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KEY TO THE AMERICAN GENERA OF ASTERINAE (ASTERACEAE)

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ABSTRACT

An artificial key is provided for identification of *Aster* sensu stricto and the fourteen genera that have been recently proposed to encompass the ca. 180 New World species segregated from *Aster: Almutaster, Ampelaster, Canadanthus, Chloracantha, Doellingeria, Eucephalus, Eurybia, Ionactis, Oclemena, Oreostemma, Psilactis, Sericocarpus, Symphyotrichum*, and *Tonestus*. *Aster* sensu stricto is represented by only a single species native to the New World, *A. alpinus*. Also included in the key are *Aster tataricus*, naturalized in eastern North America, and the distinct genus *Boltonia*, which is often associated with a group of Old World *Aster*.

KEY WORDS: *Aster*, Asteraceae, Asterinae, New World, systematics

In a systematic review of the genus *Aster* as it has been broadly conceived in recent treatments, it was proposed that the ca. 180 American species of this alliance be divided among a number of segregates (Nesom 1994). In this view, only a single species of *Aster* sensu stricto occurs natively outside of the Old World: *A. alpinus* grows in northern Eurasia and across Beringia into Alaska and southward along the Rocky Mountain cordillera as far as Colorado. *Aster tataricus*, which is native to northeast Asia, is naturalized in the eastern United States; as noted in the review, this species probably should be placed in a genus separate from *Aster* sensu stricto. Only *Doellingeria* among the American segregate genera also has species in the Old World.

Several of the genera included here (particularly *Tonestus, Ionactis, Boltonia*, and *Chloracantha*) are ambiguous in their relative positions among other potentially related genera (Nesom 1994). *Tonestus kingii* is the only species of that genus that has been treated within *Aster*, and *Tonestus* may be more closely related to the Solidagininae than to genera it is associated with among segregates of *Aster*. *Ionactis* has been hypothesized to be related to *Eucephalus* and to the goldenasters, but it differs from both in a number of critical morphological features. *Boltonia* is isolated among American genera associated with *Aster*; it has long been considered to be closely related to the Asian genus *Kalimeris* (an *Aster* segregate), but morphological features

in the key below suggest that it may be closer to the South American subtribe Brachycominae. *Chloracantha* also appears to be phyletically isolated although it is similar to *Boltonia* in some features, particularly habit. Other North American species previously treated within *Aster* have recently been repositioned in *Erigeron* and *Machaeranthera*, and several South American species of *Aster* sensu lato have recently been dispersed among phyletically diverse genera.

The recognition of the genera segregated from *Aster* apportions the morphological variation into reasonably discrete entities, but apparent parallelisms create practical difficulties in the definition of some genera. The generic placement of certain species (particularly within *Eurybia*) will be problematic because of distinctive morphological specializations. These problems are discussed in detail elsewhere (Nesom 1994) and reflected in the artificial key provided here. In any case, the key should serve at least as a starting point for those who elect to use this taxonomic system or something similar to it. Construction of keys and the identification of genera and species groups will be considerably easier on a regional basis, just as it has been for *Aster* sensu lato. Detailed descriptions of these genera, species groups, and problematic species are found in the *Aster* review (Nesom 1994), as are authorities for all names used in the present report.

In previous keys and discussions, I have used the terms "ligule" and "achene" in reference to the expanded portion of the pistillate corollas and the fruit of Astereae. Those terms are replaced here by "lamina" and "cypsela," in acknowledgment of their more technical correctness and their ineluctable fate in forthcoming application.

KEY TO THE AMERICAN GENERA OF ASTERINAE

1. Cypselas strongly flattened with lateral wings; pappus of two lateral awns (or thickened bristles) and a series of short, highly reduced, awns or scales; disc corollas with tube 0.2-0.5 mm long and abruptly expanded into the limb, the veins accompanied by orange resin ducts..... *Boltonia*
1. Cypselas flat to terete, without wings; pappus of barbellate bristles disc corollas with a longer tube, abruptly or gradually opening into the limb, the veins without orange resin ducts (except in *Chloracantha*). .....(2)
   2. Stems suffrutescent, usually sparsely to densely thorny, sometimes unarmed in var. *spinosa*; leaves deciduous by anthesis; heads terminal on wiry, green stems, arranged in a diffuse capitulescence; resting axillary buds with bud scales..... *Chloracantha*
   2. Stems usually herbaceous, suffrutescent in a few species, never thorny; at least the cauline leaves persistent and present at flowering (the stems of *Oreostemma* scapose); heads variously arranged but not on wiry green stems in a diffuse capitulescence; resting buds not formed.....(3)
3. Plants arising from long or short rhizomes and fibrous roots, not strongly woody at the base.....(9)
3. Plants arising from a distinct taproot or thick, woody, mostly erect caudex branches.....(4)

4. Plants perennial, usually arising from a thick taproot or thick caudex branches. .....(7)
4. Plants annual, usually arising from a slender taproot.....(5)
5. Heads and upper stems stipitate-glandular; ray cypselas epappose.. *Psilactis*, in part
5. Plants completely eglandular; ray cypselas pappose (*Symphyotrichum*, in part). .(6)
6. Phyllaries evenly herbaceous and of subequal length; pistillate flowers in 2-4 series in a broad outer zone, the lamina absent or rudimentary to filiform and short; disc (staminate) flowers fewer than the pistillate; pappus bristles in 2 series, all of equal length. .....*Symphyotrichum* sect. *Conyzopsis*
6. Phyllaries with a green, rhombic apical patch, basally indurate, graduated in length (imbricate); pistillate flowers in 1(-2) series, the lamina prominent or strongly reduced; disc flowers more numerous than the ray; pappus bristles of equal length and in a single series. ....*Symphyotrichum* sect. *Oxytripolium*, in part
7. Stems scapose, eglandular or minutely granular-glandular near the apex; heads solitary; plants arising from a thick taproot or sometimes a short rhizome..... ..... *Oreostemma*
7. Stems with well-developed cauline leaves, eglandular or densely glandular; heads solitary or few and loosely associated in a corymbiform capitulescence; plants arising from a thick taproot or thick, woody caudex branches. .....(8)
8. Stems and leaves eglandular or with short-stipitate glands; leaves 1-nerved, congested on the stems; phyllaries stiff, evidently indurate-thickened, distinctly keeled; rays mostly blue to purple; disc cypselas commonly 2-nerved, ray cypselas usually 3-4 nerved; carpopodium oblique; pappus with an outer series of bristles much shorter than the inner.....*Ionactis*
8. Stems and leaves usually with long-stipitate glands (eglandular in some species); leaves with at least the secondary veins evident, not crowded on the stems; outer phyllaries loose, foliaceous; rays yellow, white, or absent; cypselas mostly 5-8-nerved; carpopodium a symmetrical ring at right angles to the long axis of the cypsela; pappus of (1-)2 series of bristles of equal length, rarely with a shorter outer series..... *Tonestus*
9. Phyllaries without a green apical patch. .....(14)
9. Phyllaries with a distinct, green apical patch or zone, the lower portion of the phyllary indurate. .....(10)
10. Capitulescence diffuse or the heads terminally clustered but not in a distinctly corymboid association; apical patch of phyllaries rhombic, sharply delimited at the base and basally acute or attenuate, basally truncate in some species; pappus bristles apically attenuate, in a single series.....(12)
10. Capitulescence corymboid or reduced to glomerate clusters; apical patch of phyllaries basally truncate, sometimes not sharply delimited; pappus bristles apically dilated, in (1-)2-3 series of equal or subequal length.....(11)
11. Heads pedicellate, mostly distinct (subsessile in *Eurybia compacta*); leaves stipitate-glandular in a few species, otherwise eglandular; disc corollas yellowish; style branch appendages spreading hairy from base to tip (closely papillate in a few species); rays blue and strongly coiling, or white and non-coiling in sect. *Biotia*; cypselas narrowly cylindric, glabrous to moderately strigose.....*Eurybia*
11. Heads sessile or subsessile in glomerate clusters; leaves sessile- or punctate-glandular; disc corollas white; style branch appendages closely papillate; rays white, not coiling; cypselas turbinate, strigose-sericeous.....*Sericocarpus*

12. Ray cypselas epappose. ..... *Psilactis*, in part
12. Ray cypselas pappose..... (13)
13. Plants trailing or climbing (not twining) vines. ..... *Ampelaster*
13. Plants mostly erect, sometimes leaning but never trailing or even subscandent..... ..... *Symphyotrichum*, in part
14. Leaves all cauline, glabrous, linear with 3 parallel veins; pappus of a single series of equal-length, apically attenuate bristles; involucre glandular..... ..... *Almutaster*
14. Leaves various but not as above; pappus bristles in (1-)2-3 series of equal length, apically dilated or attenuate; involucre glandular or eglandular. ..... (15)
15. Plants monocephalous; phyllaries evenly herbaceous, in 2(-3) series of subequal length; cypselas obovate, 2-nerved and flattened, usually sessile-glandular near the apex; pappus often with an evident short, outer series. ..... *Aster alpinus*
15. Plants with two or usually more heads, or if monocephalous then without the above combination of features..... (16)
16. Leaves neither clasping nor subclasping; phyllaries usually strongly graduated in length, not foliaceous; stems, leaves, and phyllaries eglandular or sometimes sessile-glandular but without stipitate glands. ..... (18)
16. Leaves clasping or subclasping; phyllaries subequal in length, at least those of the outer series foliaceous; stems, leaves, and phyllaries with stipitate glands. . ..... (17)
17. Outer phyllaries foliaceous, the inner usually with a green apical patch or zone; basal leaves usually the largest, persistent; cypselas cylindric; pappus bristles usually dilated at the apex..... *Eurybia* sect. *Herrickia*
17. Outer phyllaries similar to the inner, herbaceous from base to apex; lowermost cauline leaves greatly reduced in size (scale-like) and not persistent; cypselas flattened; pappus bristles apically attenuate. ..... *Canadanthus*
18. Phyllaries herbaceous, 1-nerved, with a green band along the midvein from base to tip, often purple-margined; basal leaves the largest, persistent; cypselas terete. ..... *Aster tataricus*
18. Phyllaries usually somewhat indurate at least near the base, with 1 or more nerves, never with a medial green band; lowermost cauline leaves greatly reduced in size (scale-like); cypselas terete to flattened. ..... (19)
19. Heads mostly solitary or sometimes few and in a loosely corymboid capitulescence; leaves thickened and stiff, 1-nerved, congested on the stems (internodes abbreviated); disc cypselas commonly 2-nerved, ray cypselas usually 3-4-nerved; carpopodium oblique..... *Ionactis*
19. Heads in a distinctly corymboid capitulescence; leaves relatively thin and flexuous, spaced along the stem with internodes prominent, venation with at least the secondary nerves evident; all cypselas 4-9 nerved; carpopodium at right angles to the long axis of the cypsela. ..... (20)
20. Leaves usually sessile-glandular on the lower surface; collecting appendages of the disc style branches spreading-hairy from base to tip; cypselas densely sessile-glandular; pappus bristles apically attenuate or (in *Oclemena reticulata*) slightly dilated at the apex. ..... *Oclemena*
20. Leaves not sessile-glandular, rarely short-stipitate glandular; collecting appendages of the disc style branches closely papillate at least in the distal portion; cypselas eglandular; pappus bristles usually prominently dilated at the apex. ..... (21)

21. Cypselas terete or subterete, with (4-)5-9 evenly spaced, orange-resinous nerves, at maturity about the same length as the phyllaries; phyllaries oblong, not keeled, each with a midvein and 1-2 lateral pairs of nerves; eastern North America and southeastern Asia. ..... *Doellingeria*
21. Cypselas distinctly flattened, with a pair of lateral nerves and sometimes 1-2 whitish, subepidermal nerves on each face, shorter than the phyllaries at maturity; phyllaries ovate to ovate-oblong, keeled, 1-nerved; western North America..... ..... *Eucephalus*

LITERATURE CITED

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