

compressed, 2.5–3.7 mm, 4–7-nerved, faces glabrous; **pappi** reddish brown, tawny, or rose-tinged, 4–6.2 mm. $2n = 16, 32$.

Flowering Aug–Oct. Open, often thin, rocky, well-drained soils, oak-hickory woods, edges of woods, thickets, calcareous hammocks, wooded stream banks or cliffs, roadsides; 100–500 m; Ont.; Ala., Ark., Fla., Ga., Ill., Ind., Iowa, Ky., Md., Mich., Minn., Miss., N.C., Pa., Tenn., Va., W.Va., Wis.

Symphyotrichum shortii is of conservation concern along the whole periphery of its range, notably in Canada; there is a report from the District of Columbia but the species is not established there. *Aster shortii* Lindley forma *gronemanni* Benke is a roseate phenotype, and forma *candidus* Benke a white one, forma *shortii* being the normal blue or purple one. They are not recognized here.

33. *Symphyotrichum undulatum* (Linnaeus) G. L. Nesom, Phytologia 77: 293. 1995 • Wavyleaf aster

Aster undulatus Linnaeus, Sp. Pl. 2: 875. 1753; *A. asperifolius* E. S. Burgess; *A. baldwinii* Torrey & A. Gray; *A. claviger* E. S. Burgess; *A. corrigiatus* E. S. Burgess; *A. gracilescens* E. S. Burgess; *A. linguiformis* E. S. Burgess; *A. loriformis* E. S. Burgess; *A. mohrii* E. S. Burgess; *A. proteus* E. S. Burgess; *A. sylvestris* E. S.

Burgess; *A. triangularis* E. S. Burgess; *A. truellii* E. S. Burgess; *A. undulatus* var. *diversifolius* (Michaux) A. Gray; *A. undulatus* var. *loriformis* E. S. Burgess

Perennials, 30–160 cm, cespitose; short-rhizomatous or with branched, woody caudices. **Stems** 1–3+, erect (straight, brittle), hirtellous to glabrescent proximally to densely hirtellous distally. **Leaves** thin, margins scabrous, abaxial faces hirtellous, densely so on midveins, adaxial usually scabrous, sometimes strigose or hirsute, rarely glabrate; basal withering by flowering (sometimes new winter rosette developing), petiolate (petioles purplish, narrowly winged, bases dilated and sheathing, hirsute), blades oblong-ovate or ovate to widely ovate, (10–)35–60(–140) × (10–)15–70 mm, bases usually cordate or subcordate to rounded, sometimes attenuate, margins shallowly crenate-serrate to subentire, apices obtuse or rounded, mucronulate; proximalmost cauline withering by flowering, proximal persistent, winged-petiolate, distally more widely winged or ± sessile, wings widening abruptly at strongly auriculate-clasping petiolar bases, blades ovate to lanceolate, 30–120(–140) × (10–)20–50 mm, reduced distally, bases cordate- or auriculate-clasping (sessile), margins crenate-serrate or entire, apices acute or acuminate, mucronate; distal sessile, blades lance-ovate to oblong or lanceolate to linear-lanceolate,

sometimes pandurate (branch leaves ovate to lanceolate, sharply smaller), 4–100 × 0.5–26 mm, reduced distally, bases ± clasping, sheathing, margins serrulate or entire, apices acute or acuminate to long-acuminate. **Heads** open, narrow to wide paniculiform arrays, branches widely spreading, divaricate to ascending, sometimes secund, ± densely leafy. **Peduncles** well developed, 0.3–3(–5) cm, branches to 10 cm, spreading, bracteate, densely hirtellous to strigillose, bracts 3–10+, firm, appressed, subulate (2–3 mm), grading into phyllaries. **Involucres** campanulate to cylindro-campanulate, 3.8–5.5 mm. **Phyllaries** in 4–5(–6) series, appressed or outer spreading, oblong-lanceolate (outer) to linear-oblongate (inner) or linear (innermost), strongly unequal, bases indurate $1/2$ – $2/3$, margins scarious, erose, hyaline, ciliolate, green zones diamond-shaped to lanceolate, apices acute to acuminate or obtuse, often ± involute, often mucronulate, sometimes tips purplish, abaxial faces hirsutulous, adaxial sparsely so distally. **Ray florets** 12–16(–25); corollas usually blue to purple, sometimes lilac, laminae 6–12 × 1.4–2.5 mm. **Disc florets** 15–22(–25); corollas cream or light yellow becoming purple, 4–5.8 mm, tubes slightly shorter than funnelform throats, lobes lanceolate, 0.5–0.9 mm. **Cypselae** dull purple to light brown or tan, oblong-obovoid, compressed, 1.7–2.2 mm, 3–4-nerved, faces strigillose; **pappi** cream or rose-tinged, 3.5–5 mm. $2n = 16, 32$.

Flowering Aug–Oct. Dry or well-drained, loamy or rocky soils, open deciduous woods, borders, clearings, dry hammocks, sandhills, open-wooded bluffs underlain by sandstone or limestone; 200–1500 m; N.S., Ont.; Ala., Conn., Del., D.C., Fla., Ga., Ill., Ind., Ky., La., Maine, Md., Mass., Miss., N.H., N.J., N.Y., N.C., Ohio, Pa., R.I., S.C., Tenn., Vt., Va., W.Va.

Symphyotrichum undulatum is of conservation concern in Illinois and Nova Scotia. Hybridization with *S. drummondii* and *S. oolentangiense* has been by reported by A. G. Jones (1989), but some specimens so annotated represent phenotypic variation of *S. undulatum*. *Symphyotrichum undulatum* is sometimes confused with members of the *S. patens* complex due to its auriculate-clasping, more or less panduriform cauline leaves.

34. *Symphyotrichum urophyllum* (Lindley ex de Candolle) G. L. Nesom, Phytologia 77: 294. 1995 • White arrowleaf or arrowleaf aster

Aster urophyllus Lindley ex de Candolle in A. P. de Candolle and A. L. P. de Candolle, Prodr. 5: 233. 1836; *A. sagittifolius* Wedemeyer ex Willdenow var. *dissitiflorus* E. S. Burgess

Perennials, 40–120(–200) cm, cespitose; short-rhizomatous or with stout, branched caudices.

Stems 1–5+, erect (straight to slightly flexuous, brittle,

sometimes stout), proximally glabrous or glabrate, distally sparsely pilose. **Leaves** thin, margins usually shallowly, sometimes deeply serrate, rarely entire (distal), (piloso- to strigoso-)ciliate to scabrous (distal), apices mucronate, abaxial faces moderately pilose, $\pm$ densely so on midveins, adaxial glabrate to sparsely pilose or scabrous; basal usually withering by flowering, sometimes persistent, long-petiolate (5–15 cm, petioles not or narrowly winged, sheathing), blades ovate to lance-ovate or lanceolate, 25–120 $\times$ 15–50 mm, bases usually shallowly, sometimes deeply, cordate to truncate or rounded, apices acute, sometimes rounded; proximal cauline sometimes deciduous at flowering, winged-petiolate (petioles distally usually broader-winged, clasping), blades ovate to lanceolate, 50–120 $\times$ 20–50 mm, gradually reduced distally, bases usually truncate or rounded to attenuate, sometimes cordate, apices usually acute or acuminate, sometimes nearly caudate; distal $\pm$ shortly winged-petiolate or sessile, blades lance-ovate or lanceolate to linear-lanceolate, 10–100 $\times$ 1–25 mm, reduced distally, bases attenuate to cuneate, margins entire to subentire, scabrous, apices acuminate to subcaudate. **Heads** (crowded) in dense, elongate, paniculiform arrays, branches stiffly ascending to erect (sometimes arched when long, peduncles then often secund), usually racemiform, sometimes paniculiform, leafy. **Peduncles** 0.3–2 cm, sparsely pilosulous to glabrate, bracts many, ascending, linear to subulate, 2–4 mm, grading into phyllaries. **Involucres** cylindric, (4–)4.5–6(–7) mm. **Phyllaries** in 4–6 series, appressed or recurved-spreading, subulate (outer) to linear-lanceolate (inner), unequal, bases indurate $1/3$ – $1/2$ +, margins scarious, hyaline, erose, sparsely ciliate (mostly distally), green zones linear-lanceolate (outer) to linear (inner), apices long-acuminate to caudate, recurved, hyaline-mucronate to aristate, tips often purple, faces glabrous. **Ray florets** 8–15(–20); corollas mostly white to pale pink or lilac or light blue, laminae 4.5–8(–10) $\times$ 0.8–1.5 mm. **Disc florets** (8–)10–15(–20); corollas whitish to cream becoming pink, (3.5–)4–5 mm, tubes shorter than funnelform throats (with hairs), lobes lanceolate, 0.4–0.7 mm. **Cypselae** tan to brown or dull purple (nerves stramineous), obovoid, $\pm$ compressed, 1.8–2.5 mm, 4–6-nerved, faces glabrous or glabrate or very sparsely strigillose; **pappi** white or rose-tinged, 3–4 mm. **2n** = 16.

Flowering Aug–Oct. Open, dry or mesic, sandy or loamy, sometimes rocky soils, limestone pavements, glades, ravines, open oak, sassafras, aspen, or pine woods, edges of woods, moist or dry, rocky bluffs, savanna, wooded banks, stabilized dunes, fields, roadsides, hedgerows, railroads; 40–300+ m; Ont.; Ala., Ark., Fla., Ga., Ill., Ind., Iowa, Kans., Ky., Maine, Md., Mass., Mich., Minn., Miss., Mo., Nebr., N.J., N.Y., N.C., N.Dak., Ohio, Okla., Pa., S.C., Tenn., Vt., Va., W.Va., Wis.

The name *Aster sagittifolius* Wedemeyer ex Willdenow has been misapplied to this taxon; our interpretation of

the type of this entity concurs with that of A. G. Jones (1980), i.e., that it is conspecific with the type of *Symphyotrichum cordifolium* or a garden hybrid involving the latter. *Aster sagittifolius* forma *hirtellus* (Lindley) Shinnery is not recognized here.

35. *Symphyotrichum oolentangiense* (Riddell) G. L. Nesom, *Phytologia* 77: 288. 1995 • Azure or skyblue aster



Aster oolentangiensis Riddell, W. J. Med. Phys. Sci. 8: 495. 1835; *A. azureus* Lindley; *A. azureus* var. *poaceus* (E. S. Burgess) Fernald; *A. azureus* var. *scabrior* Engelm ex E. S. Burgess; *A. capillaceus* E. S. Burgess; *A. poaceus* E. S. Burgess; *A. vernalis* Engelm ex E. S. Burgess

Perennials 20–150 cm, caespitose; short-rhizomatous or with branched, woody caudices. **Stems** 1–5+, erect (straight), glabrate to hispidulous, distally pilosulous to strigillose in arrays. **Leaves** thick, firm, margins entire or crenate-serrate, scabrous, apices mucronate, faces scabrous, abaxial strigose to piloso-strigose or hirsute, adaxial strongly strigose; basal withering by flowering, long-petiolate (petioles slightly winged, bases dilated, sheathing, ciliate), blades ovate to lance-ovate, 40–150(–180) $\times$ 10–40(–60) mm, bases $\pm$ cordate or rounded to attenuate, margins crenate-serrate to subentire, apices rounded or obtuse to acute; proximal cauline petiolate (petioles narrowly winged, clasping), blades ovate or ovate-lanceolate to lanceolate, 30–130 $\times$ 12–70 mm, gradually or $\pm$ abruptly reduced distally, bases rounded to attenuate, margins entire, scabrous, apices acute or attenuate, callus-pointed; distal sessile or sometimes short-petiolate and $\pm$ winged (appressed or ascending), blades lanceolate or linear-lanceolate to subulate, 5–80 $\times$ 1–10 mm, strongly reduced distally (more sharply so on branches), bases attenuate to cuneate or $\pm$ rounded, margins entire. **Heads** in open, paniculiform arrays, branches ascending, stiff, sometimes long-arching and peduncles secund, $\pm$ ridged, densely leafy with small, $\pm$ appressed branch leaves, $\pm$ strigose. **Peduncles** ascending, 0.2–6 cm, glabrate, densely bracteate, bracts linear-subulate, scabrous- or ciliate-margined, often revolute, grading with phyllaries. **Involucres** campanulate to cylindro-campanulate, 4.5–8 mm. **Phyllaries** in (3–)4–6 series, appressed or outer slightly spreading, lanceolate to oblong-lanceolate, strongly unequal, bases indurate $1/2$ – $3/4$, margins scarious, erose, hyaline, ciliate, apical green zones diamond-shaped, apices acute to acuminate or caudate (then tips often involute), mucronulate to apiculate, faces glabrous. **Ray florets** (10–)13–20(–25); corollas usually pale to azure blue to violet-purple, rarely rosy, white or bluish white), laminae (5–)8–12(–14) $\times$ 1.4–1.7 mm. **Disc florets**

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