Taxonomic Insights from a Comprehensive Review of Antennaria (Asteraceae) in British Columbia

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Context of Study

• Context of Study

• The genus *Antennaria*

• *Antennaria media-alpina* complex

• *Antennaria pulvinata*
Context of Study

Traditional taxonomic study of morphological variation within the genus (α-taxonomy)

Integrative Taxonomy

Testing alternative taxonomic approaches directly on specimens
Context of Study

Randall J. Bayer

Jerry Chmielewski
Publ. 1986-2006
The Genus *Antennaria*

- dioecious perennials
- c. 45 species worldwide; c. 34 species in North America
- 1700+ specimens reviewed
The Genus *Antennaria*

- Hybridization
- Polyploidy
- Apomixis
- Poorly-defined species limits
- Overlapping species concepts
The Genus *Antennaria*

- Sexual diploids (tetraploids)
The Genus *Antennaria*

- Sexual diploids (tetraploids)
- Sexual in some regions, apomictic in others

AUTOPOLYPLOID
The Genus *Antennaria*

- Sexual diploids (tetraploids)
- Sexual in some regions, apomictic in others
  - **AUTOPOLYPLOID**
- Fully apomictic
  - **ALLOPOLYPLOID**
The Genus Antennaria
How do we deal with this taxonomically?

Antennaria ‘communis’
How do we deal with this taxonomically?
How do we deal with this taxonomically?

Antennaria sp. (sexual)

e.g., A. rosea

Antennaria sp. (sexual)
How do we deal with this taxonomically?
1. *Antennaria media-alpina* complex
I. *Antennaria media-alpina* complex
I. *Antennaria media-alpina* complex
I. *Antennaria media-alpina* complex

- *A. media*
- *Antennaria sp.*
- *A. alpina s.s.*
I. *Antennaria media-alpina* complex

*A. media*

*A. alpina s.s.*
I. *Antennaria media-alpina* complex

BUT WHAT ABOUT LEAF FLAGS?
I. *Antennaria media-alpina* complex

P.M. Dziuk
www.minnesotawildflowers.info
I. *Antennaria media-alpina* complex

Isolectotype
*Sonne s.n. [NY]*

Paratype
*J.M. Macoun 11242 [NY]*

Type material of *Antennaria media*
I. *Antennaria media-alpina* complex

- *A. media*
  - P. Slichter

- Antennaria sp.
  - V. Skilton

- *A. alpina* s.s.
  - V. Skilton
  - J. Lehmuskallio

- *A. media*
  - P. Slichter

- *A. alpina* s.s.
  - J. Lehmuskallio
I. Antennaria media-alpina complex


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Canonical discriminant analysis was used to assess the taxonomic status of the broad-phyllarioid taxa Antennaria isolepis, A. pallida, A. pedunculata, and A. rousseaui. High cross-validation assignment rates as well as high Geisser assignment probabilities for each of the taxa included in the phenetic study indicate that A. isolepis, A. media, A. microphylla, A. parvifolia, A. pedunculata, A. rousseaui, and A. umbretella are morphologically distinct from those broad-phyllarioid species. Several characteristics may be used to distinguish the latter species from the former, the most distinguishing of which is, however, the zygotically broad in velvety trichomes. Qualitative gross morphology, reproductive biology, flower morphology, and provenance also may be used to help distinguish among the species. These characteristics, in addition to the results of the canonical discriminant analysis, support a classification scheme that recognizes the broad-phyllarioid species as A. pallida. Type collections of A. isolepis, A. pedunculata, and A. rousseaui were assigned to A. pallida through the use of the classification criteria. Included in the taxonomic treatment of A. pallida is a synonymy, species description, and citation of representative specimens.

North American species of the genus Antennaria have been the focus of considerable phenetic (Bayer, 1983a, 1987, 1989b, 1990a, c; Chmielewski, 1993, 1994a, b; Chmielewski and Chinnappa, 1988a, 1991; Chmielewski, Chinnappa, and Sciple, 1990a, b; Chmielewski, Chinnappa, and Warner, 1990), cytologic (Bayer, 1984; Chinnappa, 1984, 1986; Bayer and Stebbins, 1987; Chmielewski and Chinnappa, 1988b, c, 1990), and enzymatic (Bayer and Crawford, 1986; Bayer, 1988, 1989b, 1990, 1991, 1992a) attention for the past decade. Despite this attention, substantial work is still necessary to resolve morphological limits and phylogenetic associations among numerous species and complexes. Although the 300+ described species of North American Antennaria may comprise an unworkable taxonomy, we must be cautious not to reduce this list to a series of complexes or species that in their own right lack morphological integrity or do not adequately reflect the evolutionary history of the genus.

Bebbeck and Stebbins (1938) proposed a classification system for the genus Crepis, which like Antennaria, is also taxonomically complex as a consequence of polyploidy from two or more of the sexual diploids, whether sexual or asexual, were also assigned specific rank. The latter authors recommended that this system be adopted in subsequent revisions of the genus Antennaria.

Several species of Antennaria, including A. pallida E. Nelson (= A. borealis Greene, not Gandoger), A. isolepis Greene, A. rousseaui A.E. Porsild, and A. pedunculata A.E. Porsild were described as broad-phyllarioid, apomictic, and arctic-alpine in distribution. Greene (1899) considered A. borealis to be most similar in habit and foliage to A. media Greene. Floristic works that followed this publication and included North American arctic-alpine taxa have recognized A. pallida as distinct (Hultén, 1949, 1968; Porsild, 1950; Anderson, 1959; Scoggan, 1979), whereas others have excluded the species (Rydberg, 1917; Raup, 1934; Polunin, 1940, 1939; Cronquist, 1955; Wiggins and Thomas, 1962; Porsild and Cody, 1989) or placed it in synonymy with A. umbretella (Rydberg) Welsh, 1974).

Antennaria isolepis Greene was described as a well-marked species that was allied to that group of northern Rocky Mountain species that includes A. parvifolia Nuttall
1. *Antennaria media-alpina* complex

*Antennaria pallida*
I. *Antennaria media-alpina* complex

Distribution of *A. pallida* in British Columbia
II. *Antennaria pulvinata*
II. *Antennaria pulvinata*

A NEW SPECIES OF *ANTENNARIA* (ASTERACEAE) FROM MONTANA AND WYOMING

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ABSTRACT

A new species, *Antennaria aromatic*, from Montana and Wyoming is described and compared with the morphologically similar *A. media*, *A. umbrinella*, and *A. alpina*.

Because over three hundred North American species of *Antennaria* are listed in the Gray Herbarium Card Index, it is with some trepidation that I describe yet another one. However, field observations, examination of herbarium specimens, and cytological evidence indicate that a distinct species, *Antennaria aromatic*, exists in the mountains of Montana and Wyoming.

*Antennaria aromatic* Evert, sp. nov.

Herba perennis humilis tomentosa glandifera aromatic, 2–6 cm alta. Folia basalia cuneata vel spatulata, tomentosa, 5–10 mm longa, 3–8 mm lata. Caules tomentosi glandiférii, 2–5 cm longi. Capitula 2–5, in cyma subcapitata. Involucra fusca, acuta vel obtusa, 4–7 mm alta. Corollae pistillatae 4 mm longae, corollae staminatae 3 mm longae. Achenia tuberculata 1.5–2.0 mm longa. Pappus pistillatus capillaris ca. 4 mm longus, pappus staminatus clavatus 3 mm longus (Fig. 1).

Plants low, mat-forming, short-stoloniferous, tomentose, stipitateglandular, aromatic in life, dioecious, perennial, 2–6 cm tall, from suffrutescent caudices clothed with marcescent leaves; basal leaves widely cuneate-spatulate to occasionally oblanceolate, densely persistently white-tomentose on both surfaces, glandular, mucronate, 5–10(–13) mm long, 3–8(–10) mm wide; cauline leaves densely to loosely tomentose on both surfaces, glandular, oblanceolate, 0.5–2.0 mm wide, 3–7 mm long.
II. *Antennaria pulvinata*
II. Antennaria pulvinata

ANTENNARIA PULVINATA GREENE: THE LEGITIMATE NAME FOR A. AROMATICA EVERT (ASTERACEAE: INULEAE)

JERRY G. CHMIELEWSKI

ABSTRACT

Canonical variates analysis was used as an analytical technique to document morphological discontinuities among individuals of Antennaria media (n = 63), A. pulvinata (n = 103), A. rosea (n = 64) and A. umbritinella (n = 65). Evaluation of the defined classification criterion indicated that 94% of the specimens were classified correctly. The classification criterion was subsequently used to classify type collections of A. aromatica (n = 26) into one of the previously defined groups. Results based on these analyses as well as previously published information demonstrate that A. aromatica and A. pulvinata are morphologically indistinguishable. The analyses also indicate that A. pulvinata and A. rosea exhibit morphological integrity relative to each other and would best be treated as distinct species. The four species, A. media, A. pulvinata, A. rosea and A. umbritinella, exhibit morphological integrity and should be treated as distinct. A list of synonymy is provided for A. pulvinata.

Key Words: Antennaria media, A. pulvinata, A. rosea, A. umbritinella, A. aromatica

INTRODUCTION

Antennaria aromatica Evert was originally described as a sexual diploid Cordilleran species (Evert, 1984). Subsequent studies have demonstrated that the species is morphologically, cytologically and reproductively more variable (Bayer and Stebbins, 1987; Bayer, 1984, 1989a), as well as more widely distributed (Chmielewski and Chinnappa, 1988a; Bayer, 1989a), than initially proposed. Additional interest in A. aromatica stems from the implication
II. **Antennaria pulvinata**

*A. aromatica*

*A. pulvinata*
II. *Antennaria pulvinata*
II. Antennaria pulvinata
II. *Antennaria pulvinata*

Distribution of *A. pulvinata* in British Columbia
II. *Antennaria pulvinata*
THANK YOU!