

*Pistia* L. WATER-LETTUCE

*Pistia stratiotes* L. Aquatic perennial herb, free-floating, clonal via stolons, fibrous-rooted, rosetted, in range 5–12 cm tall; monoecious; shoots with ascending to spreading basal leaves from cormlike stem, long-hairy and velveteen, the velveteen hairs water-repellent, mostly erect but curved above midpoint in the same direction, 1–1.5 mm long, colorless, multicellular (moniliform), when water-stressed hairs shrivel from tip toward base; each plantlet with a large mass of highly branched adventitious roots, the largest roots 150–300+ mm long, arising from leaf bases; stolons cylindrical, 2–2.5 mm diameter, with short 1-celled and longer multicellular hairs, each stolon forming 1 plantlet at tip. **Leaves:** helically alternate, simple, sessile or petiolate, with stipule; stipule axillary, membranous and ligulelike, ca. 15 mm long; petiole present on outer leaves of rosette, flattened on lower surface, to 20 × 12 mm, to 6 mm thick, in  $\times$ -section semi-circular to elliptic, long-pilose with hairs to 8 mm long; blade wedge-shaped or broadly obovate to broadly oblanceolate or spatulate (roundish), (20–)50–150(–250) × 25–65 mm, central portion to 18 mm thick, broadly tapered to tapered at base, entire, rounded to truncate and often shallowly notched at tip, sometimes wavy or slightly inrolled above midpoint, parallel-veined with 5–13 evenly spaced principal veins conspicuously raised on lower surface, velveteen, upper surface with veins raised on thickened central area and others slightly sunken; tissue spongy with numerous air cavities (aerenchyma). **Inflorescence:** spike (spadix), axillary, the axis having 1 pistillate flower at base, 2 bracts, and a subterminal, oblique whorl of 6–8 staminate flowers, spadix surrounded by and fused along rachis to a sheathing bract (spathe); peduncle at anthesis erect and ca. 5 mm long increasing in fruit, long-hairy; spathe 15–20 mm long, constricted between pistillate flower and staminate flowers to form a lower and an upper portion; lower spathe narrowly urn-shaped or vase-shaped, 11–11.5 × 4–5 mm, green, typically closed at base, sometimes with overlapping margins concealing ovary, with 2 spreading, rounded lobes ca. 1.5 mm long below the constriction, long-pilose on outer surface; upper spathe  $\pm$  cylindrical but open with margins not overlapping, ca. 7 × 5 mm, ovate-oblique with slightly flaring margins at orifice, mostly white, nearly free but at base fused to rachis for 1–1.5 mm, shorter pilose on outer surface; lower bract fused to spadix axis above pistillate flower and within lower portion of spathe, shieldlike and heart-shaped (peltate), 2.5 × 2–3 mm, green, glossy, positioned behind stigma and visible when stigma exposed; upper bract cupped and 2–2.2 × 3–4 mm or dishlike and 5 mm diameter, yellow-green but white at base, irregularly lobed (to 11 lobes or teeth) and scalloped on margin, sections of margin sometimes rolled under; rachis somewhat conic at tip, free from spathe for ca. 4 mm (from base of upper bract to tip), white; pedicel short (staminate flower) or absent (pistillate flower). **Staminate flower:** highly reduced; **perianth** absent; **stamens** 2, fused, 1.2 × 0.6–0.7 mm; filament absent; anthers dithecal, light yellow, opening by short slits on out-facing side; pollen light yellow; **pistil** absent. **Pistillate flower:** **perianth** absent; **stamens** absent; **pistil** 1, ca. 9 mm long; ovary superior, laterally fused to spadix rachis for 5–7 mm, ovoid flattened on fused face,  $\pm$  5.5 × 4 mm, greenish, glabrous, 1-chambered with 4–27 ovules; style conic, ca. 2.5 mm long, green, sparsely hairy; stigma truncate, 1–1.3 mm across, papillate. **Fruit:** berrylike,  $\pm$  dry, with thin  $\pm$  transparent wall, typically 1–10+-seeded, ovoid with tapered beak (style), ca. 11 × 5 mm, brown, with bulging seeds radiating from fruit base; within

lower portion of spathe, emersed in water (pendent), at maturity typically lacking an associated leaf. **Seed:** oblong-columnar, ca.  $2.5 \times 1.2$  mm, light brown, weakly 4-angled or 5-angled, truncate at tip with central depression, wrinkled on sides. Late July–mid-September.

Waif. A clonal, free-floating, tropical, freshwater aquatic perennial first collected in late July 2004 along the quiet northwestern shoreline of Malibou Lake, where it likely escaped from a lakeside residence. In tropical shallow-water bodies *Pistia stratiotes* can experience logarithmic growth with vegetative reproduction via stolons, producing a new plantlet at the tip of each stolon, so the surface of a tropical pond or river oxbow can become covered with a monoculture of water-lettuce within several months. In the United States water-lettuce is established in subtropical waterways from Florida to coastal Texas, and occurs sporadically in other states, and does not persist through cold temperatures, but *Pistia* might be capable of surviving in southern California, where winter temperatures are mild. Plants are buoyant because the leaves have thick, spongy (air-filled) tissue (aerenchyma), and leaves are covered with hairs that cause water to remain as droplets rolling on the hair layer rather than wetting the surface with stomates. During summer heat, the characteristic inflorescence (spathe, a bract + a spadix, a spike of nonshowy flowers) may form in a leaf axil. A pistil (= entire female flower) is fused on the inside to the lower half of the spathe, which wraps around the ovary concealing it; the stigma is revealed by two spreading lobes, giving access to a pollinator, and the stigma is exposed and receptive before staminate flowers on the inflorescence are exposed (protogynous). Days later the upper half of the spathe spreads apart to expose the whorled staminate flowers, each which consists only of two fused anthers.

B. A. Prigge & A. C. Gibson