A TAXONOMIC REVISION OF THE ANTEMNARIA ROSEA
(ASTERACEAE: INULEAE: GNAPHALIINAE) POLYPLOID COMPLEX

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The Antennaria rosea species complex is circumscribed to contain four subspecific taxa. A complete synonymy and key to the subspecies of A. rosea is presented. The following new combinations are proposed: Antennaria rosea subsp. arida (E. Nch.) R. Bayer, A. rosea subsp. cenfina (Greene) R. Bayer, and A. rosea subsp. patwinata (Greene) R. Bayer. The affinities of A. rosea to other species of Antennaria are discussed and a key to separate A. rosea from related polyploid complexes is provided.

Antennaria rosea Greene is a morphologically diverse, polyploid, agamic complex that is widely distributed in western North America from Arizona and New Mexico north to the Northwest Territories and Alaska and east to Hudson Bay. It also occurs as disjunct series of populations on the shores of James Bay, the Thunder Bay district of Ontario north of Lake Superior, and in Atlantic Canada. The species is almost entirely pistillate, a gametophytic apomict, and staminate plants are extremely rare. Chromosome numbers include triploid, tetraploids, and pentaploids, but the tetraploid cytotypes predominate (Bayer, 1987a; Bayer & Stebbins, 1987). The reported diploid counts for A. rosea (Chmielewski & Chinappa, 1988) are spurious because these collections should instead be referred, in my view, to sexual species such as A. microphylla Rydb. and A. umbrinella Rydb., not A. rosea.

Traditionally, many authors have recognized A. rosea as those clones with rose-colored phyllaries (Bayer, in press). Field studies have indicated that there can be tremendous amounts of variation with respect to number of heads per flowering stalk and phyllary color even within a small population. Phyllary color can range from white, to pink, red, and brown within a small population (see the following population diversity sample collections at ALTA and RM: Bayer & Lebedyk M-607, UT-615; Bayer & Stebbins I-304; Bayer et al. CO-459, CO-460, ID-603, UT-618, WY-502). As originally described by Greene (1898), A. rosea represents only a few apomictic clones (microspecies or agamospecies) in a much larger aggregate of related clones that is circumscribed here as A. rosea sens. lat.

Antennaria Guertner has its greatest morphological diversity in western and arctic North America. Until about 1896 only a handful of species had been described for North America, primarily by Europeans. Beginning in 1897 and continuing to about 1950, several North American botanists began collecting and describing new species of Antennaria. Merritt L. Fernald (eastern North America), E. L. Greene (North America), M. O. Malte (North American arctic), E. Nelson (western United States), A. E. Porland (North American arctic and subarctic), P. A. Rydberg (western United States), and others described almost 300 taxa for North America during that period. Realistically, about 40 species of Antennaria probably should be recognized worldwide (Bayer, 1987a).

Some past and a few present authors have acknowledged each apomict at the rank of species, leading to cumbersome classifications that could only be used by those who constructed them or those familiar with the type collections of these microspecies. At least 40 microspecies that can be referred to A. rosea have been described and it is apparent to most that it is impossible to construct a key to
these microspecies, even if someone familiar with the type specimens can recognize them. Recently, Chmielewski and Chinnappa (1988) have advocated retaining the numerous microspecies of northwestern Canada and Alaska described by Pursil, but I agree with Welsh (1974) that they are not sufficiently distinct to warrant recognition (Bayer, in press). Clearly, the best solution to this problem is to combine the apomicts into related groups of apomicts and recognize them as an agamic species complex, as has been done for the *A. neodioica* Greene and *A. parlinii* Fern. species complexes for eastern North America (Bayer & Stebbins, 1982). The purpose of this paper is to provide a morphological description for *A. rosea* sens. lat. and four subspecific taxa, as well as provide a list of nomenclatural and taxonomic synonyms.

**Relationships**

Recent phytic analyses of *A. rosea* and related sexually reproducing species (Bayer, 1987b; Bayer, in press) have indicated that *A. rosea* is a polyploid complex, the result of hybridization from among several amphimictic species of *Antennaria*, namely *A. aromatica* Evert, *A. corymbosa* E. Nels., *A. marginata* Greene, *A. microphylla*, *A. pulchella* Greene, *A. racemosa* Hook., and *A. unbrinella*. Some authors (Cronquist, 1955; Sharsmith, 1960; among others) place *A. microphylla* in synonymy under *A. rosea*. However, the transition from *A. rosea* is just as evident with many of the other sexual species, especially *A. corymbosa* and *A. unbrinella*, as it is with *A. microphylla* (Bayer, in press). *Antennaria rosea* may be readily distinguished from its sexual progenitors by the fact that populations of the sexual species have approximately equal frequencies of staminate and pistillate plants, while those of *A. rosea* almost always consist entirely of pistillate clones. Chmielewski and Chinnappa (1988) have maintained that staminate plants are apparently quite frequent in the southern portion of the range of *A. rosea*, but I would refer most of these staminate plants to the sexual relatives of *A. rosea*, especially *A. corymbosa*, *A. microphylla*, and *A. unbrinella*. Staminate *A. rosea* clones, as discussed in the context of this paper, are “aberrant males” (terminology of Stebbins, 1932), which are sterile, in very low frequency in populations, and as a result contribute nothing to the reproductive effort of the population. This is in contrast to “normal males” (Stebbins, 1932), which are in equal frequency with pistillate clones, are fertile, and are vital contributors to the reproductive effort of the population. Consequently, I maintain that populations of *A. rosea* containing staminate clones are infrequent and when they do occur they are in a very low frequency within the population. Chmielewski and Chinnappa (1988) have not provided critical information concerning the type (i.e., normal or aberrant) of the staminate clones of *A. rosea* they reported.

*A. gaspensis* (Fern.) Fern. is considered a synonym of *A. rosea*, based not only on morphology, but on the fact that the habitat of *A. gaspensis* is similar to that of many western segregates of *A. rosea* (Bayer, in press). Some *A. rosea* segregates from western North America are indeed morphologically inseparable from *A. gaspensis*, as was alluded to by Fernald in his original description of the species (Fernald, 1905). In Atlantic Canada, where *A. rosea* (= *A. gaspensis* (Fern.) Fern.) is sympatric with *A. neodioica* Greene subsp. *neodioica* and *A. neodioica* subsp. *petaloidea* (Fern.) Bayer & Stebbins, *A. rosea* can be recognized based on the presence of small, linear-lanceolate, scarios appendages at the apices of the upper cauline leaves. Additionally, *A. rosea* can be readily separated from *A. neodioica* subsp. *canadenensis* (Greene) Bayer & Stebbins based on the pubescent nature of the adaxial upper leaf surfaces as opposed to glabrous ones in *A. neodioica* subsp. *canadenensis*. In western North America, four other polyploid agamic com-
plexes may sometimes be confused with *A. rosea*, because some morphological overlap occasionally occurs. *Antennaria alpina* (L.) Gaertner, *A. media* Greene, *A. neodioica* subsp. *howellii* (Greene) Bayer, *A. parvifolia* Nutt., and *A. rosea* can be readily separated using the following key.

**Key to the western North American Antennaria agamic complexes**

1 Basal leaves glabrous adaxially, 1–3-nerved ........................................ *A. neodioica* subsp. *howellii*

1 Basal leaves sometimes glabrescent adaxially to mostly pubescent, 1-nerved.

2 Phyllary tips green-black or black.

3 Upper cauline leaves with a flat, subulate, scarious, tip (flag), similar to the tips of the phyllaries ................................................................. *A. alpina*

3 Upper cauline leaves acuminate, not tipped by a scarious appendage similar to the tips of the phyllaries ................................................................. *A. media*

2 Phyllary tips zoned combinations of white, green, pink, rose, sanguine, or light to deep brown.

4 Pistillate involucres 4–8 (10) mm high; flowering stems usually 8–35 cm tall .......... *A. rosea*

4 Pistillate involucres 8–15 mm high; flowering stems usually 2–8 cm tall .......... *A. parvifolia*

**Taxonomy of *A. rosea***

Specimens from ALTA, CAN, CAS, DDO, DAV, GH, ID, MONT, MONTU, NDG, NY, RM, and US were used in numerical taxonomic studies of *A. rosea* (Bayer, in press) in which 42 morphological characters were measured from 110 herbarium specimens. The following description is based on data obtained in that analysis (Bayer, in press), as well as direct observations of field and herbarium material.

**Antennaria rosea** Greene

Mat-forming perennial herbs, odorless, with 3–7 leafy stolons per basal rosette; rosette-leaves spatulate to cuneate, 4–20 (24) in number, 8–40 mm long, 2–10 mm wide, without distinct petioles, glabrescent to canescent, occasionally with purple glandular hairs. Stolons decumbent, (1) 2–7 cm long, with 7–32 leaves, the proximal leaves in the basal rosette 3–14 mm long, 0.5–3 mm wide, the distal rosette leaves 7–38 mm long, 2–10 mm wide. Flowering stem (4) 8–40 cm high; cauline leaves (5) 7–20, linear-ob lanceolate, the lower 9–36 mm long, 2–16 mm wide, the upper 6–17 mm long, 1–3 mm wide, only those about the heads sometimes possessing linear-lanceolate, scarious appendages at their tips (flags). Pistillate heads 3–16 (20), corymbose, occasionally racemose-corymbose; involucre 4–8 (10) mm high; phyllaries in 2 or 3 series, subulate, scarious, the longest 3.5–7.5 mm long, 0.7–1.8 mm wide, colors extremely various, white, green, pink, rose, sanguine, stramineous, light brown, deep brown, to blackish-red, colors zoned, with base of a darker shade or different color than the tip. Florets 40–150 per head; corollas 2.5–5 (6) mm long, pappus 3.5–6.5 mm long, achenes 0.7–1.8 mm long, with or without papillae. Staminate plant extremely rare, stamin ate heads 8, corymbose; involucre 6 mm high; phyllaries 4.5 mm long; 1.5 mm wide, corolla 3.5 mm long; pappus clavate, 3.5 mm long. 2n = 42, 56, or 70.

Cluster analysis (Bayer, in press) indicated that the *A. rosea* complex contained several distinct clusters of OTUs. Further inspection of the specimens belonging to those clusters has disclosed that morphological characters exist that can be used to circumscribe these intraspecific groups. Each group is recognized as a subspecies of *A. rosea*. Additionally, each subspecific taxon morphologically resembles one or two of the sexual progenitor species most closely (Bayer, in press). For example, *A. rosea* subsp. *rosea* most closely resembles the sexual species *A. corymbo sa* and *A. racemosa*, whereas *A. rosea* subsp. *pulvinata* is most similar to sexual *A. aro-
matica. Antennaria rosea subs. confinis is most closely related to A. pulchella and A. umbrinella, but A. rosea subs. arida is morphologically similar to the sexual species, A. microphylla. A stepwise discriminant analysis (Dixon, 1981) disclosed characters that can be used to reliably separate the subspecific taxa. These characters were subsequently used to produce the following key to the four subspecies of A. rosea.

Key to the subspecies of Antennaria rosea

1 Longest leaves of flowering rosettes 20 mm or more in length; phyllaries shades of white, pink, green, or red, but usually not brown .................. 1. A. rosea subs. rosea

1 Longest leaves of flowering rosettes less than 20 mm in length; phyllaries of various shades of white, pink, green, red, and brown.

2 Involucr 6.5 mm or greater in length; corolla 3.5–6 mm long, pappus usually greater than 5 mm long; cauline leaves sometimes tipped with a flat, lanceolate, scarious appendage; phyllaries of various colors.

3 Flowering stalks greater than 17 cm high; lowermost cauline leaves usually greater than 19 cm long; heads usually 6–12 in number .................................. 2. A. rosea subs. arida

3 Flowering stalks less than 17 cm high; lowermost cauline leaves usually 19 mm or less in length; heads usually 3–5 in number .................................. 4. A. rosea subs. pulvinata

2 Involucr less than 6.5 mm in length; corolla 2.5–3.5 mm long, pappus usually 5 mm or less in length; cauline leaves tapering to a slender, subulate tip; phyllaries usually various shades of cream, pale yellow, grayish, or brown ................................ 3. A. rosea subs. confinis

The following formally recognizes the three new subspecific combinations as well as the subspecific autonym of A. rosea sens. lat.

1. ANTENNARIA ROSEA Greene subsp. ROSEA


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Rosette-leaves 20–40 mm long; stolons decumbent, 20–70 mm long; flowering stem 10–40 cm high; with cauleine leaves, the lower 15–36 mm long, the upper 8–17 mm long; pistillate heads 6–20, involucre 5–8 mm high; phyllaries 4.5–6.5 mm long; florets 50–150 per head; corollas 3.5–4.5 mm long; pappus 4–6 mm long.


Rosette-leaves 10–20 mm long; stolons decumbent, 15–45 mm long; flowering stem 19–30 cm high; with cauleine leaves, the lower 19–26 mm long; the upper 9–15 mm long; pistillate heads 6–12, involucre 6.5–8 mm high; phyllaries 5–7.5 mm long; florets 60–120 per head; corollas 3.5–6 mm long; pappus 5–6 mm long.


3. Antennaria rosea Greene subsp. confinis (Greene) R. Bayer, comb. & stat. nov.


Rosette-leaves 10-20 mm long; stolons decumbent, 15-45 mm long; flowering stem 9-25 cm high; with cauline leaves, the lower 10-20 mm long; the upper 6-10 mm long; pistillate heads 4-11, involucres 4.5-6.5 mm high; phyllaries 3.5-5.5 mm long; florets 60-120 per head; corollas 2.5-4 mm long; pappus 3.5-5 mm long.

4. **Antennaria rosea** Greene, subsp. **pulvinata** (Greene) R. Bayer, comb. nov.


Rosette-leaves 8–18 mm long; stolons decumbent, 10–60 mm long; flowering stem 4–17 cm high; with cauline leaves, the lower 9–19 mm long; the upper 6–11 mm long; pistillate heads 3–5, involucre 6.5–10 mm high; phyllaries 5–7 mm long; florets 40–90 per head; corollas 3.5–5 mm long; pappus 5–6.5 mm long.


**Excluded Taxa**


*Antennaria chilensis* and *A. magellanica* both occur in the southern tip of South America, principally Tierra del Fuego of Argentina and Chile, north to about 45°S lat. (Moore, 1983). They resemble segregates of the *A. rosea* complex, but additional study will be needed before the taxonomic position of these amphitropic disjuncts can be fully evaluated.

This specimen probably represents a hybrid between Agoseris media and Agoseris umbrellina.


This taxon may represent a black-phylaryed intraspecific variant of Antennaria corymbosa. It is known from additional sites in Wyoming and Utah. (See Bayer & Lebelyk WY-504 and Bayer et al. UT-620 at ALTA and RM.)

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Literature Cited


