

Alismataceae (Water-Plantain Family) Traits, Keys, & Comparison Charts

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In Newfoundland and Labrador, the Alismataceae is represented by 5 species, 4 of which are native, although none are considered common in the province. The single European introduction, *Baldellia ranunculoides* subsp. *repens* (creeping water plantain), was discovered by Leila Clase in 2001, in a coastal brackish marsh in Bristol's Hope, eNfld. The only other North American location for this species is in Puget Sound, WA, USA. All of our species are aquatic perennials, rooted in the bottom of streams or shallow ponds; most have leaves that are emergent (extending above the water's surface), but in deeper water, some may have long, flattened, leaf-like petioles (phyllodia) that lack a true blade. *Sagittaria cuneata* (northern arrowhead) and *Baldellia* may have floating, emergent, and submersed leaves, depending on the depth of water.

Alismataceae Traits (for species in NL)

- Perennial **wetland or aquatic herbs**, with horizontal rhizomes or stolons.
- **Leaves are all basal and simple**, with **submersed, emergent, or floating blades**; stipules are absent.
- Petioles are long (\pm equal in length to the water depth in submersed leaves), with bases that sheath the stem.
- Blades are **linear, elliptic, or sagittate**; bases are tapering (cuneate) or sagittate; margins are entire; primary veins are parallel.
- Flowers are **bisexual or unisexual** (usually monoecious) with **regular symmetry**.
- Flowers are **borne singly or in small umbel-like clusters** on slender peduncles arising from rosettes of basal leaves on specialized "inflorescence stolons," or flowers several to numerous in open **racemes or panicles**; pollination is by insects (entomophily).
- The perianth consists of **3 green sepals** and **3 white or pink petals**.
- **Stamens 6** in bisexual flowers, **or 12 to many** in unisexual male (staminate) flowers.
- Pistils are numerous and distinct, arranged in rings or globose heads, each pistil has a **superior ovary with 1 carpel**; style are short, stigmas are minute.
- Fruits are **indehiscent, single-seeded achenes**, ovoid or strongly flattened.

Alismataceae (Water-Plantain Family) Key

Key to species in Newfoundland and Labrador

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- 1a. Plants with bisexual flowers, borne singly in small umbel-like clusters, or in erect many-branched panicles; sepals 3, green; petals 3, white and/or pink with a yellow spot at the base of each petal; stamens 6; pistils 15–23; achenes are ovoid and flat or ridged. **2**
- 1b. Plants with unisexual flowers arranged in racemes, with several whorls of 3 flowers; 1–2+ whorls of female (pistillate) flowers are situated below the male (staminate) flowers, or all flowers male; sepals 3, petals 3, usually white; stamens 12–many; pistils numerous, arranged in globose heads; achenes are strongly flattened (*Sagittaria*). **3**
- 2a. Plants to 10 dm tall; leaves emergent and ascending, with long petioles and ovate to elliptic blades to 3.5 dm long × 1.5 dm wide; flowers numerous, arranged in erect, many-branched panicles; individual flowers are 7–13 mm across; petals are white, 3.5–6 mm long; achenes are strongly flattened, about 2–3 mm long, and arranged in a ± circular ring on a flat receptacle, forming fruiting heads about 4–7 mm across. ...
..... ***Alisma triviale*** (common water plantain)
- 2b. Plants to 2 dm tall; leaves emergent, submersed, or floating, with narrowly elliptic to oblanceolate blades 1–9 cm long × up to 2.3 cm wide; flowers solitary or few; individual flowers 15–22 mm across; petals are up to 8.5 mm long, varying in colour from pink, or pink with white (pink toward to margins), to all white; achenes are ovoid, 5-ridged, about 2 mm long, and arranged in globose fruiting heads 4–5 mm across. ***Baldellia ranunculoides*** subsp. ***repens*** (creeping water-plantain)
- 3a. Leaves emergent or submersed, lacking basal lobes; submersed 'leaves' are flattened petioles (phyllodia), to 40 cm long × up to 1 cm wide; emergent leaves have long petioles with linear to oblanceolate blades to 17.4 cm long × up to 4 cm wide; filaments of stamens are pubescent, broader at the base, and shorter than the anthers.....
..... ***Sagittaria graminea*** subsp. ***graminea*** (grassleaf arrowhead)
- 3b. Leaves with emergent or floating blades to 26 cm long, usually with sagittate basal lobes, submersed phyllodia sometimes present in deeper water; filaments of stamens are glabrous, slender, and about equal to or longer than the anthers. **4**
- 4a. Emergent blades to 17 cm long by up to 11 cm wide, sagittate; floating leaves often present, 7.5–9 cm long; inflorescence bracts flat, lanceolate, attenuate at the apex, thin, and 0.7–3.5 cm long; petals up to 1 cm long; achenes are 1.8–2.6 mm long, with erect, incurved beaks <0.4 mm long. ***Sagittaria cuneata*** (northern arrowhead)
- 4b. Emergent blades to 26 cm long, usually sagittate; widths vary from narrow to broad (1–25 cm wide); floating leaves absent; inflorescence bracts concave, firm, and 0.4–1.5 cm long; petals 1–2 cm long; achenes are 2.5–4 mm long, with horizontal, lateral beaks 0.6–1.6 mm long. ***Sagittaria latifolia*** (broadleaf arrowhead)

<i>Alismataceae</i> Comparison Chart 1: <i>Alisma</i> and <i>Baldellia</i>		
Species:	<i>Alisma triviale</i>	<i>Baldellia ranunculoides</i> subsp. <i>repens</i>
	northern water-plantain	creeping water-plantain
Plants	perennial aquatic herbs, to 10 dm tall; rhizomatous	perennial aquatic herbs, to 2 dm tall, with horizontal creeping stolons, described as "inflorescence stolons" producing leaves and flowers at the nodes (Kozłowski <i>et al.</i> 2008)
Leaves	usually emergent, in basal rosettes, ascending, on long petioles; blades ovate to broadly elliptic, 5–35 cm long × 3–15 cm wide, apices are blunt (obtuse) to acute, bases are obtuse, rounded, or shallowly cordate, margins are entire	in basal rosettes, on short or long petioles (to 50 cm in submersed plants); emergent plants have ascending leaves with narrowly elliptic or oblanceolate blades, 1–9 cm long × up to 2.3 cm wide; submersed plants produce leaves with submersed and floating blades
Inflorescence	open, multi-branched panicles, to 1 m tall, with 2–10 whorls of branches	inflorescence stolon axis is horizontal, creeping, and rooting at the nodes; 1–5 flowers are borne at each node
Flowers	7-13 mm across, bisexual, on slender, straight pedicels 1–4 cm long	15–22 mm across, bisexual, on curved pedicels 1.5–8 cm long
Sepals	3, green, 2–3 mm long, ovate, concave, with scarious margins	3, green, 3–4.5 mm long, ovate, ± flat, without scarious margins
Petals	3, white , rarely pink-tinged, obovate to nearly orbicular, with a yellow spot at the base, 3.5–6 mm long , erose along the obtuse to rounded apex; petal margins not overlapping	3, usually pink, or pink towards the margins and white basally , less frequently all white, all with a yellow spot at the base; 6.5–8.5 mm long × 9–12 mm wide; with overlapping petal margins
Stamens	6; anthers are 0.6–1 mm long	6; anthers are 1.1–1.5 mm long
Pistils	15–23, styles are lateral, curved , and 0.4–0.6 mm long	15–20, styles are terminal and very short
Fruiting Heads	in a ring (circular to slightly 3-angled) on a flat receptacle, 4–7 mm across	in globose clusters , on a convex receptacle, 4–5 mm across
Achenes	ovoid, with flattened sides , about 2–3 mm long × 1–2 mm wide; with 1 groove along the outer (dorsal) edge, the short beak erect and near the top of the inner (ventral) edge	ovoid, 5-ridged , to 2 mm long × <1 mm wide, with a rough (papillose) surface and a short, acute, ± curved, terminal beak

<i>Alismataceae</i> Comparison Chart 2: <i>Sagittaria</i>			
Species:	<i>Sagittaria cuneata</i>	<i>Sagittaria graminea</i>	<i>Sagittaria latifolia</i>
	northern arrowhead	grassleaf arrowhead	broadleaf arrowhead
Plant	aquatic perennial herbs with submersed, floating, or emergent leaves		
	submersed or emergent, to 11 dm long ; rhizomes absent; stolons often with large tubers (corms)	submersed or emergent, to 6 dm tall, usually shorter in our area; with short rhizomes	usually emergent, to 4.5 dm tall ; rhizomes absent; stolons often with large tubers (corms)
Submersed Leaves	phyllodia flattened , narrow, and strap-like, to 50 cm long	phyllodia flattened , strap-shaped, to 40 cm long by <1 cm wide	rare, linear, to 60 cm long
Floating Leaves	leaf blades sagittate , 7.5–9 cm long × 3.5–4 cm wide; petioles to 1 m long	none	none
Emergent Leaves	leaf blades are ovate to sagittate , 2.5–17 cm long × 1.5–11 cm wide ; basal lobes are triangular, 0.7–11 cm long × 0.7–6 cm wide, and usually shorter than the unlobed portion of the blade ; mature blades are oriented obliquely or ± horizontally on recurved petioles about 3.5–50 cm long	leaf blades are linear, narrowly elliptic, or oblanceolate , about 2.5–17.5 cm long × 0.2–4 cm wide ; rarely with basal lobes ; petioles are 6.5–17 cm long	leaf blades are linear to sagittate , about 3–26 cm long × 0.7–26 cm wide ; occas. unlobed and lanceolate; basal lobes equal to or shorter than the unlobed portion of the blade ; lobe widths vary from linear (0.5–2 cm wide) to ovate (up to 15 cm wide); petioles are about 6.5–50 cm long
Inflorescences	usually emergent, racemes (rarely panicles), with several whorls of unisexual flowers, usually with 3 flowers per whorl ; pedicels are subtended by 3 bracts; plants are usually monoecious, usually with 1–2 whorls of female (pistillate) flowers situated below the whorls of male (staminate) flowers , or all flowers in the raceme may be staminate; the lowest whorl of flowers is sometimes branched		
	racemes 14–21 cm long × 2–10 cm wide, with 2–8 whorls of flowers; bracts are 0.7–3.5 cm long, flat, ± thin, lanceolate, acute to attenuate at the apex, and fused basally for ± 1/4 their length	racemes 2.5–21 cm long × 1–8 cm wide, with 2–8 whorls of flowers; bracts are fused basally for 1/4 to 1/2 their length, the free triangular lobes are 2–6 mm long	racemes about 4.5–28 cm long × 4–23 cm wide, with 2–9 whorls of flowers; bracts are 0.4–1.5 cm long, concave, ± firm, ovate, acute at the apex, and fused only at the base

<i>Alismataceae</i> Comparison Chart 2: <i>Sagittaria</i> - continued			
- page 2 -	<i>Sagittaria cuneata</i>	<i>Sagittaria graminea</i>	<i>Sagittaria latifolia</i>
Flowers	to 2.5 cm across, on pedicels 0.5–2 cm long	to 2.3 cm across, on pedicels 0.5–3 cm long	to 4 cm across, on pedicels 0.5–3.5 cm long
Sepals	3, ovate, 4–8 mm long	3, ovate, 3–8 mm long	3, ovate, 5–11 mm long
Petals	3, obovate to nearly orbicular, white, 0.7–1 cm long	3, obovate to nearly orbicular, white or pale pink, 1–2 cm long	3, obovate to nearly orbicular, white, 1–2 cm long
Staminate Flowers	stamens 15–25; filaments slender, glabrous, ± equal in length to the anthers	stamens 12–many; filaments short, broader at the base, pubescent, shorter than the anthers	stamens 20–many; filaments slender, glabrous, longer than the anthers
Pistillate Flowers	pistils are numerous, distinct, spirally arranged on a convex receptacle; each pistil has a superior ovary of 1 carpel, 1 ovule, and a short style		
	pedicels are 0.5–2 cm long	pedicels are 1–3.5 cm long	pedicels are 0.5–6 mm long
Fruiting Heads & Achenes	fruiting heads are 0.8–1.5 cm across; achenes are obovoid, ± flat, 1.8–2.6 mm long × 1.3–2 mm wide, with a short, incurved beak , 0.1–0.4 mm long	fruiting heads are 0.4–1.5 cm across, seldom developing northward; when present, achenes are oblanceoloid , about 1.4–2 mm long × 0.8–1.2 mm wide, with a minute, oblique beak , 0.1–0.3 mm long	fruiting heads are 1–1.7 cm across; achenes are obovoid, ± flat, 2.5–4 mm long × 1.5–2.5 mm wide, with a lateral, horizontal beak , about 0.6–1.6 mm long
	achenes are ± flat, with a dorsal (outer) wing wider than the ventral (inner) wing; beaks are situated above the narrower ventral wing		
Range	Native in central Labrador, introduced in wNfld. (Rapid Pond).	Native in Nfld. and seLab. (Forteau).	Native to sw/wNfld., but spread by human intervention

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