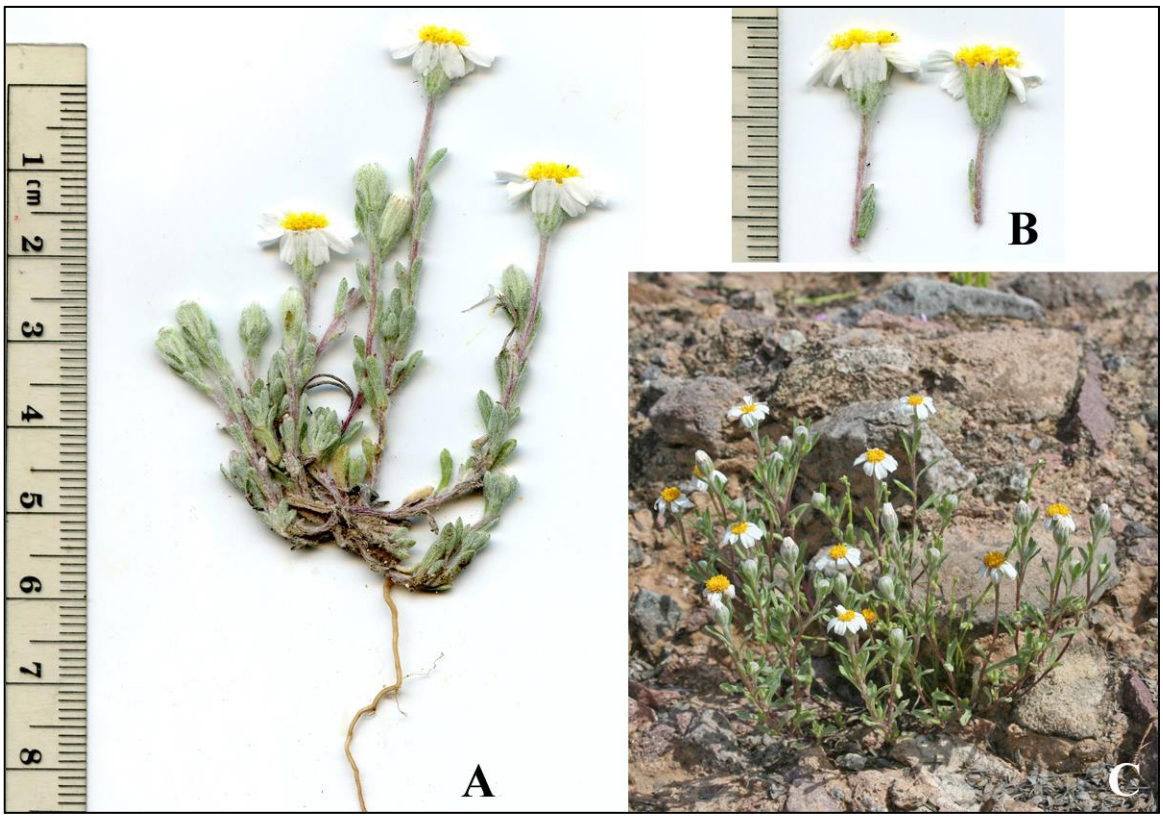


Figure 48. *Eriophyllum lanosum*. (A & B) Hwy 85, near N boundary of Organ Pipe, 14 Feb 2015. (C) Javelina Mtn, Sauceda Mts, 5 Mar 2005.

Widespread and often common in Organ Pipe and the eastern portion of Cabeza Prieta; valley bottoms, washes, and rocky slopes and mountains.

Southeastern California, southern Nevada, southern and western Arizona, southwestern New Mexico, southwestern Utah, northern Sonora, and both Baja California states.

**OP**: Puerto Blanco Mts, trail to Dripping Springs, 4 Apr 1973, *Holmgren 6653* (ASU). Arch Canyon trail, 11 Mar 1983, *Daniel 2592* (ASU). Armenta Road 1.4 mi W of Hwy 85, 11 Mar 2003, *Felger 03-268*. W side of Sierra Santa Rosa, along border, 12 Mar 2003, *Felger 03-367*. Hwy 85, 1 mi S of N boundary, 29 Mar 2003, *Harlan 03-6*.

**CP**: Growler Valley, *Phelps 18 Mar 1978* (ASU). Charlie Bell Pass, 3 Apr 1992, *Whipple 3944*. Charlie Bell Road near E boundary of Refuge, 9 Apr 1993, *Felger 93-312*. Growler Wash, 10 Apr 1993, *Felger 93-370*.

*Evax*, see **Diaperia**

**Gaillardia** – Blanket flower

North America including Mexico, and South America; 15 species. Heliantheae, Gaillardinea.

**Gaillardia arizonica** A. Gray
[*G. arizonica* var. *pringlei* (Rydberg) S.F. Blake]
Arizona blanket-flower. Figure 49.

Spring ephemerals with sessile glands and white, often crinkled hairs to more than 2 mm long. Leaves basal, 3–10 cm long, or alternate, entire to toothed or pinnatifid. Heads showy, solitary at branch tips, 3.5–4 cm wide. Phyllaries separate, green and leafy, narrowly to sometimes broadly lanceolate, the outer (larger) phyllaries 6–14 mm long. Ray and disk florets bright yellow; rays 12–28 mm long, broad and cleft into 3 conspicuous terminal lobes. Achenes 2.5–3 mm long, obscured by dense, ascending hairs at first white, becoming golden brown; pappus of broad, membranous scales, the midrib sometimes extended into an awn.

Widely scattered in small, localized populations. Mostly along washes and arroyos in the eastern part of Cabeza Prieta, such as the San Cristobal Valley on loamy flats where water settles, and similarly on the muddy flats of Las Playas. Organ Pipe in fine soils such as on flats east of Growler Canyon in the Bates Mountains, the north-central part of the Monument, and the northeast bajada of the Puerto Blanco Mountains.

Northern Sonora, Arizona, Nevada, and southwestern Utah.

**OP**: Near N entrance of Organ Pipe, 24 Mar 1941, *McDougall 31*. Dripping Springs, 15 Apr 1951, *Parker 7924*. Growler Canyon, S of Bates Well, 19 Mar 1975, *Lehto L8304* (ASU). Cuerda de Leña, 23 Mar 2003, *Rutman 2003-392* (ORPI).

**CP**: 7 mi E of Papago Wells, 14 Mar 1937, *Harbison 16850* (SD). Jose Juan Tank, *Monson 24 Apr 1958* (CAB). S of Las Playas, 10 Apr 1978, *Lehto L22468*. Deer Hollow, N of Agua Dulce Mts, 20 Mar 1982, *Reichenbacher 923*. Charlie Bell Road at W branch of Daniels Arroyo, 10 Apr 1993, *Felger 93-345*. San Cristobal Wash, N boundary of Refuge, *Malusa 18 Apr 2001*.

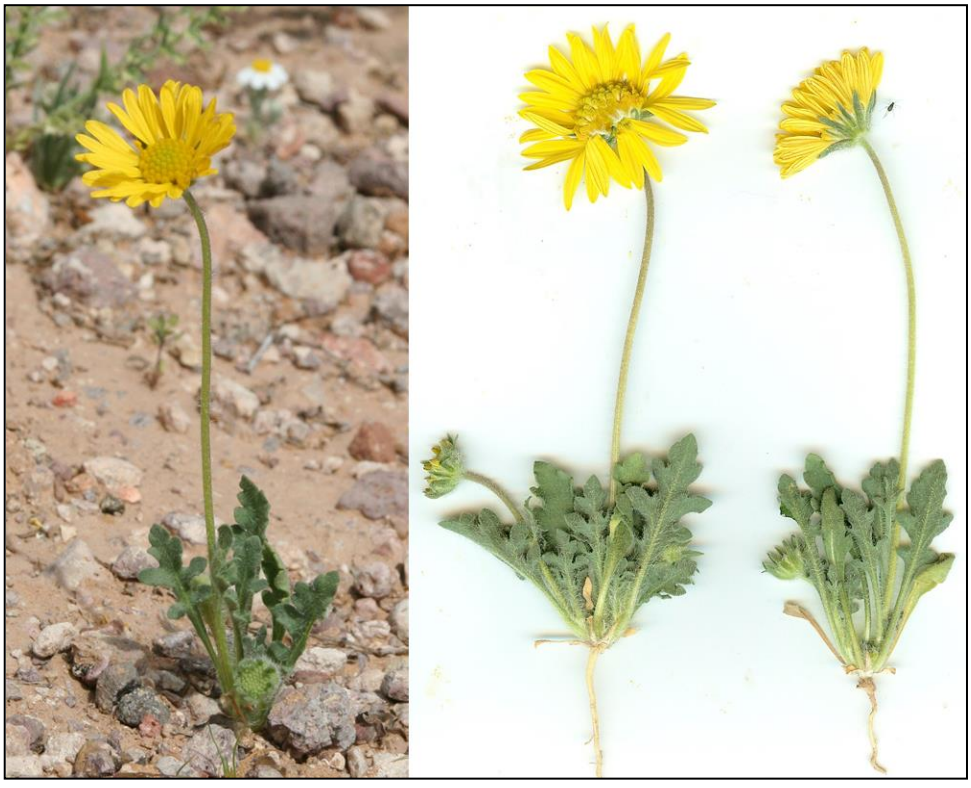

Figure 49. *Gaillardia arizonica*. Pipeline Road NE of Ajo, 15 Mar 2008.

**Gamochaeta**

Native to the Western Hemisphere; 50 species. Gnaphalieae.

**Gamochaeta stagnalis** (I.M. Johnston) Anderberg
[*Gnaphalium stagnale* I.M. Johnston]
Desert cudweed, rosy everlasting. Figure 50.

Small spring ephemerals, to about 25 cm tall, densely woolly with soft white hairs. Leaves alternate, sessile, (1) 3–4 cm long, mostly oblanceolate, and entire. Flower heads in capitate clusters, small and straw-like, scarcely opening. Phyllaries scarious and often purple tipped (reddish purple or wine color), but sometimes only brownish. Florets discoid, minute, numerous, and probably self-fertilizing (autogamous), the corollas with purplish tips. Outer florets numerous and pistillate; inner florets 2–4 and bisexual. Achenes 0.3–0.5 mm long; pappus bristles united into a ring and readily deciduous as a unit (a feature of the genus).

Known in the flora area only from Bull Pasture in the Ajo Mountains where it was found in dried pools along a small rocky arroyo; growing with *Androsace occidentalis*, *Erythranthe cordata*, *Festuca octoflora*, *Myosurus cupulatus*, *Myriopteris wrightii*, *Poa bigelovii*, *Pterostegia drymarioides*, *Triodanis biflora*, and *Veronica peregrina*. It does not extend farther into the desert.


Figure 50. *Gamochaeta stagnalis*. Intermittent stream, Bull Pasture, 18 Mar 2005.

Southwestern California, southern Arizona, southwestern New Mexico, and Mexico including Baja California, Baja California Sur, Chihuahua, Coahuila, Durango, Nuevo León, San Luis Potosí, Sinaloa, Sonora, and southward at least to Colima and Zacatecas. *Gamochaeta stagnalis* is probably not native in southwestern California and northwestern Baja California. It is often weedy and also misidentified and confused with seemingly closely related species (Nesom 2004, 2012).

**OP**: Bull Pasture: Bedrock drainage with shallow sediments that flows seasonally and retains moisture, 3160 ft, 18 Mar 2005, *Rutman 20050318-9*; Small bedrock arroyo or canyon bottom, dried up pool with a sheet of dried algae, 10 Apr 2005, *Felger 05-213*.

**Geraea**

Two species; *Geraea viscida* is a chaparral species in California and Baja California. *Geraea* is allied to *Encelia*, and natural but mostly sterile hybrids are known. Heliantheae, Ecliptinae.

**Geraea canescens** Torrey & A. Gray
Desert sunflower, desert gold. Figure 51.

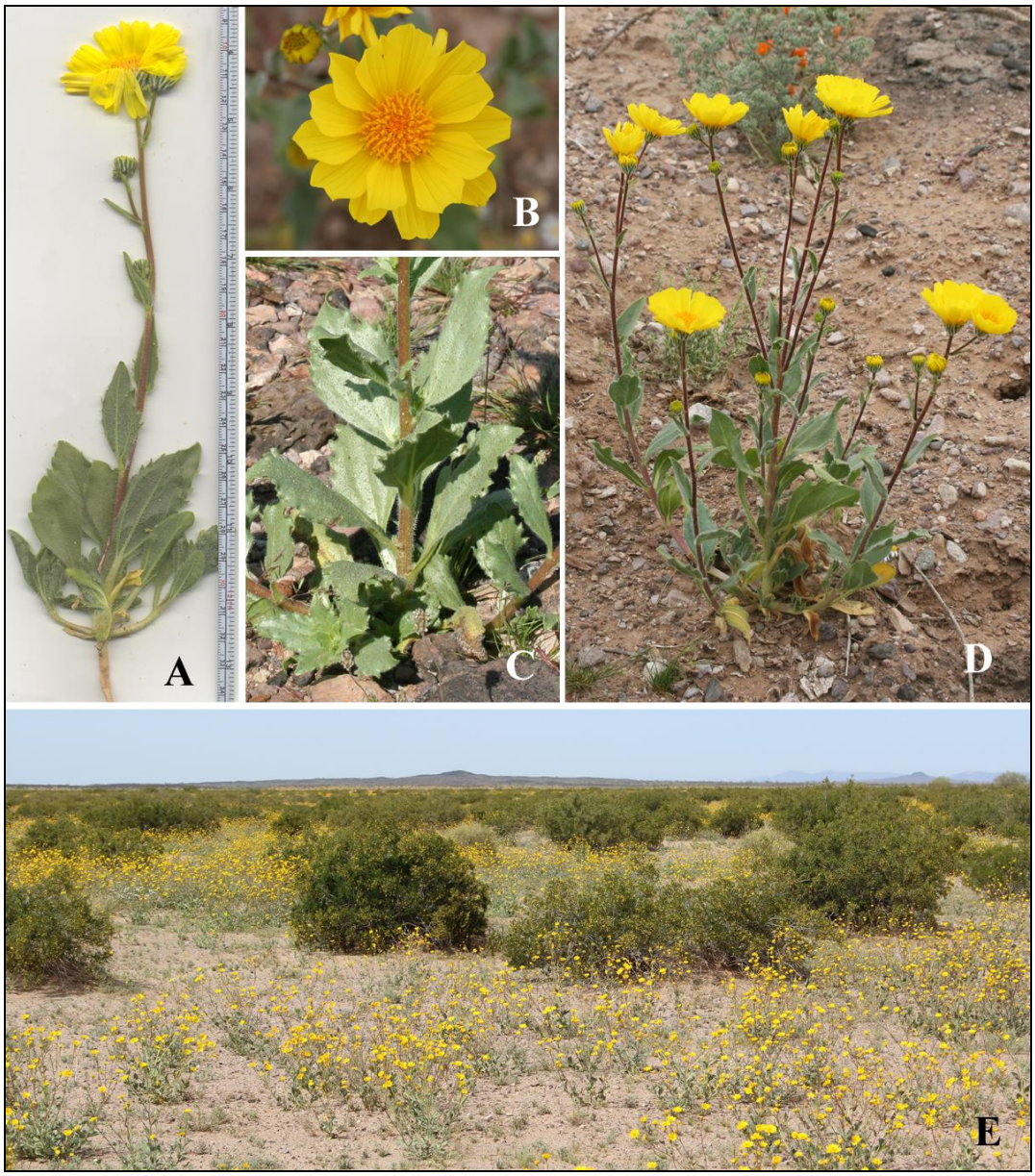


Figure 51. *Geraea canescens*. (A, B & D) Organ Pipe headquarters area, 8 Mar 2008. (C) Coffeepot Mt, Sauceda Mts, Maricopa Co., 27 Feb 2005. (E) An exceptional year on the sandy flats of Lago Seco, Goldwater Range, Maricopa Co., 18 Mar 2014.

Cool-season ephemerals, generally seen in spring, 15–100 cm tall, usually with 1 to several ascending branches, or sometimes much-branched above. Upper stems and outer phyllaries densely glandular. Leaves alternate (2.5) 5–13 cm long, rough to the touch with coarse white hairs, oblanceolate to obovate or elliptic, coarsely toothed, or smaller leaves sometimes entire; petioles winged or the leaves sessile; upper stem leaves reduced. Phyllaries graduated, the inner and longer ones 5–9 mm long, dark green, linear-lanceolate, strikingly outlined with white hairs (ciliate). Flower heads sunflower-like, showy, closing at night, opening after sunrise, the rays bright yellow, sterile, (0.8) 1.5–3.2 cm long, the disk yellow-orange, with chaffy bracts clasping the disk achenes and falling with them. Achenes flat, blackish, 5–7 mm long with whitish margins continuous with 2 slender, persistent awns. Flowering December–April.

One of the most abundant and conspicuous wildflowers in the region; sandy soils of the desert floor and dunes, desert pavements and poorly drained flats, and sometimes on lower slopes. Sometimes on moderately saline soils. It has been in the western part of the flora area for at least 8600 years.

Baja California, northwestern Sonora, southwestern Arizona, southeastern California, southern Nevada, and southwestern Utah.

**OP**: 8 mi S of Growler Well, *Nichol 17 Mar 1939*. Quitobaquito, 27 Nov 1939, *Harbison 26178* (SD). NW corner of Monument, 21 Mar 1941, *McDougall 8*. Growler Valley, Sep 1951, *Supernaugh 450*. Camino Dos Republicas 6 mi E of Hwy 85, 11 Feb 1978, *Bowers 1041*. Bates Well, 12 Mar 2003, *Felger 03-304.*

**CP**: Pinacate Lava Field, 26 Mar 1932, *Shreve 5927*. 14 mi W of Papago Well, 18 Feb 1979, *McLaughlin 1962*. Tule Well, 29 Apr 1986, *Hodgson 4128* (DES). The Playa, 20 Mar 1992, *Telewski 51*. Christmas Pass, 14 Apr 1992, *Steinmann 278*. Pinta Sands, 11 Apr 1993, *Felger 93-425*.

**TA**: Butler Mts, *Van Devender 27 Mar 1983*. Flats E of Tinajas Altas Mts, 2 Mar 2014, *Van Devender*, observation (MABA in SEINet). †Butler Mts, achenes, 3820 & 8570 ybp.

**Gutierrezia** – Snakeweed

Ephemerals and small woody shrubs or subshrubs. Leaves alternate and narrow. Herbage and phyllaries glandular-punctate and resinous. Flower heads small, the phyllaries graduated, persistent, with ray and disk florets. Pappus present or occasionally reduced. The two species in the flora area are strikingly different.

Western North America and western South America; 28 species. Astereae.

1. Spring ephemerals; rays white, the disk yellow…….... **Gutierrezia arizonica**
1. Perennial subshrubs; all flowers yellow…….. **Gutierrezia sarothrae**

**Gutierrezia arizonica** (A. Gray) M.A. Lane
[*Greenella arizonica* A. Gray. *Xanthocephalum arizonicum* (A. Gray) Shinners]
Arizona snakeweed. Figure 52.

Small, delicate spring ephemerals, usually less than 20 cm tall; stems slender, single or few-branched above. Leaves at base of plant, often in a basal rosette, narrowly elliptic-oblanceolate or lanceolate, 1–2 mm wide, and reduced or absent above. Flower heads single or several on slender peduncles. Rays white, 6–7 mm long, the disk yellow. Achenes 1–1.5 mm long, densely hairy with bulbous-tipped hairs, the pappus of scales hidden by the achene hairs.

Usually in poorly drained, silty, fine-textured soil of dried mud puddles in swales, floodplains, and washes in valley bottoms with other small spring ephemerals such as *Eriophyllum lanosum*, *Festuca octoflora*, *Logfia arizonica*, *Plantago ovata*, and *Schismus barbatus.* Widely

scattered, usually in small, localized populations; eastern part of Cabeza Prieta and at least in the southeastern and northwestern parts of Organ Pipe.

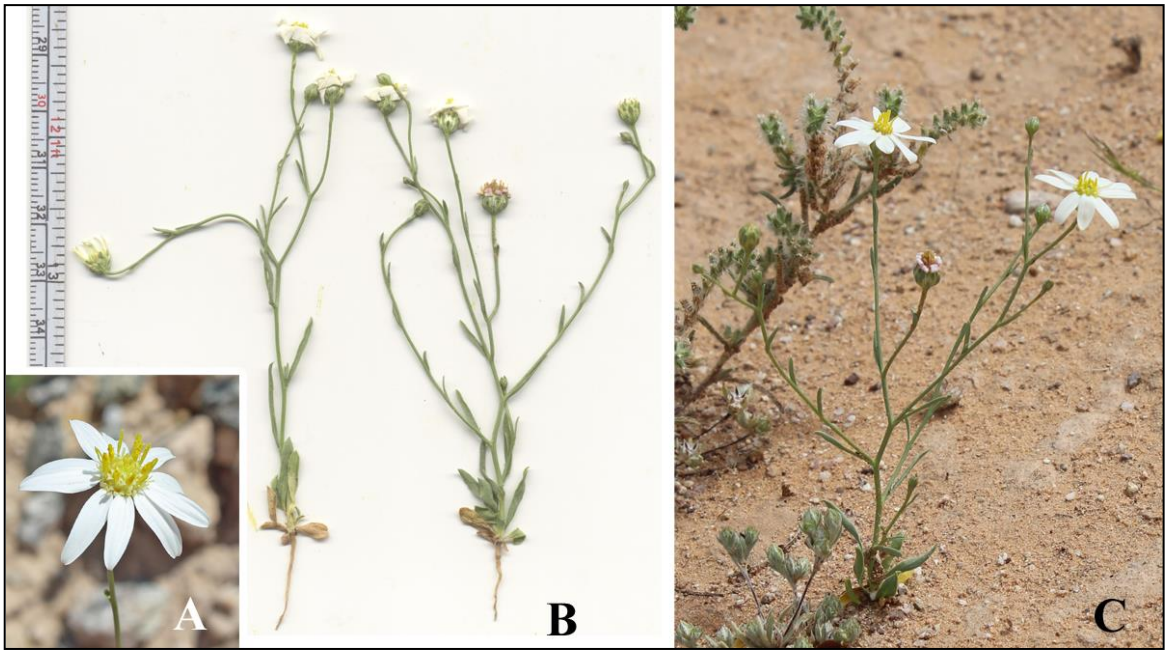


Figure 52. *Gutierrezia arizonica*. (A) Desert pavement, first mile of North Puerto Blanco Drive, 19 Mar 2015. (B & C) Near Lost City, San Cristobal Valley, 13 Mar 2014.

Eastward in southern Arizona and northern Sonora. Although a spring ephemeral in the flora area, farther east and at higher elevations it also flowers with summer rains.

**OP**: Bates Well, *Nichol 26 Apr 1939*. 3 mi S of junction of Bates Well Road and road to Cabeza Prieta Refuge, 30 Mar 1978, *Bowers 1154*. E of Dos Lomitas, 31 Mar 2003, *Rutman 2003-439*. Growler Valley, 11 Apr 2003, *Rutman 2003-465*.

**CP**: San Cristobal Wash, 11 Apr 1992, *Harlan 168*. Daniels Arroyo at Charlie Bell Road, 10 Apr 1993, *Felger 93-346*. Growler Wash, 10 Apr 1993, *Felger 93-367*.

**Gutierrezia sarothrae** (Pursh) Britton & Rusby
Broom snakeweed; *hierba de la víbora*; siw tadsagĭ. Figure 53.

Subshrubs 40–60 cm tall; stems woody below, slender and numerous, mostly erect to ascending; herbage and phyllaries sticky, resinous. Leaves mostly 2–5 cm × 0.5–1.3 mm, narrowly linear, with moderately sparse pubescence of short white hairs. Flower heads 4–5 mm long, in dense, much-branched terminal clusters; involucres 3.5–4.5 × 2.5–3 mm, persistent, the phyllaries thick and with a resin pocket near the tip; with bright yellow ray and disk florets, the florets (ray and disk) 6–14. Achenes 1.3–1.5 mm long, the surface obscured by short, white, ascending hairs; pappus of membranous scales about as long as achenes on disk florets, shorter on ray achenes. Flowering mostly September and October.

Mountains in Cabeza Prieta and Organ Pipe including to the crestline in the Ajo Mountains. Often among grasses and on rocky slopes, sometimes in rock crevices. This or one or two similar species grew in Organ Pipe mountains from about 13,500 to at least 32,000 years ago.

Central Mexico to western Canada.

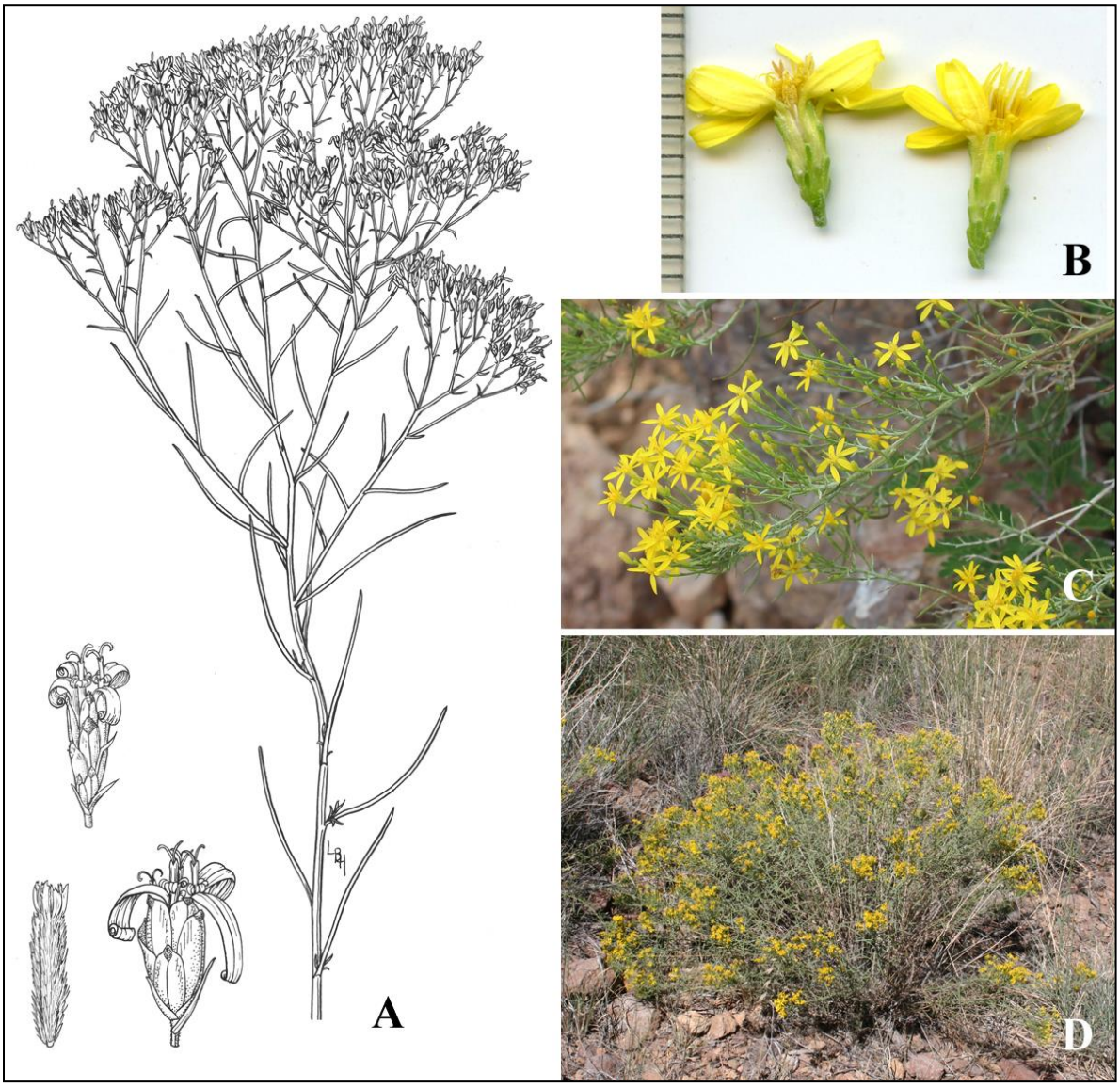


Figure 53. *Gutierrezia sarothrae*. (A) By Lucretia Breazeale Hamilton. (B) Alamo Canyon above Alamo Well, 3 Sep 2014. (C) Bull Pasture Trail, 19 Sep 2014. (D) Arch Canyon, 21 Sep 2008.

**OP**: Bull Pasture trail, 5 Nov 1977, *Bowers 935*. Alamo Canyon, 17 Oct 1987, *Baker 7567* (ORPI). Trail from The Cones to Mount Ajo, 4090 ft, 10 Apr 2005, *Felger 05-283*. Diablo Mts, 807 m, shaded base of N-facing cliff, 22 Sep 2013, *Rutman 20130922-24*. †*G.* cf. *sarothrae*: Alamo Canyon, involucres, 13,500 to 32,000 ybp (3 samples); Montezuma's Head, involucres, 17,830 to 21,840 ybp (3 samples); Puerto Blanco Mts, on ridge, involucres, 14,120 ybp.

**CP**. Heart Tank, *Simmons Sep 1963*. Tule Tank drainage, 23 Mar 1992, *Harlan 130*. Eagle Tank, 13 Jun 1992, *Felger 92-584*. Canyon S of Heart Tank, 14 Jun 1992, *Felger 92-593*.

**Gymnosperma**

This genus of one species is related to *Gutierrezia*. Astereae.

**Gymnosperma glutinosum** (Sprengel) Lessing
Gumhead. Figure 54.

Suffrutescent perennials or small shrubs, often 0.6–1 m tall; glabrate (minutely scabrous). New growth—stem tips, leaves, and flower heads—glistening with viscid, glandular exudate, especially in dry seasons. (This exudate is water soluble because the surfaces are virtually devoid of visible exudate after rainy periods.) Leaves alternate, sessile, tardily drought deciduous, shiny green, densely gland-dotted, linear-lanceolate to linear-oblanceolate, 2–8 cm × 2–4.5 mm, the midrib on lower surface prominently keeled. Flower heads 1.5 mm wide, in dense terminal clusters, and persistent; phyllaries graduated, membranous with a resin pocket near the tip, the larger phyllaries 3–4 mm long. Flowers bright yellow; ray florets small and inconspicuous with reduced corollas and not exceeding the phyllaries; ray and disk florets fertile. Achenes 1.3–2 mm long, cylindrical, with minute hairs; pappus reduced to an almost microscopic ring. Flowering nearly all year, especially during the warmer months.

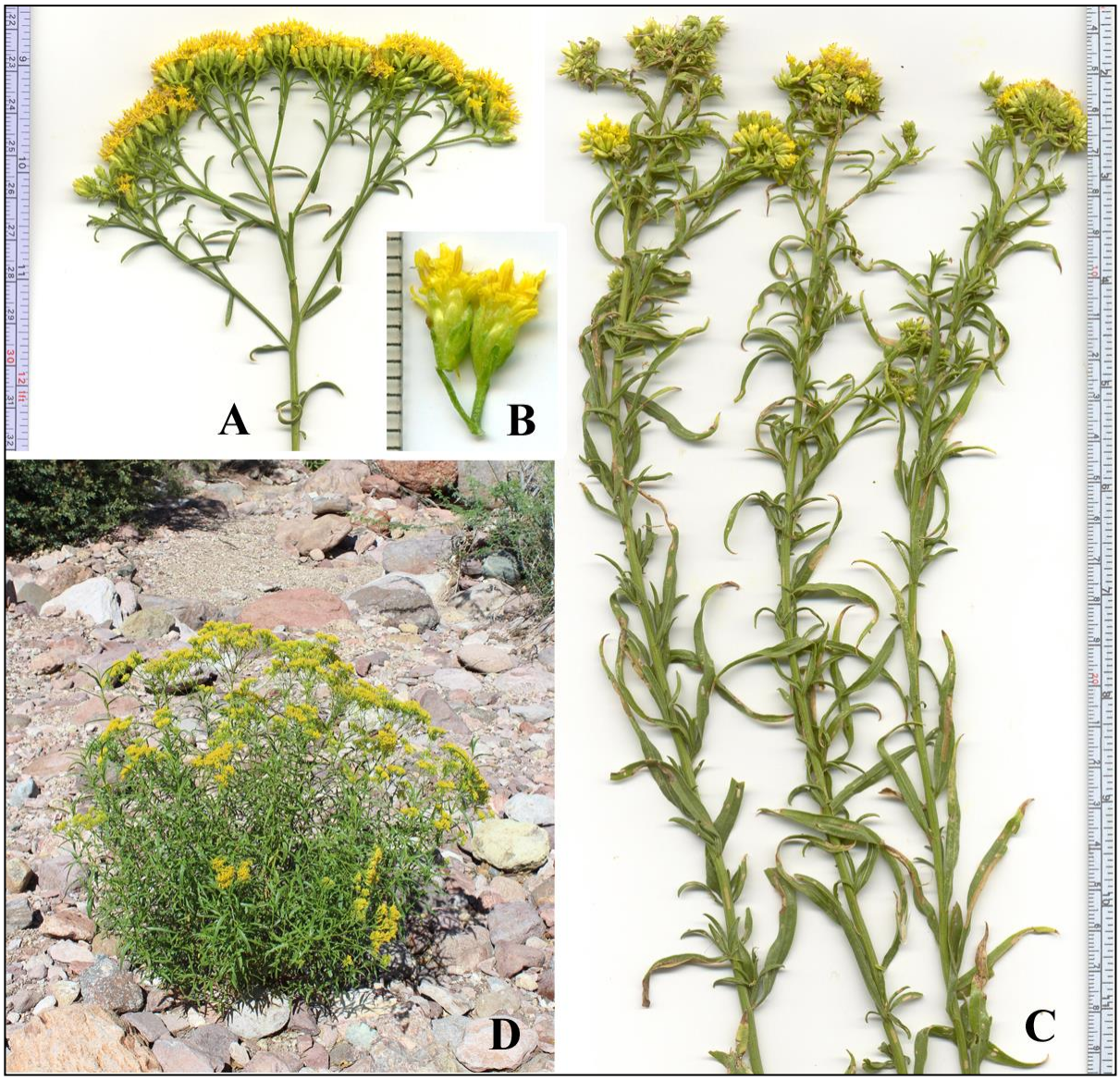


Figure 54. *Gymnosperma glutinosum*. (A & D) Alamo Canyon near Alamo Well, 7 Sep 2013. (B) Wash draining N end of Diablo Mts, N end of Ajo Mountain Drive, 26 Aug 2014. (C) Arch Canyon, 10 Sep 2008.

Widely scattered, seldom common, mostly on rocky slopes and mountain arroyos or canyons, extending to the summits of the drier mountains. The plants are amazingly drought resistant and often retain bright green foliage and even produce some flowers during extended drought when nearly all of the surrounding plants are dormant and leafless. Fossil specimens from the Ajo and Tinajas Altas mountains date from 15,700 years ago.

Southern Arizona to southern Texas and Guatemala.

**OP**: Pitahaya Canyon, 3400 ft, *Nichol 23 Feb 1939*. Alamo Canyon, 2400 ft, 3 Dec 1977, *Bowers 988*. Kuakatch Wash, near E boundary, *Rutman 23 Oct 1999* (ORPI). Diablo Mts, 807 m, shaded base of N-facing cliff, 22 Sep 2013, *Rutman 20130922-14*. †Montezuma's Head, involucre, 13,500 ybp.

**CP**: Tule Tank, 15 Apr 1941, *Benson 10802*. Buckhorn Tank, *Dodson 28 May 1972* (CAB). Eagle Tank, 13 Jun 1992, *Felger 92-90*. Cabeza Prieta Peak, 24 Mar 1995, *Yeatts 3701* (CAB). Sierra Pinta, summit, *Cain 15 Nov 2003*. Heart Tank and Tuseral Tank, 14 & 15 Jun 1992, *Felger*, observations.

**TA**: Tinajas Altas, 19 Feb 1979, *McLaughlin 1969*. †Tinajas Altas, involucres, achenes, 1230 to 15,680 ybp (10 samples).

**Helianthus** – Sunflower; *mirasol*

Large ephemerals or perennial herbs, with coarse or prominent hairs. Leaves mostly alternate, or sometimes opposite below, petioled, and often with ovate blades. Flower heads large and showy on prominent peduncles. Those in the flora area have sterile ray florets with bright yellow corollas, and a reddish purple disk with fertile florets. Achenes thick, laterally compressed, enclosed by prominent chaffy bracts; pappus usually with a pair of deciduous awned scales.

Native to North America including Mexico; 52 species. Heliantheae, Helianthinae.

1. Leaves green, sparsely hairy; phyllaries ovate, at least 4 mm wide, the attenuate tip at least 4 mm long; disturbed habitats…….. **Helianthus annuus**
1. Leaves gray-green, moderately to densely hairy; phyllaries lanceolate, 1.8–3.5 mm wide, the attenuate tip 1 mm long or less or absent; dunes……... **Helianthus niveus**

****Helianthus annuus** Linnaeus
Sunflower; *mirasol*. Figure 55.

Robust, warm-weather ephemerals, potentially to about 2 m tall, with harsh (hispid) hairs. Leaves petioled, the blades ovate, 10–40 cm long, the margins serrate. Phyllaries green, ovate, the margins usually ciliate. Heads large, more than 10 cm wide. Rays bright yellow, 2.5–5 cm long. Achenes glabrous; pappus of 2 lanceolate scales and sometimes additional obtuse scales.

Rare along Hwy 85 and not established in the flora area. Common along roadsides across much of Arizona. This is the common weedy sunflower from northern Mexico to western Canada.

Cultivars of this species, usually with a single, very large head, are major oil-seed crops and the only North American composite to be developed as a major agricultural crop.

**OP**: Hwy 85 near milepost 68, road shoulder, *Rutman 21 Jul 1998*.

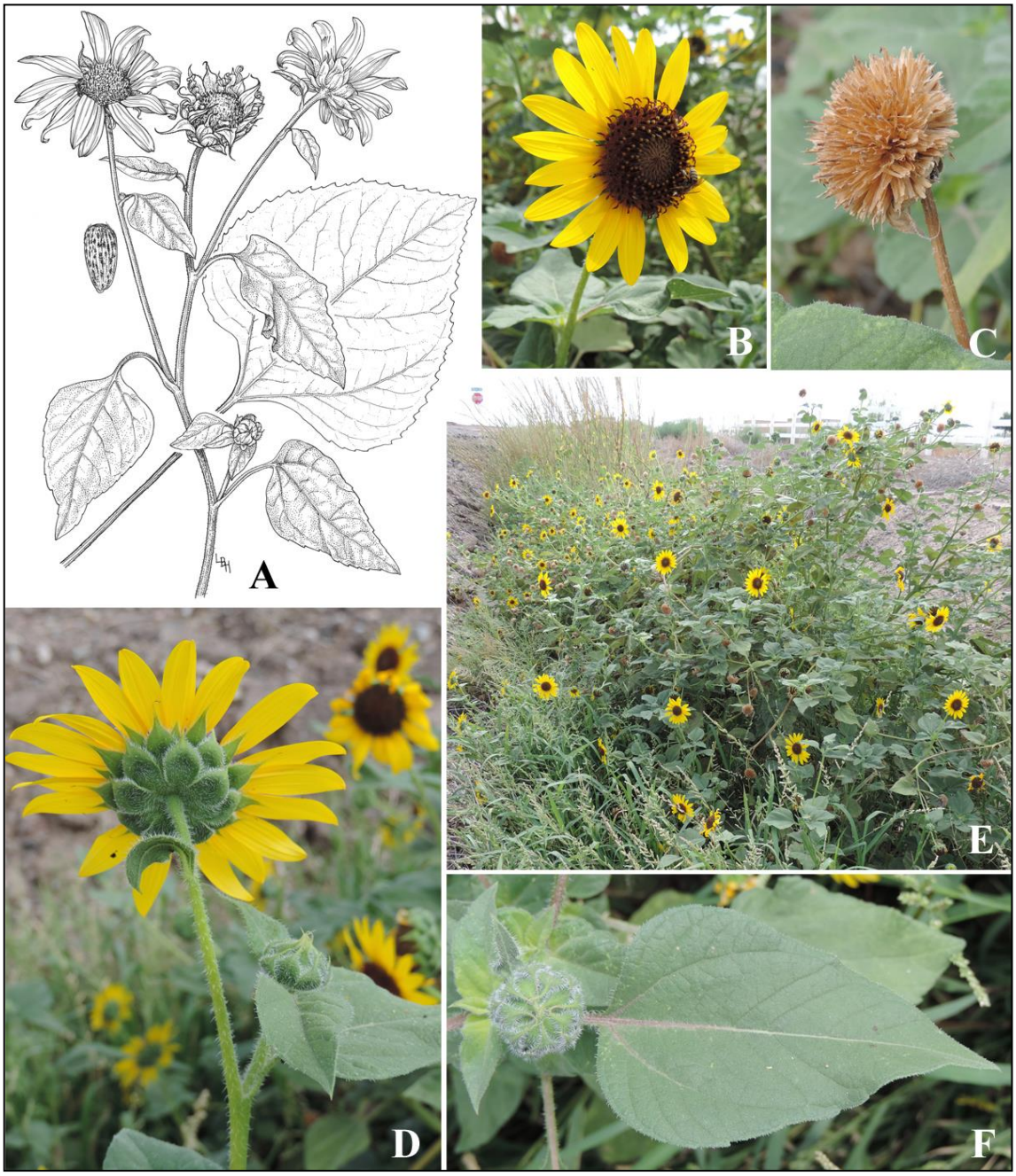


Figure 55. *Helianthus annuus*. (A) By Lucretia Breazeale Hamilton. (B–F) Hazen Road, about 1 mi E of Hwy 85, Buckeye, Maricopa Co., 9 Aug 2016.

**Helianthus niveus** (Bentham) Brandegee subsp. **tephrodes** (A. Gray) Heiser
Dune sunflower; *mirasol de las dunas*; hi:wai. Figure 56.

Non-seasonal ephemerals and perhaps sometimes short-lived perennials, 0.5–1+ m tall. Herbage and phyllaries green to whitish, villous to canescent. Leaves opposite below, alternate and sometimes opposite above, mostly 4–12 cm long, the petioles prominent, the blades lanceolate to broadly ovate, the margins entire or serrated. Heads including rays (3.5) 4–9 cm wide; phyllaries graduated, lanceolate, 8–10 × 1.8–3.5 mm, the attenuate tip to 1 mm long or absent. Rays bright yellow, mostly 2–3 cm long, the disk florets dark brownish purple. Achenes 4–5 mm long, thick

(rhombic in cross section), mottled black and pale tan, with long, silky, forward-pointing hairs (or the achenes sometimes markedly flattened, blackish and without hairs, these perhaps immature); pappus deciduous, of several shorter scales and 2 larger, awn-tipped scales. Flowering in spring and with summer-fall rains.

Common on dunes in Cabeza Prieta and west of the Tinajas Altas Mountains.

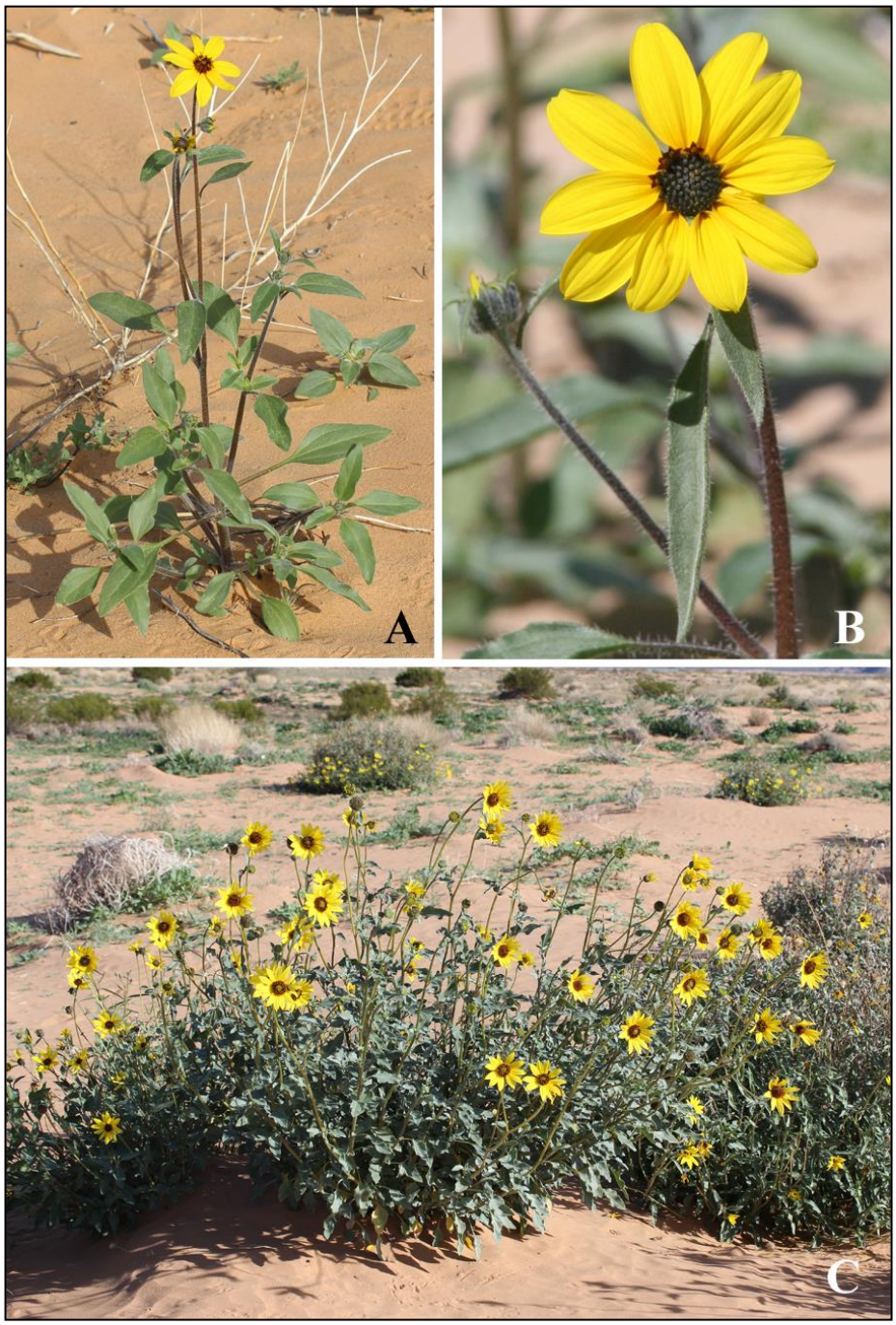


Figure 56. *Helianthus niveus* subsp. *tephrodes*. Dunes 20 mi S of Sonoyta on Mex Hwy 8, Sonora: (A) 6 Feb 2014. (B) 16 Feb 2008. (D) Pinta Sands near Camino del Diablo, 11 Feb 2014.

This subspecies occurs in sand soils, especially dunes, in southeastern California and southwestern Arizona, and adjacent northernmost Sonora. Subspecies *niveus* occurs on the Baja California Peninsula and the Sonora coast southward to the Guaymas Region.

**CP**: Pinta Sands: *Monson 21 Feb 1958* (CAB); 17 Apr 1983, *Hodgson H-2076* (DES); 15 Sep 1992, *Felger 92-775.*

††**Heterotheca** sp.
Camphor weed

An unidentified camphor weed grew at Tinajas Altas for more than 33,000 years, until about 4000 years ago. This is the only record for this genus in the flora area. The nearest population of a member of this genus is the narrow dune endemic, *H. thiniicola* (Rzedowski & Ezcurra) B.L. Turner, in the Gran Desierto of northwestern Sonora. This genus includes 28 species in North America. Astereae.

**TA**: †Tinajas Altas, achenes, 4010 to >37,000 ybp (13 samples).

*Hymenoclea*, see **Ambrosia**

**Hymenothrix**

Southwestern United States and Mexico; 5 species. Heliantheae, Chaenactidinae.

**Hymenothrix wislizeni** A. Gray
Thimblehead. Figure 57.

Ephemerals or short-lived herbaceous perennials, sometimes propagating by short rhizomes. Stems often 50–70 cm tall. Densely pubescent with glandular hairs and short, coarse, white non-glandular hairs; young growth or basal part of plant viscid-sticky, the subsequent herbage less so. Stems erect, mostly 50–70 cm tall. Leaves 2 or 3 times pinnately dissected, the larger leaves 6–10+ cm long, early leaves in a basal rosette, the stem leaves with fewer segments. Inflorescences much-branched, flat-topped, the heads crowded in dense terminal clusters. Heads 8–10 mm wide, the phyllaries green, 2.7–4 mm long. Ray and disk florets bright yellow, bisexual and fertile. Achenes 2.5–4 mm long, 4- or 5-angled; pappus of 10–13 persistent slender scales with transparent margins, the midrib extending into an awn. Flowering April and September–December.

Often in open areas in sandy-gravelly washes and sometimes along roadsides. Usually in small, isolated populations in the lowlands of Organ Pipe and two records in Cabeza Prieta.

Southern and central Arizona, southwestern New Mexico, northern Sonora, and northwestern Chihuahua.

**OP**: Rancho Bonito, 30 Nov 1939, *Harbison 26196*. N of headquarters, 26 Mar 1965, *Ranzoni 357* (ORPI). 4 mi N of Visitor Center, tributary to Cherioni Wash, *Warren 10 Nov 1983.* Aguajita, 23 Oct 1987, *Felger 87-266*. Kuakatch Wash near E boundary, *Rutman 23 Oct 1999* (ORPI).

**CP**: Little Tule Well, 12 Jun 1992, *Felger 92-536*. Daniels Arroyo, 27 Sep 1992, *Harlan 332*.

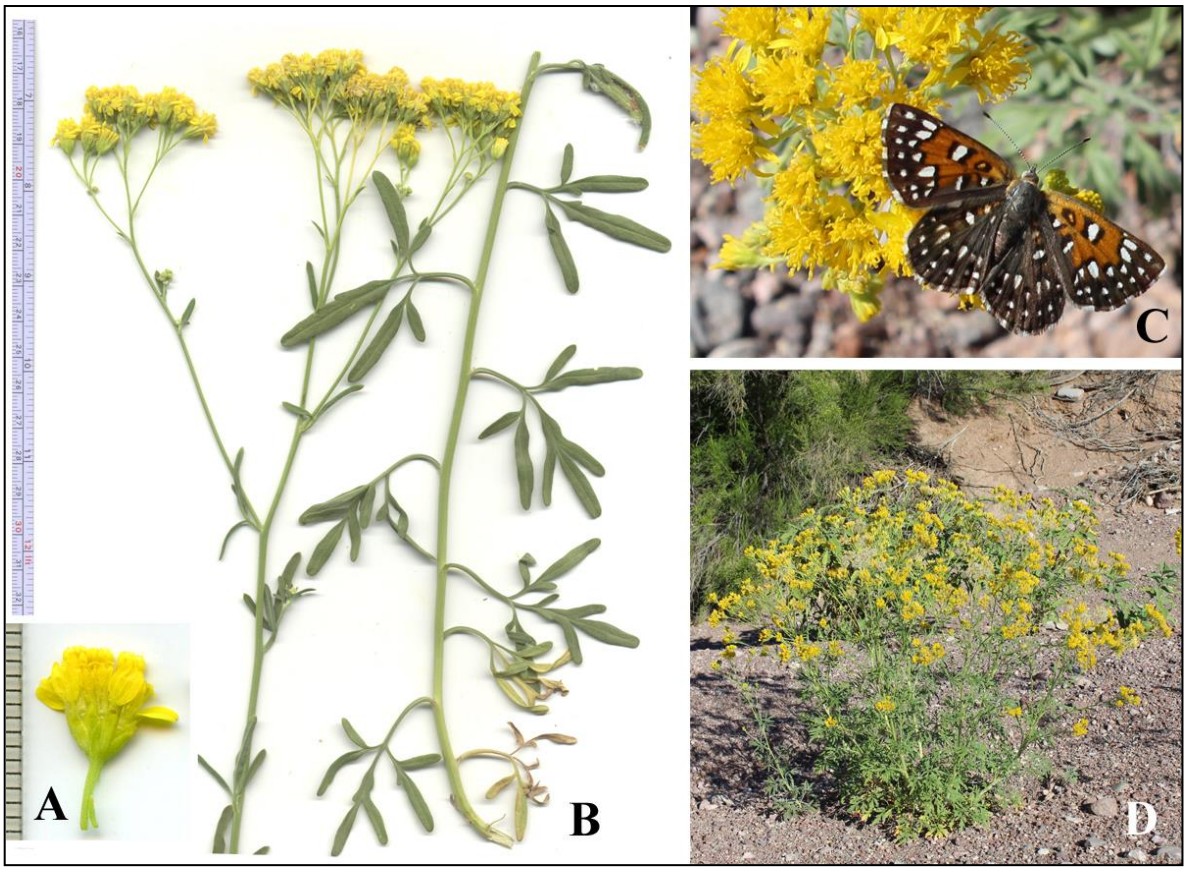


Figure 57. *Hymenothrix wislizeni*. Why: (A) 20 Sep 2014; (B) 8 Oct 2013. (C) Mormon Metalmark (*Apodemia mormo*), Alamo Wash near Hwy 85, 2 Nov 2013. (D) Wash crossing Hwy 85 within 2 mi of N boundary of Organ Pipe, 5 Oct 2013.

**Hymenoxys**

North America to South America; 25 species. Heliantheae, Gaillardinea.

**Hymenoxys odorata** de Candolle
Bitterweed. Figure 58.

Aromatic spring ephemerals 20–45 cm tall, sparsely pubescent and dotted with microscopic globules of resin-like exudate. Leaves in basal rosettes withering as the leafy stems develop; leaves pinnately dissected into thick, blunt-ended, slender segments. Flower heads 5–10 mm wide (not including the rays), with bright yellow ray and disk florets, the rays 7–10 mm long, 8–10 in number, turning down at maturity and persistent. Phyllaries in 2 or 3 rows, densely villous, the outer phyllaries rigid, strongly arched or broadly keeled, conspicuously thickened and united at their bases; inner phyllaries separate, longer than the outer ones. Achenes 2 mm long, densely silvery-silky haired; pappus of 5 or 6 acuminate to awn-tipped scales.

Fine-textured, clay soils of playas in Cabeza Prieta, often locally and seasonally abundant.

Arizona to Kansas and northern Mexico, and California only along the Colorado River at Parker.

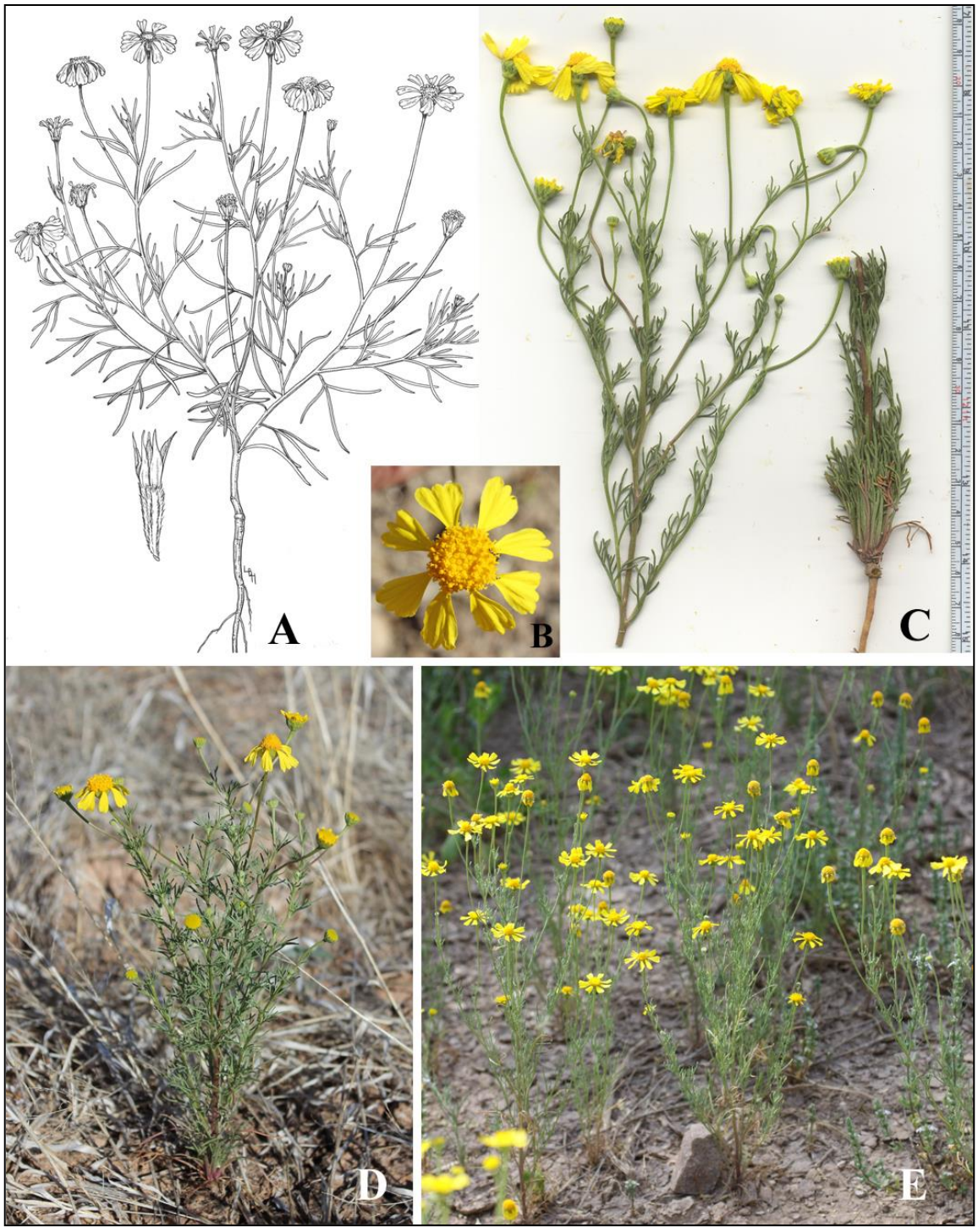


Figure 58. *Hymenoxys odorata*. (A) By Lucretia Breazeale Hamilton. (B, C & E) Roadside ditch, Pinacate Junction, Mex Hwy 2, Sonora, 5 Mar 2014. (D) Roadside near El Huerfano, Mex Hwy 2, Sonora, 5 Mar 2014.

**CP**: Pinta Playa, *Monson 21 Feb 1958*. Marker 81 off the Camino del Diablo, W of O'Neill Hills, *Harlan 20 Mar 1983*. Las Playas, 10 Apr 1993, *Felger 93-382*.

**Isocoma**

Southwestern United States and Mexico; l6 species. A genus segregated from *Haplopappus*. Astereae.

**Isocoma acradenia** (Greene) Greene var. **acradenia**
[*Haplopappus acradenius* (Greene) S.F. Blake. *Isocoma veneta* (Kunth) Greene]
Alkali goldenbush. Figure 59.

Resinous shrubs often 0.8–1 m tall with slender, brittle, shiny stems. Herbage copiously resinous-glutinous from the glands; young herbage with sparse, short, white hairs soon mostly covered in resin, the older herbage appearing glabrate. Leaves alternate, (1) 1.5–4.6 cm long, yellow-green, narrowly oblanceolate to lanceolate, the margins entire or few toothed. Flower heads usually clustered, (4) 4.5–6.5 mm wide, bright yellow with disk florets only. Phyllaries graduated, firm, linear-oblong, with a thin-walled, wart-like resin pocket near the tip. Achenes 2–3.5 mm long, ribbed, moderately to densely pubescent, with many coarse pappus bristles of uneven length. Flowering spring and late summer-fall.

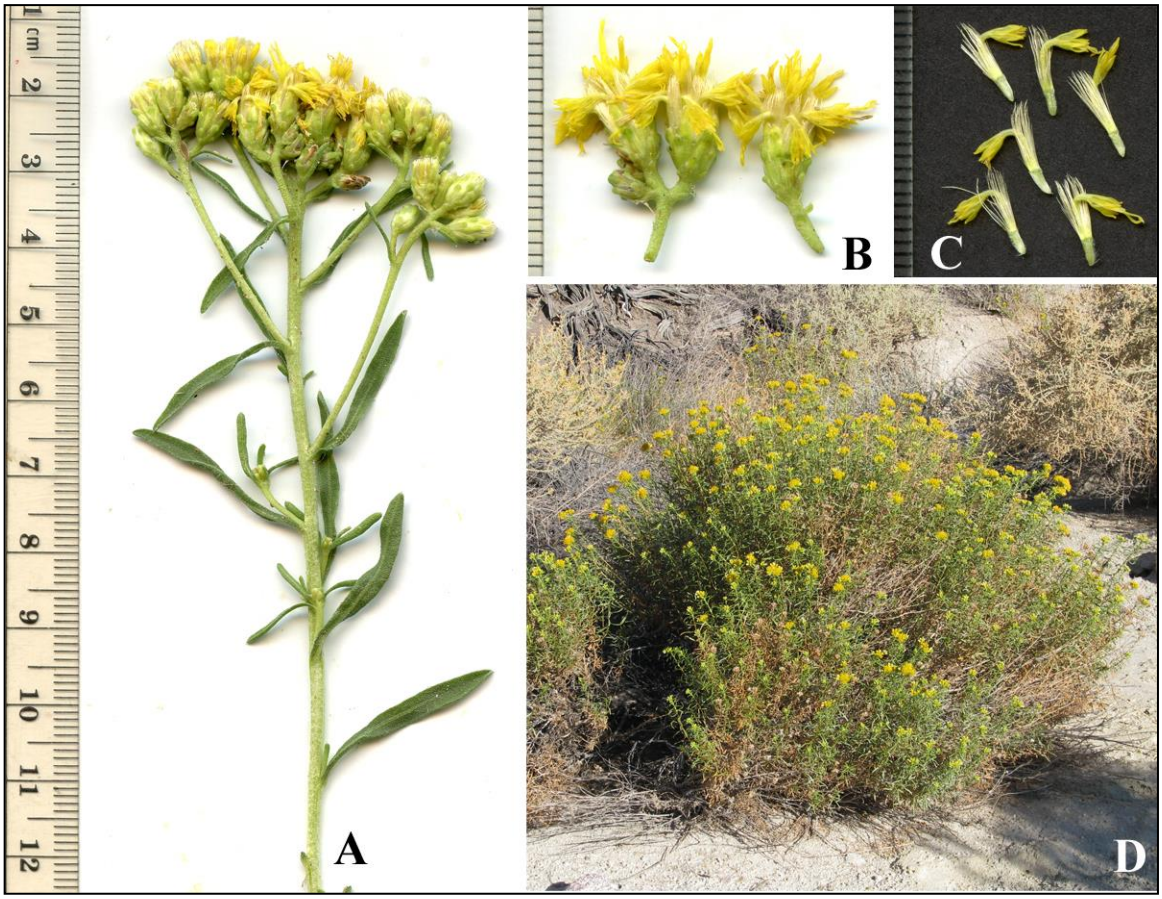


Figure 59. *Isocoma acradenia* var. *acradenia*. Quitobaquito: (A–C) 23 Sep 2014; (D) 20 Oct 2010.

Localized near waterholes and washes and their floodplains, often with saline soils. Especially common in Organ Pipe in the Quitobaquito area; also La Abra Plain, with *Atriplex polycarpa* near Dos Lomitas, and lower-elevation canyon bottoms in the Ajo Mountains. Simmons (1965, 1966) reported it from Tule Well in Cabeza Prieta.

Southwestern United States, Baja California, and Sonora.

Alkali goldenbush was used medicinally by many groups, including by the Cahuillas for "curing colds and sore throats" (Bean & Saubel 1972: 75) and by the Gila River Pimas as a disinfectant to treat sores (Rea 1997: 135), for inflammation, for "cleansing the blood" (Hrdlička 1908: 246), and as a deodorant (Rea 1997).

**OP**: Quitobaquito, *Nichol 28 Apr 1939*. Arch Canyon, *Fouts 15 Jun 1948* (ORPI). Dripping Springs, *Simmons 11 Oct 1963*. Aguajita, 23 Oct 1987, *Felger 87-272*. 3 mi W of Dos Lomitas, *Rutman 29 Aug 2001* (ORPI).

**CP**: Tule Well, *Simmons Sep 1964* (specimen not located, cited by Simmons 1965, 1966).

**Koanophyllon**

Western United States to South America and West Indies; 115 species. A genus segregated from *Eupatorium*. Eupatorieae.

**Koanophyllon palmeri** (A. Gray) R.M. King & H. Robinson
[*Eupatorium palmeri* A. Gray. *E. solidaginifolium* A. Gray in part]
Umbrella thoroughwort. Figure 60.

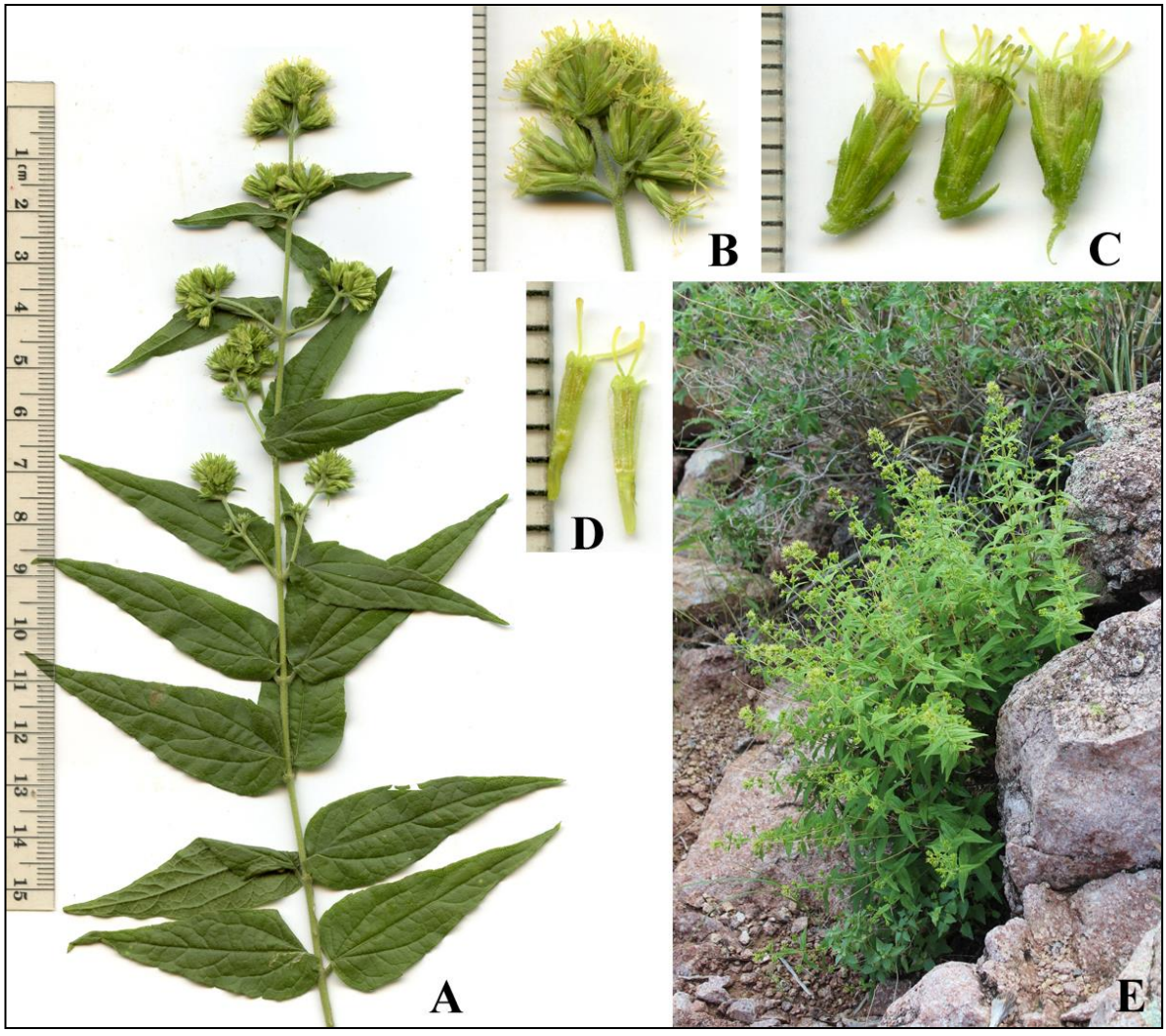


Figure 60. *Koanophyllon palmeri*. (A–D) Arch Canyon, 12 Jan 2014. (E) Estes Canyon, Bull Pasture Trail, 19 Sep 2014.

Low, spreading herbaceous perennials or subshrubs, sometimes to about 1 m tall. Leaves opposite, petioles short, the blades 3–6 cm long, lanceolate to triangular, relatively thin but firm and often shiny green, the margins entire or toothed, the margins and veins of lower leaf surfaces with short, hooked white hairs. Inflorescences rather open and divaricately branched. Flower heads of disk florets, the corollas whitish; involucres 3.5–4 mm wide. Achenes prismatic, 5-ribbed, pale brown, 1.5–1.6 mm long; pappus of many persistent barbellate bristles. Flowering mostly September and October, and sometimes late April and May.

Ajo Mountains including Alamo, Arch, and Boulder canyons, and rocky slopes to the crestline.

Eastward and northward in Arizona to New Mexico, and western Mexico.

The western Mexico and Arizona populations of *K. solidaginifolium* (A. Gray) R.M. King & H. Robinson are segregated as *K. palmeri*. As now interpreted, *K. solidaginifolium* ranges from Texas southward to Michoacán and Coahuila, forming part of a complex of related taxa.

**OP**: Alamo Canyon: *Nichol 4 May 1939* (ORPI); 13 Dec 1939, *Harbison 26254*; South Alamo Canyon, 29 Sep 1988, *Wilson 200*. Boulder Canyon, 3 May 1978, *Bowers 1293* (ORPI). Arch Canyon, 900 m, 2 Dec 1990, *Felger 90-528*. Middle fork of Alamo Canyon, near the crestline, 15 Mar 2003, *Rutman 2003-323* (ORPI). Bull Pasture trail in Estes Canyon, 3000 ft, 10 Apr 2005, *Felger 05-192*.

**Lactuca** – Lettuce

North America to Central America, Eurasia, and Africa; 75 species. *Lactuca sativa* is lettuce. Cichorieae.

***Lactuca serriola** Linnaeus

Prickly lettuce, compass plant. Figure 61.

Ephemerals often germinating in late winter or spring, flowering in late spring and summer, and sometimes surviving through the summer. Highly variable in size, occasionally reaching 2+ m tall but usually much shorter. Stems shiny white, mostly unbranched below; herbage often with stiff bristles. First leaves in a basal rosette, the stem leaves often 10–22 cm long, pinnatifid, turned basally to hold the leaf edgewise and upright in a north-south plane, hence the name "compass plant"; midvein on lower leaf surfaces with a row of thick stiff hairs, but not on leaves produced in fall. Inflorescence a terminal, open panicle. Involucres enlarging after flowering to 11–15 mm long, the phyllaries green, the larger ones conspicuously broadened at base, the tips with small tufts of hair. Flowers pale yellow, the florets ray-like (ligulate). Achene body 2.8–3 mm long, laterally compressed, with short bristles near apex, and a slender beak as long as to much longer than the body and supporting a pappus of silky white hairs.

Usually locally in disturbed habitats and occasional in natural areas, such as the San Cristobal Wash and south end of Coyote Wash in the Lechuguilla Valley. Widely scattered in Organ Pipe, but scarce in natural areas.

Native to Europe, now weedy in many parts of the world. The seeds are the source of Egyptian lettuce-seed oil, used in food for its pleasant flavor and as a semi-drying oil.

**OP**: Puerto Blanco Drive, 3.4 mi E of turnoff to Senita Basin, 20 Jun 1979, *Bowers 1756*. Quitobaquito, 18 Mar 1998, *Rutman*, observation. Burned area 3 mi E of Dos Lomitas, *Rutman 29 Aug 2001* (ORPI).

**CP**: San Cristobal Wash at Camino del Diablo, 10 Apr 1993, *Felger 93-375*.

**TA**: Lechuguilla Valley at Camino del Diablo, S end of Coyote Wash, locally abundant, some dry dead stalks from last year 2+ m in height, 28 Mar 2010, *Felger 10-162*.

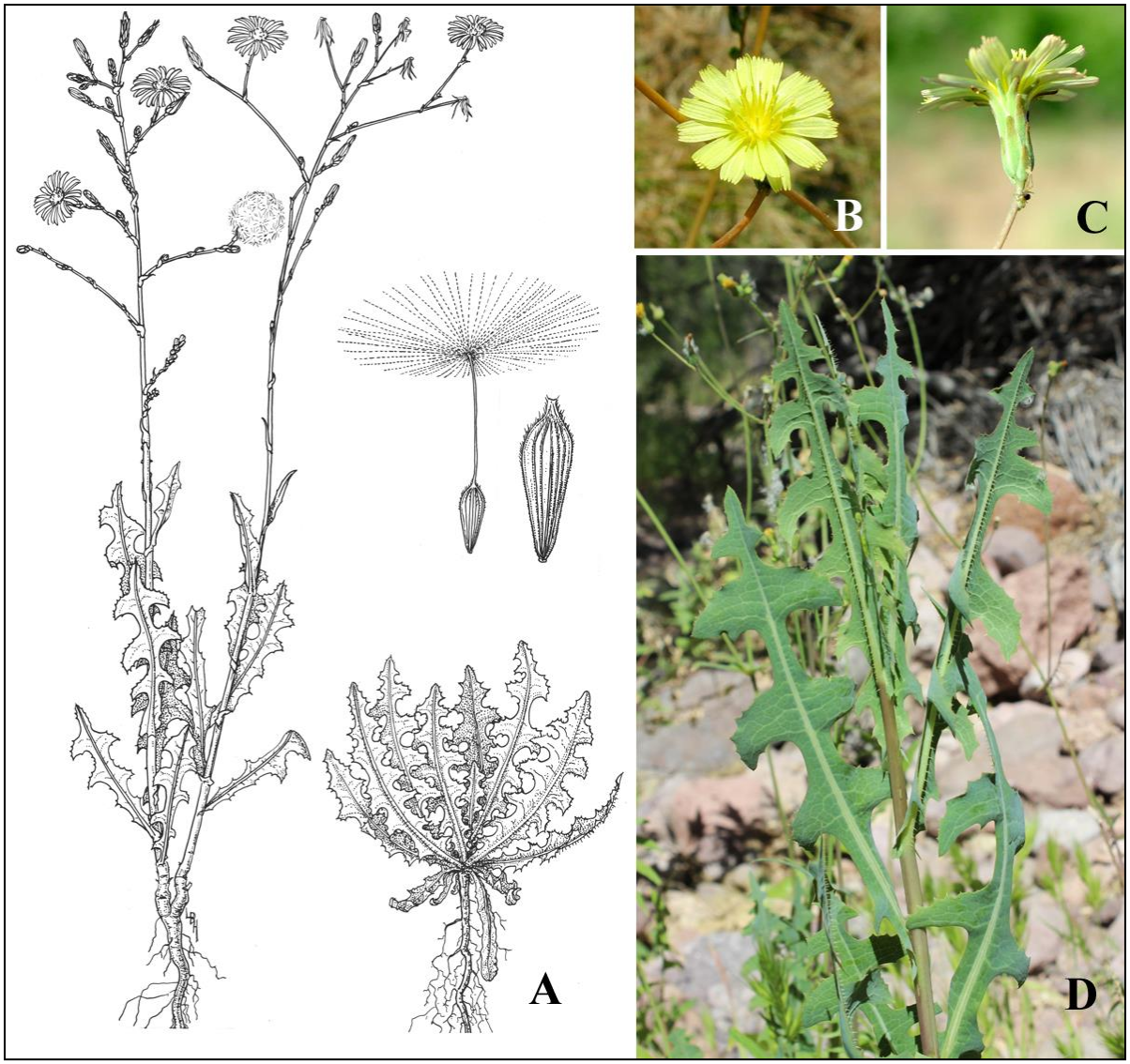


Figure 61. *Lactuca serriola*. (A) By Lucretia Breazeale Hamilton. (B & C) Boulder, Garfield Co., UT, 29 Jul 2001, photos by Max Licher (SEINet). (D) Alamo Canyon, 4 Apr 2015.

**Leucosyris**

Small xerophytic ephemeral, annual or perennial herbs; leaves alternate. Nine species in southwestern United States and northern Mexico. Astereae.

1. Stems leafy except in extreme drought; heads with lavender rays and yellow disk florets. …….. **Leucosyris arida**
1. Stems sparsely leaved to nearly leafless; heads with disk florets only, flowers bright yellow. ……. **Leucosyris carnosa**

**Leucosyris arida** (B.L. Turner & D.B. Horne) Pruski & R.L. Hartman
[*Arida arizonica* (R.C. Jackson & R.R. Johnson) D.R. Morgan & R.L. Hartman. *Machaeranthera ammophila* Reveal. *M. arida* B.L. Turner & D.B. Horne. *M. arizonica* R.C. Jackson & R.R. Johnson, Rhodora 69 (780): 476–480, 1967. *M. coulteri* var. *arida* (B.L. Turner & D.B. Horne) B.L. Turner]
Arid tansy-aster. Figure 63.

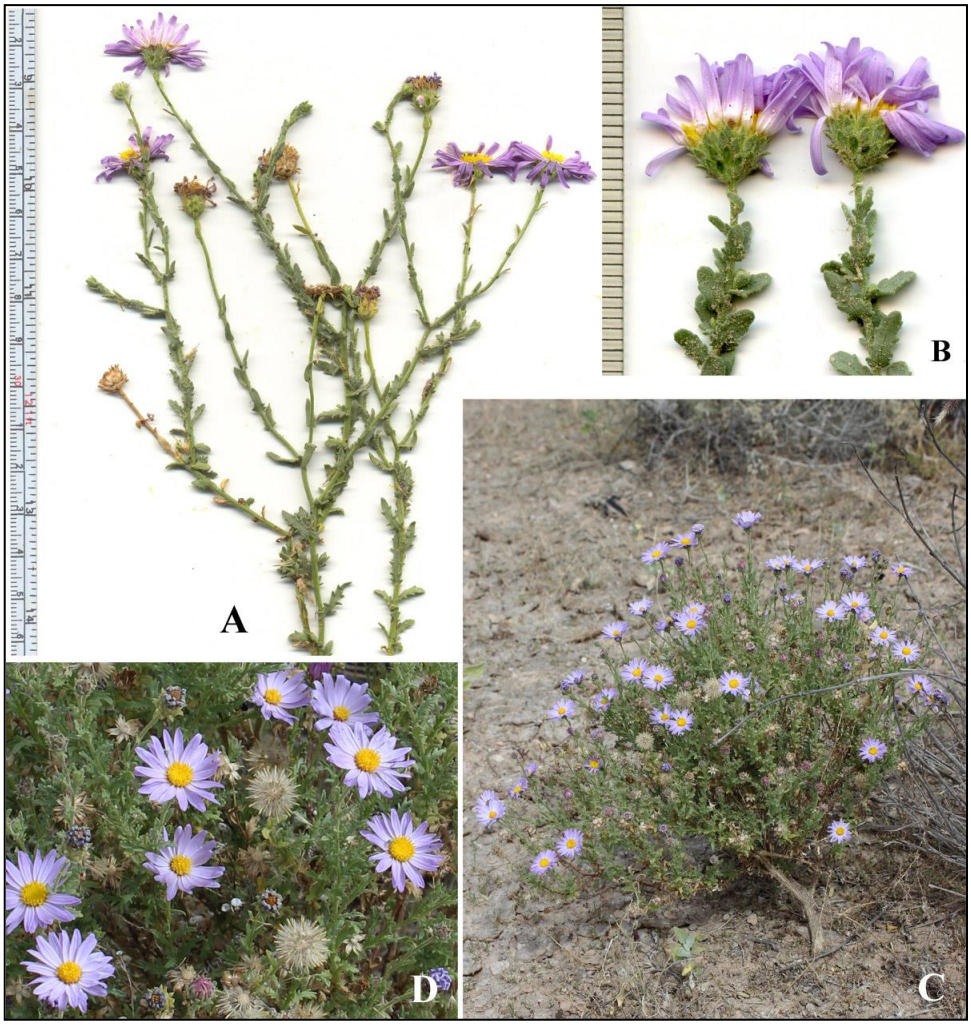


Figure 63. *Leucosyris arida*. Río Sonoyta floodplain near El Huerfano, Sonora: (A) 28 Mar 2013; (C & D) 6 Feb 2014. (B) Quitobaquito, 23 Sep 2014.

Non-seasonal ephemerals to short-lived perennials depending on soil moisture, usually less than 75 cm tall, with a well-developed taproot; plants glandular pubescent. First leaves 4–6 cm long, in a soon-withering basal rosette; stem leaves reduced, pinnatifid to toothed or essentially entire. Rays lavender, 8–12 mm long, ray achenes without a pappus. Disk yellow; disk achenes 1.5–2.2 mm long with a pappus of many unequal bristles. Flowering with sufficient soil moisture almost throughout the year, especially late spring and early summer.

Locally common in washes, sandy and alkaline flats, and roadsides in lowland areas of Organ Pipe and especially common in the Quitobaquito region. Also in the eastern and central part of Cabeza Prieta.

Northwestern Sonora, western Arizona, southeastern California, and southern Nevada.

**OP**: Near Cherioni Well, 9 Apr 1941, *McDougall 65*. Quitobaquito: Low rocky hillside and sandy soil around Quitobaquito Springs, *n* = 5, 31 Mar 1962, *Jackson 3043-1 & Johnson* (holotype of *Machaeranthera arizonica*, KANU; *Jackson 3043-4 & Johnson* (isotype, KANU); *Jackson 3043-2 & Johnson*, isotype of *M. arizonica*, ARIZ); 21 Aug 1983, *Sundberg 2109*. Cuerda de Leña Wash at N boundary, 31 Mar 1978, *Bowers 1157*. Puerto Blanco Mts, small wash near Red Tanks trailhead, 12 Sep 2013, *Rutman 20130912-12*.

**CP**: Charlie Bell Well: *Johnson 26 Mar 1960*; 26 Sep 1992, *Harlan 314*. Tule Well: 28 Mar 1970, *Duncan 7*; 11 Apr 1993, *Felger 93-435*.

**Leucosyris carnosa** (A. Gray) Greene
[*Arida carnosa* (A. Gray) D.R. Morgan & R.L. Hartman. *Aster carnosus* (A. Gray) A. Gray ex Hemsley, not *A. carnosus* Gilbert. *A. intricatus* (A. Gray) S.F. Blake. *Leucosyris carnosa* var. *intricata* (A. Gray) Cronquist. *Machaeranthera carnosa* var. *intricata* (A. Gray) G.L. Nesom]
Alkali aster. Figure 64.

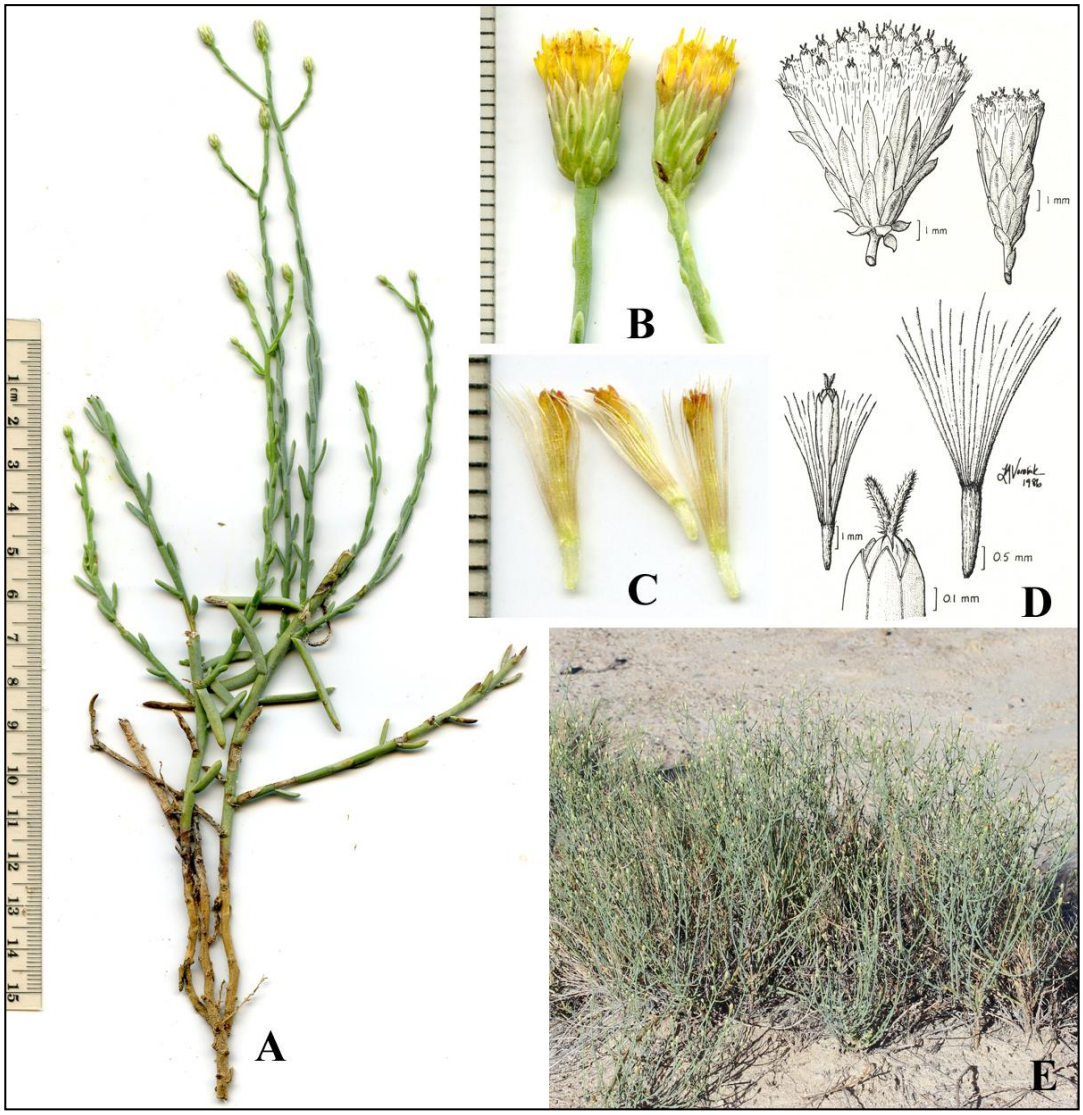


Figure 64. *Leucosyris carnosa*. (A–C, E) Quitobaquito, 23 Sep 2014. (D) Illustration by Linda Ann Vorobik.

Herbaceous perennials, essentially glabrous; sometimes dying back to ground level during drought. Stems often becoming partly decumbent, with few, often spreading branches. Leaves and young stems glaucous, often semi-succulent. Leaves few, often widely spaced, linear, entire, quickly deciduous, 1.4–3.6 cm long on new growth, mostly less than 1 cm, the upper leaves scale-like. Heads of bright yellow disk florets; ray florets none. Achenes 3–4 mm long, the surfaces obscured by white hairs; pappus of many unequal bristles 6–7 mm long. Flowering with sufficient soil moisture during the warmer months.

Saline soils at Quitobaquito, often on nearly barren ground with *Anemopsis californica*, *Juncus mexicanus*, and *Nitrophila occidentalis*.

Widely scattered in similar habitats in northwestern Sonora, Arizona, California, and Nevada.

**OP**: Quitobaquito: 25 Nov 1972, *Pinkava 10004* (ASU, DES, MO); 1 Apr 1980, *Stimson 233*; 23 Jul 1986, *Felger 86-219*.

**Logfia**

Diminutive or small cool-season ephemerals, usually white-woolly. Leaves alternate or seemingly whorled (*L. arizonica*), sessile or petioles obscure, the margins entire. Heads minute, sessile, or peduncles very short, generally grouped in clusters, the actual phyllaries none or vestigial and grading into the chaffy bracts; florets discoid. Outer florets pistillate, spirally arranged between outer bracts; inner florets bisexual, clustered in center of elongated, often tack-shaped receptacle. (Figure 65). Corollas reduced and dull in color, or sometimes pink or purple at tips. Achenes 0.6–1 mm long (Figure 66). Achenes of outermost pistillate florets at least relatively smooth and shiny, without a pappus. Achenes of inner bisexual florets slightly smaller, rougher (the surface with a cellular-patterned sculpturing) and duller or pubescent with unicellular trichomes (papillae), and a pappus of 12–30 deciduous white bristles minutely barbed above and sub-plumose below.

North America including Mexico, Eurasia, and north Africa, and some widely introduced elsewhere; 12 species. *Logfia* is a genus segregated from *Filago*. Gnaphalieae.

1. Branching pattern usually symmetric (2 equal side-branches at nodes, "pseudo-dichotomous"); flower heads and leaves mostly restricted to the branch nodes (forks); leaves nearly linear, usually much longer than the heads; florets inside innermost chaffy bracts 4–12, the minority (0–2) pistillate. …….. **Logfia arizonica**
1. Branching pattern usually asymmetric (irregular); flower heads and leaves more or less evenly distributed; leaves oblanceolate to oblong, usually not much longer than the heads; florets inside innermost chaffy bracts 12–40, the minority (3–7) bisexual.

2. Well-developed plants mostly spreading, wider than tall, branched from base without a dominant central stem; leaves mostly oblong to obovate, obtuse; achenes of innermost florets mostly smooth, with a pappus of 11–15 bristles falling away singly or in pairs; corolla lobes of inner florets mostly 5, usually yellowish…… **Logfia depressa**
2. Well-developed plants often erect and taller than wide, and often branched from a dominant central stem; leaves mostly oblanceolate, acute; achenes of innermost florets mostly sparsely papillate, with a pappus of 17–23 bristles falling away in complete or partial rings; corolla lobes of inner florets mostly 4, usually red-tipped…….. **Logfia filaginoides**

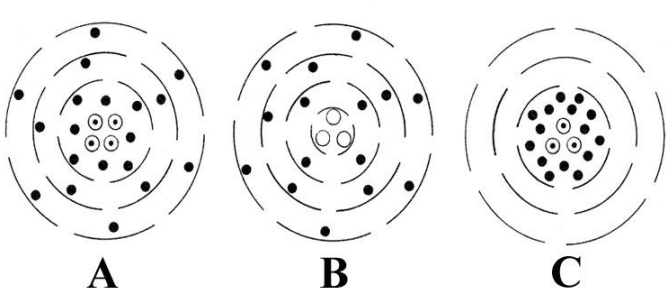


Figure 65. Filaginoid and gnaphaloid flower heads. Diagrams showing relative positions of bracts, pistillate florets (solid circles), and disk florets (open circles) comprising bisexual flowers (open circles with a dot) and staminate flowers (open circle without a dot). (A) *Logfia*; (B) *Stylocline*; (C) *Gnaphalium* sensu lato (*Gamochaeta* and *Pseudognaphalium*). Illustration by Matthew B. Johnson (from Felger 2000).

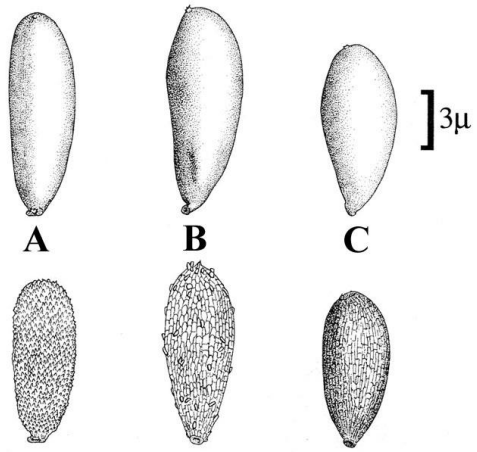


Figure 66. *Logfia* achenes. Upper row, achenes of outermost pistillate florets; lower row, achenes of bisexual inner florets. (A) *L. arizonica*; (B) *L. filaginoides;* (C) *L. depressa*. Illustration by Matthew B. Johnson (from scanning electron microscope photos by James D. Morefield, from Felger 2000).

**Logfia arizonica** (A. Gray) Holub
[*Filago arizonica* A. Gray. *Oglifa arizonica* (A. Gray) Chrtek & Holub]
Arizona fluffweed. Figure 67.

Plants usually less than 10 cm tall, often as wide as or wider than tall, with forked branching. Stems dark-colored, wiry, with relatively long internodes. Leaves whorled, those just below the flower heads usually conspicuously longer than the heads. Achenes 0.9–1 mm long. Pappus bristles falling away in complete or partial rings.

Widespread and often seasonally common, in sandy gravelly or clayish-silt soils, along washes, margins of waterholes and dirt tanks, canyon bottoms, and floodplains where water may temporarily accumulate and has recently dried up, and also in soil pockets on rocky slopes including higher elevations in the Ajo Mountains. Often growing intermixed with *L. filaginoides*.

Southern and central Arizona, southern California, Baja California, Baja California Sur, and northwestern Sonora.

**OP**: 2 mi WSW of Bates Well, rocky hill, 30 Mar 1978, *Bowers 1122*. Aguajita, 6 Apr 1988, *Felger 88-274*. W base of Santa Rosa Mts, *Rutman 3 Feb 2003* (ORPI). Middle fork Alamo Canyon near crestline of Ajo Mts, 3400 ft, 15 Mar 2003, *Rutman 2003-321*.

**CP**: Charlie Bell Pass, 3 Apr 1992, *Whipple 3945A* (CAB). Jose Juan Represo, 12 Jun 1992, *Felger 92-561*. Antelope Tank, 13 Jun 1992, *Felger*, observation. Papago Well, 26 Feb 1993, *Felger 93-138*.

**TA**: Coyote Water, 18 Mar 1998, *Felger 98-114*. Camino del Diablo at Coyote Wash, 10 Jan 2002, *Felger 02-9*.

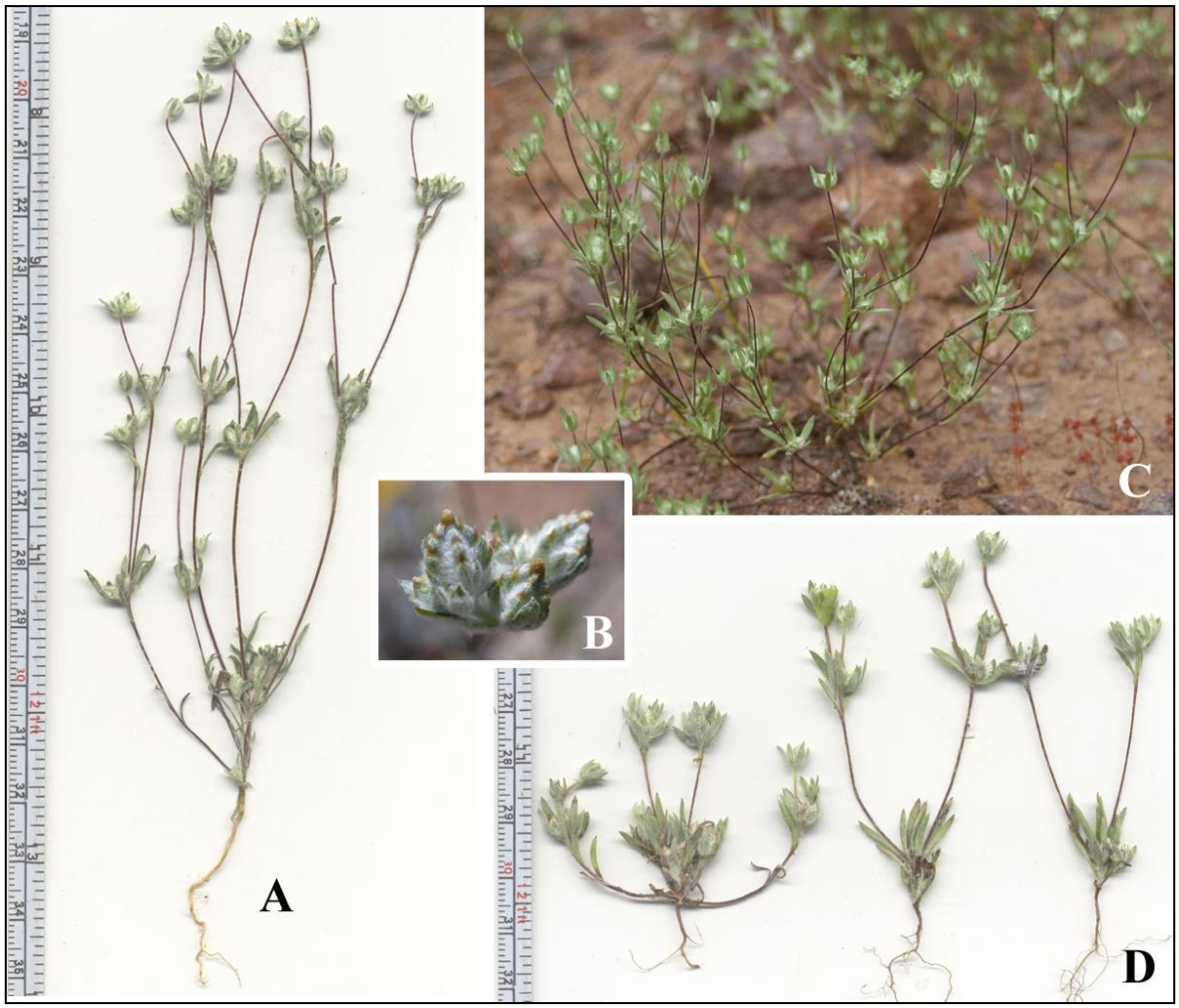


Figure 67. *Logfia arizonica*. (A) Alamo Well, 16 Mar 2014. (B) Catalina Island, CA, 2 May 2003, photo by Gary A. Monroe (CalPhotos). (C) N foothills of Puerto Blanco Mts, 3 Mar 2005. (D) Bull Pasture, 7 Mar 2014.

**Logfia depressa** (A. Gray) Holub

[*Filago depressa* A. Gray. *Oglifa depressa* (A. Gray) Chrtek & Holub]. Figure 68.

Low, spreading plants, usually less than 5 cm tall, densely white-woolly, the internodes usually very short. Leaves mostly broad and blunt. Achenes (0.6) 0.7–0.9 mm long. Inner florets with pappus of 11–15 bristles falling away singly or in 2s.

Sandy-gravelly soils, especially in wash floodplains in the western part of Organ Pipe and low dunes in Cabeza Prieta; also in nearby northwestern Sonora. This inconspicuous and often misidentified species is probably more widespread, since it might be confused with *Stylocline*, especially *S. gnaphaloides*.

Northern Sonora to southern Nevada, southeastern California, and Baja California.


Figure 68. *Logfia depressa*. (A & C) Kuakatch Wash near Kuakatch Village, 11 Mar 2015. (B) Anza Borrego State Park, San Diego Co., CA, 27 Mar 2011, photo by Keir Morse (CalPhotos).

**OP**: Senita Basin Road, 4.5 mi S of Senita Basin, along wash, 23 Mar 1969, *Lehto L15440b* (ASU 18822, mixed collection with *Stylocline gnaphaloides*, det. James D. Morefield, 1992). 2.5 mi by road W of Hwy 85 on 2-way section of Puerto Blanco Drive, 1400 ft, 11 Apr 1978, *Bowers 1219* (ORPI). About 1 mi N of Bates Well road, towards Bluebird Mine, 22 Mar 2003, *Rutman 388* (ORPI).

**CP**: Pinta Sands encroaching E side of Pinacate Lava, growing with *Stylocline micropoides*, 11 Apr 1993, *Felger 93-400*.

**Logfia filaginoides** (Hooker & Arnott) Morefield
[*L. californica* (Nuttall) Holub. *Filago californica* Nuttall. *Oglifa californica* (Nuttall) Rydberg]
California fluffweed. Figure 69.

Plants characteristically slender with erect stems, often 3–20 cm tall. Herbage usually with woolly hairs. Stems more or less evenly leafy. Achenes 0.9–1 mm long. Inner florets with a pappus of 17–23 bristles falling away in complete or partial rings.

Widespread and often common, from low to high elevation, among rocks on slopes, bajadas, and along washes and canyons or at waterholes.

Arizona, California, Nevada, New Mexico, western Texas, Utah, Baja California, Baja California Sur, and Sonora southward to the Guaymas Region.

**OP**: Alamo Canyon, 12 Apr 1978, *Bowers 1248*. Twin Peaks, 4 Mar 1984, *Van Devender 84-48* (ORPI). Quitobaquito, 29 Mar 1988, *Felger 88-128*. Growler Mts, W of Growler Pass, 7 Mar 2003, *Rutman 2003-223* (ORPI). Trail from The Cones to Mount Ajo, 4090 ft, 10 Apr 2005, *Felger 05-285*.

**CP**: Charlie Bell Pass, 3 Apr 1992, *Whipple 3945B*. Agua Dulce Pass, 13 Jun 1992, *Felger 92-573*.
**TA**: Tinajas Altas, 18 Mar 1998, *Felger 98-144*.

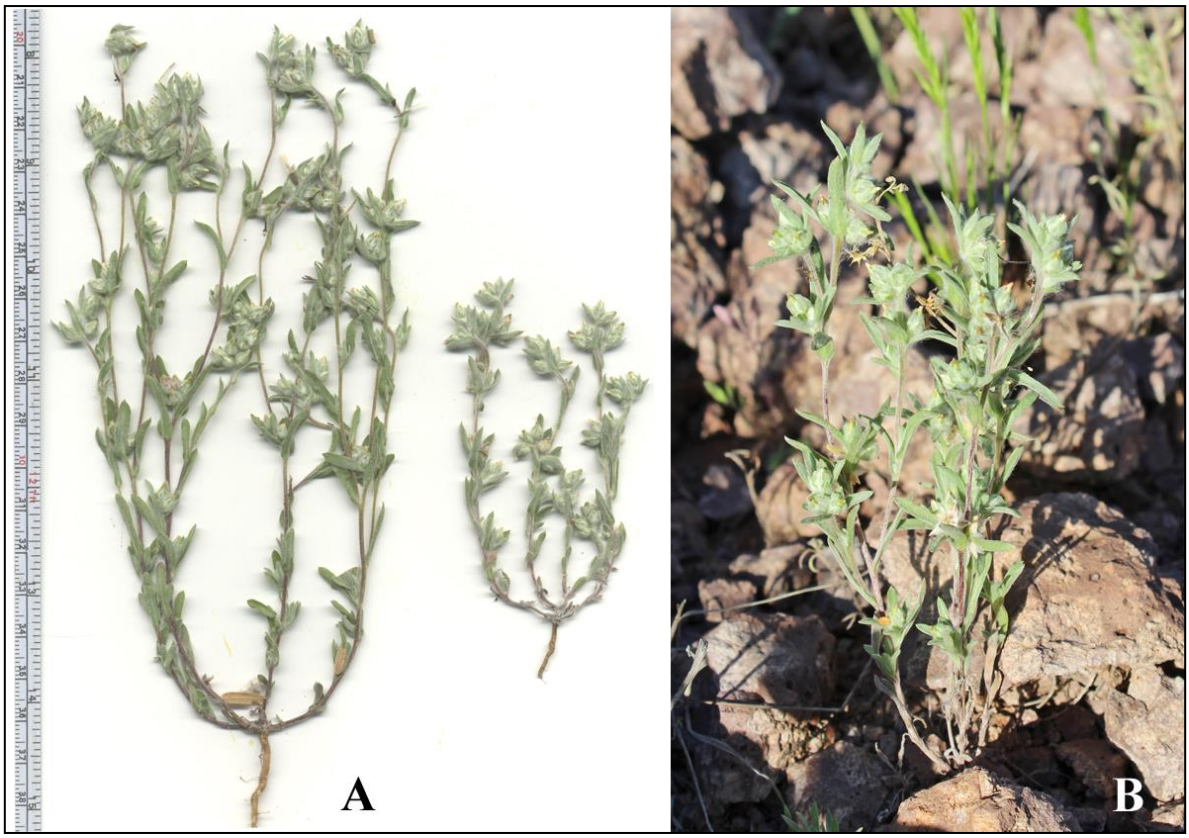


Figure 69. *Logfia filaginoides*. (A) Estes Canyon Trail, 7 Mar 2014. (B) Red Tanks parking area, Puerto Blanco Mts, 15 Mar 2005.

**Machaeranthera**

Two species; *Machaeranthera tanacetifolia* occurs in western North America including Mexico and Arizona. Astereae.

The large and unwieldy former *Machaeranthera*, once included in *Aster*, has been split into a number of monophyletic segregate genera (e.g., Morgan & Hartman 2003; Pruski & Hartman 2012). The former *Machaeranthera* sensu lato includes *Dieteria*, *Leucosyris*, and *Xanthisma*.

**Machaeranthera tagetina** Greene
[*Aster tagetinus* (Greene) S.F. Blake]
Mesa tansy aster. Figure 70.

Annuals, highly variable depending on soil moisture, often 10–25 cm tall, exceptionally robust plants to 75 cm tall. Leaves alternate, mostly 1- or 2-times pinnatifid. Flowering spring and summer, or possibly biennial in favorable situations. Densely pubescent with golden glandular-tipped hairs, sessile glands, and non-glandular hairs. Flower heads showy, involucres 3–9 mm high, the disk flowers yellow, the rays violet; ray and disk florets forming similar achenes and pappus, the achenes 2.5–3 mm long, sub-cylindrical, brown, densely covered with white hairs, and a persistent pappus of many barbellate bristles.


Figure 70. *Machaeranthera tagetina*. (A) Estes Wash at Ajo Mountain Drive, 21 Sep 2008. Alamo Canyon: 9B) 15 Sep 2013; 9C) 7 Sep 2013. (D) Estes Canyon, trail to Bull Pasture, 26 Aug 2008.

Ajo and Diablo mountains, especially at higher elevations, in open, sunny areas.

Southern to north-central Arizona, southwestern New Mexico and northeastern Sonora and adjacent Chihuahua; generally not in the drier regions of the Sonoran Desert.

**OP**: Arch Canyon, *Galiano 27 Aug 1986* (ORPI). Bull Pasture, 10 Apr 2005, *Felger 05-219*.

**Malacothrix**

Spring ephemerals with milky sap. Leaves mostly basal, the flower heads ligulate and often nodding in bud; florets yellow or white. Achenes ribbed, with or without a pappus. Cichorieae.

Native to western United States and northwestern Mexico, and introduced in South America; 20 species.

1. Leaves pinnatifid with slender thread-like segments; receptacle bristly; achenes 2.4 mm long. …….. **Malacothrix glabrata**
1. Leaves broad, with coarse teeth; receptacle not bristly; achenes 1.8–2 mm long.

2. Flower heads (1.5) 2.5–3 cm wide, one to few per stem; rays yellow with reddish streaks on underside, 4–6 mm longer than the phyllaries…….. **Malacothrix fendleri**
2. Flower heads 1–1.5 cm wide, several to many per stem; rays uniformly white (or maybe yellowish), 1–2 mm longer than the phyllaries…….. **Malacothrix sonorae**

**Malacothrix fendleri** A. Gray
Fendler's desert-dandelion. Figure 71.

Plants glabrate to mostly pubescent with cottony cobwebby hairs, and sparsely pubescent with gland-tipped hairs near the base of the plant and sometimes on lower leaf surfaces. Basal rosette leaves often 2.5–5.5 cm long, elliptic to oblanceolate, pinnately lobed or toothed. Stem leaves greatly reduced, the flowering stems bearing one to several flower heads. Flowers heads (1.5) 2.5–3 cm wide, the rays bright yellow, often with reddish tips, and reddish stripes on lower surfaces, larger rays often 10–13 mm long, with 5 prominent terminal teeth. Receptacle not bristly. Achenes brown, 1.8–2.2 mm long, slender and cylindrical, the tip forming a cup, the ribs extending into the terminal cup; pappus of 12–15 readily separating slender, white, barbellate bristles.

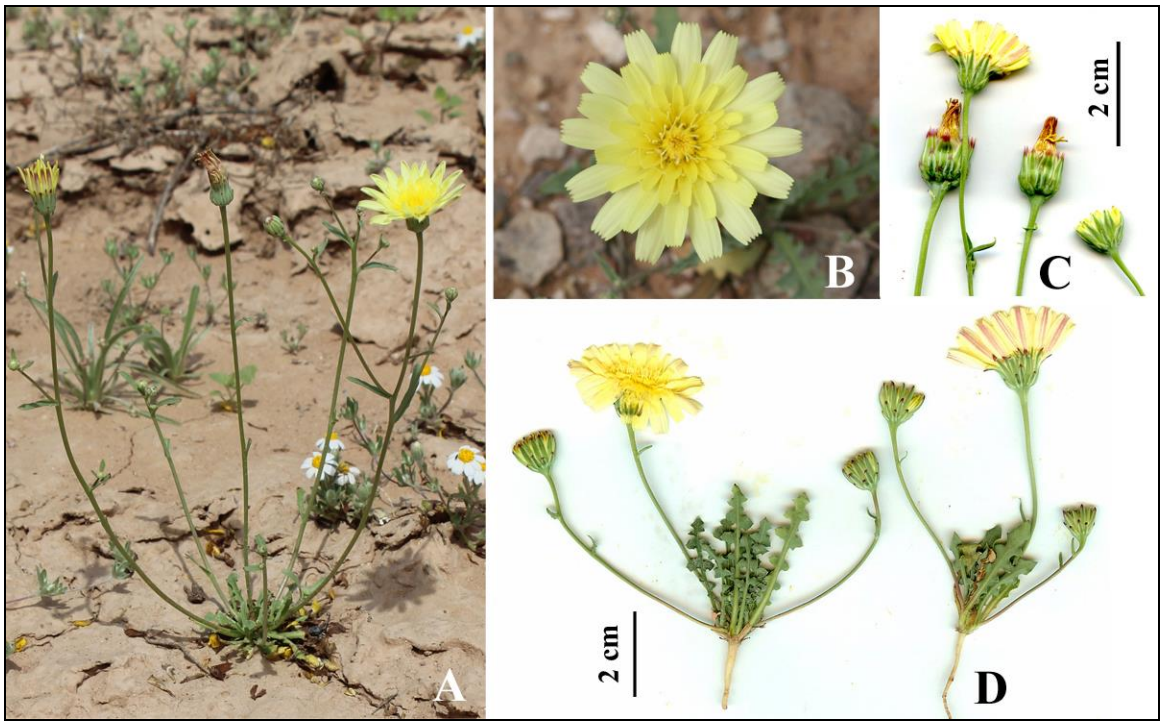


Figure 71. *Malacothrix fendleri*. (A) Lago Seco, Goldwater Range, Maricopa Co., 18 Mar 2014. (B & D) Sikort Chuapo Mts, 15 Mar 2008. (C) Hwy 85, mile 62, east of Why, 5 Apr 2015.

Washes and valley plains, often in low places where water temporarily settles. Eastern part of Cabeza Prieta and the northern part Organ Pipe; apparently not common.

Southern and eastern Arizona to western Texas, northern Sonora, and northern Chihuahua.

**OP**: Near junction of Bates Well Road and road to Cabeza Prieta, 3 Mar 1978, *Bowers 1139*. Hwy 85 near the N boundary, 31 Mar 1979, *Bowers 1611* (ORPI). Valley flat NE of Montezuma's Head, Ajo Mts, *Rutman 4 Apr 1998* (ORPI). Armenta Road, 11 Mar 2003, *Felger 03-259*.

**CP**: San Cristobal Wash: 16 Apr 1976, *Engard 869* (DES); 11 Apr 1978, *Reeves 6826-A* (ASU); Near San Cristobal Wash along Camino del Diablo, 11 Apr 1992, *Harlan 153*. Redtail Tank, *Cutler 17 Mar 1995* (CAB).

**Malacothrix glabrata** (A. Gray ex D.C. Eaton) A. Gray
[*M. californica* de Candolle var. *glabrata* A. Gray ex D.C. Eaton]
Desert dandelion. Figure 72.

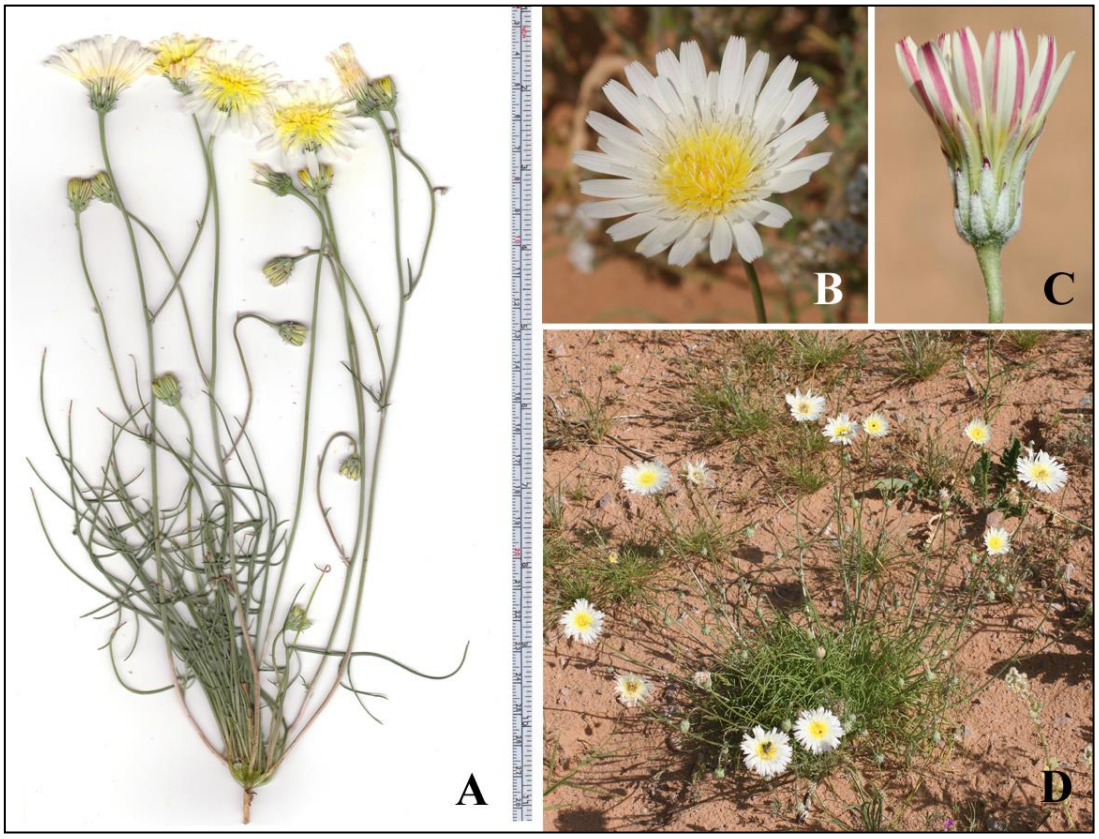


Figure 72. *Malacothrix glabrata*. (A) Hwy 86 roadside, E of Kitt Peak Road, 11 Apr 2010. (B & D) Dunes 20 mi S of Sonoyta, Sonora, on Mex Hwy 8, 27 Mar 2010. (C) Puerto Peñasco, Sonora, 17 Feb 2008.

Herbage slightly woolly when young, becoming glabrate, often semi-succulent. Leaves mostly in a basal rosette, 6–18 cm long, pinnatifid with linear to thread-like segments, usually withering before flowering. Flowering stems simple, or few- to sometimes many-branched, 10–45+ cm tall, mostly with a few leaves below. Involucres 2.5–3 cm wide; phyllaries densely to sparsely woolly on outer surfaces, the larger phyllaries ca. 20+ in number, (8) 9–14 mm long, green with white, membranous margins. Flower heads on long peduncles, nodding in bud; closing at night, opening at about 7 a.m. Heads to 5 cm in diameter, cream white to pale yellow with a darker yellow

center. Ligules 12–16 (25) mm, the outer ligules often with a pale reddish mid-stripe below. Receptacle bristly. Achenes 2–3 mm long, with 1 or few pappus bristles and with or without tooth-like scales.

Widespread and common; dunes, plains, washes, bajadas, canyons, and sometimes on rocky hills and mesas.

Northwestern Sonora and Baja California Sur to Oregon, Idaho, Utah, and Arizona.

**OP**: Alamo Canyon, 2500 ft, *Nichol 14 Mar 1939*. 7.2 mi NW of Visitor Center on Puerto Blanco Drive, 10 May 1979, *Bowers 1713*. Aguajita, 3 Mar 1992, *Felger 92-115*. NE of Bates Mts, 23 Mar 2003, *Rutman 2003-399*.

**CP**: Papago Well, *Crooks 31 Mar 1937*. W side of S end of Sierra Pinta, *Monson 20 Mar 1958*. Pinacate Lava, 29 Mar 1985, *McLaughlin 2983*. San Cristobal Wash, 11 Apr 1992, *Harlan 162*. Pinta Sands, 11 Apr 1993, *Felger 93-401*.

**Malacothrix sonorae** W.S. Davis & P.H. Raven
Sonoran desert-dandelion. Figure 73.

Figure 73. *Malacothrix sonorae*. Bull Pasture Trail near Estes Wash, 6 Apr 2010.

Delicate plants often 10–20+ cm tall. Basal rosette leaves 2.5–5 cm long, lanceolate to oblanceolate, with broad, coarse teeth or toothed segments; stem leaves reduced. Flower heads 1–1.5 cm wide, on branched and slender-stemmed inflorescences, the ligules white (or maybe yellowish). Phyllaries 8–14 or more, 7–9 mm long, the accessory bracts ca. 8–10 in number, less than ⅓ as long as the longer phyllaries. Receptacle not bristly. Achenes slender, 1.8–2 mm long, with 15 ribs, the uppermost part of the achene smooth, the pappus of 1–2 bristles plus persistent teeth.

Washes, canyon bottoms, and rocky slopes in the Ajo and Santa Rosa mountains, often in shaded niches; seldom common.

Southern Arizona from the Ajo Mountains to eastern Pima County, and Sonora southward to the vicinity of Hermosillo and the northern margin of the Guaymas Region.

**OP**: Arch Canyon, 3500 ft, 28 Mar 1965, *Niles 554*. Ajo Loop Drive, 4 May 1978, *Bowers 1306* (ORPI). Sierra Santa Rosa, canyon bottom, 12 Mar 2003, *Felger 03-317*. Alamo Canyon, 29 Mar 2003, *Felger 03-418*.

**CP**: Salazaria Wash, 32º11'20"N, 113º43'W, 12 Apr 1992, *Harlan 220*.

*Microseris linearifolia*, see **Uropappus lindleyi**

**Monoptilon**

Two species; *Monoptilon bellidiforme* occurs in Arizona, California, Nevada, and Utah. Astereae.

**Monoptilon bellioides** (A. Gray) H.M. Hall
Mojave desert-star. Figure 74.

Low-growing spring ephemerals mostly 1.5–25 cm wide, with coarse, white hairs and sessile glands, especially on the phyllaries. Early leaves in a basal rosette, the stem leaves alternate, linear-spatulate, often 7–12 mm long, closely spaced below the flower heads, and few and widely spaced along stems, reaching 20–35 mm long on robust plants. Flower heads showy, solitary on stem tips, 1 or more per plant, often obscuring the leaves, mostly 1.2–1.7 (2) cm wide, showy, the rays 6–10 mm long, white to lavender, the disk yellow; flower heads "closing" at night, the rays inrolling. Phyllaries 5–6 mm long, narrowly oblanceolate to elliptic, green with membranous margins and red acuminate tips, the inner phyllaries partially enclosing the ray achenes. Achenes 1.5 mm long, obovate, brown, and hairy; pappus of golden-brown scales and bristles 2–2.5 mm long.

Seasonally common and widespread. Often producing spectacular displays on otherwise nearly barren gravelly flats and desert pavements; sandy to rocky soils, washes, bajadas, *Larrea* flats, mesas, and lower slopes. Sometimes only a few cm tall with a single flower head, but in sandy soils of canyon bottoms in favorable seasons sometimes forming sprawling plants to 50 cm across.

Northwestern Sonora, northeastern Baja California, western and southern Arizona, southeastern California, and southern Nevada.

**OP**: Tres Alamos Canyon, 2700 ft, *Nichol 24 Feb 1939*. W base of Ajo Mts, 2500 ft, 14 Mar 1941, *Benson 10625*. Dripping Springs, *Hesselberg 10 Apr 1966*. N of junction of Bates Well and Cabeza Prieta roads, 30 Mar 1978, *Bowers 1153*. Aguajita, wash, *Beale 8 Apr 1988* (ORPI).

**CP**: Charlie Bell Pass, 3 Apr 1992, *Whipple 3911* (CAB). Pinta Sands, 11 Apr 1993, *Felger 93-430*. 2 mi NW of Christmas Pass, *Rutman & Tibbitts 18 Feb 2002*.

**TA**: N of Tinajas Altas Pass, *Halse 31 Mar 1973*. Tinajas Altas Canyon, 19 Mar 1998, *Felger*, observation.

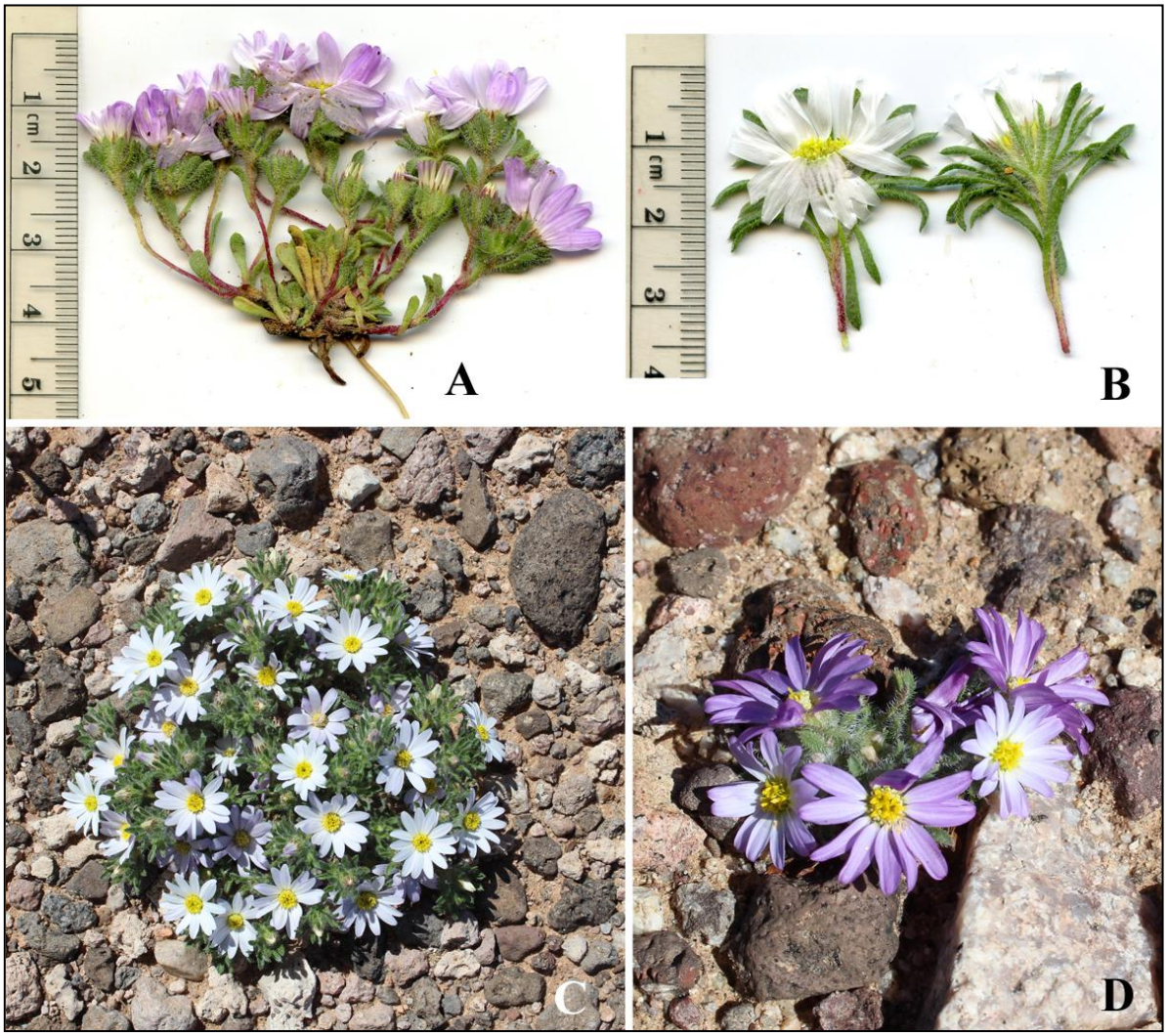


Figure 74. *Monoptilon bellioides*. (A) Kuakatch Wash near Kuakatch Village, 11 Mar 2015. (B) Midway Wash, 28 Feb 2015. (C) W side of Lookout Mountain, Maricopa Co., 12 Mar 2014. (D) Kuakatch Wash near Hwy 85, 3 Mar 2014.

***Oncosiphon**

Native to southern Africa, widely introduced; 8 species. Anthemideae.

***Oncosiphon piluliferum** (Linnaeus f.) Källersjö
[*Matricaria globifera* (Thunberg) Frenzl ex Harvey]
Globe chamomile, stinknet; *manzanilla*. Figure 75.

Small, aromatic spring ephemerals. Flowers heads rounded, of more than 100 minute, yellow disk florets.

Known in the flora area from several records. Perhaps established in San Cristobal Wash in Cabeza Prieta.

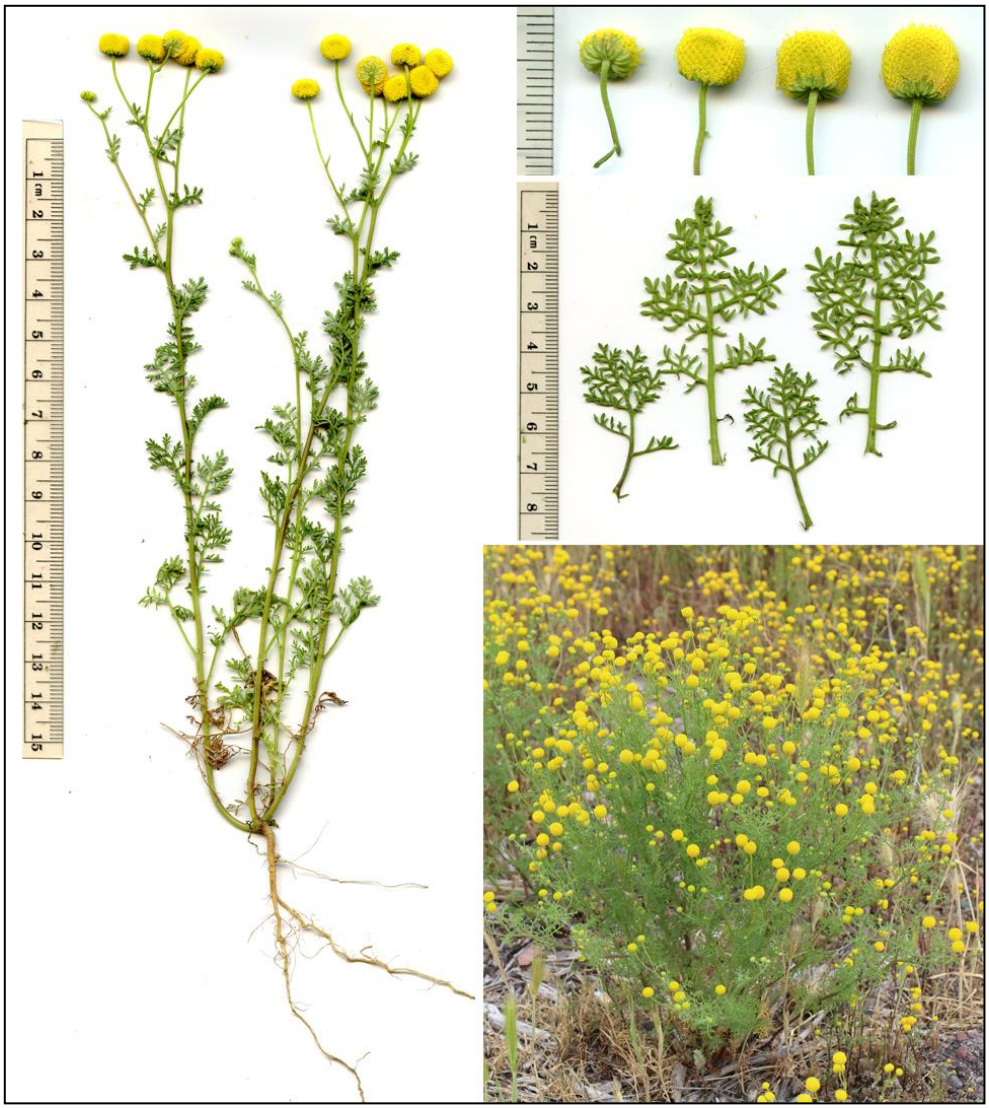

Figure 75. *Oncosiphon piluliferum*. Roadside N of the Gila River, Hwy 85, Maricopa Co., 28 Feb 2015.

Occasionally encountered elsewhere in Arizona in the Sonoran Desert but seldom in natural areas. Also in California and native to South Africa. This species was first noted in North America in 1981 in southern California and the Phoenix region and it rapidly became locally common.

**OP**: Cherioni Wash & Hwy 85, several plants, disturbed road shoulder on soils imported from vicinity of Why (a few plants also at another construction site 2–3 mi N of Visitor Center), *Rutman 15 Apr 2005*.
**CP**: San Cristobal Wash, 32˚06'N, 113˚07'W, 11 Apr 1992, *Harlan 165*.

**Packera** – Ragwort

Subtropical to arctic region in North America; 64 species. This genus is segregated from *Senecio*. Heliantheae, Senecioneae.

*Packera* "contains species that have traditionally been referred to as the 'aureoid senecios,' an informal group first recognized by Asa Gray. Base chromosome numbers of × = 22 or 23 and a suite of morphologic characters have been used in circumscription of *Packera*. Studies involving

molecular data and palynological analysis lend additional support for recognition of the genus" (Tock 2006). Yet the distinctions can be daunting.

**Packera quercetorum** (Greene) C. Jeffrey
[*Senecio quercetorum* Greene]
Oak Creek ragwort. Figure 76.

Herbaceous perennials to 50 cm tall; often bluish green, glabrous or tomentose basally and in leaf axils. Stems usually purple tinged, especially below. Largest leaves at base and in basal rosette, to 15 cm long, petioled, the blades obovate or pinnately lobed, the terminal lobe largest and with toothed margins; upper stem leaves reduced; lower leaf surface often reddish purple. Flowers heads many, on branched inflorescences held well above the leaves, with bright yellow ray and disk florets, the rays 6–10 mm long; ray and disk florets fertile. Phyllaries green, equal and relatively thick, glabrous or the tips pubescent. Achenes 1.5–4 mm long, cylindrical and ribbed, with deciduous, filiform, white pappus bristles. Flowering March to May.


Figure 76. *Packera quercetorum*. (A) Arch Canyon below Mount Ajo, 29 Mar 2015, photo by Peter Holm. (B) Sedona, Coconino Co., 24 Apr 2004, photo by Max Licher.

Ajo Mountains in canyons and higher elevations, especially shaded north-facing slopes. This is an isolated population, and the only one for the Sonoran Desert and Pima County.

Southwestern New Mexico and widespread in Arizona in non-desert regions and into pine forests.

**OP**: Alamo Canyon, *Nichol 4 May 1939*. Side canyon of Arch Canyon, 3500 ft, 28 Mar 1965, *Niles 547*. Boulder Canyon, 2800 ft, 3 May 1978, *Bowers 1284*. Trail from The Cones to Mount Ajo, 3940 ft 10 Apr 2005, *Felger 05-253*.

**Palafoxia**

Southern United States and Mexico; 12 species. Heliantheae, Chaenactidinae.

**Palafoxia arida** B.L. Turner & M.I. Morris var. **arida**
Spanish needles. Figure 77.

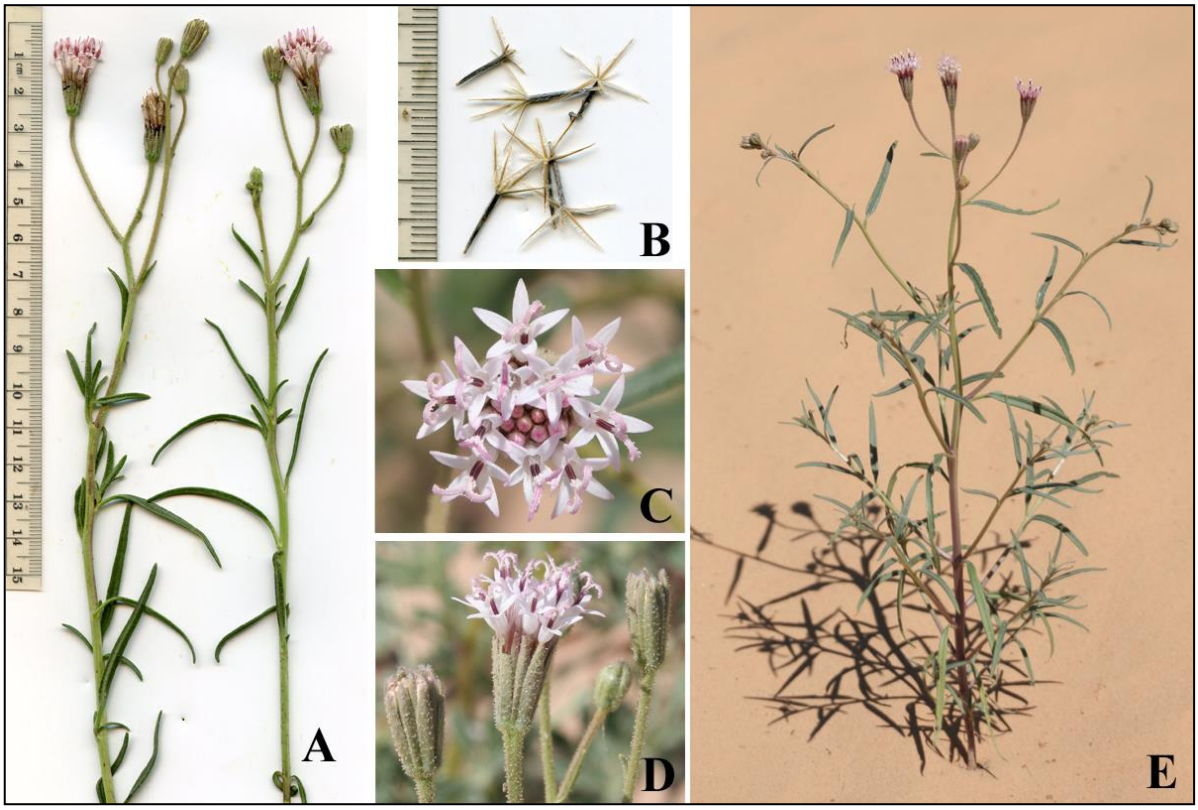


Figure 77. *Palafoxia arida* var. *arida*. Puerto Peñasco, Sonora: (A) 19 Feb 2015; (E) 17 Feb 2008. (B) Dunes near Maya Palace, 25 mi E of Puerto Peñasco, Sonora, 20 Feb 2015. (C & D) Dunes S of Sierra Blanca, Pinacate Biosphere Reserve, Sonora, 16 Feb 2008.

Winter-spring ephemerals sometimes germinating and flowering with summer-fall rains. Plants usually erect, often 30–90 cm tall, with a single erect main axis or branched from above the middle, or sometimes many-branched and bushy when well watered; with coarse silvery hairs. Leaves at first opposite, otherwise alternate, 3–9 cm long, linear to linear-lanceolate, with forward-pointing hairs; margins entire. Flowering stems and phyllaries with glandular hairs. Flower heads cylindrical to narrowly turbinate, mostly 20–25 mm long, of disk florets only, the corollas and stigmas dull white to pale pink, the anthers dark purple. Phyllaries equal, in a single series. Achenes 7.5–12.3 mm long, narrowly obpyramidal, blackish, 4-angled, mostly densely pubescent with short white hairs or sometimes glabrous; pappus of papery scales.

Central part of Organ Pipe westward; widespread in Cabeza Prieta, most abundant on sandy soils including dunes.

Mojave and Sonoran deserts in southwestern United States and northwestern Mexico. In central Sonora, at about Hermosillo and Bahía Kino, *P. arida* grades into *P. linearis* (sensu Turner & Morris), which extends southward to Sinaloa, and a similar transition occurs on the Baja California Peninsula. Turner and Morris (1975: 79) differentiate *P. linearis* as "sprawling shrublets having linear leaves with round or obtuse apices" and restrict it to "coastal sand dunes of southern Baja California."

Plants from that region appear indistinguishable from those of coastal southwestern Sonora and Sinaloa.

**OP**: Puerto Blanco Drive, 10 mi by road W of Hwy 85, 11 Apr 1978, *Bowers 1226*. Aguajita, wash, 14 Sep 1988, *Felger 88-406*.

**CP**: Tule Mts, 26 mi W of Papago Well, 15 Apr 1941, *Benson 10787 & Darrow*. O'Neill's Grave, 11 Apr 1992, *Harlan 182*. Pinta Sands: 10 Apr 1978, *Reeves 6789* (ASU); 15 Sep 1992, *Felger 92-781*.

**TA**: Butler Mts, sand dune, *Van Devender 27 Mar 1983.*

**Parthenice**

This genus has a single species. Heliantheae, Ambrosiinae.

**Parthenice mollis** A. Gray
Annual monsterwort. Figure 78.

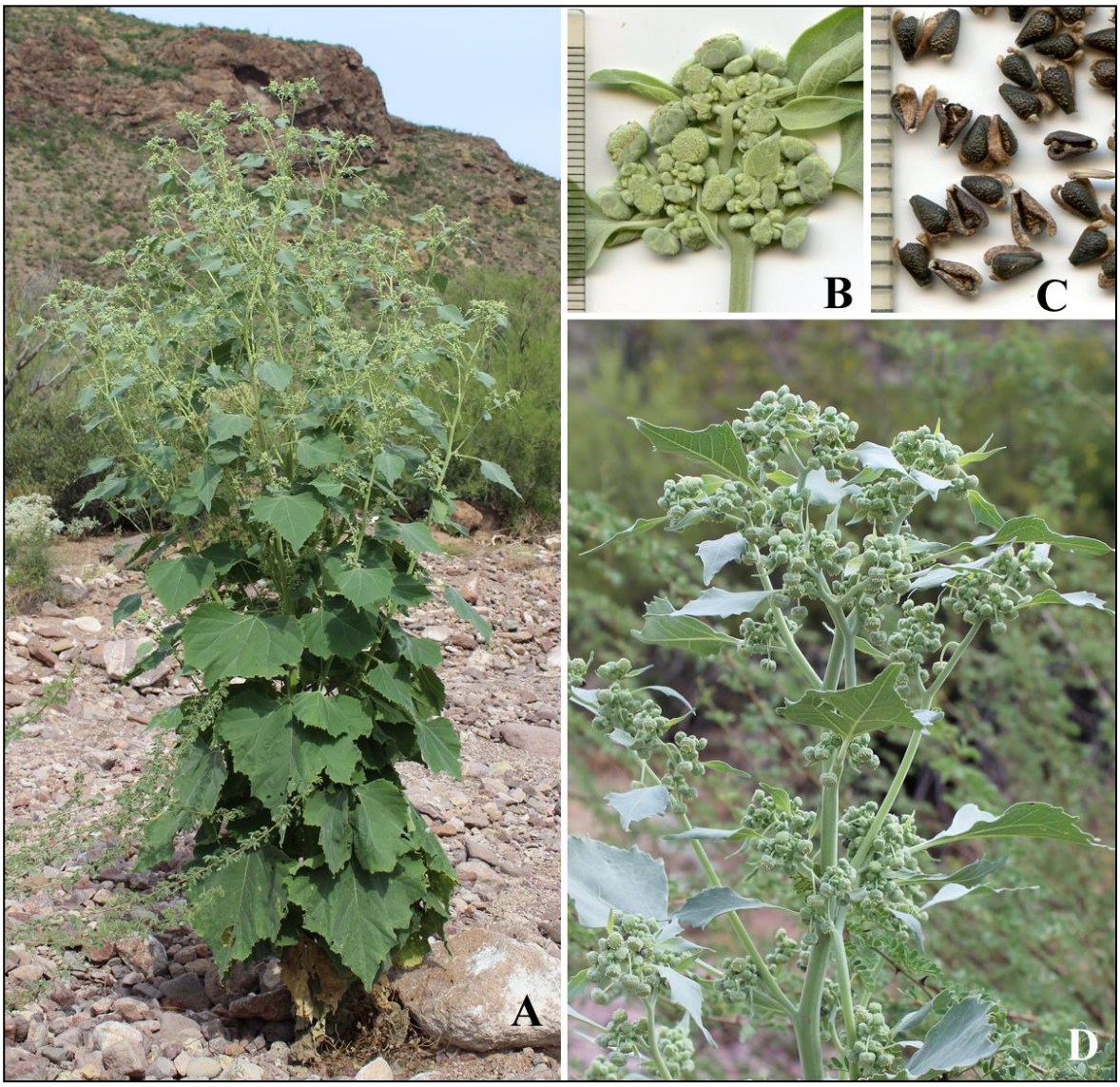


Figure 78. *Parthenice mollis*. Estes Wash near Ajo Mountain Drive: (A) Plant 2 m tall, 14 Aug 2013. Estes Wash, 0.5 mi S of Estes Canyon trailhead on Ajo Mountain Drive: (B & C) 26 Aug 2014; (D) 14 Aug 2013.

Robust warm-weather ephemerals, the stems erect, reaching 2 m tall, with dull gray-green herbage. Leaves alternate, petioled, the blades mostly 10–25 cm long and nearly as wide (exceptionally 36 cm wide), velvety pubescent, ovate to deltate, the margins coarsely and shallowly toothed. Flower heads many in open panicles, 5 mm wide, gray-green and inconspicuous with disk-like florets, the corollas yellowish. Ray florets minute, with achenes 2 mm long, obovate, the pappus minute or absent. Receptacle with bracts (palea) partially enclosing achenes and falling with them. Disk florets numerous, functionally staminate. Reproductive with summer rains.

Occasional in sandy-gravelly soils of washes and steep rocky slopes in Organ Pipe, mostly in the Ajo Mountains to higher elevations.

Arizona and northwestern Mexico.

**OP**: 12 mi N Visitor Center, 13 Jul 1962, *Ranzoni 176* (ORPI). Estes Canyon Picnic Area, 6 Nov 1977, *Bowers 961* (ORPI). Estes Wash, 706 m, 8 Aug 2003, *Rutman 20030808-4* (ARIZ, ASU). Slopes N of the saddle between Arch and Boulder canyons, 26 Oct 2003, *Rutman 20031026-13.*

**Pectis** – Chinchweed

Summer ephemerals in the flora area, also perennials elsewhere. Leaves opposite, narrow, sessile or essentially so, and with 1–several pairs of bristles or cilia near the base of the leaf. Flower heads with ray and disk florets. Achenes linear, club-shaped; pappus variable, sometimes reduced.

Western Hemisphere, the Galapagos Islands and Hawaii; 90 species. Heliantheae, Pectidinae.

Most species in the genus are pungently aromatic with essential oils imparting a lemon-like scent and have leaves and phyllaries dotted with conspicuous oil glands. However, two of the three species in the flora area are not aromatic, and have small, inconspicuous and selfing (autogamous) flowers. *Pectis* is rare among the Tageteae and composites in general in having $C_4$ rather than $C_3$ photosynthesis, providing an important adaptation to hot climates. Molecular studies show *Pectis* to be sister to, or encompassing, the genus *Porophyllum* or part thereof (Hansen 2012; Loockerman et al. 2003).

1. Plants pungently aromatic; flowers bright yellow and showy; ray florets 7–9…….. **Pectis papposa**
1. Plants not aromatic; flowers rather inconspicuous, dull yellow or purplish; rays florets 3–6.

2. Plants usually less than 5 cm tall, the internodes often shorter than the leaves; heads sessile, almost hidden among upper leaves; flowers yellow, the ray florets 3, the disk florets more than 3; achenes do not cling…….. **Pectis cylindrica**
2. Plants usually more than 10 cm tall, the internodes usually longer than the leaves; heads on slender peduncles at least 1 cm long; flowers purplish, the ray florets 4–6, the disk florets 1–3; achenes cling due to minute barbs…… **Pectis linifolia**

**Pectis cylindrica** (Fernald) Rydberg
[*P. prostrata* Cavanilles var. *cylindrica* Fernald]
Sonoran chinchweed; *hierba de chinche*. Figure 79.

Small, often mat-forming plants, the mats may be formed of many small, individual plants; not aromatic. Leaves (0.8) 1–2 (2.4) cm long, narrowly oblanceolate, narrowed to a winged petiole-like base with prominent bristles; midrib and margins of lower leaf surfaces thickened and light colored, the margins minutely toothed. Heads with 3 ray florets and 8–13 or fewer disk florets; the florets relatively inconspicuous, scarcely protruding from the involucre. Rays yellow, small and not obviously differentiated from the disk florets. Achenes 4–4.5 mm long, slender, blackish, with straight to slightly sinuous white hairs. Pappus of ray achenes with 2 scales; pappus of disk achenes with 5 scales. Self-fertile (autogamous), characterized by reduced, inconspicuous flowers and low pollen production (Keil 1975).

Seasonally abundant in dry mud of flooded playas including Pinta Playa and Las Playas in Cabeza Prieta. Also in similar habitats in nearby Sonora and eastward from Organ Pipe at Menager's Dam.

Southwestern Texas to Arizona and northern Mexico including the Baja California Peninsula.

**CP**: Pinta Playa, *Edwards 9 Oct 1977* (ASU). Las Playas, 28 Nov 2001, *Felger 01-566*.

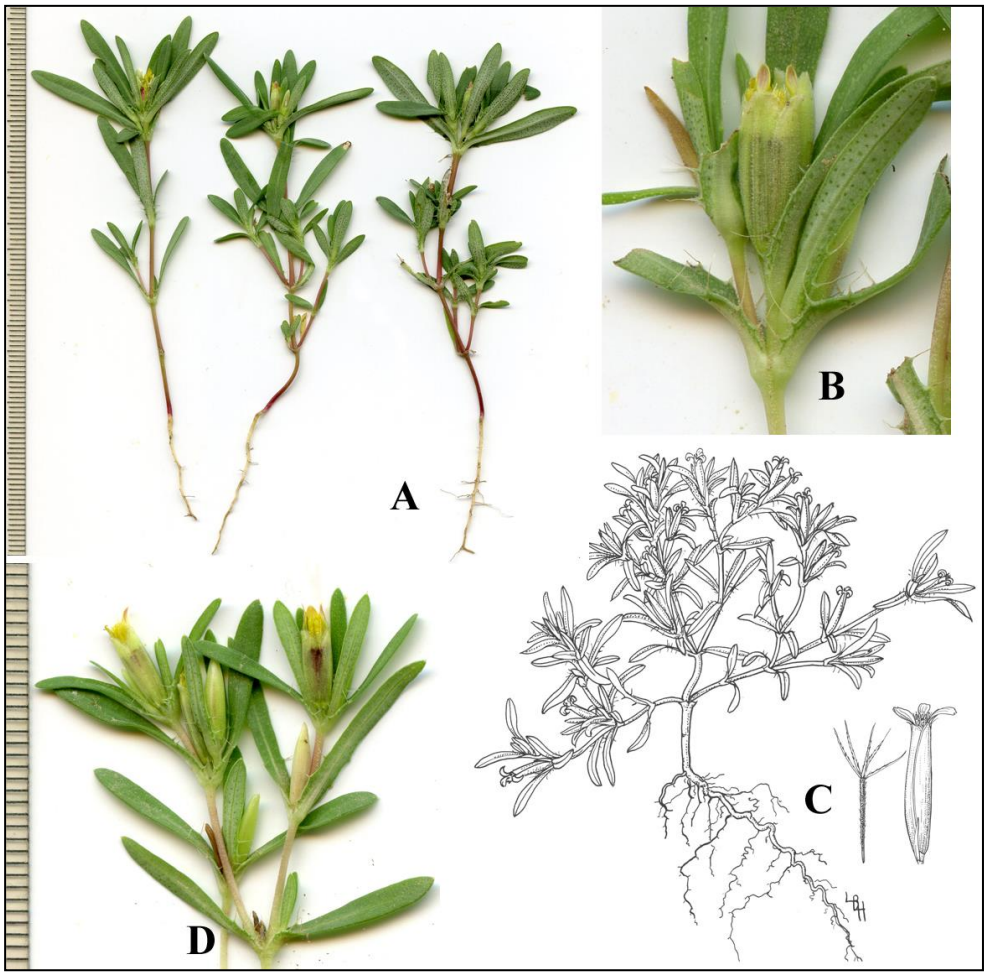


Figure 79. *Pectis cylindrica*. (A, B & D) Roadside of Hwy 86, east of Why, 1 Aug 2014. (C) By Lucretia Breazeale Hamilton.

**Pectis linifolia** Linnaeus var. **linifolia**
[*P. linifolia* var. *marginalis* Fernald. *P. punctata* Jacquin]
Figure 80.

Plants gland-dotted but not aromatic, to about 25 cm tall, the stems very slender with forked branching. Leaves linear, to 3 cm long; internodes usually longer than the leaves. Phyllaries often purplish. Heads of 5 small ray florets and 1–3 disk florets, rather inconspicuous, self-fertile (autogamous) as evidenced by low number of florets per head, reduction in ray size (1 mm long), and small anthers (less than 1 mm long) with low pollen production. Achenes ca. 5 mm long, the pappus of 2 or 3 spreading awns.


Figure 80. *Pectis linifolia* var. *linifolia*. (A) Base of cliff, Arch Canyon, 13 Sep 2013. (B & C) Wash crossing N end of Ajo Mountain Drive, draining the Diablo Mts, 26 Aug 2014. (D) Bull Pasture Trail, against N-facing cliff, 25 Sep 2013.

Scattered in the Ajo Mountains in shaded microsites.

Arizona to South America, West Indies, and Pacific Islands. The geographic distribution is one of disjunctions. It has "adaptations that appear to favor animal dispersal, with birds being the most likely carriers. The achenes of these plants characteristically bear stout, divaricately spreading awns that project from fruiting heads. . . . The achenes readily cling to fabrics and presumably equally well to feathers. The plants commonly grow on open rocky coastal sites which in insular situations are favored by sea birds" (Keil 1978: 137). *Pectis linifolia* var. *linifolia* has the largest natural range of the genus. However, some of its distribution (the Galapagos and Hawaiian Islands) is probably due to recent introduction (Hansen 2012). Another variety is very limited in distribution.

**OP**: E Loop Road, 3.3 mi from Route 85, 24 Sep 1972, *Pinkava 9970* (ASU, DES). Estes Canyon at crossing of Ajo Mountain Drive, large wash in shade of trees and shrubs, 2*n* = 12 (II), 2400 ft, 28 Aug 1976, *Keil K-11787* (ASU). Arch Canyon: *Wirt 13 Aug 1990*; Loose talus shaded microsite, 12 Sep 2013, *Rutman 20130912-18*. Bull Pasture Trail, about halfway up to Bull Pasture, 25 Sep 2013, *Rutman 20130925-10*.

**Pectis papposa** Harvey & A. Gray var. **papposa**
Desert chinchweed; *manzanilla del coyote*; ban manzani:ya. Figure 81.

Summer-fall ephemerals; pungently aromatic; highly variable in size, sometimes to 30 cm across, usually much smaller and occasionally reproducing when only 1.5 cm tall. Leaves 1.5–4 cm long, linear with prominent bristles on a winged petiole-like base. Heads showy, flowers bright yellow. Phyllaries 3.5–4 mm long, oblong, green with a firm midrib. Rays conspicuous, 6–8; ray achene pappus absent or reduced to a crown of minute scales. Disk pappus of many plumose bristles, conspicuous but shorter than the corollas, or the disk pappus on some plants reduced to a crown of minute scales or absent. Achenes 2.8–3.5 mm long, columnar, blackish, with appressed, white (to brownish) hairs, the tips uniquely curled inward with a bulbous-tip (occasionally the hairs few and straight).

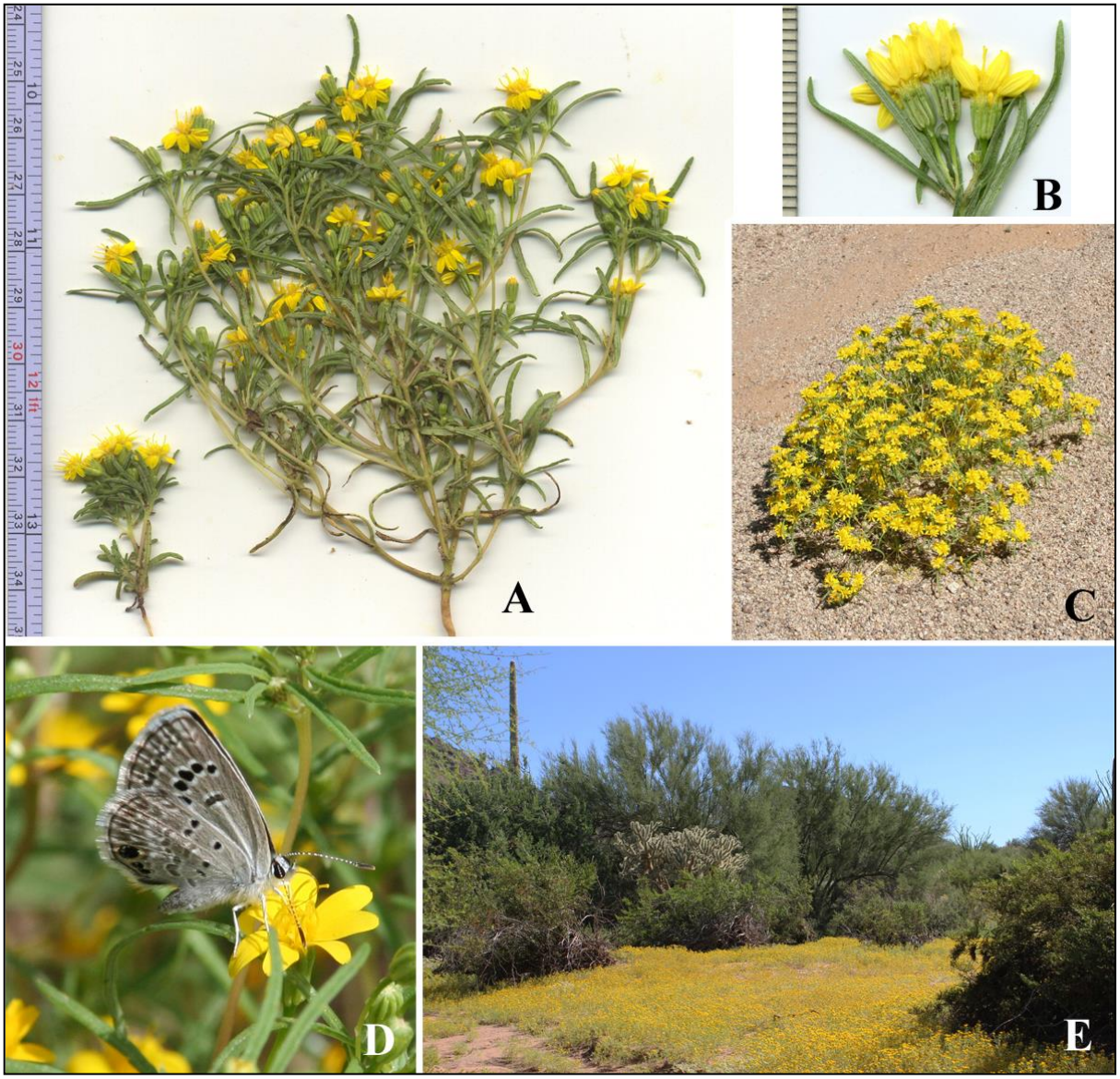


Figure 81. *Pectis papposa* var. *papposa*. (A) N boundary of Organ Pipe near Hwy 85, 17 Sep 2013. (B) Why, 31 Jul 2014. (C) Bates Well Road, W of Bates Well, 30 Sep 2006. (D) Reakirt's Blue (*Echinargus isola*), roadside of Hwy 86, E of Why, 20 Aug 2006. (E) Knucklehead Wash, base of Childs Mountain, 5 Sep 2014.

One of the most abundant and widespread summer-fall wildflowers in the region; sandy to rocky soils, dunes, washes, plains, slopes, and around waterholes.

This species occurs in all four North American deserts and often colors the landscape yellow. Two varieties: var. *papposa* occurs in the Great Basin, Mojave, and Sonoran Deserts in southwestern United States and northwestern Mexico. Variety *grandis* Keil primarily occurs in the Chihuahuan Desert.

The Seris, Pimas, Zunis and others have used the plant medicinally and as a spice (e.g., Moerman 1998). Leaves and phyllaries in *Pectis* species are dotted with embedded pellucid glands (oil glands). In *P. papposa* and others the liquid within the schizogenous cavities includes a mixture of strongly scented monoterpenes, often described as "lemon-scented" when citral is the predominant compound and "spicy-scented" when other oils are predominant. The essential oil is rich in cumaldehyde and carvone, and potentially as a commercial source of these fragrant aldehydes, now obtained from cumin, caraway, and dill seed oils (e.g., Bradley & Haagen-Smit 1949).

**OP**: Near Alamo Canyon, *Hesselberg 15 Oct 1966*. Cuerda de Leña wash at N boundary, 13 Sep 1978, *Bowers 1535*. Quitobaquito, 10 Nov 1987, *Felger 87-304*.

**CP**: Jose Juan Represo, 12 Jun 1992, *Felger 92-557*. Daniels Arroyo at Charlie Bell Road, 18 Aug 1992, *Felger 92-669*. Camino del Diablo 1 mi E of Namer's Grave, 15 Sep 1992, *Felger 92-768*.

**TA**: Coyote Wash at Camino del Diablo, 25 Oct 2004, *Felger 04-66*. Coyote Water, 25 Oct 2004, *Felger 04-56*.

**Perityle** – Rock daisy

Ephemerals or perennial herbs. Leaves petioled, alternate or opposite below. Flower heads with ray and disk florets or without rays. Achenes black, flattened, the margins thickened, white, and edged in ciliate hairs; pappus with small scales or not, and also 1 or 2 often unequal, minutely barbed awns or awns sometimes absent.

North America, especially southwestern United States, and South America; 66 species. Heliantheae, Peritylinae.

1. Perennials; flower heads of yellow-gold disk florets, without rays; Ajo Mountains.
…….. **Perityle ajoensis**
1. Cool-season ephemerals; flower heads with white rays and a yellow disk; widespread.
…… **Perityle emoryi**

**Perityle ajoensis** T.K. Todsen, J. Arizona Acad. Sci. 9: 35, 1974.
Ajo rock-daisy. Figure 82.

Perennial herbs (dwarf shrubs) 20–70 cm tall, often globose with upright to spreading stems. Leaves opposite below, alternate above, the foliage somewhat sparse, minutely and partially woolly and also with short glandular hairs; leaf blades ovate to broadly triangular (deltate) or nearly circular in outline, 5–12 mm long and about as wide, the petioles about as long as the blades. Flower heads at the tips of twigs, single or in small clusters, the heads 8–10 mm long, with about 20–30 yellow-gold disk florets and no rays. Achenes narrow, 3–3.5 mm long, flattened, the body blackish at maturity with thickened yellowish-white margins; pappus with 1 or 2 stout bristles (awns) 2–3 mm long, or the bristles sometimes absent. Flowering at least in October.

This species is known only from the Ajo and Diablo mountains. It may have been present at least 22,000 years ago (see *Perityle* sp. below). *Perityle ajoensis* is highly localized and often grows out of rock crevices at elevations mostly above 2700 ft. The habitat is very patchy, and patches are

generally small (can be measured in square meters). Some patches have a few dozen plants, some have just a few. Most of the patches seem to have water percolating very slowly through the bedrock. The rock is not wet but you can see mineral deposits indicating percolation. Then again, Marc Baker found a large boulder with *P. ajoensis*, and this could not have had water percolation. The habitat patches are all on north-facing cliffs or places like overhangs where the plants are shaded. This species probably will become extinct due to climate change.

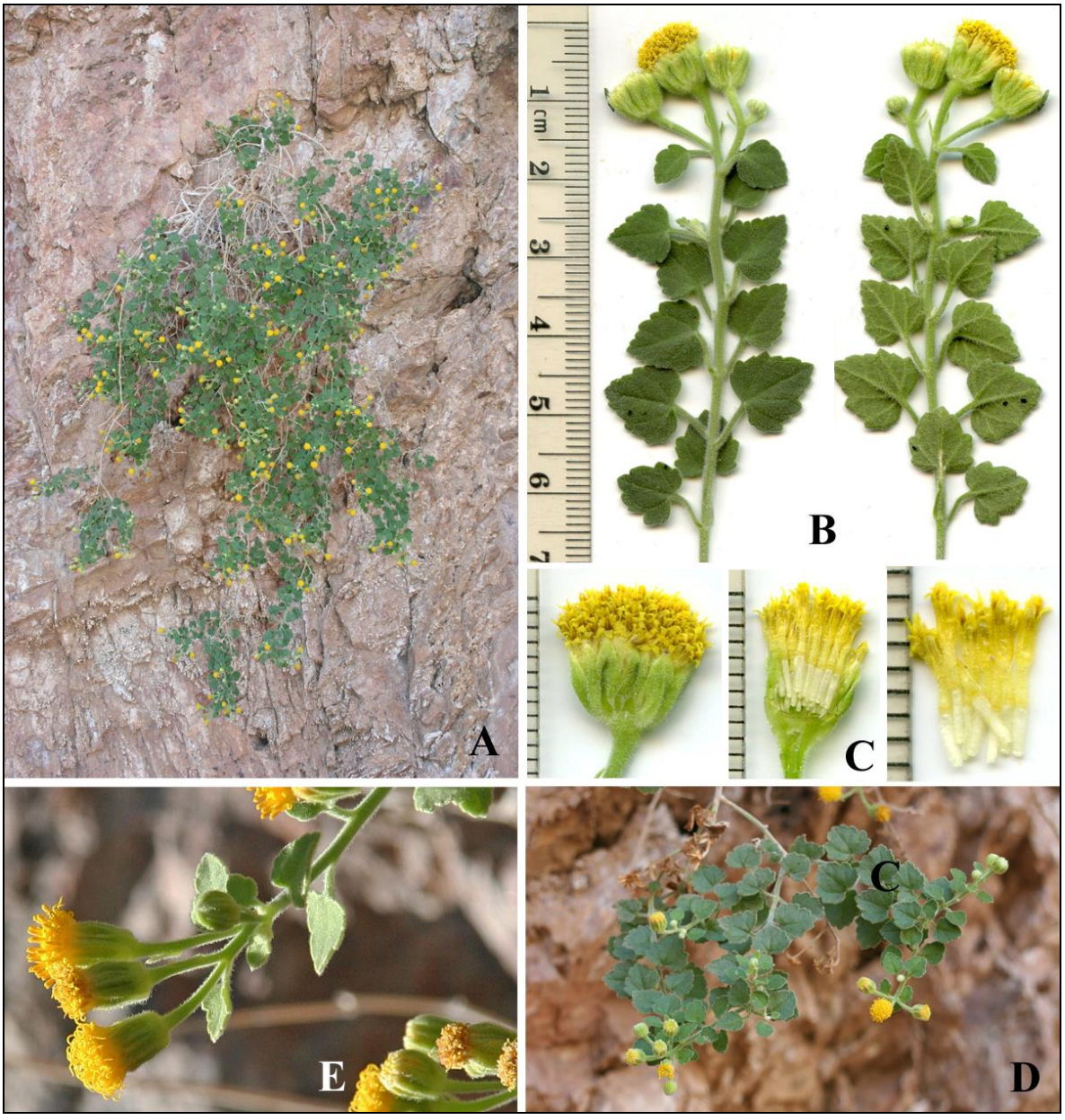


Figure 82. *Perityle ajoensis*. Arch Canyon: (A) 16 Sep 2006; (B & C) 12 Sep 2014. (D) Boulder Canyon, 16 Sep 2006. (E) N-facing cliff, trail to Mt Ajo, 15 Sep 2008.

**OP**: Bull Pasture Trail, 22 Oct 1972, *Todsen 2292* (holotype, NY; isotypes: ARIZ, ORPI). Estes Canyon, *Henry 6 Nov 1977*. Boulder Canyon, *n* = 17, 13 Oct 1988, *Baker 7643* (ASU, ORPI). Arch Canyon, 2 Dec 1990, *Felger 90-525*. Near crestline of Ajo Mts, 15 Mar 2003, *Rutman 2003-337* (ORPI). Diablo Mts, 807 m, rooted in N-facing cliff, 4 plants (all in flower) at this site, 22 Sep 2003, *Rutman 20030922-20*.

**Perityle emoryi** Torrey
Desert rock-daisy. Figure 83.

Cool-weather ephemerals, 5–60 cm tall, sometimes semi-succulent when well watered; bearing sessile and stalked glands and sparse non-glandular hairs, or glabrate with age. Leaves mostly alternate, 1.5–6 (8+) cm long, the blades about as wide as long, coarsely toothed to palmately lobed, the lobes also toothed. Phyllaries 3.5–5.5 mm, green, oblong-ovate to obovate, ribbed, the margins ciliate. Ray corollas white, often 4–4.5 mm long, the disk florets yellow; disk and ray corollas densely glandular. Achenes 2.5–3.1 mm long, flat, blackish, the margins thin (not calloused), with a border of short, white hairs. Pappus of small scales and a single stout bristle or the bristle absent. (About one third of the specimens from the flora area lack pappus bristles; there is no discernible pattern to the variation.)


Figure 83. *Perityle emoryi*. Estes Canyon: (A) 2 Mar 2008; (C) 15 Mar 2008. (B & D) Alamo Canyon, 26 Feb 2014.

One of the most widespread winter-spring wildflowers in the region; sandy to rocky soils, washes, plains, and slopes. It was in the Puerto Blanco Mountains more than 2400 years ago and at Tinajas Altas more than 11,000 years ago.

Sonora and Baja California Sur to southern California, southern Nevada, southwestern Utah, and western Arizona, and disjunct in Peru and Chile.

**OP**: Puerto Blanco Mts, *Nichol 25 Feb 1939*. Red Tanks Canyon, 8 Apr 1941, *McDougall 50*. Bates Well, *Tinkham 22 Apr 1942*. Aguajita, 19 Jun 1989, *Felger 89-236*. Alamo Canyon, *Rutman 5 Mar 1995* (ORPI). †Puerto Blanco Mts, achenes, 2160 & 2340 ybp.

**CP**: 7 mi E of Papago Well, *Harbison 5 Dec 1939* (SD). Charlie Bell Pass, 3 Apr 1992, *Whipple 3912*. O'Neil's Grave, 11 Apr 1992, *Steinmann 186-C*. Cabeza Prieta Peak, 24 Mar 1995, *Yeatts 3664*.

**TA**: Base Tinajas Altas, 29 Mar 1930, *Kearney 6562 & Harrison*. Tinajas Altas Mts at Mexico border, 18 Mar 1998, *Felger*, observation. Coyote Water, 25 Oct 2004, *Felger 04-57*. 2.5 mi SE of Tinajas Altas, 22 Nov 2008, *Felger 08-209*. †Tinajas Altas, achenes, 9230 & 10,950 ybp.

††**Perityle** sp.

The Montezuma's Head midden site of this unidentified *Perityle* is similar to the present-day, rocky habitats of *P. ajoensis*.

**OP**: †Alamo Canyon, achenes, 8130 & 8590 ybp. †Montezuma's Head, leaves, achenes, 13,500 to 21,840 ybp (3 samples).

**Peucephyllum**

This genus has a single species. Heliantheae, Chaenactidinae.

**Peucephyllum schottii** A. Gray

Desert fir, pygmy cedar; *romero del desierto*. Figure 84.

Woody shrubs 1–2+ m tall, resembling a small conifer, with woody, twisted trunks and branches, and shredding bark. Herbage conspicuously resinous with crowded glands glistening golden when fresh. Leaves alternate, essentially evergreen, mostly 7–30 × 0.8–1 mm, crowded at ends of twigs, sessile, linear-filiform, terete or nearly so, and bright green. Flower heads 10–15 mm long, solitary at stem tips, with disk florets only, fragrant, pale yellow-green, the corolla lobes and upper tube becoming reddish purple with age. Achenes 2.5–3 mm long, the surfaces nearly to wholly obscured by a dense covering of white hairs. Pappus of many scales and slender white bristles. Flowering January–May, and probably in fall.

Rocky slopes of volcanic and granite ranges in the western part of Cabeza Prieta and in the Tinajas Altas Region, often more common at higher elevations. It has been in the Tinajas Altas Region for at least 15,700 years.

Extremely arid regions of the Sonoran and Mojave deserts in southwestern United States and northwestern Mexico.

**CP**: Tule Tank, Cabeza Prieta Mts, 15 Apr 1941, *Benson 10799*. Ridgetop, SE edge of A-1 Basin, Cabeza Prieta Mts, 11 Mar 1984, *Hodgson 2752* (DES). Ridge E of Tule Tank, 23 Mar 1998, *Telewski 512*. Eagle Tank, 13 Jun 1992, *Felger*, observation.

**TA**: Tinajas Altas, *Van Devender 5 Mar 1983*. S of Tinajas Altas, N-facing slope, 8 ft tall, 7–8 ft wide, 18 Apr 1983, *Hodgson 2096* (DES). †Butler Mts, achenes, 740 to 11,060 ybp (5 samples). †Tinajas Altas, leaves, involucres, achenes, 1230 to 15,680 ybp (6 samples).

Figure 84. *Peucephyllum schottii*. Near Red Cone Campground, Pinacate Biosphere Reserve, Sonora, 7 Mar 2009.

**Pleurocoronis**

Small shrubs or subshrubs, often globose, 0.8–1 m across, much branched, the stems slender and brittle. Leaves opposite below, alternate above, petioled, tardily drought deciduous. Inflorescences of loose terminal clusters of several or more heads; heads many flowered, with white to pale yellow disk florets with purple stigmas. Corolla tube long and slender, the lobes minute; style branches club-shaped and conspicuously exserted. Involucres of an inner series of larger phyllaries and an outer series of smaller, graduated phyllaries. Achenes narrowly obpyramidal and glandular, the pappus of barbellate bristles and membranous scales. Growth and flowering response non-seasonal.

The genus has 3 species including *Pleurocoronis gentryi* endemic to Baja California Sur. Eupatorieae.

The two intergrading species in the flora area mostly grow in rock crevices on steep, often north-facing granitic and volcanic cliffs, canyon walls, and rock slopes. *Pleurocoronis* has been in the Tinajas Altas Region for at least 15,700 years.

1. Leaf blades conspicuous and about as wide as long……. **Pleurocoronis laphamioides**
1. Leaf blades often much reduced and longer than wide…… **Pleurocoronis pluriseta**

**Pleurocoronis laphamioides** (Rose) R.M. King & H. Robinson
[*Hofmeisteria laphamioides* Rose]. Figure 85.

Differing from *P. pluriseta* by the much wider leaf blades and proportionally shorter petioles; leaf blades bright green and often semi-succulent, broadly ovate with several large teeth.

Organ Pipe mountains including the Ajo and Puerto Blanco mountains.

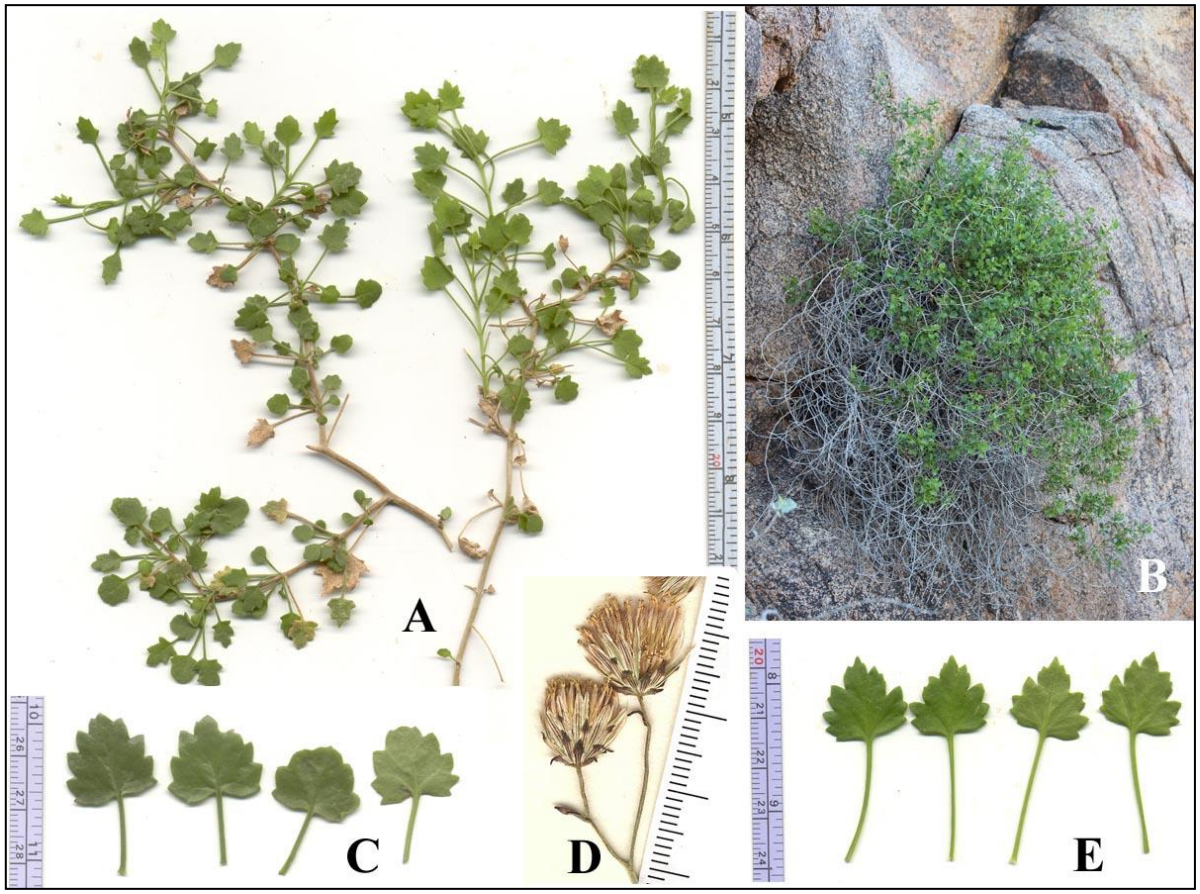


Figure 85. *Pleurocoronis laphamioides*. (A) Estes Canyon, 21 Sep 2008. (B & C) Granite cliff, Victoria Mine area, Puerto Blanco Mts, 23 Dec 2013. (D) Rocky hillside near Dripping Springs, Puerto Blanco Mts, *Lehto 3697*, 22 Mar 1964 (ASU). (E) Alamo Canyon, 9 Sep 2013.

Western Sonora, from east of the Pinacate region and adjacent Arizona southward to the Guaymas Region, Gulf of California islands, and Gulf Coast of both Baja California states.

There is a gradual (clinal) increase in leaf-blade size and relative width from drier to moister conditions from north to south (southwestern Arizona southward along the Sonora coast and similarly southward on the Baja California Peninsula). In the flora area there is a similar trend, with a transition across the flora area from the more arid west to the less arid east of narrower (*P. pluriseta*) to broader (*P. laphamioides*) leaves, and the variation is likewise continuous (clinal). However, the broader-leaved plants in the eastern part of Organ Pipe have conspicuously smaller leaves than *P. laphamioides* populations from farther south (central Sonora and Baja California Sur). Assigning the small but broad-leaved Organ Pipe populations to *P. laphamioides* rather than *P. pluriseta* is arbitrary and illustrates the problem of naming points on a continuum.

**OP**: Alamo Canyon: *Nichol 4 May 1939*. Dripping Springs, 18 Mar 1945, *Gould 3019*. Middle fork Alamo Canyon near crestline, 15 Mar 2003, *Rutman 2003-353* (ORPI). Bedrock outcrops NW of Kino Peak, 20 Mar 2005, *Rutman 20050320-38*.

**Pleurocoronis pluriseta** (A. Gray) R.M. King & H. Robinson
[*Hofmeisteria pluriseta* A. Gray]
Arrowleaf; *canutillo*. Figure 86.

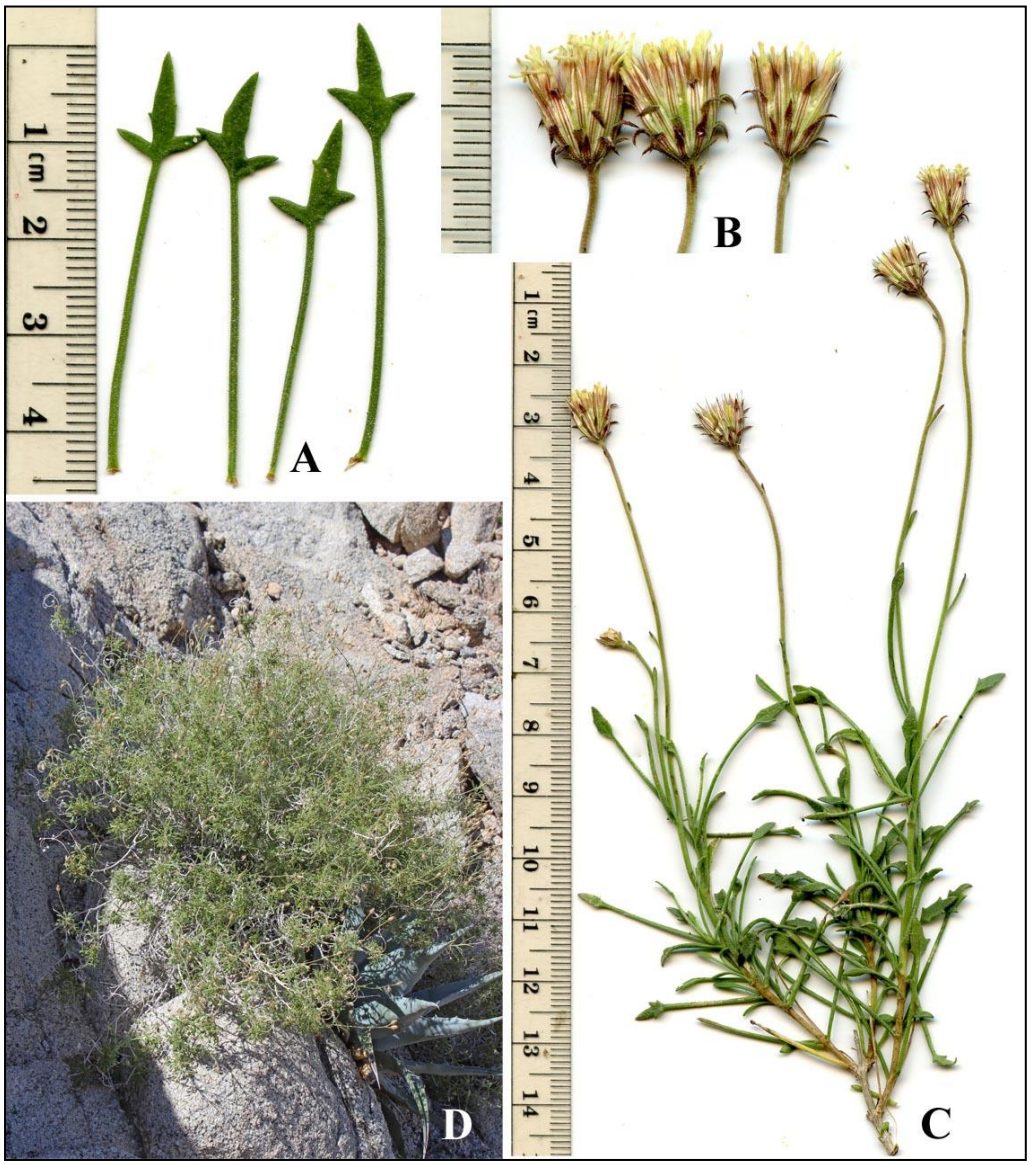


Figure 86. *Pleurocoronis pluriseta*. Steep granite slopes near Mex Hwy 2, Sierra Nina (Sierra del Águila), Sonora: (A & B) 7 Mar 2015; (C) 19 Mar 2015; (D) 17 Mar 2014.

Herbage densely pubescent with stalked, glandular hairs or relatively less pubescent when well watered or shaded. Leaves tardily drought deciduous; petioles 6–38 mm long, the blades mostly 5–15 (18) × 3.5–14 mm, ovate to lanceolate—narrowly arrow-shaped, usually with 1–3 pairs of large teeth on each margin. Leaf size and shape highly variable with moisture and shade. On hot exposed cliffs the leaves may consist of little more than the petioles, with the blades reduced to narrow spear-

shaped thickenings. Inner phyllaries 8–11 mm long, linear, thin, often green or purplish, with 3 prominent veins and thin, membranous white margins, the tip acuminate. Corollas, styles, stigmas, and anthers white to pale yellow, or the style branches and stigmas purple. Achenes 2.5–3 mm long, 4-angled, the surfaces minutely hairy with appressed hairs that spread when wet; pappus bristles 5–6.5 mm long, intergrading with outer small membranous scales, or the scales sometimes absent.

Widespread in Cabeza Prieta and Tinajas Altas, and perhaps in the western margin of Organ Pipe.

Northwestern Sonora, southwestern Arizona, Baja California, southeastern California, and southern Nevada.

**CP**: Tule Tank, 15 Apr 1941, *Benson 10804*. Tule Mts, 2 Feb 1992, *Felger 92-45*. Childs Mt, 2845 ft, 18 Aug 1992, *Felger 92-640*. Cabeza Prieta Peak, 2550 ft, 25 Mar 1995, *Yeats 3649*.
**TA**: Tinajas Altas Mts, 4 Mar 1927, *Belden 3604*. Base of Tinajas Altas, 29 Mar 1930, *Kearney 6564*. Tinajas Altas, 5 Dec 1935, *Goodding 2103*.

†**Pleurocoronis** sp.

The younger specimens are probably *P. pluriseta*.

**TA**: †Butler Mts, achenes, involucres, 740 to 11,250 ybp (7 samples). †Tinajas Altas, involucres, achenes, 4010 to 15,680 ybp (9 samples).

**Pluchea**

Widespread in both hemispheres; 50 species, although not monophyletic. Heliantheae, Plucheeae.

1. Annuals or herbaceous perennials, not woody……. **Pluchea odorata**
1. Shrubs with long, slender, woody branches……... **Pluchea sericea**

**Pluchea odorata** (Linnaeus) Cassini var. **odorata**
[*P. purpurascens* (Swartz) de Candolle]
Marsh fleabane, alkali camphor weed; *jara*. Figure 87.

Annual or perhaps perennial herbs 1–1.5 m tall from a thick, semi-fleshy root, sometimes with rhizomes. Herbage with sticky (viscid) as well as soft hairs, dotted with glands, and stinking. Leaves mostly 4–15 cm long, ovate to elliptic or lanceolate, toothed or entire or nearly so; lower leaves petioled, the upper leaves reduced and sessile. Phyllaries graduated, larger ones 4–5.5 mm long. Corollas and phyllaries pale to bright rose-lavender; rays absent; outer florets pistillate, numerous, in several series, the inner florets with sterile ovaries. Achenes 0.8–1.2 mm long, brown, columnar; pappus of slender, minutely barbed bristles. New growth generally emerging in spring or early summer; maturing and flowering August and September, the stems dying in late fall or early winter.

Locally common in wet soil around the Quitobaquito pond and ditches with flowing water, and nearby at Williams and other local springs.

Widespread in North American wetlands, often on alkaline and saline soils, to South America, western Africa, and Pacific Islands. A second, poorly defined sympatric variety occurs in eastern North America.

**OP**: Quitobaquito: 24 Nov 1955, *Anderson 4*; 23 Jul 1986, *Felger 86-204*. Williams Spring, *Van Devender 30 Aug 1978*.

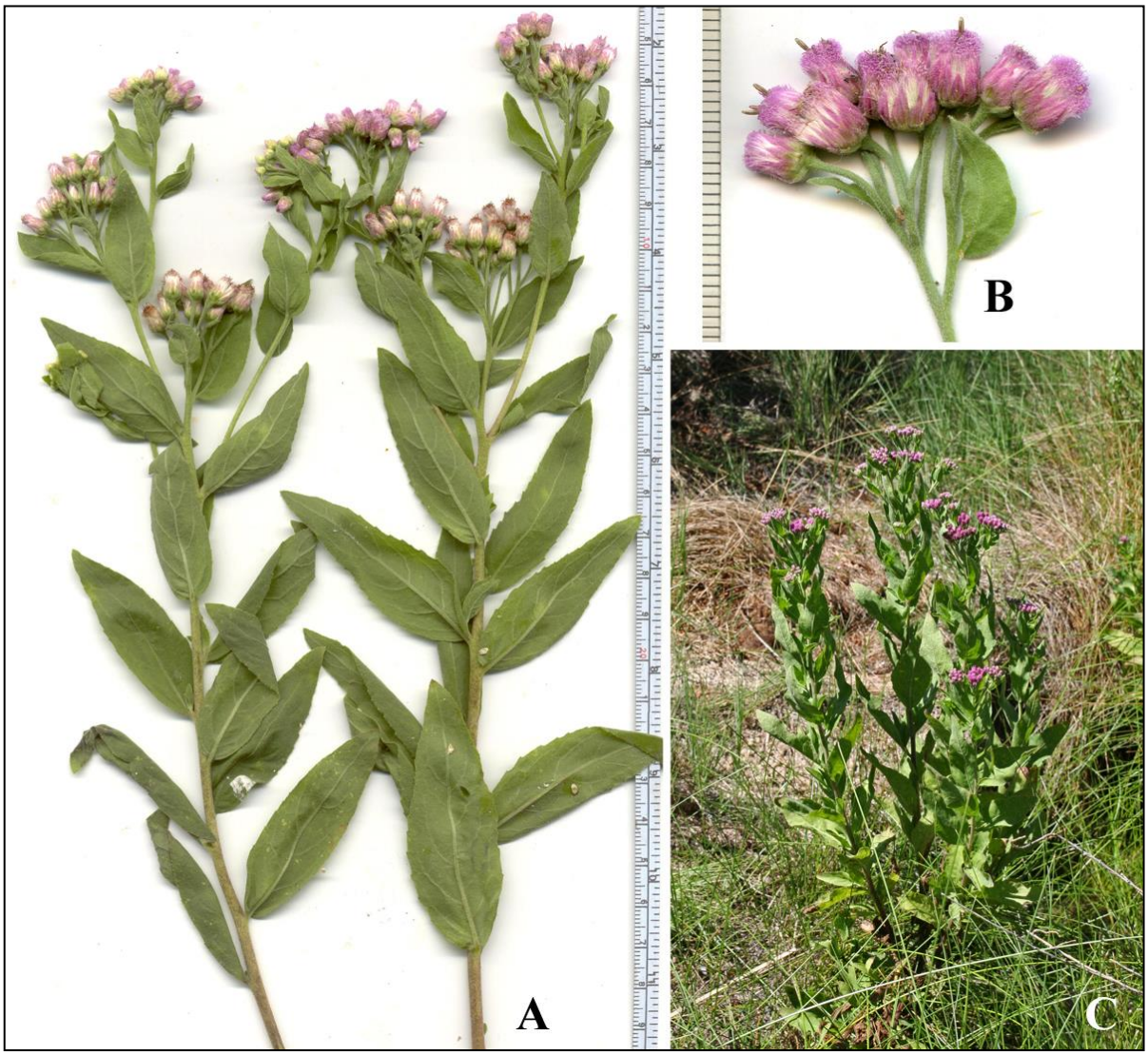


Figure 87. *Pluchea odorata* var. *odorata*. Quitobaquito: (A) 11 Sep 2008; (B) 23 Sep 2014; (C) 13 Sep 2006.

**Pluchea sericea** (Nuttall) Coville
[*Tessaria sericea* (Nuttall) Shinners]
Arrowweed; *cachanilla*; komagĭ ʼuʼus, ʼuʼus kokomadk. Figure 88.

Woody shrubs often 1.5–2.5+ m tall, densely colonial, spreading by rhizomes. Stems solid (not pithy; see *Baccharis salicifolia*), willow-like, erect, and densely leafy. Herbage densely silvery-hairy, not aromatic. Leaves (1) 1.5–4.5+ cm long, entire, sessile, mostly narrowly elliptic to lanceolate. Phyllaries often pinkish, graduated, the outer ones conspicuously broader, to 3 mm long, the longer inner ones 5–6 mm long. Flower heads of pinkish disk florets; outer florets pistillate, numerous, in several series, the inner florets functionally staminate with sterile ovaries. Achenes 1–1.3 mm long; pappus of slender, minutely barbed bristles widened (dilated) at apex, especially on central florets. Flowering at least March–June.

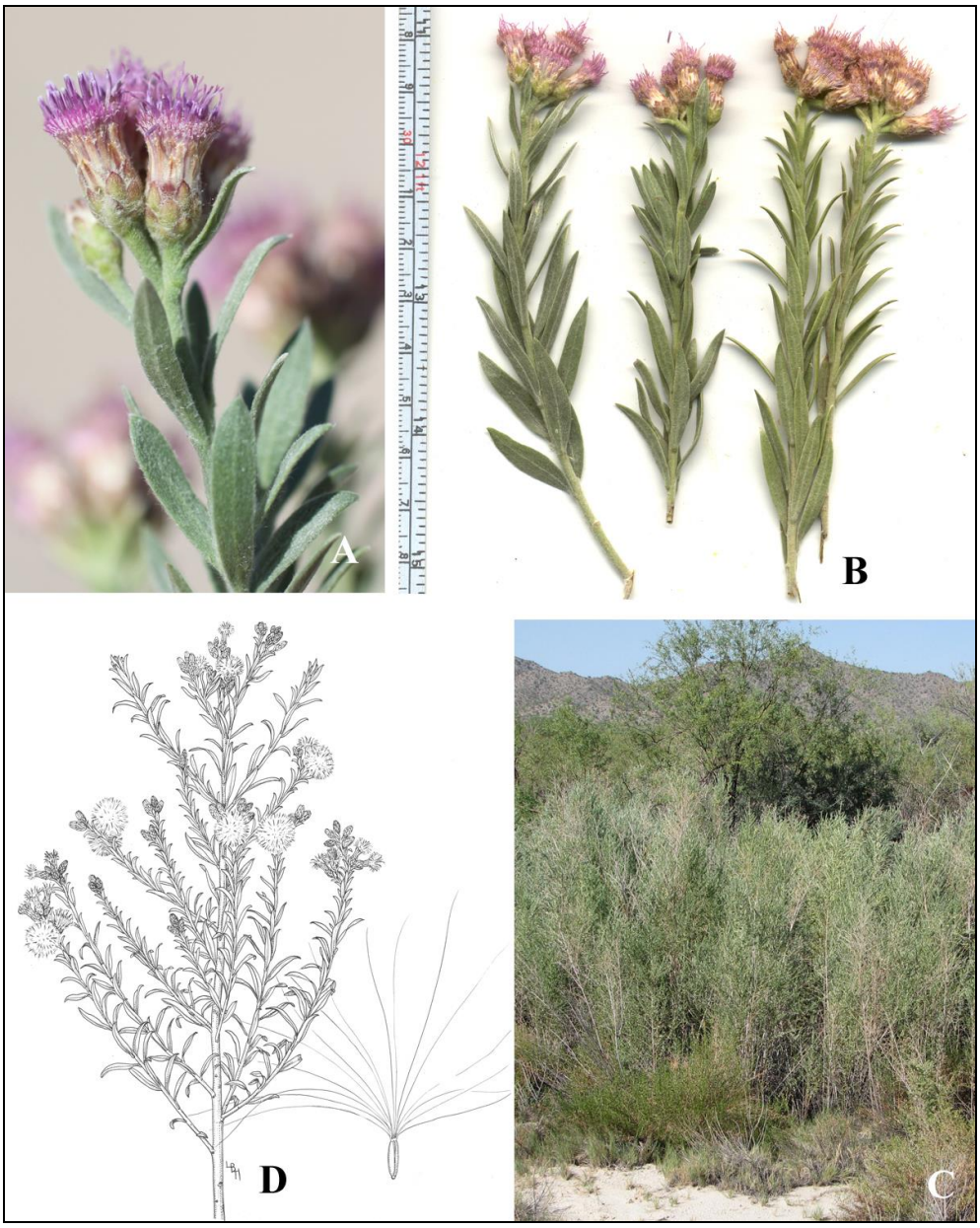


Figure 88. *Pluchea sericea*. (A & B) Below Gillespie Dam, Maricopa Co., 31 Mar 2013. (C) Quitobaquito, 10 Sep 2007. (D) By Lucretia Breazeale Hamilton.

Locally abundant in moist soil near Burro and Williams springs, and Quitobaquito at the springs and pond, and infrequent in nearby adjacent old fields and alkaline flats.

Southern California (most common in the desert, especially the Salton Trough) to southern Utah and western Texas, Baja California, Chihuahua, and northern Sonora. Arrowweed thrives in places of high water table and saline soils.

The long, leafy stems were used for round-house construction, and stems of the correct thickness were made into arrows for hunting bighorn sheep (Childs 1954; Philip Salcido in Felger et al. 1992). Arrowweed was widely used medicinally (Curtin 1949; Rea 1997; Russell 1908).

Placement of this distinctive species is problematic. John Pruski (pers. comm. to Felger, 7 Aug 2015), wrote "I would not use *Tessaria* in the USA nor introduce *Tessaria* into usage in USA. I use *Tessaria* only in tropics and as containing only 4 species. . . . Even though Guy Nesom in Flora of North America suggests *sericea* may fall outside of *Pluchea*, it is not a *Tessaria*."

**OP**: Burro Spring, 4 May 1978, *Bowers 1315*. Quitobaquito: *Nichol 28 Apr 1939*; *Van Devender 30 Aug 1978* (ORPI).

**Porophyllum**

Annuals and perennials. Western Hemisphere; 25 species. Heliantheae, Pectidinae.

**Porophyllum gracile** Bentham

Slender poreleaf; *odora, hierba del venado*. Figure 89.

Herbaceous perennials, glabrous and glaucous bluish-green with dark purplish, elongated and translucent oil glands and a pungent odor somewhat like that of marigolds (*Tagetes*), to which *Porophyllum* is related. Stems straight, slender, and brittle. Leaves opposite below, alternate above, 1.5–6 cm long, linear to thread-like, sparse and widely spaced, quickly drought deciduous, especially the larger ones. Flower heads cylindrical, solitary at ends of branchlets, of disk florets only; corollas white to pale purple with dark purple longitudinal lines. Phyllaries 10–17 mm long, linear-oblong, the margins membranous and rose-purple. Achenes 8–13 mm long, linear, blackish, moderately to densely covered with short, stiff, appressed hairs; pappus of many slender, pale brown barbellate bristles. Flowering at various seasons.

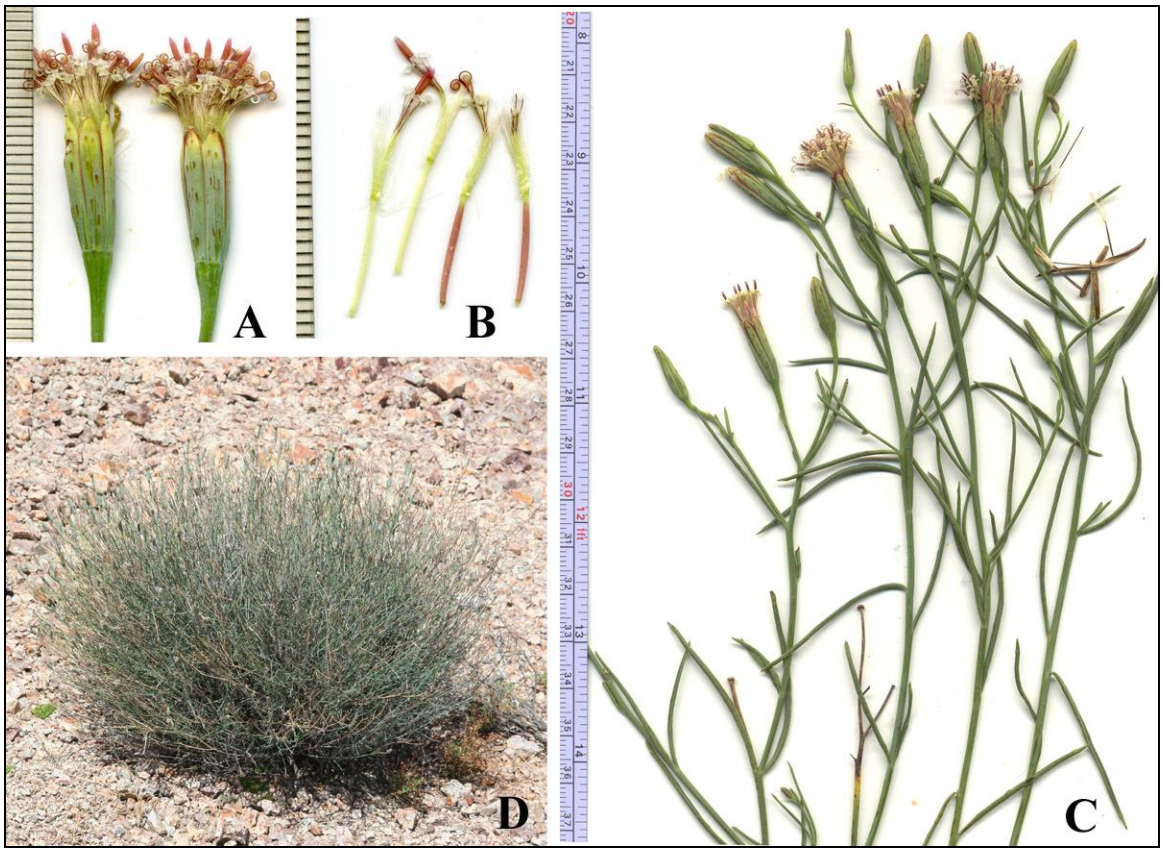


Figure 89. *Porophyllum gracile*. (A & B) N of Little Ajo Mts at Charley Bell Road, 5 Sep 2014. (C) Foothills of Black Mountain (SW of Ajo), 17 Sep 2013. (D) Victoria Mine area, Puerto Blanco Mts, 7 May 2006.

Widespread across the flora area but seldom very common; gravelly bajadas, and sometimes along larger washes, canyons, rocky slopes, and to high elevation in the Ajo Mountains. It has been in the Tinajas Altas Region for at least 8600 years.

Arizona, southeastern California, Nevada, western Texas, Utah, and Baja California, Baja California Sur, northwestern Sinaloa, and Sonora.

This aromatic plant was used by the Seris to aid childbirth and as a remedy for colds, toothache, and diarrhea—one woman said, "the thing it is not good for does not exist" (Felger & Moser 1985: 286).

**OP**: Cipriano Well, *Nichol 27 Apr 1939*. Bates Well, *Tinkham 23 Apr 1942*. Quitobaquito, 29 Mar 1988, *Felger 88-118*. Trail from The Cones to Mount Ajo, 3940 ft, 10 Apr 2005, *Felger 05-261*. Puerto Blanco Mts, Red Tanks Wash, 21 Sep 2013, *Rutman 20130921-6*.

**CP**: Tule Tank drainage, 23 Mar 1992, *Harlan 134*. Agua Dulce Pass, Christmas Pass, and Buckhorn Tank, 13 & 14 Jun 1992, *Felger*, observations. W of Chico Sunie Well, 2 Feb 2003, *Rutman 2003-19*.

**TA**: Tinajas Altas, *Van Devender 5 Mar 1983*. 1.8 mi N of international border, E side Tinajas Altas, Mts, 22 Nov 2008, *Felger 08-214*. †Butler Mts, achenes, involucres, 740 to 8570 ybp (4 samples). †Tinajas Altas, involucres, achenes, 1230 to 8255 ybp (3 samples).

**Prenanthella**

This monotypic genus is related to *Rafinesquia* and *Stephanomeria*. Cichorieae.

**Prenanthella exigua** (A. Gray) Rydberg
[*Lygodesmia exigua* (A. Gray) A. Gray]
Brightwhite. Figure 90.

Figure 90. *Prenanthella exigua*. Charlie Bell Pass, Growler Mts, 16 Mar 2015.

Diminutive spring ephemerals, often 10–28 cm in height, with minute tack-shaped glandular hairs. Main axis well developed and paniculately branched above. Early leaves in a basal rosette or closely spaced on lower stem, 1.7–6 cm long, oblanceolate, pinnately and coarsely toothed to incised, often becoming red-green and withering as the upper branches develop; stem leaves reduced upward to subulate scales. Flower heads 5 mm long, of 3 or 4 ligulate (ray-like) florets, white with violet tips, the ligules 2.5–3 mm long; anthers white shading to violet at tips; stigmas violet with dark purple papillae; phyllaries 3 or 4, 4–5 mm long, plus 1 or 2 smaller accessory bracts. Achenes 3–3.7 mm long, columnar with a truncate apex, light brown, with 5 narrow grooves; pappus bristles in a dense tuft, persistent, white, minutely barbellate, fused at their bases, unequal in length, the longer ones 2.5–3 mm, or pappus bristles sometimes absent from 1 or more achenes in a head, the epappose achenes more persistent and slightly longer than the pappus-bearing achenes.

Widely scattered but usually localized across the flora area; mostly on rocky soils and sandy-gravelly wash margins, and hills and mountains.

Arizona to southeastern California, Colorado, Nevada, Utah, western Texas, northwestern Sonora, and rare in Baja California.

**OP**: Red Tanks, 8 Apr 1941, *McDougall 49.* Headquarters area, 10 Apr 1941, *McDougall 72*. Open rocky slopes, 0.5 mi NE of Quitobaquito, 18 Mar 1945, *Gould 2990*. 0.5 mi W of Bates Well Road, N boundary, 8 Mar 2003, *Rutman 2003-261* (ORPI).

**CP**: Agua Dulce Mts, 1200 ft, 14 Apr 1941, *Benson 10753*. Rocky slope 2 mi by road E of Tule Well, 28 Mar 1985, *Bowers 2996*. Charlie Bell Pass, 3 Apr 1992, *Whipple 3920*.

**TA**: Tinajas Altas above the tinajas, 19 Mar 1998, *Felger 98-132*.

**Psathyrotes**

Southwest United States and northwest Mexico; 3 species. Heliantheae, Gaillardinea.

**Psathyrotes ramosissima** (Torrey) A. Gray

Desert velvet, turtleback. Figure 91.

Spring ephemerals or short-lived perennials; plants compact, much-branched and rounded, often 3.5–10 cm high, densely leafy and woolly-scurfy, and strongly scented, with a well-developed taproot. Leaves alternate, 1.7–4 cm long, petioled, the blades broadly ovate to kidney-shaped, often 1.2–2.3+ cm wide, thick, and velvety gray-green with deeply incised veins. Flower heads 8–9 mm long, with yellow disk florets, some with tips becoming red; peduncles well developed. Achenes hidden by dense "furry" hair, the achenes including pappus 4.5–6.5 mm long, the pappus of more than 100 bristles; achene hairs and pappus bristles bright iridescent copper color (dull yellow when immature or old and faded).

Localized near Tule Well and the north end of the Tinajas Altas Region; on volcanic desert pavement, cobble-rock bajadas, and on a steep granitic slope.

Deserts in western Arizona, northwestern Sonora, Baja California, California, Nevada, and Utah.

**CP**: 1 mi NW of Tule Well, 21 Mar 1992, *Yeatts 3246* (CAB).

**TA**: Camino del Diablo, E edge of Davis Plains, *Halse 31 Mar 1973* (probably slightly north of the flora area). Along the "old" Tinajas Altas Pass road (a bit north of the present Tinajas Altas Pass road), UTM 11 7 72 843 E, 35 81 704 N (WGS 84), 1050 feet, common, 18 Apr 2011, *Malusa*, photo.

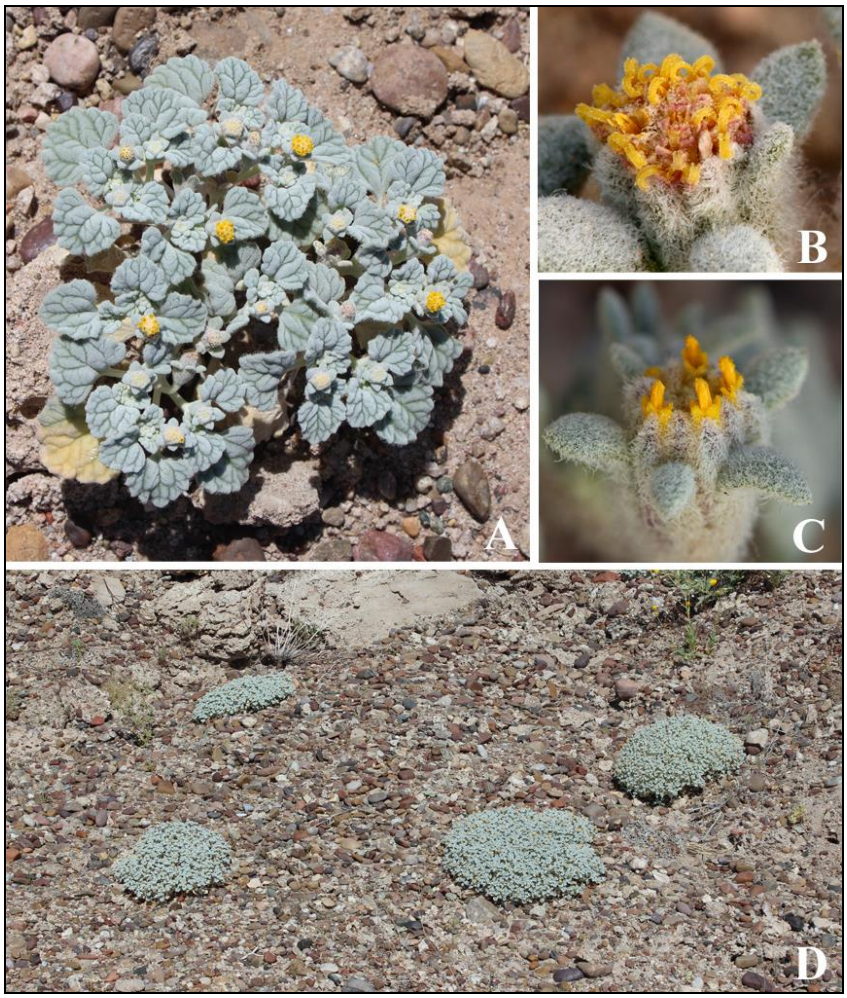


Figure 91. *Psathyrotes ramosissima*. (A & D) Ancient pebbly sediment deposit of Gila River near Sears Point, Maricopa Co., 5 Apr 2014. (B & C) Owens Valley, Chalk Bluff Road, Inyo Co., CA, 24 Apr 2008, photo by Steve Matson (CalPhotos).

**Pseudognaphalium**

Worldwide; 100 species. Gnaphalieae.

**Pseudognaphalium canescens** (de Candolle) Anderberg
[*Gnaphalium canescens* de Candolle. *G. texanum* I.M. Johnston. *G. wrightii* A. Gray]
Wright's cudweed. Figure 92.

Herbaceous, short-lived perennials, often 20–40 (70+) cm tall, relatively robust and with white-woolly (tomentose) herbage. Leaves alternate, sessile, 2–6.5 cm long, oblanceolate, and entire, the leaf bases scarcely or not decurrent. Flower heads 4–5 mm wide, with shiny, papery phyllaries (bracts). Florets many; outer florets pistillate, the inner florets fewer and bisexual; achenes 0.8–0.9 mm long, the pappus with about a dozen bristles falling in clusters or easily fragmented rings (Figure 64).

Rocky slopes especially at higher elevations and canyons in the Ajo Mountains. It does not extend farther into the desert. Many plants established in the scour zone of Alamo Canyon after the epic flood of September 2012.


Figure 92. *Pseudognaphalium canescens*. Alamo Canyon: (A) 21 Sep 2008; (B) 9 Sep 2013; (C) 7 Sep 2013.

Southwestern United States to central Mexico.

**OP**: Alamo Canyon, *Nichol 4 May 1939* (ORPI). Bull Pasture Trail, 3000 ft, 4 Nov 1979, *Bowers 1927*. Trail from The Cones to Mount Ajo, 4025 ft, 10 Apr 2005, *Felger 05-273*. Trail from Estes Canyon to Bull Pasture, 2908 ft, 18 Mar 2005, *Rutman 20050318-1*. Wash bed of S fork of Alamo Canyon, 2400 ft, 7 Sep 2013, *Rutman 20130907-6*.

**Psilostrophe**

Western United States and Mexico; 7 species. Heliantheae, Gaillardinea.

**Psilostrophe cooperi** (A. Gray) Greene

Paper daisy, paper flower. Figure 93.

Much-branched mound-shaped perennials 30–75 cm tall, probably not long-lived and sometimes flowering in first season. Stems, leaves, and phyllaries densely white woolly, the stems and leaves less woolly to glabrate with age. Stems leafy; leaves alternate, often 2.5–5+ cm long, linear, gray-green, quickly drought deciduous. Heads on peduncles mostly 2–8 cm long; phyllaries mostly 6–7 mm long, green beneath the woolly hair, lanceolate, thickened and callus-like basally and

along the midrib. Flowers bright yellow; rays 1–1.7 cm long and about as wide, 3-lobed at tip, turning downward at maturity. Achenes 3 mm long, glabrous, light colored, truncate at apex; pappus of 4–6 scales. Flowering at various seasons including spring and fall, dormant during the cooler months.

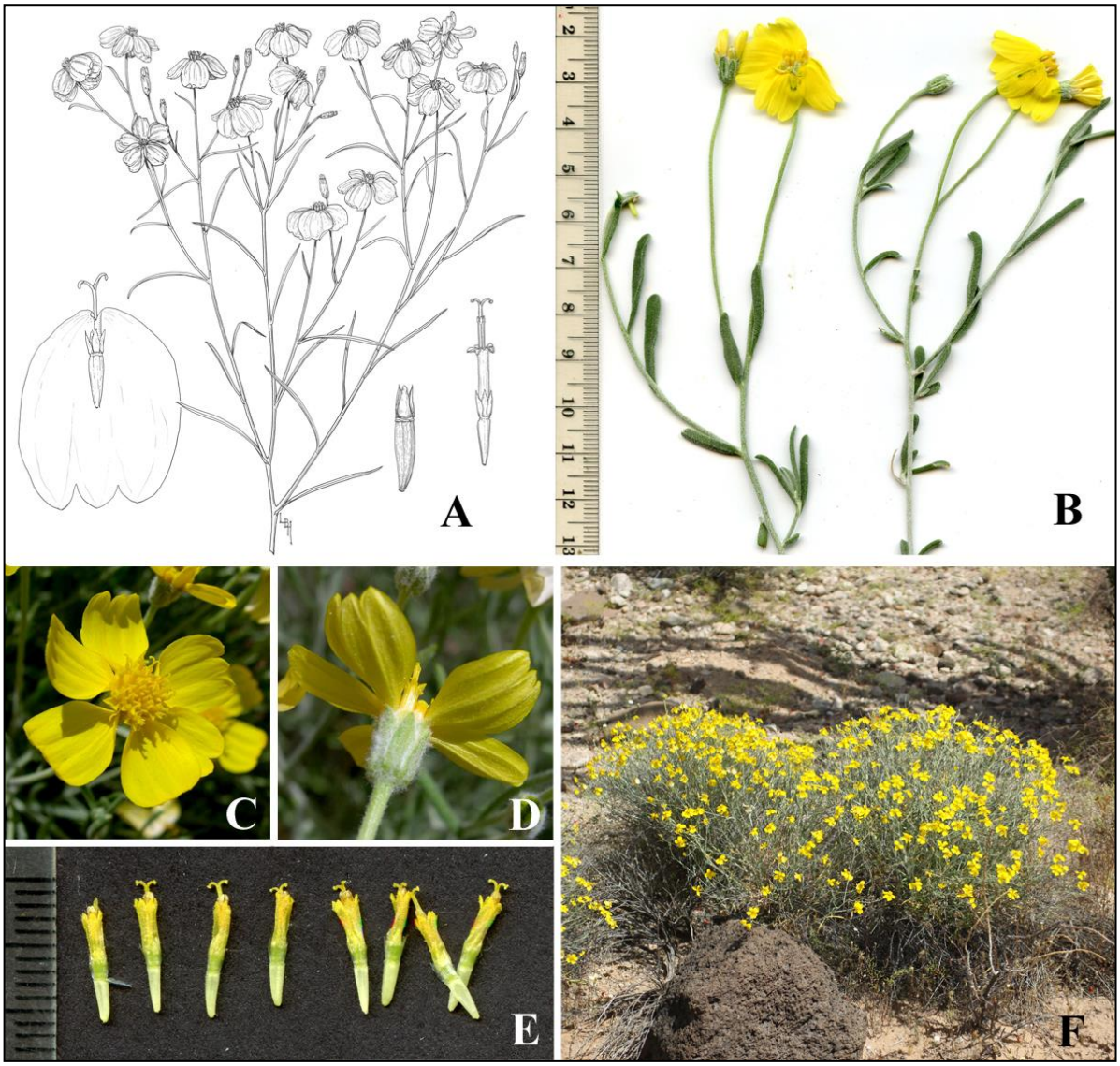


Figure 93. *Psilostrophe cooperi*. (A) By Lucretia Breazeale Hamilton. (B) Road shoulder, Hwy 86, mile 62, E of Why, 1 Aug 2014. (C & D) Red Rock Loop Road, Sedona, Yavapai Co., 8 Jun 2005, photos by Max Licher (SEINet). (E) Wash crossing N end of Ajo Mountain Drive, 30 Sep 2014. (F) Base of latite hill, Gunsight Hills, 23 Apr 2010.

Rocky slopes and washes on the east side of Cabeza Prieta and widespread in Organ Pipe on sandy-loamy soils of lower bajadas, small washes, hills, mountains, and roadsides.

Arizona to northern Sonora, southeastern California, Baja California, Nevada, and Utah.

**OP**: 8 mi S of Growler Well, *Nichol 17 Apr 1939* (ORPI). Walls Well, *Nichol 28 Apr 1939*. 10 mi N of Sonoyta, *McDougall 22 Mar 1941*. Dripping Springs, *Hesselberg 10 April 1970*. Valley of the Ajo, 31 Mar 1980, *Stimson 224.*

**CP**: Charlie Bell Road east of Growler Mts (Simmons 1966). Daniels Arroyo, 26 Sep 1992, *Harlan 322*. Childs Mt, 2240 ft, 9 Apr 1993, *Felger 93-302*. Growler Mts, 1.1 mi S and 0.7 mi E. Growler Peak, 830 m, 24 Mar 2009, *Holm 20090324-2*.

**Rafinesquia**

Tap-rooted winter-spring ephemerals with milky sap. First leaves in a basal rosette, petioled and pinnatifid, the stem leaves alternate, reduced upwards, sessile, pinnately lobed, the leaf bases usually clasping the stem. Heads showy with ligulate (ray-like) florets only, the florets progressively smaller inward. Flowers mostly white. Achenes narrow and tapering to a beak (neck) below the pappus; pappus bristles slender and plumose. Two species. Cichorieae.

1. Larger (outer) rays often 10 mm long; achenes 9–12 mm long; pappus bristles plumose to tip, plumose hairs of pappus (the tiny branchlets) straight……. **Rafinesquia californica**
1. Larger (outer) rays (15) 20–30 mm long; achenes 12–14 mm long; uppermost one-fifth to one-fourth of pappus bristles not plumose (lacking branchlets), the lower part of pappus bristles with plumose and often cobwebby hairs. ……..... **Rafinesquia neomexicana**

**Rafinesquia californica** Nuttall
California chicory. Figure 94.

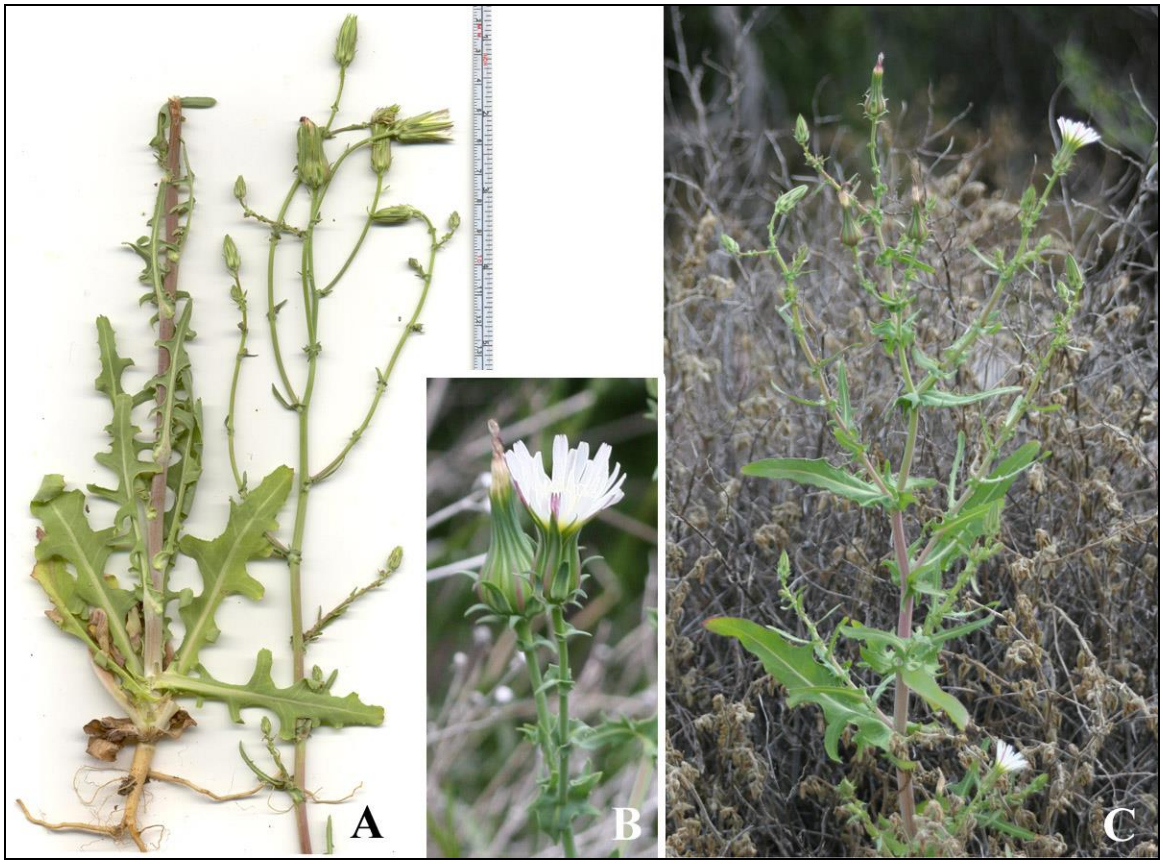


Figure 94. *Rafinesquia californica*. Estes Canyon: (A) 23 Mar 2008; (B & C) 18 Mar 2005.

Often 15–30+ cm tall with a single or few-branched, self-supporting main stem. Leaves variously pinnately cleft or dissected; lower leaves 5–8 (15+) cm long, withering as the stem develops. Flower heads highly variable in size depending on plant size and soil moisture; larger (outer) rays often 10 mm long, white except for a broad rose-purple mid-stripe on the lower (outer) surface, the rays of the inner florets white with yellow at the summit of the throat forming a yellow center or eye on the flower head. Achenes 9–12 mm long; pappus bristles 6–10+ mm long.

Common in Ajo Mountains at higher elevations and in large canyons, and also recorded from Childs Mountain.

Entering the upper elevations and margins of the Sonoran Desert in central and southern Arizona, northern Sonora, and Baja California, and also in California, Nevada, and Utah.

Differing from *R. neomexicana* by the often more robust habit, single- to few-branched and generally self-supporting and stouter main stems, broader leaf segments, generally smaller flower heads that do not open widely, achenes thicker, more sculptured, glabrous, and shorter, with more slender achene beaks, and a different pappus structure. The two sometimes grow intermixed.

**OP**: Alamo Canyon, 24 Mar 1941, *McDougall 29*. Estes Canyon, 2500 ft, 5 Apr 1978, *Bowers 1203* (ORPI). Bull Pasture trail, 2785 ft, 9 Apr 2005, *Felger 05-169*.
**CP**: Childs Mt, summit, 2845 ft, 9 Apr 1993, *Felger 93-299*.

**Rafinesquia neomexicana** A. Gray
Desert chicory. Figure 95.

Plants mostly 15–60 cm tall. Stems usually zigzag, often stout although weak and herbaceous. Basal rosette leaves 4–10 cm long, quickly withering as the stem develops, the blades thin, the segments broad when the plants are well watered, and thread-like when developing under drier conditions. Flower heads relatively large, the size highly variable depending on plant size and soil moisture. Larger (outer) rays (15) 20–30 mm long, pure white except for a pale rose-purple mid-stripe on the lower (outer) surface, the innermost florets white with yellow at the summit of the throat. Inner phyllaries (13) 17–22 mm long. Achenes 12–14 mm long; pappus bristles mostly 10–15 mm long, plumose except at tips, dull white, often cobwebby below.

The plants often grow in the protection of small shrubs, the flowering stems overtopping the "nurse" shrub, which is often *Ambrosia deltoidea* or spiny shrubs especially in drier years and places. The tops of the plants are often eaten by animals. Widespread across the region; sandy to rocky soils, dunes, washes, plains, and slopes, lowlands and mountains to higher elevations. It has been in the region for more than 10,000 years.

Baja California, Baja California Sur, Chihuahua, northern Sonora, and southeastern California to western Texas, Nevada, and Utah.

**OP**: Growler Valley, 20 Mar 1933, *Shreve 6206*. Alamo Canyon, 2500 ft, *Nichol 14 Mar* 1939. Aguajita, wash, 13 Mar 1992, *Felger 92-244*. Santa Rosa Mts, 12 Mar 2003, *Felger 03-346*. Trail from The Cones to Mount Ajo, 4090 ft, 10 Apr 2005, *Felger*, observation.
**CP**: Tule Well, 11 Mar 1937, *Harbison 26156*. Charlie Bell Pass, 3 Apr 1992, *Whipple 3948*. Papago Well, 26 Feb 1993, *Felger 93-139*. Pinta Sands, 11 Apr 1993, *Felger 93-404*.
**TA**: Tinajas Altas Pass, along wash, 20 Feb 1979, *McLaughlin 1974*. Coyote Water, 21 Feb 2005, *Felger 05-151*. †Tinajas Altas, achenes, 10,070 ybp.

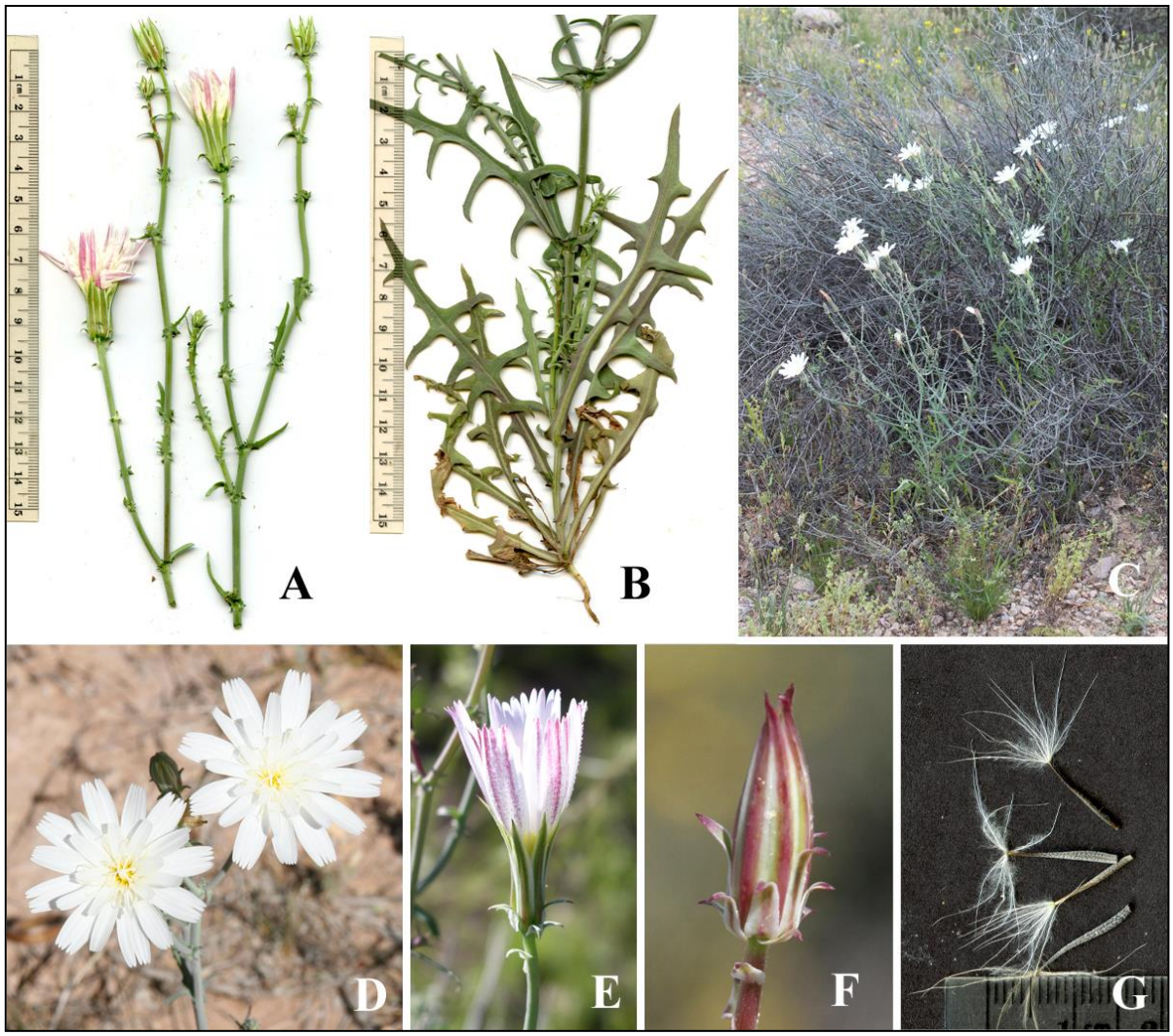


Figure 95. *Rafinesquia neomexicana*. Hwy 85, 0.5 mile S of N boundary of Organ Pipe: (A) 14 Feb 2015; (E) 13 Feb 2005. (B) Kuakatch Wash at Hwy 85, 9 Mar 2015. (C) North Puerto Blanco Drive at Red Tanks Trail, 12 Mar 2015. (D) North Puerto Blanco Drive, 29 Feb 2008. (F) Chico Sunie Wash near Chico Suni Village, 25 Feb 2005. (G) Hwy 86 near mile marker 62, 5 Apr 2015.

**Senecio**

Ephemerals or perennial herbs or subshrubs. Leaves alternate or basal, often with stipule-like leaf bases. Heads with ray and disk florets, or rays sometimes absent; rays in a single row, their number related to the number of phyllaries. Involucres usually cylindrical-campanulate, the phyllaries equal or nearly so, and often also with an outer series of smaller accessory (calyculate) bracts. Flowers yellow. Achenes columnar; pappus of numerous fine, white, soft capillary hairs. The generic name derives from the Latin *senex* ("old man"), referring to the many white pappus hairs, said to resemble the beard of an old man.

Worldwide; 1000 species. Heliantheae, Senecioneae.

1. Leaves often semi-succulent, pinnatisect with pectinate segments (narrowly linear segments spreading at right angles)……. **Senecio flaccidus**
1. Leaves various but not semi-succulent and not pectinately pinnatisect.

2. Leaves not noticeably thin; pinnately lobed, the terminal lobe largest and with toothed margins; phyllaries in a single series, or with an inconspicuous lower series (the calyculus). ..... **Packera quercetorum**
2. Leaves noticeably thin; variously toothed to irregularly lobed but not pinnately lobed; phyllaries in 2 series, the lower series (the calyculus) reduced but readily visible.

3. Stems and leaves green, with woolly tufts at leaf bases and axils; rays conspicuous, 10 mm long…… **Senecio lemmonii**
3. Stems and lower leaves glabrous and often purple-green; rays none or sometimes inconspicuous and several mm long…….. **Senecio mohavensis**

**Senecio flaccidus** Lessing var. **monoensis** (Greene) B.L. Turner & T.M. Barkley
[*S. monoensis* Greene]
Sandwash groundsel. Figure 96.


Figure 96. *Senecio flaccidus* var. *monoensis.* (A) San Pedro Riparian National Conservation Area, Cochise Co., 12 Apr 2003, photo by Liz Makings (SEINet). (B–D) Sedona, Yavapai Co., 3 May 2001, photos by Max Licher.

Winter-spring ephemerals, glabrous or glabrate. Leaves sessile or short-petioled, mostly 3–10 cm long, the blades divided into narrow spreading lobes (pectinate). Flowers heads usually in compound clusters, with bright yellow ray and disk florets, rays 10–20 mm long. Phyllaries 7–10 mm long. Achenes hairy.

Organ Pipe in sandy gravelly soils in washes in the Bates and Growler mountains. Apparently rather scarce in the flora area.

This species ranges from southwestern United States to Puebla and Veracruz, Mexico. Variety *monoensis* is largely a plant of the Mojave and Great Basin regions, where it is perennial. The Sonoran Desert plants are annuals but resemble the Mohave Desert plants in having highly dissected leaves and green foliage (comparatively glabrate) and a herbaceous habit, whereas vars. *flaccidus* and *douglasii* are conspicuously white-hairy as well as being shrubs.

**OP**: Growler Canyon, wash with *Ambrosia ambrosioides* and *Baccharis glutinosa*, 30 Mar 1979, *Bowers 1600*.

**Senecio lemmonii** A. Gray
Lemmon groundsel. Figure 97.


Figure 97. *Senecio lemmonii*. Bull Pasture Trail: (A) 7 Mar 2014; (C) 30 Mar 2008. (B) S fork of Alamo Canyon, 12 Mar 2005. (D) Poland Creek, Bradshaw Mts, Yavapai Co., 3 Apr 2001, photo by Max Licher (SEINet).

Ephemerals, mostly in spring or sometimes short-lived perennials, highly variable in size, often 25–65+ cm tall, glabrate except woolly tufts in leaf axils and moderately woolly leaf bases. Stems leafy, the leaves 4–14 cm long, green, petioled below, sessile above and clasping the stem, the blades thin, mostly lanceolate to elliptic, toothed to sometimes entire. Heads 10–13 mm long, the

phyllaries 6–7.5 mm long with dark tips. Flowers bright yellow; rays well developed, 8–13 in number, 10 mm long. Achenes 3.5–3.7 mm long with short white hairs.

Often in shaded or north-facing niches, widely scattered and not common, usually among rocks; mountains, especially at higher elevations in the eastern part of Cabeza Prieta and widespread in Organ Pipe to the top of the Ajo Mountains.

Western and southern Arizona, Sonora, Baja California, and Baja California Sur.

**OP**: Canyon Diablo, 21 Mar 1935, *Kearney 10849*. Alamo Canyon, *Nichol 4 May 1939*. S side of Arch Canyon, 28 Mar 1965, *Lockwood 192*. Twin Peaks, 1900 ft, shady places on north slope, 4 Mar 1984, *R.K. Van Devender 84-47*. Growler Mts, 7 Mar 2003, *Rutman 2003-243* (ORPI). Canyon upstream from Bates Well, 11 Mar 2003, *Felger 03-294*. Sierra Santa Rosa, 12 Mar 2003, *Felger 03-314*.

**CP**: Agua Dulce Mts, near main ridge, 2000 ft, N exposure, *Simmons 24 Jan 1965*. Childs Mt, 2240 ft, 9 Apr 1993, *Felger 93-292*. Growler Mts, 1.1 mi S and 0.7 mi E Growler Peak, N-facing slope, 24 Mar 2009, *Holm 20090324-1*.

**Senecio mohavensis** A. Gray
Mojave groundsel. Figure 98.

Delicate, glabrous winter-spring ephemerals 12–30 (40) cm tall. Stems leafy, solitary to well branched above. Stems and lower leaves usually purple-green. Leaves mostly 2–9 cm long, ovate to obovate, irregularly toothed to coarsely lobed, thin and almost membranous; lower leaf surfaces often purplish, the upper leaves sessile and broadly clasping the stem. Flower heads 8–13.5 mm long; corollas yellow, with disk florets only or rays occasionally present but inconspicuous. Phyllaries (6) 7–8.5 mm long. Achenes 2.8–3.2 mm long, cylindrical, with short white hairs.

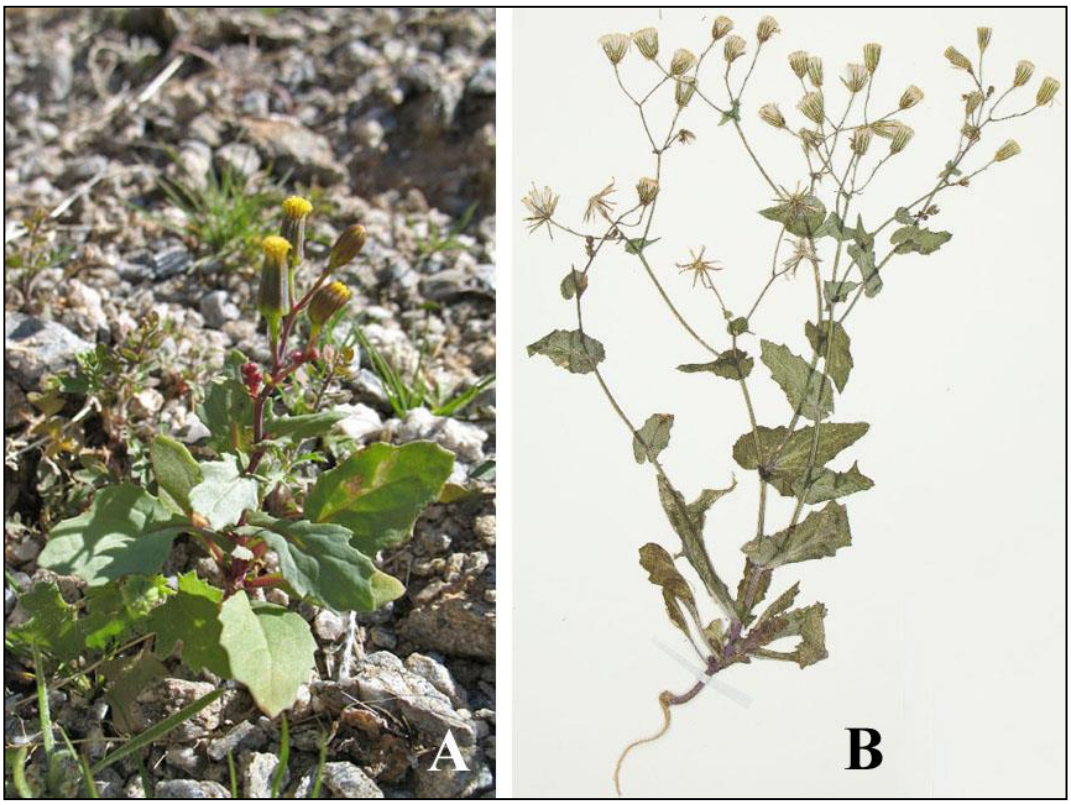


Figure 98. *Senecio mohavensis*. (A) Sierra Estrella Wilderness, 13 Feb 2009, photo by Les Landrum (SEINet). (B) W flanks of Sierra Estrella Mountains and Wilderness Area, 20 Mar 1994, *Hodgson 8090* (DES).

Often in protected, shaded places among rocks in canyons and on north-facing mountain slopes. Widely scattered across the flora area but seldom common.

Mojave and Sonoran deserts in Arizona, Baja California, Baja California Sur, California, Nevada, and Sonora.

The seeds retain viability for at least 15 years and the achenes become mucilaginous when wet. *Senecio mohavensis* resembles the Mediterranean *S. flavus* but is less closely related to it than to a previously recognized variety of *S. flavus* that is now known as *S. mohavensis* subsp. *breviflorus* (Kadereit) M. Coleman. *Senecio mohavensis* probably reached the New World through relatively recent long-distance bird dispersal (Coleman et al. 2001; Liston et al. 1989).

**OP**: Headquarters Area, 10 Apr 1941, *McDougall 76*. Quitobaquito, N-facing rocky slope, localized beneath shrubs, 29 Mar 1988, *Felger 88-114*.

**CP**: Cabeza Prieta Tank, 6 Apr 1979, *Lehto L23513* (ASU). Agua Dulce Spring, 26 Feb 1993, *Felger 93-91*. Childs Mt, 2240 ft, 9 Apr 1993, *Felger 93-293*.

**TA**: Tinajas Altas, on granite, *Van Devender 26 Mar 1983*.

***Sonchus** – Sow-thistle

Winter-spring ephemerals with milky sap. Leaves alternate. Heads ligulate with pale yellow ray-like florets. With age the phyllaries often become swollen and callus-like at the base. Achenes compressed, with three prominent ridges (ribs) on each side, beakless and truncate at apex; pappus of numerous fine, soft hairs plus a few deciduous scales.

Native to the Old World; 50 species; some are worldwide weeds. Cichorieae.

1. Stems sometimes more than 1 m tall; plants usually conspicuously spinescent; achenes smooth between ribs, the ribs not knobby, the margins thin and wing-like……. **Sonchus asper**
1. Stems seldom reaching 1 m tall; plants not conspicuously spinescent; mature achenes wrinkled and roughened between the ribs (caution: achenes may need to be mature), the ribs transversely knobby, the margins not thin and wing-like…… **Sonchus oleraceus**

***Sonchus asper** (Linnaeus) Hill subsp. **asper**
Spiny sow thistle; *chinita*; ho'idkam, 'i:vakĭ. Figure 99.

Larger plants spiny-prickly, often robust, sometimes reaching 1.8 m in height but usually much smaller. Mostly glabrous except stalked glands reaching 1–1.3 mm in upper part of the plant. Leaves pinnatifid with an enlarged terminal segment, and often with spinescent-tipped teeth; early leaves in a rosette, 6–30+ cm long, the rosette and lower stem leaves with winged petioles, the upper leaves sessile and clasping the stem; lowermost leaf segments (basal auricles) of stem leaves rounded (on giant, robust plants the basal auricle can be deeply cut with many spinescent teeth). Achenes 2.8–3 mm long, flat, oval to oval-obovate; pappus more or less deciduous.

Localized and seldom numerous, mostly at waterholes, especially artificial ones and other disturbed habitats, and along washes and canyons.

Native of Europe, naturalized and weedy worldwide.

**OP**: Quitobaquito, *Nichol 4 May 1939*. Visitor Center, *Beal 19 Mar 1989* (ORPI).

**CP**: Jose Juan Tank, 26 Feb 1993, *Felger 93-98*. Charlie Bell Road at W branch of Daniels Arroyo, 10 Apr 1993, *Felger 93-359*.

**TA**: Coyote Wash at Camino del Diablo, 10 Jan 2002, *Felger 02-10*. Frontera Canyon, 18 Mar 1998, *Felger*, observation.

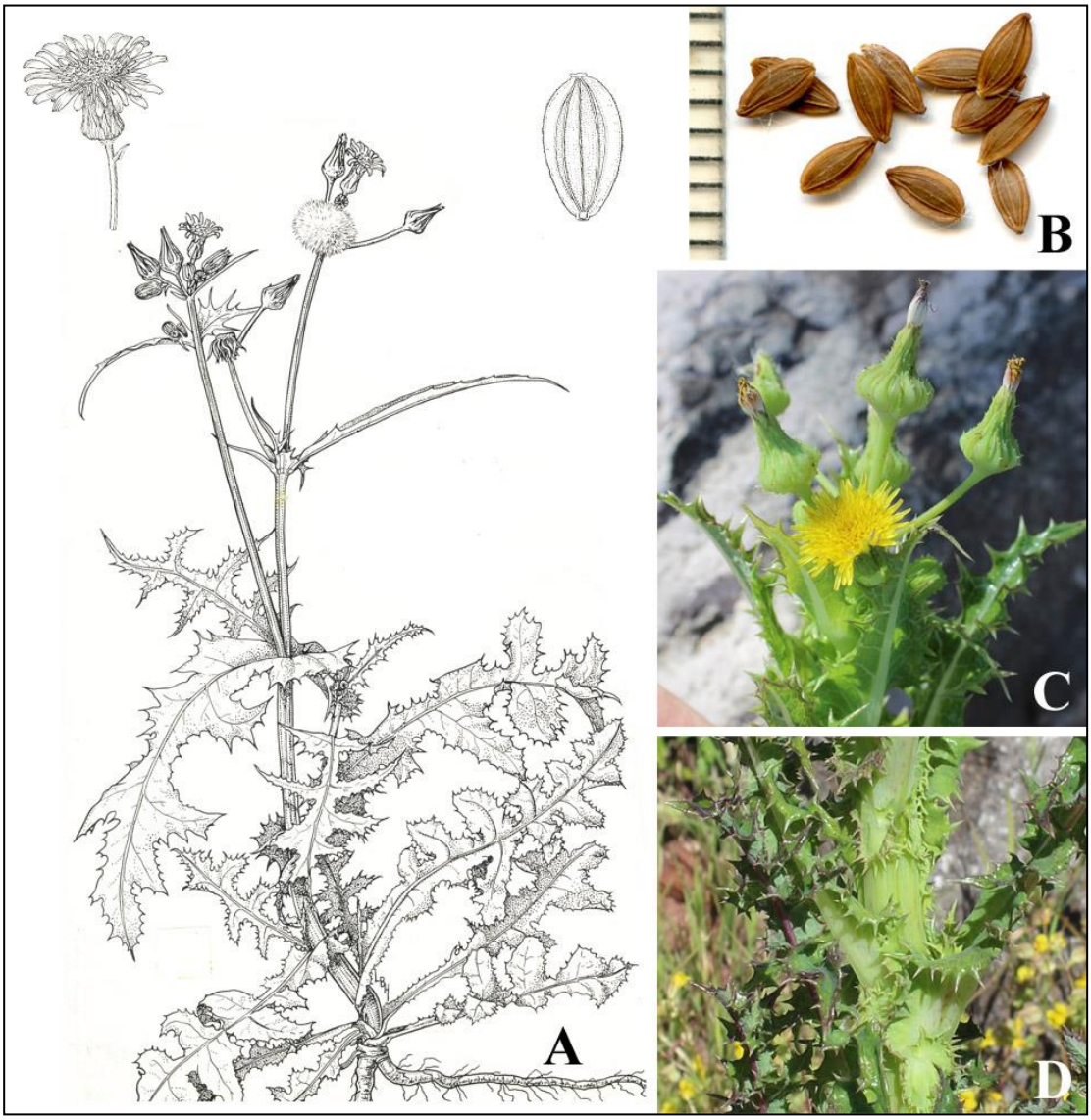


Figure 99. *Sonchus asper* subsp. *asper*. (A) By Lucretia Breazeale Hamilton. (B–D) Alamo Canyon, 4 Apr 2015.

***Sonchus oleraceus** Linnaeus
Sow thistle; *chinita*; hauvĭ, hehewo. Figure 100.

Similar to *S. asper* but usually not nearly as large and robust, the lowermost leaf segments (basal auricles) of stem leaves narrow-angled (acute), the achenes generally narrower, roughened between the ribs, the margins not thin and winged, and the pappus tending to be persistent. Achenes 2.5–3.4 mm long, narrowly elliptic to oblanceolate.

Widely scattered in canyons, washes, waterholes; disturbed habitats and also well established and widespread in natural areas but seldom common, and in the Ajo Mountains to more than 4000 feet.

Native of Europe, naturalized and weedy worldwide.


Figure 100. *Sonchus oleraceus*. Alamo Canyon: (A) 2 Mar 2008; (B) 12 Jan 2014; (D) 11 Jan 2014. (C) Estes Canyon, 2 Mar 2008. (E) Ajo, 5 Mar 2015.

**OP**: Wash near Sonoyta road, 10 Apr 1941, *McDougall 71*. 2 mi E of Bates Well, 30 Mar 1979, *Bowers 1594*. Quitobaquito, 10 Nov 1987, *Felger 87-301*. Bull Pasture, 9 Apr 2005, *Felger 05-188*.

**CP**: Childs Mt, 9 April 1993, *Felger 93-284*. Charlie Bell Road at W branch of Daniels Arroyo, 9 April 1993, *Felger 93-359*.

**TA**: Frontera Canyon, 18 Mar 1998, *Felger*, observation.

**Stephanomeria** – Wire-lettuce

Ephemerals or perennial herbs or small shrubs with milky sap. Leaves alternate, often scale-like and reduced upwards. Involucres cylindrical, often narrow, the phyllaries about 5, in a single series and nearly equal, plus smaller, accessory bracts. Heads ligulate, few flowered, the florets ray-like and equal in size; corollas white to pink or rose. Achenes columnar, beakless, 5-angled or 5-ribbed; pappus bristles plumose.

Western North America and northern Mexico; 16 species. Cichorieae.

1. Bushy perennials (sometimes flowering in the first season), the stems much branched throughout; rays (ligules) 10–12 mm long; pappus bristles 6–8 mm long…….. **Stephanomeria pauciflora**
1. Spring ephemerals with one to several erect main stems, branched above; rays 5–7 mm long; pappus bristles 2–5 mm long.

2. Pappus bristles 10 (or more?), slender and rounded in cross-section (capillary), 5 mm long; Organ Pipe, not on dunes or sand flats…… **Stephanomeria exigua**
2. Pappus bristles 5, conspicuously flattened, 2–3 mm long; dunes and sand flats in Cabeza Prieta. ……... **Stephanomeria schottii**

**Stephanomeria exigua** Nuttall subsp. **exigua**
Wire-lettuce. Figure 101.

Spring ephemerals less than 30 cm tall, with a stout taproot and a soon-withering basal rosette of leaves. Flowers pink, becoming dull with age.

Known in the flora area from near the north end of the Pozo Nuevo Hills where it grows on heavy floodplain soils and also locally in the Crater Range north of Ajo.

This highly variable species occurs in western North America and this subspecies ranges from Baja California and Sonora to Colorado, Texas, and Washington.

**OP**: 8 mi S of Growler Well, Bates Mts, 1300 ft, *Nichol 17 Apr 1939* (ORPI). Floodplain near N end of Pozo Nuevo Hills, 11 Apr 2003, *Rutman 2003-457*.

**Stephanomeria pauciflora** (Torrey) A. Nelson
Desert straw. Figure 102.

Globose or mound-shaped herbaceous perennials or shrubs with sparse foliage. Glabrous except a single collection (*Bowers 910*) that has densely pubescent herbage with short, white (pilose) hairs but in every other respect compares with *S. pauciflora*. Leaves variable, quickly drought deciduous, pinnatifid with few, spreading narrow segments, the early leaves of well-watered plants sometimes 10–15 cm long but usually much shorter, the segments usually less than 5–8 mm long; first leaves (of first-season plants) in a basal rosette. Flowers pale pink, closing by mid-day or earlier in warmer weather; flowering non-seasonally.

Common and widespread, especially along larger washes, also canyons and rocky slopes, sometimes to mountain peaks, and less common on creosotebush flats.

California and Arizona to Colorado and Kansas, and southward to Baja California Sur, Sonora, Chihuahua, and Coahuila.

**OP**: Pitahaya Canyon, 3400 ft, *Nichol 23 Feb 1939*. 6.7 mi NE of Visitor Center along Ajo Mountain Drive, 1900 ft, 5 Nov 1977, *Bowers 910*. Aguajita Spring, arroyo, 13 Sep 1986, *Felger 86-293*.

**CP**: Tule Well, 28 Oct 1937, *Gentry 3520* (DES). Pinta Sands: *Simmons 16 Apr 1963* (CAB); 8 May 1978, *Lehto L22764* (ASU). Sierra Pinta, summit, *Cain 15 Nov 2003*. *Felger*, observations: N side of Tule Mt, 2 Feb 1992; Heart Tank, 14 Jun 1992; Childs Mt, 2845 ft, 18 Aug 1992.

**TA**: 1 mi E of Tinajas Altas, 26 Apr 1986, *Van Devender 86-144*.

Figure 101. *Stephanomeria exigua*. Hwy 85, W of Three Points near mile marker 125, 16 Apr 2015.

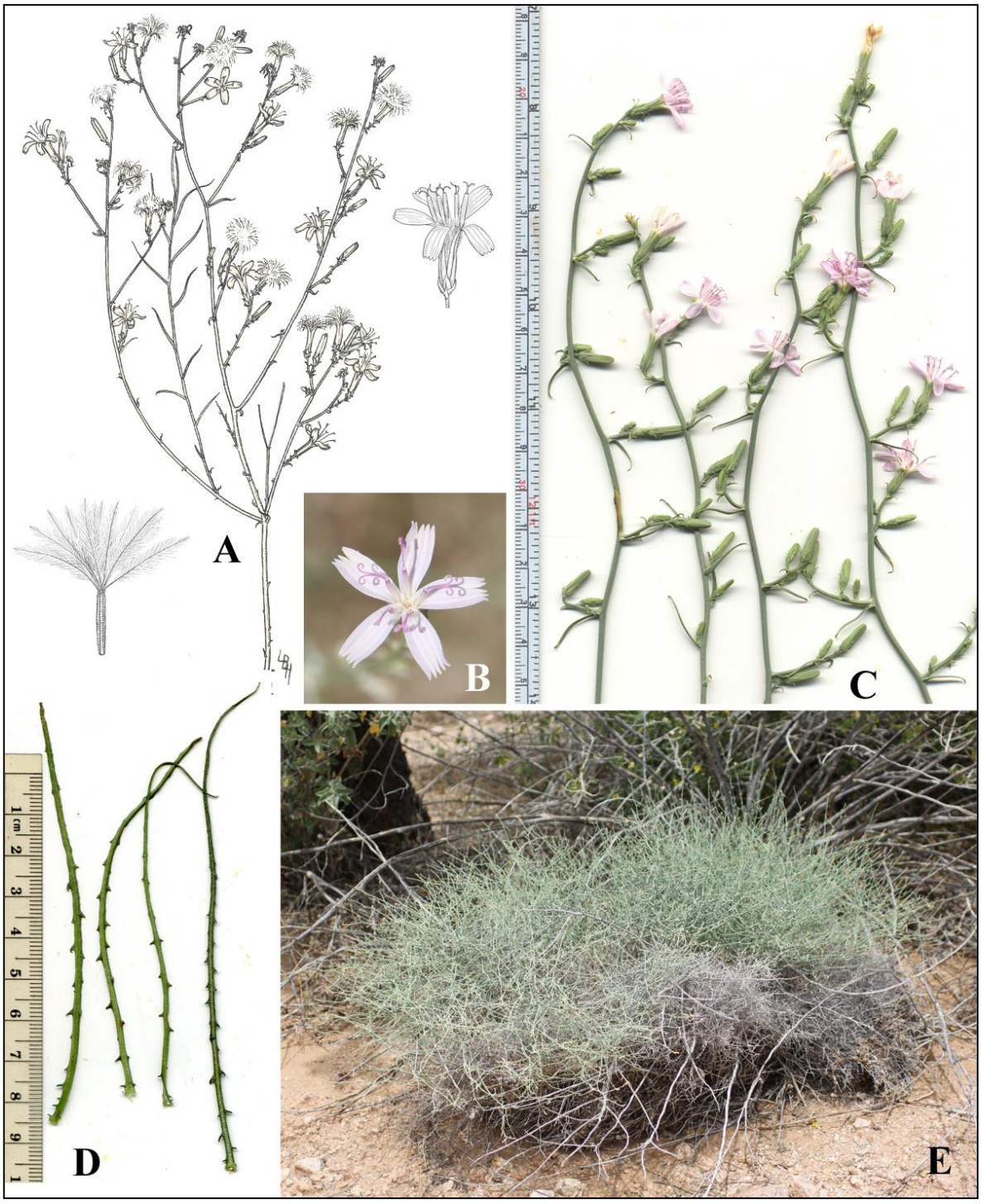


Figure 102. *Stephanomeria pauciflora*. (A) By Lucretia Breazeale Hamilton. (B) Alamo Canyon, 6 May 2006. (C) Ajo, 1 Apr 2013. (D) Aguajita Wash near US/Mexico boundary, 8 Feb 2015. (E) Senita Basin, 10 May 2010.

**Stephanomeria schottii** (A. Gray) A. Gray
[*Hemiptilium schottii* A. Gray]
Schott's wire-lettuce. Figure 103.

Spring ephemerals often 30–60 cm tall, with a stout taproot, and shiny, silvery-white stems. Early leaves thin, in a quickly withering basal rosette, 2.8–12 cm long, linear with a few teeth or pinnate segments 1–3 cm long; the plants nearly leafless at flowering time. Flowers white tinged with violet. Pappus bristles uniquely broad and flattened, with a coppery mid-stripe and broad, nearly transparent margins, the bristles with feathery tips. Flowering March to May.

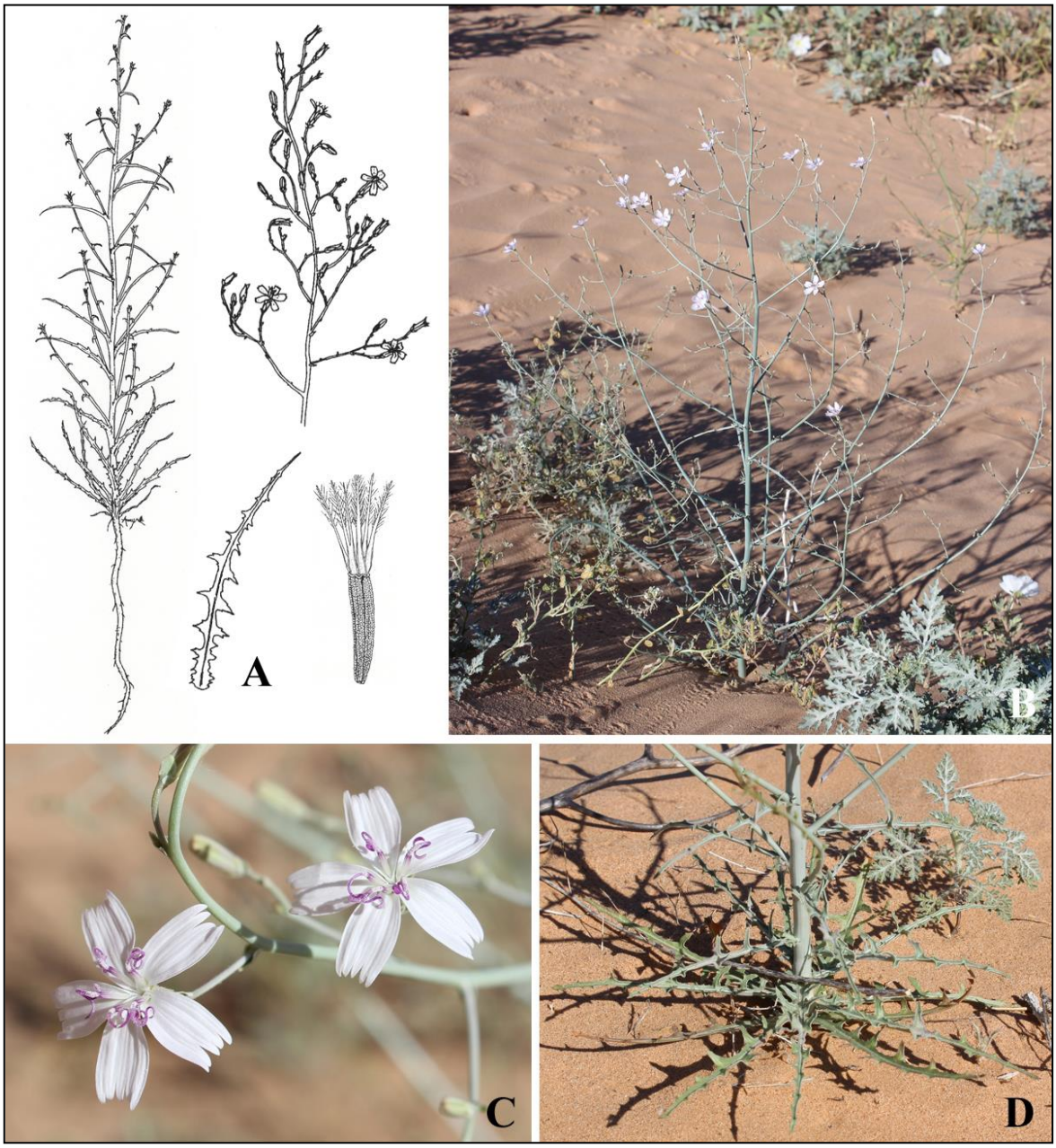


Figure 103. *Stephanomeria schottii*. (A) By Amy Eisenberg. (B–D) Dunes 20 mi S of Sonoyta, Sonora, on Mex Hwy 8, 17 Mar 2014.

Generally on sand flats and dunes. Seasonally common on the Pinta Sands and a small sand area at the west margin of the San Cristobal Wash.

Also common on the Mohawk Dunes to the north of Cabeza Prieta, and similar habitats farther west in the Goldwater Range. It is especially common on the Gran Desierto dunes and sand flats in adjacent northwestern Sonora.

Southwestern Arizona and northwestern Sonora.

After its initial discovery there was no report of this plant for more than 100 years (Lehto 1979), which is surprising since it is fairly common. Mature plants tend to be foul-smelling. The flowers are open at dawn (nocturnal?), at which time they can produce an almost sickeningly sweet fragrance, and remain open through mid-morning on warm days and longer on cooler days.

**CP**: 2 mi beyond [presumably westward from] San Cristobal Wash on Bates Well–Papago Well Road, *Larrea-Ambrosia* plain, ephemerals to 0.8 m tall, erect, branching laterally from main axis, common along gully and in the open and among shrubs, 1000 ft, 16 Apr 1976, *Engard 876* (DES). Pinta Sands: 8 May 1978, *Lehto L22764*; 10 Apr 1978, *Reeves 6780*; 11 Apr 1993, *Felger 93-438*. W margin of San Cristobal Wash, 10 Apr 1993, *Felger 93-379*.

**Stylocline –** Nest straw

Diminutive white-woolly spring ephemerals. Leaves alternate or appearing whorled beneath flower heads; leaves entire, sessile or petioles obscure, the lower leaves soon withering. Flower heads small, distinctly rounded, single or usually in clusters (glomerate) of 2–10, subtended by several leaves longer than the cluster of flower heads and seemingly functioning like phyllaries. Actual phyllaries absent (the species in the flora area). Receptacles longer than wide, cylindrical to club-shaped or linear. (The elongate receptacle is a conspicuous characteristic and often one easy to see except in immature plants, but it is not necessarily diagnostic.)

Pistillate florets in 2 to several outer series or rows, spirally arranged, lacking a pappus and without stamens; pistillate florets all subtended by phyllary-like chaffy bracts, at least the inner of these pouch-like, very woolly outside, and with an expanded membranous tip or margin; the bract and achene falling as a unit (chaffy bracts of innermost pistillate florets may be reduced) (Figure 64). Pistillate achenes smooth and shiny, tiny, without a pappus. Inner florets staminate, 2–6, in 1 series (spiral), the corolla lobes usually 5, the chaffy bracts absent or small, achenes vestigial or aborting, the pappus of 0–12 barbed bristles.

Southwestern United States and northwestern Mexico; 7 species. Some birds incorporate these small woolly plants into their nests, hence the common name. Gnaphalieae.

1. Membranous (hyaline) wing of achene-bearing chaffy bracts broadest near or below middle of whole bract, cordate or rounded…….. **Stylocline gnaphaloides**
1. Wing of achene-bearing chaffy bracts broadest well above middle of whole bract.
…… **Stylocline micropoides**

**Stylocline gnaphaloides** Nuttall
[*S. arizonica* Coville]
Everlasting nest-straw. Figure 104.

Resembling *S. micropoides* but generally smaller in stature. Larger leaves to 2 cm long, broadly linear to oblong, generally obtuse. Membranous (hyaline) wing of fruiting chaffy bracts ovate (broadest near base), or often heart-shaped (ovate-cordate) at base, extending over full length of

bract (chaff body). Pistillate achenes 0.8–1 mm long. Achenes of inner, staminate florets vestigial, generally with 1–4 pappus bristles.

Known from the flora area by a single record near the Mexican border but perhaps more widespread. Also recorded in a similar habitat about 20 km southward in Sonora.


Figure 104. *Stylocline gnaphaloides*. (A) S of Ben Lommond on Quail Hollow Road, Santa Cruz Co., 14 May 2014, photo © by Richard Spellenberg (CalPhotos). (B) Santa Rosa Island, Santa Barbara Co., CA, 7 May 2006, photo by Steve Matson (CalPhotos).

This is primarily a cismontane Californian species, extending into similar habitats in the Baja California Peninsula (Rebman et al. 2016) and barely reaching the western edge of the California desert. Another center of distribution is in Arizona from Organ Pipe to the southeastern part of Arizona and adjacent northern Sonora. There is apparently a distributional gap in the intervening, extremely arid desert (Morefield & Felger 2000).

Distinguished from *S. micropoides* by the often smaller, relatively broader and blunter leaves, smaller flower heads, usually fewer pappus bristles, and most readily by the broad, ovate or heart-shaped wing of the chaffy bracts. The two species often grow intermixed and *S. gnaphaloides* sometimes also grows with *Logfia depressa*.

**OP**: Senita Basin Road, 4.5 mi S of Senita Basin, along wash, 23 Mar 1969, *Lehto L15440* (ASU 18822, mixed sheet with *Logfia depressa*, det. James D. Morefield, 1992).

**Stylocline micropoides** A. Gray
Desert nest-straw. Figure 105.

Plants mostly much less than 15 cm tall, erect to low and spreading. Larger leaves often to 2 cm long, oblanceolate to lanceolate or awl-like, acute to acuminate. Clusters of flower heads (glomerules) subtended by leaves longer than the flower heads. Individual heads globose. Receptacles cylindrical, 2.5–3.5 × 0.5–0.6 mm, persistent long after the florets fall, each floret leaving a minute pit at its point of attachment. Largest chaffy bracts 3.4–4.5 mm long, enclosing achenes, each falling with an achene as a unit, the bract wing broadly lanceolate or oblanceolate to ovate or obovate. Pistillate achenes 1–1.3 mm long, smooth and shiny. Achenes of inner, staminate florets vestigial, generally with 3–8 pappus bristles.

Common across the desert floor including washes, creosotebush flats, and dunes, as well as soil pockets and small flats on hills and mountains, and extending to the crestline in the Ajo Mountains.

Western and southern Arizona to western Texas, California, Utah, Baja California, Chihuahua, and Sonora. Distinguished by distinctive globose heads and long bracts.

**OP**: Cement Tank, 14 Apr 1941, *McDougall 96*. Arch Canyon, 28 Mar 1965, *Niles 553*. Wash 2.5 mi W of Hwy 85 on Puerto Blanco Drive, 11 Apr 1978, *Bowers 1218*. Bull Pasture, *Beale 26 Mar 1988* (ORPI). Quitobaquito, 29 Mar 1988, *Felger 88-115*. Base of Santa Rosa Mts, *Rutman 3 Feb 2003* (ORPI). Trail to Mt Ajo, crestline above The Cones, 4090 ft, 10 Apr 2005, *Felger*, observation.

**CP**: Charlie Bell Pass, 3 Apr 1992, *Whipple 3926*. Childs Mt, 2240 ft, 9 Apr 1993, *Felger 93-294*. Pinta Sands encroaching E side of Pinacate Lava, growing with *Logfia depressa* (*93-400*), 11 Apr 1993, *Felger 93-399*.

**TA**: Tinajas Altas: *Van Devender 5 Mar 1983*; 19 Mar 1998, *Felger 98-143*. Coyote Water, 18 Mar 1998, *Felger*, observation.

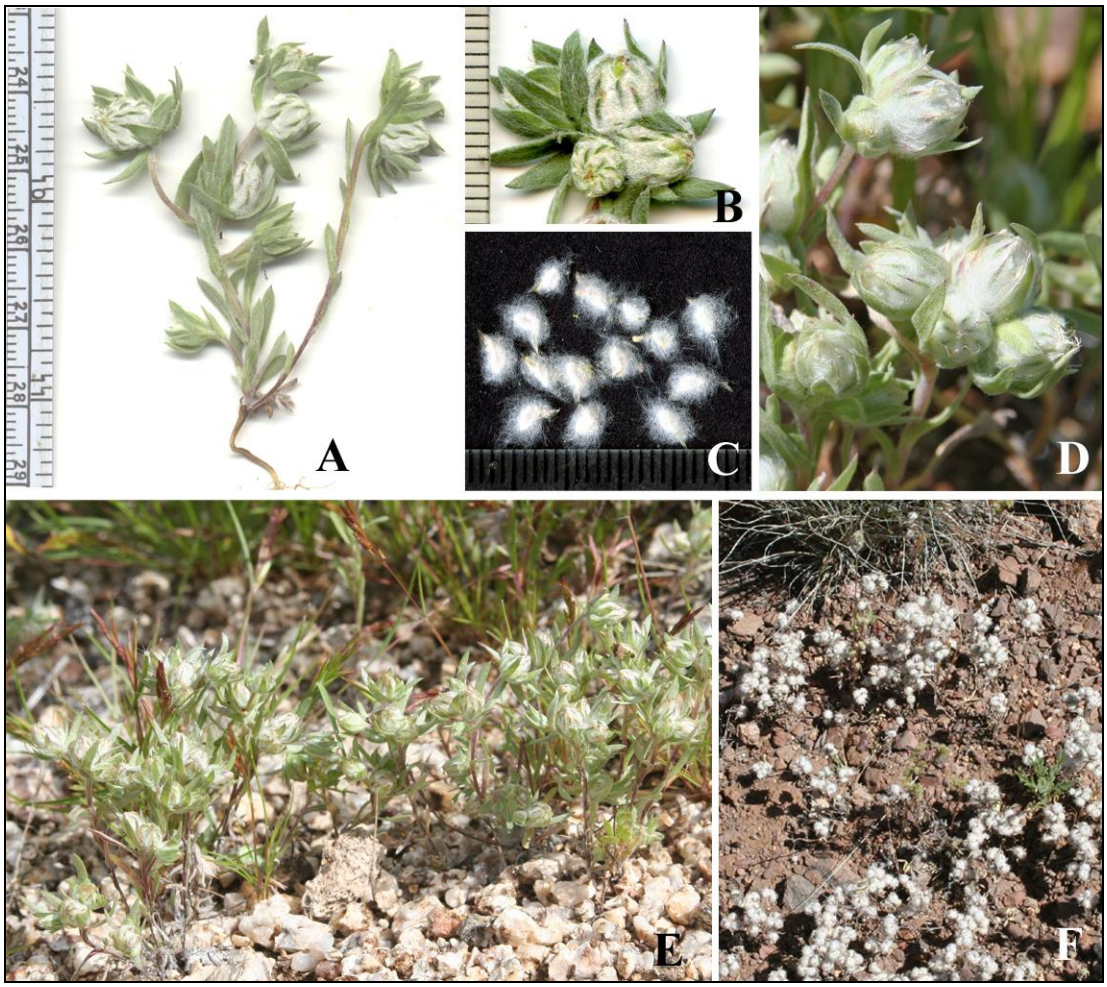


Figure 105. *Stylocline micropoides*. (A) Alamo Canyon, 11 Mar 2014. (B) Kuakatch Wash at Hwy 85, 9 Mar 2014. (C) Hwy 86, near mile marker 62, 5 Apr 2015. (D & E) Near Victoria Mine, 5 Mar 2005. (F) Bull Pasture, 10 Apr 2005.

*Tessaria sericea*, see **Pluchea sericea**

**Thymophylla**

Ephemerals or perennial herbs (or subshrubs elsewhere), strongly scented with conspicuous oil glands. Leaves and branches opposite below, often alternate above. Phyllaries united at least ⅔ of their length and with mostly round glands, and also with a series of smaller, accessory bracts (calyculi). Rays few, fertile, or sometimes reduced or absent, usually yellow; disk florets usually numerous, bisexual and fertile. Achenes obconic; pappus highly variable.

Southwestern United States and Mexico, and South America, and introduced in the Old World; 13 species. A genus segregated from *Dyssodia*. Heliantheae, Pectidinae.

1. Leaves soft, the segments not bristly; rays white (sometimes pale yellow), the disk yellow. …….. **Thymophylla concinna**
1. Leaves firm, the segments with bristly tips; flower heads all yellow….. **Thymophylla pentachaeta**

**Thymophylla concinna** (A. Gray) Strother
[*Dyssodia concinna* (A. Gray) B.L. Robinson]
Dogweed; *manzanilla de coyote*; ban mansani:ya. Figure 106.

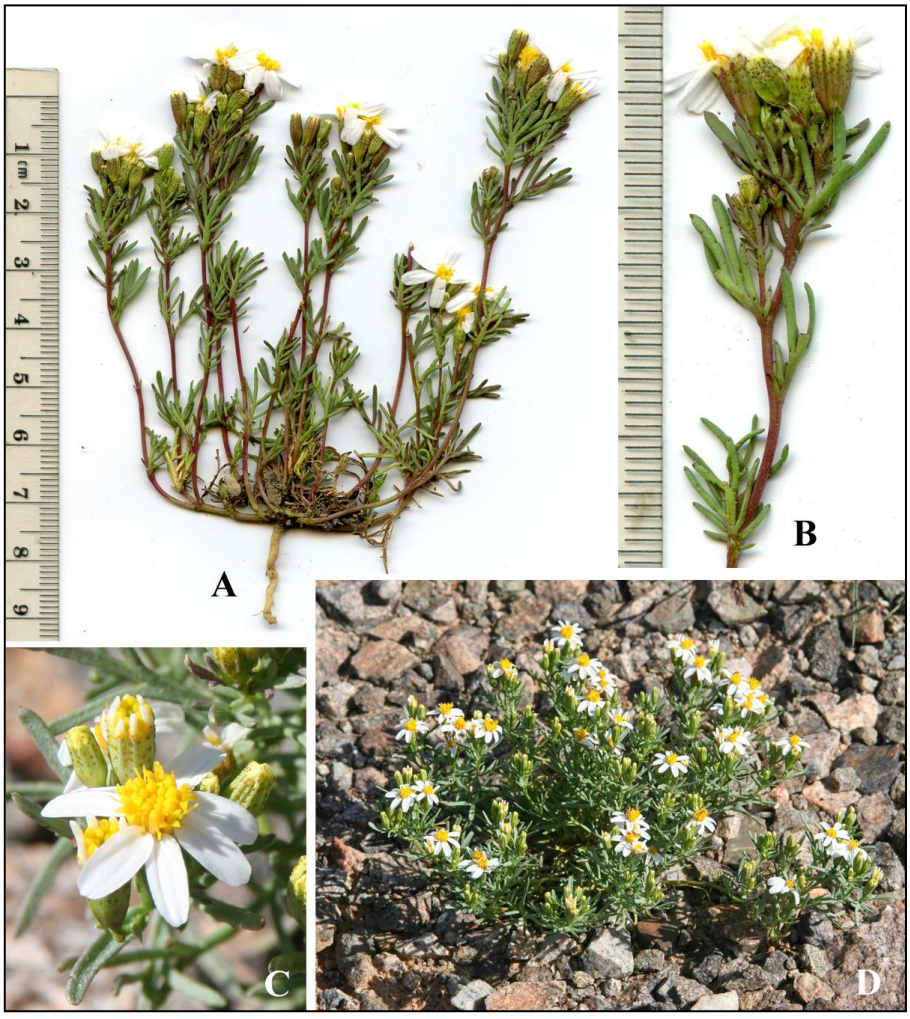


Figure 106. *Thymophylla concinna*. (A & B) North Puerto Blanco Drive near Red Tanks trailhead, 12 Mar 2015. (C & D) Near N boundary of Organ Pipe on Bates Well Road, 20 Mar 2005.

Small winter-spring ephemerals, mostly 3.5–10 cm tall, the stems becoming semi-prostrate and sometimes reaching 20 cm long. Plants glabrous or sparsely hairy, dotted with small oil glands and pungently aromatic. Leaves opposite below, alternate above, 7–16 mm long, pinnate with slender segments. Heads often clustered at ends of leafy stems, showy, the rays white, 4–5 mm long, the disk yellow. Phyllaries 4.5–6 mm long, united nearly to apex, the accessory bracts few and inconspicuous or absent. Achenes 2.8–3 mm long, slender, blackish; pappus bristles white, about as long as the achenes.

Gravelly, sandy, granitic or volcanic soils; valley plains and bajadas, and sometimes on rocky hill slopes. Near the Agua Dulce Mountains in Cabeza Prieta and widely scattered in the lowlands of Organ Pipe. Its history in the flora area extends to more than 3200 years.

Sonoran Desert in southern Arizona and central and western Sonora southward to the Guaymas Region.

The plant was boiled and the tea drunk as a medicine for colds and by women right after childbirth (Betty Melvin in Zepeda 1985: 54).

**OP**: Sonoyta Hills, 25 Apr 1944, *Clark 11470* (ORPI). Base of Twin Peaks, 2 Mar 1985, *Van Devender 85-4*. Quitobaquito, 29 Mar 1988, *Felger 88-119*. Gunsight Hills, 9 Mar 2003, *Rutman 2003-290* (ORPI). Santa Rosa Mts, upper bajada, 12 Mar 2003, *Felger 03-351*. †Puerto Blanco Mts, achenes, 3220 ybp.
**CP**: S of Agua Dulce Pass on bajada (Simmons 1966). Gravelly slopes at S edge of Agua Dulce Mts, 1400 ft, scarce, 13 Apr 1964, *Niles 341*.

**Thymophylla pentachaeta** (de Candolle) Small var. **belenidium** (de Candolle) Strother
[*Dyssodia pentachaeta* (de Candolle) B.L. Robinson var. *belenidium* (de Candolle) Strother]
Golden dyssodia. Figure 107.

Small, short-lived herbaceous perennials. Leaves 5–25 mm long, mostly opposite, or the upper ones alternate; simple or pinnately lobed, leaves or the lobes needle-like. Flower heads on slender peduncles 2–5 cm long, with bright yellow ray and disk florets. Achenes with pappus of awned scales. Growing and flowering in warmer months with sufficient soil moisture.

Fine-textured soils among rocks at higher elevations on Childs Mountain and widely scattered in Organ Pipe along roadsides and perhaps elsewhere; often a pioneer plant along roadsides and washes.

This variety occurs in southeastern California to southern Utah and Texas and northern Mexico, and disjunct in the Chaco of Argentina. Three other varieties range from Texas to central Mexico.

**OP**: 4.7 mi from entrance of N Puerto Blanco Drive, *Beale 10 Mar 1987* (ORPI).
**CP**: Childs Mountain, 2845 ft, 18 Aug 1992, *Felger 92-636A*.


Figure 107. *Thymophylla pentachaeta* var. *belenidium*. (A) Horseshoe Mesa/Tonto Trail, Grand Canyon National Park, 4 Apr 2007, *Hodgson 21733* (DES). (B & C) Garden in Ajo, 26 Aug 2013.

**Townsendia**

Western North America and Mexico. *Townsendia* is a genus of 27 species centered in western United States. In Arizona it occurs mostly in the northern part of the state and primarily at higher elevations. Astereae.

**Townsendia annua** Beaman

Annual Townsend daisy. Figure 108.

Small, attractive cool-season ephemerals, with coarse hairs (strigose). Stems to 20 cm long but often much shorter. Leaves basal and alternate 1–2 cm long, spatulate to narrowly oblanceolate. Phyllaries numerous, lanceolate or ovate to oblanceolate with broad white-membranous (hyaline) and fringed (erose) margins. Rays 5–8 mm long, whitish, pink tinged above and purplish below (dark underside of rays is characteristic of the genus), the disk with numerous yellow florets. Achenes 2–3 mm long, with tiny knob-tipped hairs; pappus of disk achenes of pure white, flattened but slender, barbellate bristles. The attractive daisy-like flower heads are often as large as or larger than the rest of the plant.

Locally extensive population in the northwestern of part of Organ Pipe; on loamy, limestone or granitic soil in a creosotebush flat. There are no other records for any member of this genus anywhere else within the Sonoran Desert. In Arizona *T. annua* is otherwise known to range from 3000–7000 ft and the nearest "lowland" record is from near Safford in Graham County (14 Apr 1905, *Thornber 4667*). Is it really so rare in the Sonoran Desert, or has it been overlooked because of its gross similarity to *Monoptilon bellioides*?

Southeastern Utah and adjacent Colorado to Arizona, New Mexico, and western Texas, and perhaps northeastern Sonora and northern Chihuahua.

The plants resemble the common, widespread *Monoptilon bellioides*, but are readily distinguished by the softer (not bristle-like) hairs, lack of crowded, spatulate leaves beneath (subtending) the flower heads, phyllaries with wider and more prominently membranous margins (extending the length of the phyllary), flat and straight rays (not inrolling with age), distinctive pappus, and the tiny knobbed hairs on the achenes. Members of *Townsendia* generally have rays that are pink or lavender below and of a lighter shade above, but this feature can be difficult to see except on fresh specimens.

**OP**: Near Cherioni Well, 9 Apr 1941, *McDougall 64*. N boundary, Cuerda de Leña Wash, *Jordan 25 Mar 1975* (ORPI). Loamy flat W of Cuerda de Leña Wash near N boundary, 8 Mar 2003, *Rutman 2003-287*. W side of Cuerda de Leña, several hundred yards S of N boundary of OP, UTM: 12 320660, 3563790, 1462 ft, loamy flat dominated by *Larrea*, area that supported *Townsendia* also supported an amazing diversity of annual species, 23 Mar 2003, *Rutman 2003-389*.


Figure 108. *Townsendia annua*. Near Organ Pipe N boundary, W of Cuerda de Leña, 8 Mar 2003.

**Trichoptilium**

This genus has a single species. Heliantheae, Gaillardinea.

**Trichoptilium incisum** (A. Gray) A. Gray
Yellow head. Figure 109.

Small winter-spring ephemerals, sometimes persisting through summer and becoming short-lived perennials, with a taproot, and several dichotomous branches; plants 6–8 cm tall (not including peduncles). Herbage white-woolly and aromatic. Leaves clustered near base of plant, alternate or sub-opposite, (1) 1.5–5.5 cm long, the blades narrowed to a winged petiole, oblanceolate, shallowly lobed to sharply toothed with coarse teeth. Flower heads raised well above the leaves on slender peduncles, with bright yellow disk florets. Phyllaries in outer and inner whorls, 6–7.5 mm long and woolly. Achenes 2.3–2.8 mm long and densely hairy; pappus of 5 broad scales divided into many uneven, slender, white to golden bristles, the scales thickened basally into a yellow callosity. Mostly growing and flowering November–April or May, occasionally flowering with summer-fall rains if the plants survive the pre-summer drought.

Widespread in Cabeza Prieta and Tinajas Altas, mostly in rocky or gravelly soils; desert flats, bajadas, rocky slopes, washes, and locally in arid granitic and limestone hills and bajadas in the southwestern part of Organ Pipe.

Mojave and Sonoran deserts in western Arizona, California, Nevada, both Baja California states, and northwestern Sonora.

**OP**: 1.5 mi N of Bonita Well, 9 Apr 1941, *McDougall 58*. Rocky slopes along Puerto Blanco Drive, 12 Apr 1978, *Bowers 1261* (ORPI). W end Puerto Blanco Mts, 14 Mar 2003, *Rutman 2003-316* (ORPI).

**CP**: Cabeza Prieta Tank, 6 Apr 1979, *Lehto L23529* (ASU). Camino del Diablo, 9 mi W of Visitor Center turnoff, 20 Mar 1979, *Yatskievych 79-228*. 1 mi W of Tule Well, 17 Apr 1983, *Hodgson H-2084* (DES). Tule Mts, 2 Feb 1992, *Felger 92-57*. Sheep Mt, 20 Mar 1992, *Harlan 56*. W Pinta Sands, 15 Sep 1992, *Felger 92-776*.

**TA**: Tinajas Altas, *Van Devender 10 Mar 1986.*

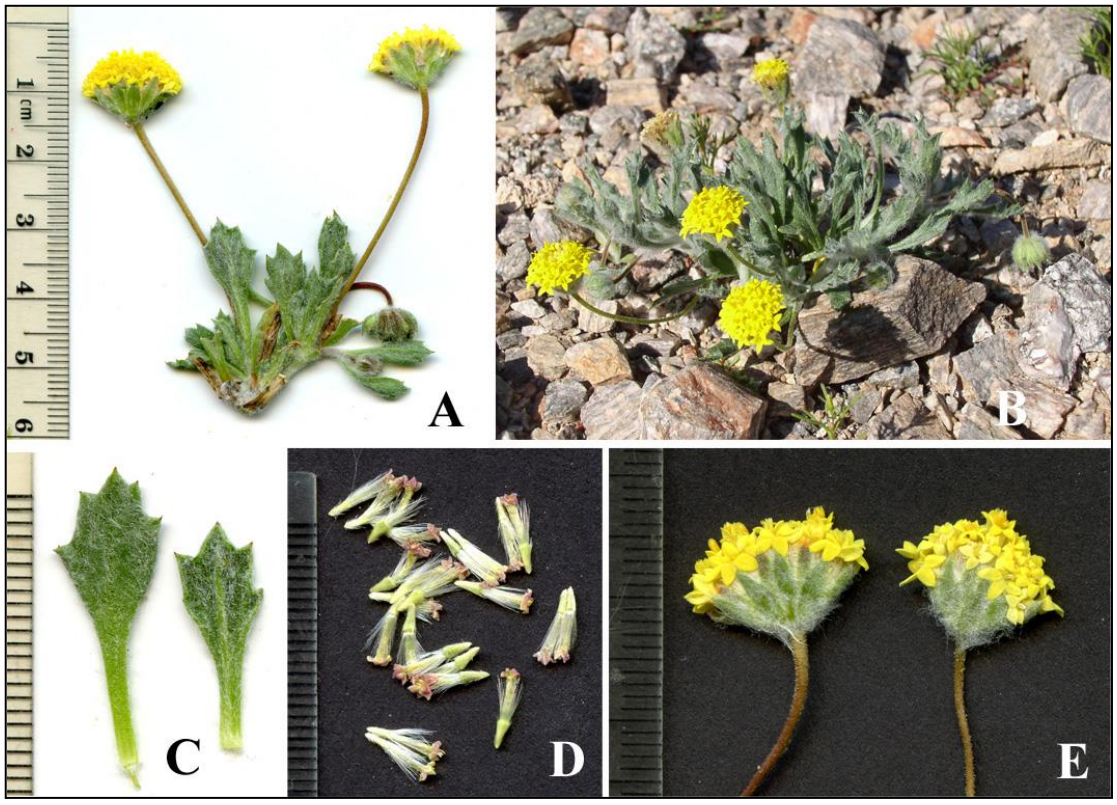


Figure 109. *Trichoptilium incisum*. (A & C) Above Quitobaquito Springs, 25 Feb 2015. (B) Quitobaquito Hills, 4 Feb 2005. (D & E) Sierra del Águila near Mex Hwy 2 at km marker 93, Sonora, 7 Mar 2015.

**Trixis** – Threefold

North America to South America, and West Indies; 65 species. Mutisieae.

**Trixis californica** Kellogg var. **californica**

California threefold. Figure 110.

Small shrubs often 50–75+ cm tall with erect-ascending, slender, brittle branches; new growth glandular and often densely pubescent with brown hairs. Plants ultimately leafless in drought and sometimes the branches die back; new growth frost sensitive. Leaves mostly (2.5) 3–8 cm long, mostly upright (ascending), sessile or petioles mostly 1–2 mm long and winged; leaf blades relatively thin, lanceolate, with minute hairs or sometimes glabrate, densely glandular especially on the lower surfaces, stomata usually on lower leaf surfaces only; leaf margins toothed to nearly entire; dry leaves semi-persistent. Flower heads in terminal clusters; florets bilabiate (2-lipped), yellow, 1 cm long.

Achenes 8–10 mm long, with a short, slender neck, the apex expanded into a disk bearing numerous soft, barbellate pappus bristles. Flowering and growing at various seasons, especially spring.

Widespread and common across the region including rocky slopes of hills and mountains often to the peaks, and bajadas, washes, and canyons. It has ranged across the flora area for at least 11,000 years.

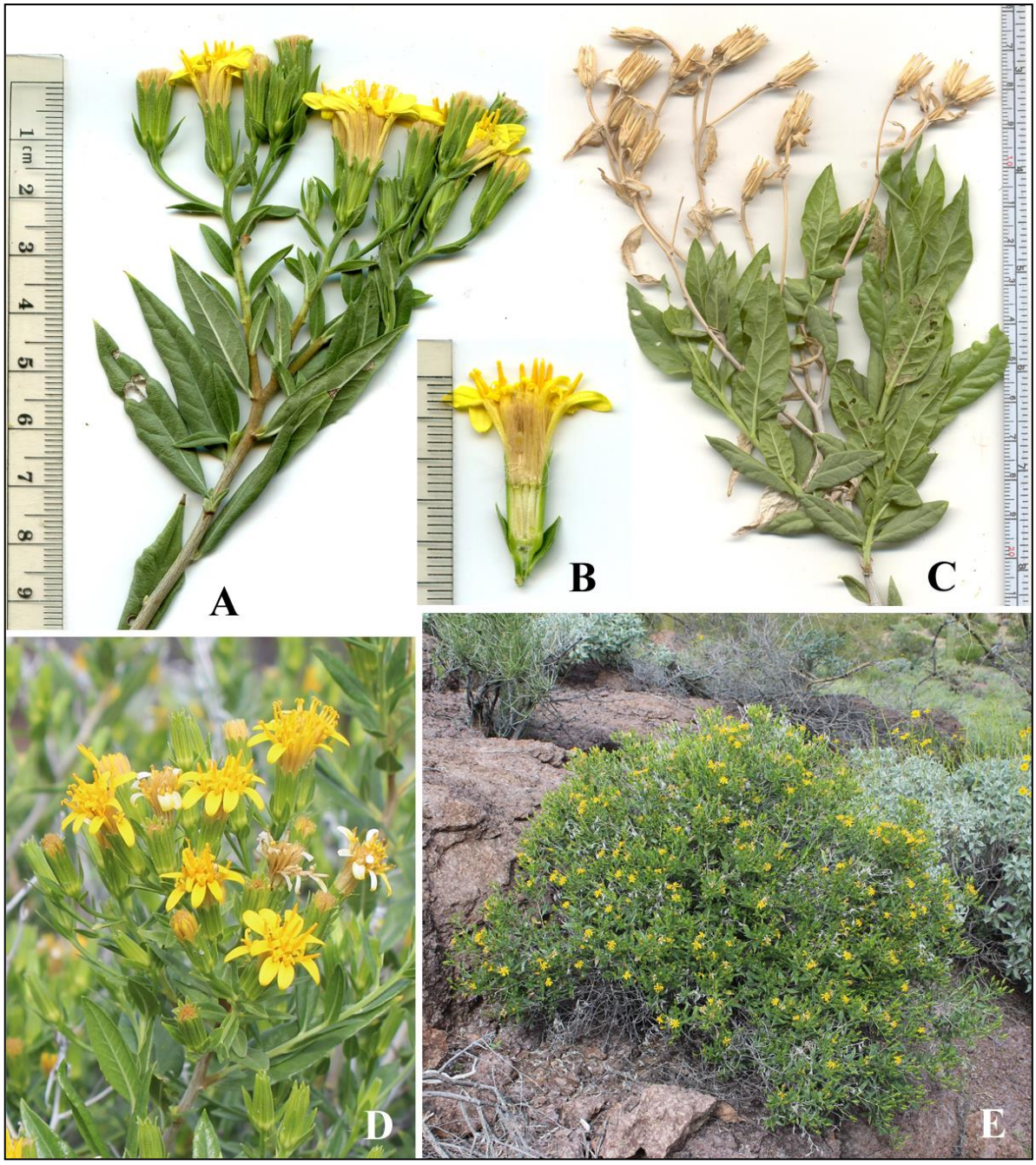


Figure 110. *Trixis californica* var. *californica*. (A, B, D, & E) Near Dripping Springs, 12 Mar 2015. (C) Branch with persistent involucres, Alamo Canyon, 10 Sep 2008.

Southeastern California to western Texas and northern Mexico. Seri women drank an infusion of this plant to hasten birthing, and the leaves were smoked like tobacco (Felger & Moser 1985).

Variety *californica* is unique among at least the North American members of *Trixis* in having stomata on both surfaces of the leaves. This feature seems to be part of a character set involving ascending rather spreading leaves, which is probably an adaptation to an arid or semi-arid environment. Variety *peninsularis* (S.F. Blake) C. Anderson, endemic to the Cape Region of Baja California Sur, is pubescent and has stomata restricted to the lower leaf surface.

**OP**: Quitobaquito: *Nichol 28 Apr 1939*; 14 Sep 1988, *Felger 88-457*. Victoria Pass, 8 Apr 1941, *McDougall 56*. Growler Mts, 24 Apr 1942, *Cooper 612*. Arch Canyon, 3500 ft, 28 Mar 1965, *Lockwood 162*. †Alamo Canyon, leaf fragments, 8590 & 9570 ybp. †Puerto Blanco Mts, on ridge, leaf fragments, modern (30) to 3440 ybp (4 samples).

**CP**: Tule Tank, *Hinkley 26 Mar 1932*. Agua Dulce Pass, 14 Apr 1964, *Niles 351*. Buck Mt Tank, 28 Mar 1970, *Duncan 14*. 5.6 mi E of Tule Well, 9 Mar 1980, *Reichenbacher 470*. Sierra Pinta, summit, *Cain 15 Nov 2003*.

**TA**: Tinajas Altas, *Vorhies 16 Apr 1924*. Tinajas Altas Pass, 4 mi W of Tinajas Altas, 17 Mar 1980, *Webster 24257*. †Butler Mts, leaf fragments, 740 to 8160 ybp (3 samples). †Tinajas Altas, leaf fragments, 4010 to 10,950 ybp (7 samples).

**Uropappus**

This genus has a single species. Cichorieae.

**Uropappus lindleyi** (de Candolle) Nuttall
[*Microseris lindleyi* (de Candolle) A. Gray. *M. linearifolia* (Nuttall) Schultz Bipontinus. *Uropappus linearifolia* Nuttall]
Silver puffs. Figure 111.

Spring ephemerals with milky sap. Leaves in a basal rosette, mostly 10–15 cm long, linear to linear-lanceolate or pinnate with a few slender segments, glabrate or moderately pubescent with crinkled white hairs near the leaf base. Stems 12–30 cm long, leafless, erect, with small glands near the flower head, each stem bearing a single, erect dandelion-like flower head. Phyllaries graduated, overlapping, the inner ones 15–30 mm long, broadly lanceolate. Heads ligulate, the florets ray-like, many, and pale yellow. Achenes 8.7–10 mm long, blackish, linear-cylindrical, and slightly tapered at each end, the apex slightly flared; pappus of 5 papery, silvery, linear-lanceolate scales 9–10 mm long, these deeply notched at the apex with a long, slender awn from the notch. The common name derives from the rounded head of achenes with their silvery-papery pappus bristles.

In the eastern part of Cabeza Prieta and widespread in Organ Pipe; washes, bajadas, canyons, and slopes including higher elevations.

Washington and Idaho to Baja California and Baja California Sur, northern Sonora, and Texas. The flowers are notably inconspicuous but the mature, achene-bearing heads are conspicuous.

**OP**: Alamo Canyon, 16 Apr 1941, *McDougall 98*. Arch Canyon, 28 Mar 1965, *Niles 544*. Boundary on Darby Well Road, 12 Mar 1983, *Daniel 2638* (ASU). 1 mi S of Pinkley Peak, 1960 ft, 2 Mar 1985, *Van Devender 85-7*. Ridge crest on trail to Mt Ajo, 4090 ft, 10 Apr 2005, *Felger*, observation.

**CP**: San Cristobal Wash, 20 Mar 1992, *Harlan 34* (CAB). Charlie Bell Road at Daniels Arroyo, 10 Apr 1993, *Felger 93-352*. Childs Mt, 9 Apr 1993, *Felger 93-290*. Near E boundary of Refuge on Charlie Bell Road, 9 Apr 1993, *Felger 93-328.*

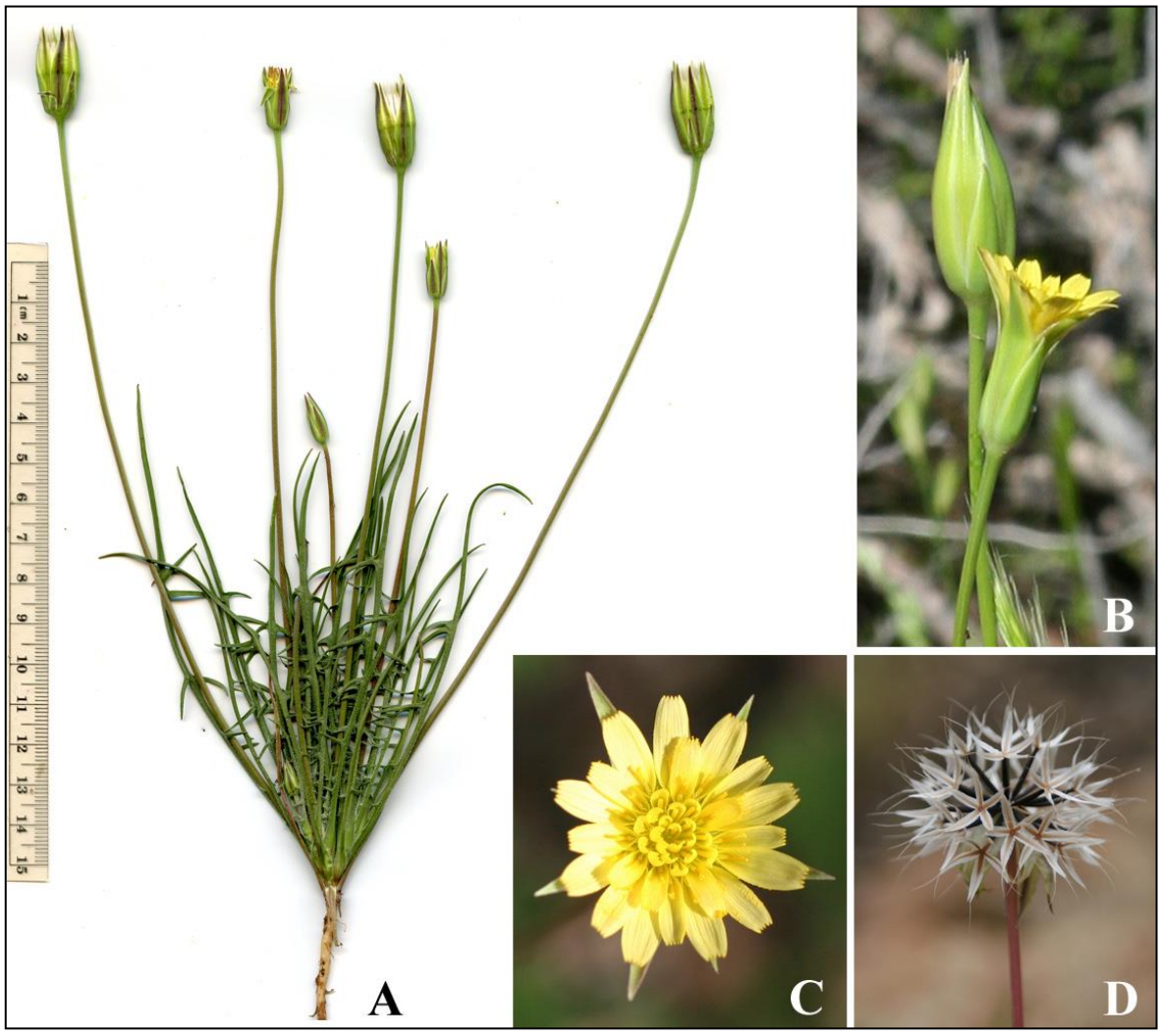


Figure 111. *Uropappus lindleyi*. (A) Near Monkey Face, North Puerto Blanco Mts, 15 Mar 2015. (B) S fork of Alamo Canyon, 12 Mar 2005. Estes Canyon: (C) 3 Apr 2010; (D) 18 Mar 2005.

**Verbesina**

North America, mostly warm-temperate to tropical regions; 200+ species. Heliantheae, Ecliptinae.

****Verbesina encelioides** (Cavanilles) Bentham & Hooker f. ex A. Gray
[*V. encelioides* var. *exauriculata* B.L. Robinson & Greenman]
Golden crownbeard, cow-pen daisy. Figure 112.

Coarse, foul-smelling, non-seasonal ephemerals, occurring during warmer months. Herbage and phyllaries with coarse white hairs. Leaves opposite below, alternate above, gray-green to whitish, and bicolored. Petioles prominent; larger leaves with stipule-like leafy appendages (auricles) near the petiole base, the blades mostly 3–7 cm long, more or less ovate to triangular, and coarsely toothed. Flower heads yellow, daisy-like and showy, 3.5–5 cm wide, with ray and disk florets; most ray corollas cleft into 3 conspicuous terminal lobes. Disk achenes enclosed in chaffy bracts. Pappus none on ray achenes, of 1 or 2 short awns on disk achenes.

The single record in the flora area is from Quitobaquito when it was occupied and being farmed. It is a common urban and agricultural weed in adjacent Sonora and nearby areas in Arizona. It does not seem to be native to southwestern Arizona and northwestern Sonora.

Widespread and often weedy in the United States and Mexico, the Caribbean, and South America; widely naturalized in the Old World. Plants with leaf auricles have been called var. *exauriculata*.

**OP**: Quitobaquito, 30 Nov 1939, *Harbison 26271* (SD).


Figure 112. *Verbesina encelioides*. (A) La Aduana, near Alamos, Sonora, 8 Apr 2005. (B & C) Portal–Paradise Road, Chiricahua Mts, Cochise Co., 24 Aug 2013. Photos by Sue Carnahan.

*Viguiera parishii*, see **Bahiopsis parishii**

**Xanthisma** – Goldenweed

Annuals or ephemerals and small herbaceous perennials. Leaves with marginal bristles. Flower heads with bright yellow disk and ray florets. Achenes dimorphic (ray and disk achenes different); pappus of many coarsely barbellate bristles.

Western North America and Mexico; 17 species. Astereae.

1. Annuals or ephemerals, the involucres without glands…… **Xanthisma gracile**
1. Perennials and also flowering in first season or year; involucres glandular.
…….. **Xanthisma spinulosum**

**Xanthisma gracile** (Nuttall) D.R. Morgan & R.L. Hartman
[*Dieteria gracilis* Nuttall. *Haplopappus gracilis* (Nuttall) A. Gray. *Machaeranthera gracilis* (Nuttall) Shinners. *Haplopappus ravenii* R.C. Jackson]
Slender goldenweed. Figure 113.

Annuals or ephemerals, growing and flowering during warmer months with sufficient moisture, usually less than 30 cm tall. First leaves in a basal rosette and withering by flowering time, leaves reduced above; leaves obovate to oblanceolate, oblong, or linear, pinnatifid with white marginal bristles. Involucres hemispheric, 6–8 mm long; ray and disk florets bright yellow. Achenes 1.5–2.5 mm long; pappus bristles 4–5 mm long. Resembling *X. spinulosum* but the plants generally smaller and somewhat more delicate.

Organ Pipe at least in the vicinity of the Ajo, Bates, Diablo, and Growler mountains; washes, canyons, bajadas, and sometimes on rocky slopes.

Semi-arid regions of southwestern United States and northwestern Mexico; not in the drier regions of the Sonoran Desert. This species has the lowest chromosome number of any flowering plant ($n$ = 2, some have $n$ = 3 or 4).

**OP**: Bates Mts, 8 mi S of Growler Well, 1300 ft, *Nichol 17 Apr 1939*. Bull Pasture Trail, 2400 ft, 9 May 1979, *Bowers 1698*.

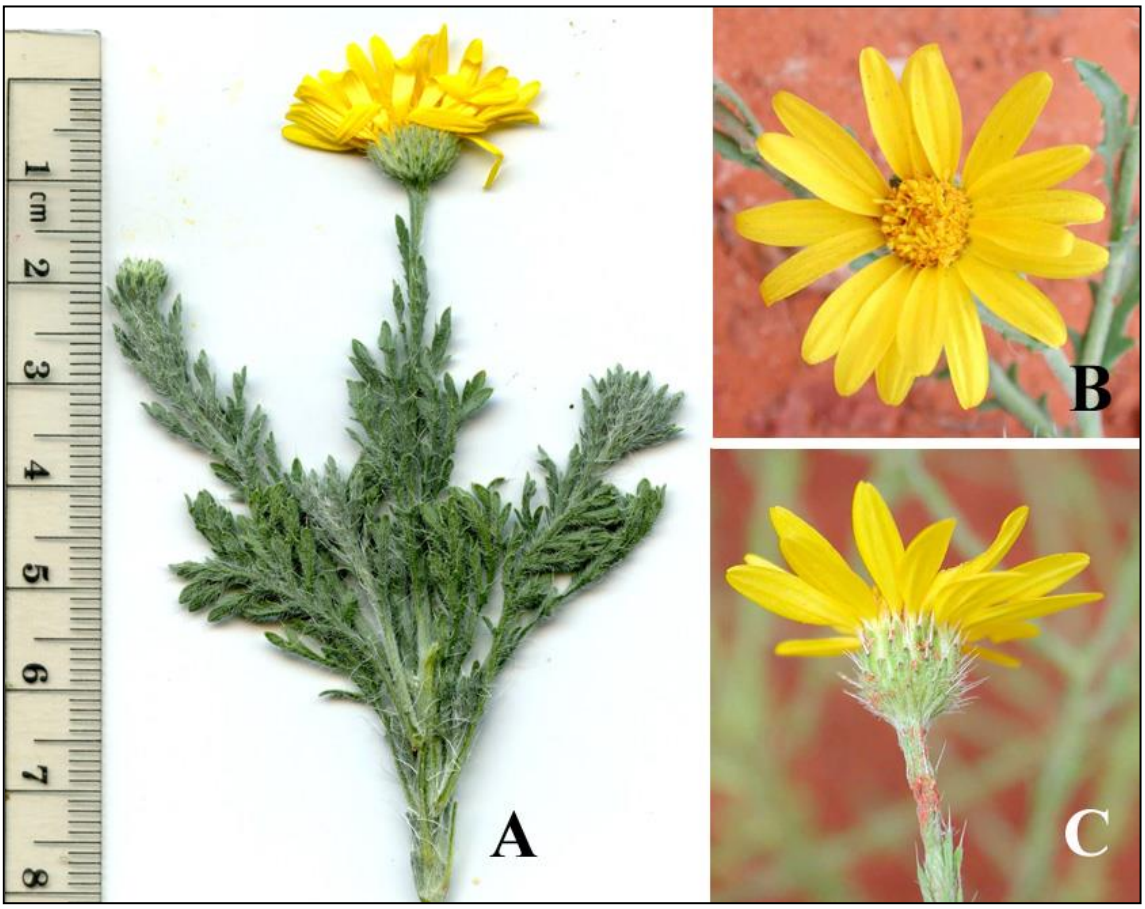


Figure 113. *Xanthisma gracile*. (A) Road to Kitt Peak, 0.5 mi from Hwy 85, 16 Apr 2015. (B) 0.5 mi W of Marble Mountain, Sikort Chuapo Mts, NE of Ajo, 14 Apr 2008, photo by Hank Jorgenson. (C) Sedona, Yavapai Co., 17 Apr 2001, photo by Max Licher (SEINet).

**Xanthisma spinulosum** (Pursh) D.R. Morgan & R.L. Hartman var. **gooddingii** (A. Nelson) D.R. Morgan & R.L. Hartman
[*Haplopappus spinulosus* (Pursh) de Candolle subsp. *gooddingii* (A. Nelson) H.M. Hall. *Machaeranthera pinnatifida* (Hooker) Shinners var. *gooddingii* (A. Nelson) B.L. Turner & R.L. Hartman]
Spiny goldenweed. Figure 114.


Figure 114. *Xanthisma spinulosum* var. *gooddingii*. Ajo roadside: (A) 22 Apr 2003; (B & C) 6 May 2006. (D) Bedrock hill N of Charlie Bell Pass, 16 Mar 2015.

Herbaceous perennials to 50+ cm tall, also flowering in the first season; the plants and flower heads highly variable in size. Herbage stipitate-glandular. Leaves 1- or 2-times pinnatifid, lobes mostly linear, the leaves often not markedly reduced above. Involucres 15–25 cm wide; phyllaries

glandular. Flower heads mostly single on short to long stems. Ray and disk florets bright yellow, flowering mostly in spring but also other seasons including with summer rains. Achenes 2 mm long; pappus bristles 4–6 mm long. *n* = 4, 8.

Widespread and common across the region, mostly among rocks on slopes, often to the summits of the drier mountains, bajadas, and sometimes along washes and on desert plains. This or a similar goldenweed was apparently common in the Tinajas Altas Region during the last 11,300 years.

Variety *gooddingii* occurs from Nevada and Utah to northwestern Sonora and Baja California. This highly polymorphic species complex, with seven recognized geographic varieties, ranges from central Mexico and Baja California Sur to Montana, North Dakota, and adjacent Canada.

**OP**: 8 mi S of Growler Well, *Nichol 17 Apr 1939*. Bates Well, 18 Nov 1939, *Harbison 26157* (SD). West Gate, 24 Apr 1942, *Cooper 554*. Bull Pasture trail, 9 May 1979, *Bowers 1697*.

**CP**: Tule Tank, 4 Dec 1934, *Goodding 2144*. Heart Tank, *Simmons 22 Apr 1965*. Charlie Bell Pass, 3 Apr 1992, *Whipple 3932*. 4.7 mi E of Tule Well on Camino del Diablo, 11 Apr 1993, *Felger 93-441*. Sierra Pinta, summit, *Cain 15 Nov 2003*.

**TA**: 1 mi N of Tinajas Altas, 18 Apr 1948, *Kurtz 1169*. Tinajas Altas: Canyon in granite mts, 28 Oct 1937, *Gentry 3536*; *Van Devender 5 Mar 1983*. Borrego Canyon, 16 Jun 1992, *Felger 92-617*. †*Machaeranthera* cf. *pinnatifida*: Butler Mts, involucres, achenes, 740 to 11,250 ybp (7 samples); †Tinajas Altas, achenes, 4010 & 9900 ybp.

**Zinnia**

United States to Argentina; 17 species. *Zinnia angustifolia* and hybrids are popular garden plants. Heliantheae, Ecliptinae.

**Zinnia acerosa** (de Candolle) A. Gray
Desert zinnia; *zinia del desierto*. Figure 115.

Dwarf shrubs, mostly less than 25 cm tall. Herbage pubescent, scabrous, or glabrate. Leaves gray-green, often 1–2 cm long, linear to needle shaped. Flowers heads with 4–7 broad, persistent, white rays and about 8–12 yellow disk florets. Achenes 2.5–4 mm long; pappus with 1–3 awns or pappus vestigial. Flowering various seasons, especially April and May, and sometimes with summer rains.

Locally common in Organ Pipe except the western portion; bajadas and open rocky slopes.

Arizona to western Texas and southward to Sonora and Zacatecas, mostly in the Sonoran and Chihuahuan deserts.

**OP**: Walls Well, *Nichol 28 Apr 1939*. 0.5 mi N of Estes Canyon picnic ground [trailhead], 9 May 1979, *Bowers 1692*. Gunsight Hills, 2 Mar 2003, *Rutman 2003-208* (ORPI). Foothills of the Diablo Mts, 2476 ft, coarse colluvium, 22 Sep 2013, *Rutman 20130922-4*.


Figure 115. *Zinnia acerosa*. Foothills of Ajo Mts, Ajo Mountain Drive between Arch and Estes canyons: (A) 2 Mar 2008; (B) 30 Mar 2008; (C) 2 Aug 2013; (D & E) 22 Mar 2015.

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