

PONTEDERIACEAE PICKERELWEED FAMILY

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Herbaceous aquatic annuals or perennials, rooted in mud or free-floating. STEMS of two types: vegetative stems indeterminate, containing many leaves; flowering stems determinate, containing a single leaf, spathe, and terminal inflorescence. LEAVES alternate, with a strongly sheathing base, petiole (excluding sessile leaves), and lamina; stipules marcescent, transparent, truncate at apex, sheathing or absent. INFLORESCENCE a panicle, spike, or with a solitary flower; spathe bract-like, glabrous, with an acute to caudate apex. FLOWERS 3-merous, perfect, zygomorphic, sessile; perianth of six petaloid, oblong to oblanceolate tepals, basally fused into a tube; stamens 3 or 6, adnate to the perianth, the anthers rounded to elongate; ovary superior, 3-locular; ovules one to many; stigma entire or 3-lobed with single-celled hairs. FRUIT a many-seeded capsule with persistent unmodified perianth, or a nutlet with thickened, ridged perianth. Seeds longitudinally winged or smooth. --6 genera, ca. 40 spp., throughout the tropics and subtropics.

1. Leaves thick and leathery; flowers with 6 stamens *Eichhornia*
1' Leaves thin and membranous; flowers with 3 stamens *Heteranthera*

Eichhornia Kunth Water-hyacinth

Annual or perennial herbs, rooting in mud or free-floating. Vegetative stem submersed and growing to surface, or emersed and short. LEAVES sessile or petiolate; sessile leaves forming a basal rosette or alternate on an elongate stem, acuminate at apex; petiolate leaves floating or emersed, cordate to oblong, acuminate to obtuse at apex. INFLORESCENCE a panicle or spike, developing in 1-several days, individual flowers open 1 day only. PERIANTH funnelform, blue or mauve, the lobes oblanceolate, glandular-pubescent, obtuse to acute at apex; stamens 6, the upper 3 shorter than the lower 3; filaments linear, glandular-pubescent, purple, curved upwards towards the apex; anthers rounded to oblong, yellow; pistils heterostylous or homostylous, the ovary ovoid, incompletely 3-locular, each locule with many ovules. FRUIT an elongate capsule with longitudinal dehiscence. SEEDS many, ovoid, the testa with longitudinal wings and cross-striae between wings. --9 spp.; tropical America and Africa. (For *E. Eichhorn*).

Eichhornia crassipes (Martius) Solms-Laubach (thick or dense). Water-hyacinth. --Perennial, free-floating herbs. Vegetative stem condensed, except when branching; flowering stem glabrous, up to 25 cm long, the lower internode reflexing after flowering. PETIOLATE LEAVES emersed, blade rounded, 2.5-11 cm long, 3.5-9.5 cm wide, obtuse at apex; petiole at least slightly swollen (sometimes greatly so), 3.5-38 cm long. INFLORESCENCE a spike with 4-15 flowers, all normally open the same day; peduncle glabrous, 5.0-12.5 cm long; spathe obovate, 4-11 cm long. FLOWERS blue or violet-blue, the tube 10-12 mm long, the tepals obtuse, 16-37 mm long, the central upper tepal with a dark blotch in the center and a yellow spot within the blotch; upper stamens 14-19 mm long; lower stamens 20-35 mm long; anthers 1.7-2.1 mm long. Pistil tristylous. CAPSULE rarely produced, about 10 mm long; seeds 1.1-2.1 mm long. -- Canals in Phoenix area, Maricopa co.; native to ne Brazil; trop. & subtrop. This species is known worldwide as an aquatic weed of eutrophic waters, reproducing quickly by vegetative means.

Heteranthera Ruiz & Pav. Mud-plaintain

Annual or perennial herbs. STEM glabrous, submersed and growing to surface or emerged and procumbent, branching. SESSILE LEAVES forming a basal rosette or alternate, simple, glabrous, acuminate to acute at apex; petiolate leaves floating or emerged, simple, reniform, cordate or oblong, thin, glabrous, obtuse to acuminate at apex, the floating leaves longer and narrower than emerged leaves. INFLORESCENCE a spike or flower solitary; peduncle elongating in one to several days, individual flowers open one day only. PERIANTH salverform, yellow, mauve, blue, or white, the lobes narrowly elliptic to linear, glandular pubescent to glabrous, obtuse to acuminate at apex; stamens 3, fused to the perianth at adjacent lobes; filaments yellow or purple, centrally inflated or linear, glandular pubescent, hairy toward apex or glabrous; anthers widely ovate to lanceolate, yellow, purple or white; ovary incompletely 3-locular; ovules few to many. FRUIT an elongate capsule with longitudinal dehiscence. SEEDS few to many, the testa with longitudinal wings and cross striae between wings. --12 spp.; New World and Africa. (Greek: *Hetero* = different + *anthera* = anther). Horn, C. N. 1985. A systematic revision of the genus *Heteranthera* (sensu lato). Ph.D. dissertation, University of Alabama. 260 pp.; Horn, C. N. 1988. *Aquat. Bot.* 31: 197-209.

1. Flowers yellow; leaves all linear, without distinct petiole and blade *H. dubia*
- 1' Flowers white, blue or mauve; leaves on non-juvenile plants with distinct petiole and blade.
 2. Leaf blade linear ovate to rounded; inflorescences 1-flowered; flowers white or blue (lavender).
 3. Young plants in water with rigid petioles and emerged blades; older plants rarely with elongate stems, with rigid petioles and emerged blades; all perianth lobes of equal size, none with flanges; mature pollen grains remaining in tetrads *H. limosa*
 - 3' Young plants in water with flexible petioles and leaf blades floating; older plants commonly with elongate stems, rigid petioles, and emerged blades; lower central perianth lobe largest, the upper central lobe with lateral flanges; mature pollen grains separating at maturity *H. rotundifolia*
 - 2' Leaf blade cordate to slightly reniform; inflorescence multiflowered; flowers mauve *H. peduncularis*

Heteranthera dubia (Jacquin) MacMillan (of *dubius* affinity). Waterstar-grass. --Perennial herbs. VEGETATIVE STEM submersed and growing to surface or emerged and contracted, procumbent, branching. LEAVES sessile, submersed or emerged, alternate (opposite at nodes with inflorescences), linear, entire, 2-10 cm long, 1-5 mm wide; apex acute; base clasping. INFLORESCENCE 1-flowered; perianth salverform, yellow, the tube 1.5-5 cm long, the lobes linear, obtuse at apex, 4-11 mm long; stamens all of equal size, 2-10 mm long, the filaments centrally inflated, the anthers lanceolate, yellow, coiling after anthesis, 0.9-3.9 mm long. SEEDS 7-30, 1.0-1.6 mm long. [*Heteranthera leibmannii* (Buchneau) Shinnery; *Zosterella dubia* (Jacquin) Small in Small & Carter; *Zosterella longituba* Alexander] -- Rivers and canals, Maricopa, Yavapai cos.; up to 600 m (1800 ft.); fl. Jun.-Oct.; no fr. seen; s. Can., e & c US; e Mex.

Heteranthera limosa (Swartz) Willdenow (of mud) --Annual herbs. VEGETATIVE STEM submersed with elongate internodes, or emerged and short. SESSILE LEAVES few, submersed, thickened, green on abaxial surface, linear to oblanceolate, obtuse at apex; petiolate leaves emerged, oblong to oval, cuneate to truncate at base, acute to obtuse at apex, 1-5 cm long, the petiole rigid. INFLORESCENCE 1-flowered; perianth salverform, blue or white, the tube 15-44 mm long, the lobes narrowly elliptic, obtuse at apex, 5.2-26.3 mm long, the upper lobes yellow toward base; stamens of two sizes, the lateral stamens 2.3-7.8 mm long, with yellow anthers 0.9-3.3 mm long; central stamen 3.3-7.2 mm long, with a purple or white anther 1.3-3.9 mm long; mature pollen remaining in tetrads. SEEDS many, 0.5-0.8 mm long. --Ponds and ditches, Cochise co.; up to 1500 m (4500 ft.); Mar.-Sep.; c US, CA; Mex.; C. Amer.; S. Amer.; Carrib.

Heteranthera peduncularis Benth (with long peduncule). --Annual herbs. VEGETATIVE STEM submersed with elongate internodes or emerged and procumbent. SESSILE LEAVES few, submersed, thin,

whitened on abaxial surface, linear to oblanceolate, the apex acute; petiolate leaves floating or emersed, 3-7 cm long, cordate, the apex acuminate. INFLORESCENCE a spike with 7-17 flowers; peduncle glabrous, 7-15 cm long; perianth salverform, mauve or white, the tube 3.4-6.0 mm long, the lobes narrowly elliptic, acuminate at apex, 3.2-4.8 mm long, the upper central lobe dark purple at base; stamens of two sizes, the laterals 1.4-2.5 mm long, with yellow oblong anthers 0.6-1.1 mm long; central stamen 2.0-3.4 mm long with an oblong, yellow anther 0.9-1.6 mm long. SEEDS many, 0.6-1 mm long. Known from only one collection (*Charles Mohr s.n.* at US) with the label data of "In aquis stagnant Arizona." Known from Mexico in ditches and ponds above 900 m (2700 ft). Based on the species distribution the Mohr collection was probably from the southeastern part of the state.

***Heteranthera rotundifolia* (Kunth) Grisebach (rounded leaves).** --Annual or facultative perennial herbs. VEGETATIVE STEM submersed with elongate internodes or emersed and procumbent. SESSILE LEAVES few, submersed, thickened, green on the abaxial surface, linear to oblanceolate, the apex obtuse; petiolate leaves floating or emersed, round to oval, 1-5 cm long, 5-25 mm wide, the base cordate to truncate, the apex obtuse to acute, the petiole flexible on floating leaves, rigid on emersed leaves. INFLORESCENCE 1-flowered; perianth salverform, blue or white, the tube 11-29 mm long, the lobes narrowly elliptic, obtuse at apex, 5.2-18.2 mm long, the lower central lobe larger, the upper central lobe with lateral flanges toward the base; stamens of two sizes, the lateral 2.8-8.0 mm long, with yellow, oblong anthers 0.4-2.6 mm long; central stamen 3.9-8.5 mm long with a sagittate, blue or yellow anther 1.3-3.9 mm long; mature pollen grains separating. SEEDS many, 0.5-1.0 mm long. --Ponds and ditches, Cochise, Graham, Santa Cruz cos.; up to 1600 m (4800 ft); Aug.-Oct.; c US; Mex.; C. Amer.; S. Amer.; Carrib.

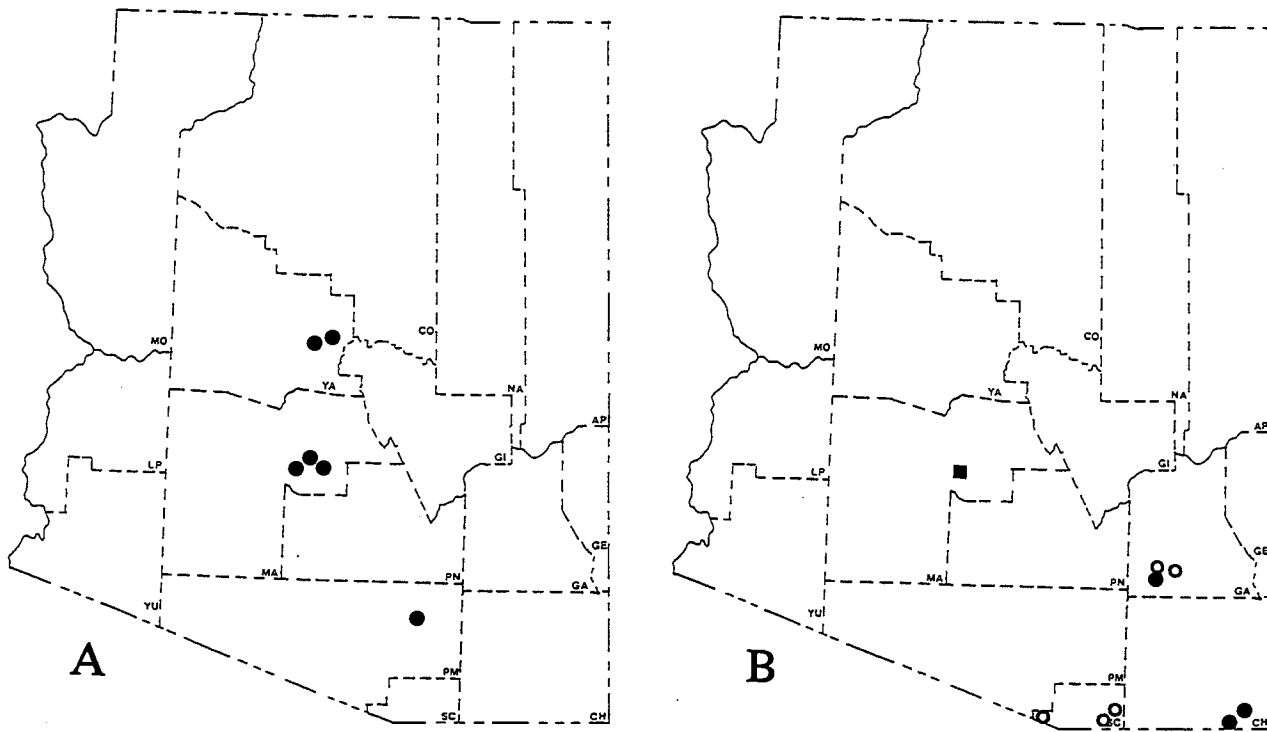


Figure 1. Distribution of: A, *Heteranthera dubia*; B, *H. limosa* (solid dots), *H. rotundifolia* (open dots), and *Eichornia crassipes* (square).

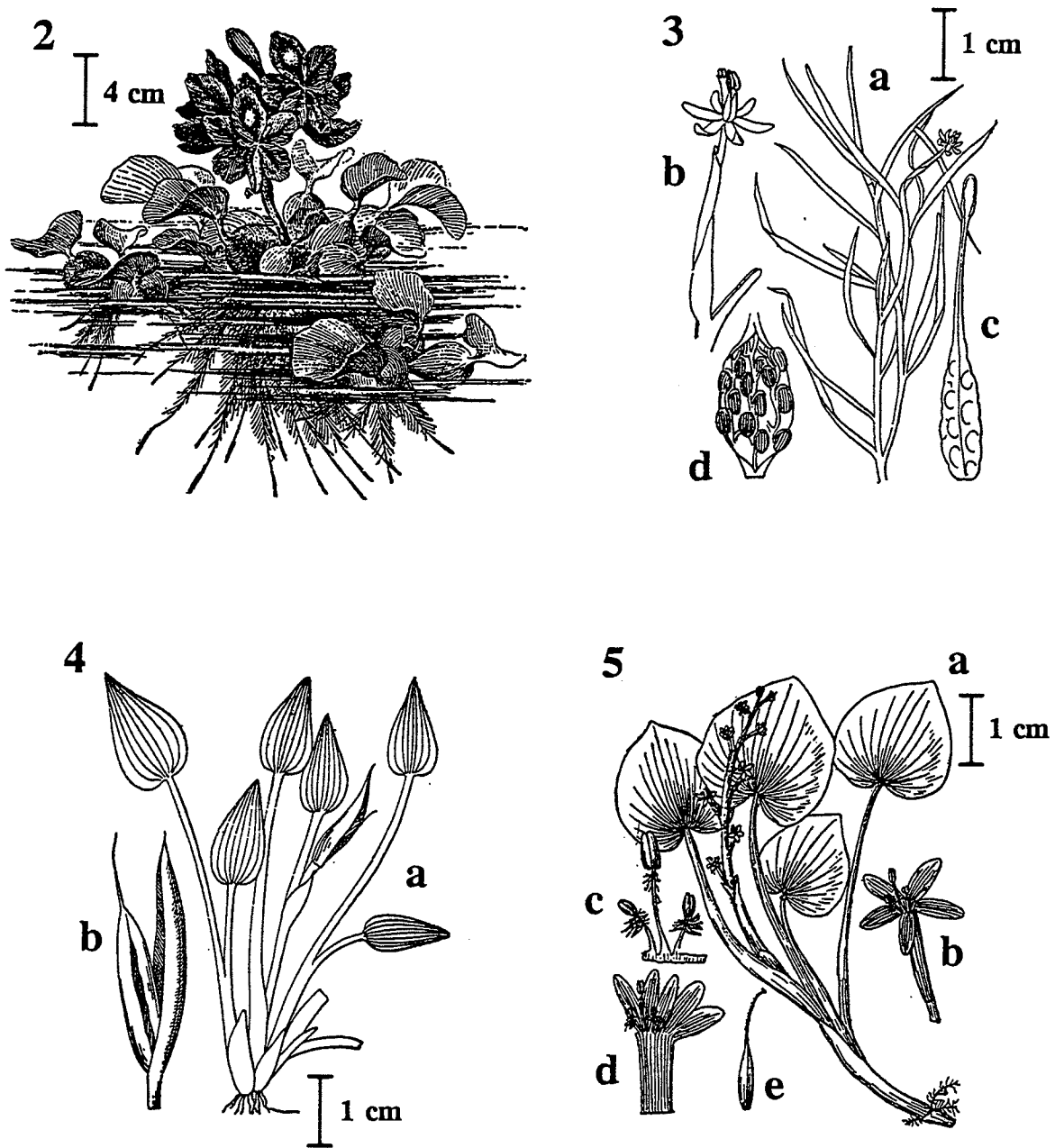


Figure 2. *Eichhornia crassipes*. Reproduced from Bailey (1930), Standard Cyclopedia of Horticulture.

Figure 3. *Heteranthera dubia*: a, plant; b, flower; c, pistil; d, capsule after dehiscence.

Figure 4. *H. limosa*: a, plant; b, flower.

Figure 5. *H. peduncularis*: a, plant; b, flower; c, dissected flower; d, stamens; e, pistil. Figures 3-5 reproduced from Britton & Brown (1913), An Illustrated Flora of the Northern United States, Canada, and the British Possessions. Centimeter scales pertain to the whole plant illustrations only, not to the enlarged plant parts. There is an artistic error in this figure: the perianth should have 6 lobes rather than 5.