



The splitting of *Aster*

The increasingly widespread acceptance of classification changes in *Aster* will result in new names for Michaelmas daisies and their relatives

Tim Sandell / RHS

In 2015 the RHS will adopt the new scientific name for Michaelmas daisies, as well as other changes in *Aster*.

JULIAN SHAW explains why

MICHAELMAS DAISIES are perhaps the most familiar plants currently grown under the *Aster* label. Mainly cultivars of *A. novae-angliae* and *A. novi-belgii*, they are a key element in gardens, giving colour to bright autumn days in the northern hemisphere. There are many cultivars available, in a wide range of shades including white, blue, purple, pink and shades of red. Until recently, Michaelmas daisies

had all been regarded as part of the large genus *Aster*, which at one time contained about 500 species.

Shrinking genera

In recent years, taxonomists have removed clusters of species from large genera in the *Asteraceae* to form smaller, more easily comprehensible units. The table below shows the general shrinkage of several large *Asteraceae* genera as more numerous, smaller genera have been established or expanded. The figures given in the two editions of Heywood (1978, 2007) summarize the situation. In 1978 the first edition recorded 1,100

genera and 25,000 species. By the second edition in 2007 the number of genera had increased by about 500 to 1,600 while the number of species remained about the same.

What has been the impact of this trend on the names we use in the garden? Many of us can remember when what we now know as *Brachyglottis* 'Sunshine' was *Senecio* 'Sunshine'. We have also come to accept *Brachyscome* rather than *Senecio* for a genus of bedding plants, *Felicia* instead of *Aster* for those blue South African daisies, and *Argyranthemum* rather than *Chrysanthemum* for bedding marguerites.

CHANGES IN NUMBER OF SPECIES IN LARGE ASTERACEAE GENERA				
	1973	1994	2008	2011
<i>Aster</i>	500	250	180	152
<i>Eupatorium</i>	1,200	48	41	45
<i>Senecio</i>	2,000-3,000	1,250	1,000	1,200
<i>Vernonia</i>	1,000	500	750	17

Sources: Willis (1973), Bremer (1994), Mabberley (2008), Shi *et al.* (2011).

Why the changes?

Many of the large genera traditionally accepted in flowering plants are assemblages of species left over after more distinctive clusters of species have been removed. This includes the horticulturally important *Aster* and *Senecio*. Rather than consisting of homogenous units linked by characters held in common, these genera tend to be artificial groupings holding the less distinctive remnants of a tribe. In effect, these large genera of remnants represent unfinished taxonomic business. This is not the best way to construct a useful taxonomy. While there have been several attempts to propose division of these large genera into smaller units, they have not been upheld by more recent molecular data.

Although a certain amount of progress in understanding relationships between species in *Aster* was made using morphology and chromosome morphology (Jones 1980, 1983; Semple & Brouillet 1980), it was only after studies analyzing variation in chloroplast and nuclear DNA that real progress began (Xiang & Semple 1996). More recent work has focused on nuclear ribosomal DNA internal transcribed spacer (ITS) sequences, such as a study by Brouillet *et al.* (2001) that employed data from 326 accessions.

These studies indicate that *Aster* in the old sense was a mixture of species from all over the world that were not particularly closely related, and really belonged in other smaller genera. Reflecting these results in the names of the plants has resulted in describing new genera, resurrecting old genera, and raising infrageneric taxa to generic rank, all of which creates unfamiliar new names.

While this might initially give rise to some inconvenience, it does reflect a more realistic classification. Plants that are genuinely similar, as



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Aster amellus is the type species of the genus, so will retain its name, along with its close relatives

opposed to superficially similar, are grouped together. Hence the classification is more useful, particularly in areas that rely on the predictive nature of taxonomy, such as conservation, plant breeding and the search for natural products. In reality, the problem lies not with the new classification and new names, but in the limited knowledge and mistaken ideas of the past that can tenaciously hold us in their grip.

Coming soon

The new classification of *Aster* has been used in the recent *Flora of North America* (Barkley *et al.* 2006) and *Flora of China* (Shi *et al.* 2011), and is appearing in new regional floras in America such as the *Flora of Missouri* (Yatskievych 2005), and also in the influential Euro+Med PlantBase database (Greuter 2003).

Mindful of the impact that the proposed name changes would have on a popular group of plants, the RHS Nomenclature and Taxonomy Advisory Group (NATAG) has been monitoring the adoption of the new classification by the international botanical community over the past 10 years. After considering the evidence and noting the widespread acceptance of the new taxonomy, NATAG has recommended its adoption for the 2015 edition of the *RHS Plant Finder*. Cross references

will be given in the book, and it is hoped that the horticultural industry and gardeners will become familiar with and use the new names.

Aster reshapes

The type species of the genus *Aster* is *Aster amellus*, a south European species sometimes known as Italian aster. This is the species to which the name of the genus is permanently linked. This means that if the genus is split up then *A. amellus* (and its closest relatives) is the species that keeps the *Aster* name. Other garden plants that keep the *Aster* name include European species such as *A. thomsonii* and its hybrid with *A. amellus*, *A. x frikartii*. *Aster pyrenaicus* also keeps its name. Incidentally, the cultivar 'Lutetia' which is often listed under *A. pyrenaicus*, appears to represent a selection of *A. amellus* (Picton 2004).

Aster tripolium, sea aster, a UK native, becomes *Tripolium pannonicum*, the only species in its genus. *Aster sedifolius* has become part of the Eurasian genus *Galatella*, consisting of 40–50 species.

Some Asiatic species, including *A. glebnii* and *A. dimorphophyllus* from Japan, and *A. taiwanensis* from Taiwan, are likely to form new genera. A recent study by Li *et al.* (2012) has demonstrated that many well known Chinese species currently in *Aster* actually represent three new unnamed genera that are closely related to Australasian species.

African asters also comprise several genera. The Madagascan species are referred to *Madagaster*, *Aster comptonii* to *Afroaster*, and *Aster capensis* and *Aster barveyanus* still await placement.

The North American species form a single large grouping that splits in to many genera, including the horticulturally important *Doellingeria*, *Eurybia* and

Symphyotrichum, the last containing the majority of Michaelmas daisies.

South American asters have also been divided up, with several species now in *Symphyotrichum*, and others in genera such as *Diplostebium*, *Noticastrum* and *Oritrophium*.

Genera in cultivation

The new and unfamiliar genera that are most widespread in horticulture are discussed below, and their distinguishing features are highlighted. The descriptions are quite technical as the genera tend to be separated on characters associated with the involucre bracts, achene or pappus. The table on p123 shows the new generic placement of currently cultivated asters, along with a reference to a convenient flora where a description can be found.

Ampelaster

This is a genus of a single species, *A. carolinianus* (syn. *Aster carolinianus*) from the Florida region forming a large sprawling or vining shrub with weak stems to 4m long. It is usually evergreen, but deciduous in cooler areas. The leaves, 3-7 x 1-2cm, are alternate, thin-textured, with bases clasping the stem. Around 1-15 flowerheads with pale rose-purple ray florets, 1-2cm long, are held in panicles. The involucre bracts, 30-50 in 5-6 series, are 1-nerved, the outer ones being linear-lanceolate to spatulate, and the inner ones being linear-attenuate and unequal in size, green only near the apex, with margins hyaline towards apex.

In the wild it grows in wet areas with a peak flowering in winter. It is not hardy and makes an unusual conservatory plant with winter interest in frost-prone climates

Aster

The species in this reduced genus are best regarded as work in progress.

There are several more genera to be separated out of it, even in Eurasia. The only certainty is that *A. amellus* and its close relatives remain permanently in *Aster*. Helpful accounts of the cultivated and wild species can be found in Grierson

(1964), Cullen *et al.* (2000), Picton (2004) and Shi *et al.* (2011).

Doellingeria

This genus of three species from eastern North America consists of hardy, herbaceous perennials. The

KEY TO REPLACEMENT ASTER GENERA IN CULTIVATION	
1a Plant sprawling or vine-like, shrubby habit	<i>Ampelaster carolinianus</i>
1b Plant herbaceous, annual or perennial, or alpine sub-shrub	2
2a Dwarf alpine herb with fleshy tap root	<i>Oreostemma alpinum</i>
2b Taller herbaceous plants or alpine subshrubs	3
3a Ray florets absent	4
3b Ray florets present	5
4a Leaves pubescent, glandular	<i>Galatella (Linoseris)</i>
4b Leaves hairless, without glands	<i>Tripolium pannonicum</i>
5a Ray florets sterile without styles	<i>Galatella</i>
5b Ray florets fertile, 2 styles present	6
6a Involucre bracts in 2 indistinct rows, all nearly equal	<i>Aster</i>
6b Involucre bracts in 3-5 rows, often very unequal	7
7a Basal and some cauline leaves petiolate, lamina base cordate to subcordate	<i>Eurybia</i>
7b Basal and lower cauline leaves petiolate, lamina base not cordate or sometimes sessile	8
8a Stem with usually 10 or less capitula (flowerheads)	9
8b Stem with more than 10 capitula (flowerheads)	11
9a Capitula solitary, alpine to 15cm, achenes dimorphic	<i>Xanthisma coloradoense</i>
9b Capitula several, herbaceous perennial to 70cm or more, achenes uniform	10
10a Outer involucre bracts obtuse to rounded; mid to upper stem leaves narrowed at base	<i>Aster amellus</i> and relatives
10b All involucre bracts acute; stem leaves more or less auriculate, semi-amplexicaule	<i>Eurybia sibirica</i>
11a Annual or biennial; ray florets about equal length to pappus	<i>Symphyotrichum squamosum</i>
11b Perennials; ray florets much longer than pappus	12
12a Involucre bracts obtuse to rounded	13
12b Involucre bracts acute or mucronate	14
13a Leaves succulent, hairless	<i>Tripolium pannonicum</i>
13b Leaves not succulent, hairy	<i>Aster amellus</i> and relatives
14a Involucre bracts 1-nerved, with orange resinous mid-vein; pappus of 4 whorls*, the outermost very much shorter	<i>Doellingeria umbellata</i>
14b Involucre bracts 1-3-nerved; pappus of 1(-3) whorls of 20-50 subequal, barbellate bristles	<i>Symphyotrichum</i>

* Sometimes described as a 'double pappus, inner row of scabrid bristles, outer row of much shorter bristles' (Bremer 1994), or 'multiseriate, outer series of short setae, 2 inner series of long barbellate bristles' (Semple *et al.* 2002), but Barkley *et al.* (2006) note '4 series, whitish, outer very short scales, inner 3 of 60-90 white to tan barbellate bristles'.

single cultivated species, *D. umbellata* (syn. *Aster umbellatus*) can reach 2m tall and is distinguished by its flat-topped corymb of many, small, white-rayed flowerheads and elliptic leaves that are scabrid above. The 4–15 ray florets are white and



Aster schreberi now belongs to a smaller genus and becomes *Eurybia schreberi*

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5–9mm long. The involuclral bracts, 16–40 in 3–5 series, are 1-nerved, lanceolate to deltoid, unequal in length, with narrowly scarious margins and rounded apices. The achenes are compressed, obconic, with 3–5 ribs and sparse, long hairs. The pappus has two types of bristle; few in the outer ring about 0.5mm long, and three inner rings of many bristles, 3–4mm long (see also the note at end of key on p122).

Eurybia

This is a genus of 23 species from North America and north Eurasia. It excludes a group of four species from the Rocky Mountains recently placed in their own genus, *Herrickia*.

Eurybia are rhizomatous, hardy, herbaceous perennials to 1.2m tall. The leaves are either heart-shaped to triangular with cordate bases (*E. divaricata*, *E. x herveyi*, *E. macrophylla* and *E. schreberi*) or spatulate to ovate with tapering bases (*E. sibirica*, *E. spectabilis*), and have narrow petioles. The flowerheads are usually borne in corymbs. The involuclral bracts, 20–140 in 3–7 rows, are 1-nerved, broadly ovate to oblong or oblanceolate, lanceolate or linear, are unequal in length with their apices obtuse to acute. The flowerheads with 5–60, white to purple, ray florets have a yellow disk that matures to purple. The achenes are obconic to fusiform, compressed, with

NAME CHANGES FOR ASTER SPECIES LISTED IN RHS PLANT FINDER 2013

Name in Aster	Generic placement or new name	References	Name in Aster	Generic placement or new name	References
<i>acris</i>	<i>Galatella sedifolia</i> subsp. <i>sedifolia</i>	FE	<i>novi-belgi</i>	<i>Symphotrichum novi-belgi</i>	FE, FNA
<i>ageratoides</i>	<i>Aster trifoliatus</i> subsp. <i>ageratoides</i>	FE	<i>oblongifolius</i>	<i>Symphotrichum oblongifolium</i>	FNA
<i>alpigenuus</i>	<i>Oreostenma alpigenuum</i>	FNA	<i>oolentangiensis</i>	<i>Symphotrichum oolentangiense</i>	FNA
<i>alpinus</i>	<i>Aster</i>	FE	<i>peduncularis</i>	<i>Aster</i>	G64
<i>amellus</i>	<i>Aster</i> (type of genus)	FE	<i>pilosus</i>	<i>Symphotrichum pilosum</i>	
<i>x amethystinus</i>	<i>Symphotrichum x amethystinum</i>	FNA	- var. <i>demotus</i>	- var. <i>pringlei</i>	FE, FNA
<i>carolinianus</i>	<i>Ampelaster carolinianus</i>	FNA	<i>puniceus</i>	<i>Symphotrichum puniceum</i>	FE, FNA
<i>ciliolatus</i>	<i>Symphotrichum ciliolatum</i>	FNA	<i>pyrenaeus</i>	<i>Aster</i>	FE
<i>coloradoensis</i>	<i>Xanthisma coloradoense</i>	FNA	<i>radula</i>	<i>Eurybia radula</i>	FNA
<i>cordifolius</i>	<i>Symphotrichum cordifolium</i>	FNA	<i>sagittifolius</i>	<i>Symphotrichum cordifolium</i>	FNA
<i>corymbosus</i>	<i>Eurybia divaricata</i>	FNA	<i>x salignus</i>	<i>Symphotrichum x salignum</i>	FE
<i>diffusus</i>	<i>Symphotrichum lateriflorum</i>	FNA	<i>scaber</i>	<i>Aster</i>	FJ
<i>diplostephioides</i>	<i>Aster</i>	FC, G64	<i>scandens</i>	<i>Ampelaster carolinianus</i>	FNA
<i>divaricatus</i>	<i>Eurybia divaricata</i>	FE, FNA	<i>schreberi</i>	<i>Eurybia schreberi</i>	FE, FNA
<i>dumosus</i>	<i>Symphotrichum dumosum</i>	FE, FNA	<i>sedifolius</i>	<i>Galatella sedifolia</i>	FE, S02
<i>ericoides</i>	<i>Symphotrichum ericoides</i>	FNA, FE	<i>sibiricus</i>	<i>Eurybia sibirica</i>	FE, FNA
<i>falcatus</i>	<i>Symphotrichum falcatum</i>	FNA	<i>soulieri</i>	<i>Aster</i>	G64
<i>foliaceus</i>	<i>Symphotrichum foliaceum</i>	FNA	<i>spathulifolius</i>	<i>Aster</i>	FJ
- var. <i>parryi</i>	- var. <i>parryi</i>	FNA	<i>spectabilis</i>	<i>Eurybia spectabilis</i>	FNA
<i>x frikartii</i>	<i>Aster</i>		<i>squamatus</i>	<i>Symphotrichum squamatum</i>	FE
<i>furcatus</i>	<i>Eurybia furcata</i>	FNA	<i>stracheyi</i>	<i>Aster</i>	FC, G64
<i>glehnii</i>	<i>Aster</i>	FJ	<i>subcaeruleus</i>	<i>Aster tongolensis</i>	FC
<i>greatae</i>	<i>Symphotrichum greatae</i>	FNA	<i>tartaricus</i>	<i>Aster</i>	FNA, FJ
<i>x herveyi</i>	<i>Eurybia x herveyi</i>	FNA	<i>thomsonii</i>	<i>Aster</i>	G64
<i>himalaicus</i>	<i>Aster</i>	FC, G64	<i>tongolensis</i>	<i>Aster</i>	FC
<i>kotarimus</i>	name not traced		<i>tradescantii</i>	<i>Symphotrichum tradescantii</i>	FNA
<i>laevis</i>	<i>Symphotrichum leave</i>	FE, FNA	<i>trinervis</i>	<i>Aster</i>	FNA, G64
<i>lanceolatus</i>	<i>Symphotrichum lanceolatum</i>	FE, FNA	- var. <i>harae</i>	<i>Aster</i>	FJ
<i>lateriflorus</i>	<i>Symphotrichum lateriflorum</i>	FE, FNA	<i>tripolium</i>	<i>Tripolium pannonicum</i>	FE
<i>linosyris</i>	<i>Galatella linosyris</i>	FE	<i>turbineus</i>	<i>Symphotrichum turbineus</i>	FNA
<i>maackii</i>	<i>Aster</i>	FC, FJ	<i>umbellatus</i>	<i>Doellingeria umbellata</i>	FNA
<i>macrophyllus</i>	<i>Eurybia macrophylla</i>	FE, FNA	<i>vimineus</i>	<i>Symphotrichum lateriflorum</i>	
<i>mongolicus</i>	<i>Aster</i>	FC	var. <i>lateriflorum</i>		FNA
<i>novae-angliae</i>	<i>Symphotrichum novae-angliae</i>	FE, FNA	<i>x versicolor</i>	<i>Symphotrichum x versicolor</i>	FE

Key to references

FC = *Flora of China* (Shi et al. 2011)
FE = *Flora Europaea* (Grierson 1975)

FJ = *Flora of Japan* (Iwatsuki et al. 1995)

FNA = *Flora of North America* (Barkley et al. 2006)

G64 = Grierson (1964)
S02 = Semple et al. (2002)

7–12 nerves, and strigillose. The pappus is reddish, tawny-pink, consisting of unequal length bristles that are often club-shaped, in 2–4 series.

Galatella

This is a genus of herbaceous perennials from Europe and Asia with 40–50 species. Growing to a height of 0.5–1m and with densely leafy stems, they have finely pubescent stems and leaves. The leaves are 1.5–6 x 1–6mm, with glandular dots and prominently 1-nerved (although lower leaves sometimes 3-nerved). The flowerheads are held in corymbiform arrays with 1–4 per short branch, each with 3–10, lavender to violet ray florets that are 10 x 1mm and sterile with aborted or absent styles. The involucre bracts are in 3–4 imbricated series; the outer, ovate-lanceolate ones being one-third as long as the inner, linear-lanceolate ones, and all are 3-nerved, acute, ciliate towards apex and with membranous margins. The achenes are cylindrical to obconic, strigose, and with 1–2 ribs per side. The pappus consists of 1–2 rows of barbellate bristles.

Galatella sedifolia (syn. *Aster sedifolius*) is in cultivation, and plants from the eastern Mediterranean are sometimes grown as *G. punctata* (syn. *Aster punctatus*) (Grierson 1975, Semple *et al.* 2002). Further study has upheld the treatment of Merxmüller (1976) who treated the European taxa as subspecies of *A. sedifolius*, but included *A. punctatus* within *A. sedifolius* subsp. *sedifolius*. Greuter (2003) has provided new names in *Galatella sedifolia* as subspecies, but with *G. punctata* as a synonym of *G. sedifolia* subsp. *sedifolia*. The situation in Turkey is summarized by Hamzaoglu *et al.* (2013) with updated nomenclature and an identification key.

Galatella and its rayless near



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relatives in *Linoseris* (syn. *Crinitaria*), along with *Tripolium*, are more closely related to *Bellis* than they are to the rest of the *Astereae* tribe (Fitz *et al.* 2002, Li *et al.* 2012).

Oreostemma

This is a genus of three species of alpine herbs from northwest North America, and *O. alpinum* is sometimes cultivated. It is distinguished by its fleshy tap root bearing a low rosette of narrow, 3-nerved leaves, and solitary flowerheads with white ray florets.

Symphyotrichum

This is the largest genus that has been split off from *Aster*. It has about 90 species distributed throughout America, with one, *S. ciliatum*, also native to Eurasia. The genus contains the Michaelmas daisies *S. novi-belgii* (syn. *Aster novi-belgii*) and *S. novae-angliae* (syn. *Aster novae-angliae*), as well as small-flowered asters such as *S. ericoides* (syn. *Aster ericoides*) and *S. lateriflorum* (syn. *Aster lateriflorum*).

The flowerheads, each with 12–35 fertile ray florets, are arranged in panicles of varying shapes. Each flowerhead has 20–84 involucre bracts, usually in 4–6 series, the bracts being linear to deltoid or lanceolate

to linear in the inner series, unequal to almost equal in length, usually 1-nerved (rarely 3-nerved), not keeled, with the green zone on the back usually diamond-shaped and often elongated towards the base. The achenes are obovoid or obconic, somewhat compressed, with 3–5 nerves. The pappus consists of 20–50, white to brown, equal bristles in usually one series.

For species identification the accounts in Barkley *et al.* (2006) and Semple *et al.* (2002) are helpful, but it is not easy. A single plant can change leaf shape completely during the growing season, involucre bract shape can change between early and late flowering, and the shape and array of flowerheads can vary hugely due to environmental factors. This, combined with selection and hybridization in cultivation, makes the variation difficult to characterize. For identifying cultivated plants it is usually easier to use colour illustrations, such as those in Picton (2004).

Older, Latin-based cultivar names, of which there are very few, as well as species epithets previously used in *Aster* (masculine) have to be modified to agree with *Symphyotrichum* (neuter), hence *A. oblongifolius* becomes *S. oblongifolium*, and so on.



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Under their new names we have *Galatella sedifolia* (far left), *Symphyotrichum novi-belgii* (left) and *Symphyotrichum novae-angliae* (above)

Tripolium

The single species in this genus, *T. panmonicum* (sea aster, previously *A. tripolium*) is easily distinguished by its succulent leaves. It is a biennial or annual of salt marshes, and thereby useful in some coastal gardens.

Xanthisma

This genus of 17 North American species is represented in cultivation by an alpine subshrub, *X. coloradoense*. It has solitary flowerheads borne over a rosette of oblanceolate, serrate leaves. These have 20–35, pink to purple ray florets.

Conclusion

This brief survey introduces a few of the many name changes that are the result of ongoing research in *Asteraceae* taxonomy.

More changes are anticipated among other large, horticulturally significant genera including *Olearia* and *Senecio*. Those who wish to read more on the subject and gain a detailed overview of the family should seek out Funk *et al.* (2009).

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