

# Plant Diversity Website

## ***Aristolochia macrophylla*** Lamark

**Common Names:** Dutchman's Pipe, Pipevine (1)

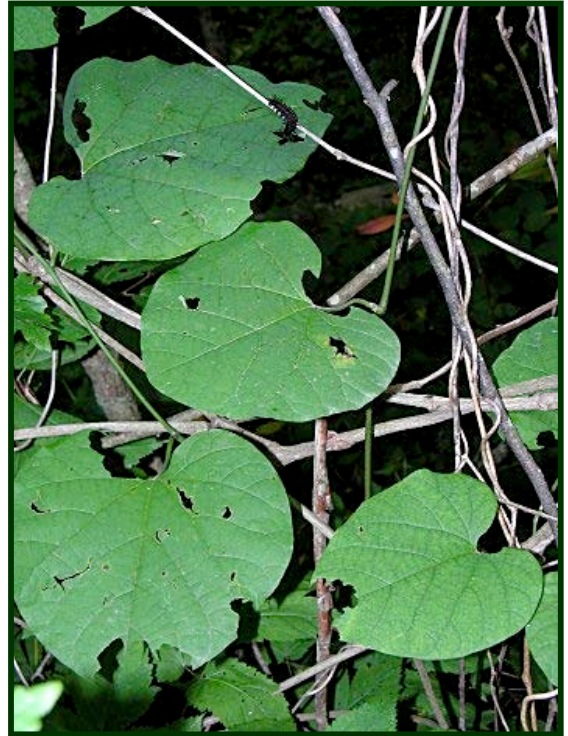
**Etymology:** *Aristolochia* comes from the Greek *aristos* meaning "best" or, originally, "most fitting" and *lochia* which means "delivery." This is due to its original use to expel the placenta after childbirth. *Macrophylla* is also from Greek, where *macros* means "long, large" and *phylo* meaning "leaf" (4, 7, 8).

**Botanical synonyms:** *Aristolochia durior* Hill, *Aristolochia sipho* L'Heritier and *Isotrema macrophyllum* (Lam.) C.F. Reed (1, 3, 4, 5).

**FAMILY:** Aristolochiaceae, the Dutchman's Pipe Family

**Quick Notable Features** (1, 3, 4):

- Long twining, woody vine
- Leaves cordate, wider than 9cm
- Flower yellow-brown to brown-purple, longer than 3cm.



**Plant Height:** typically 5-10m, but can grow to be up to 20m long (9).

**Subspecies/varieties recognized:** None found so far.

**Most Likely Confused with:** *Menispermum canadaense*, *Slcyos angulatus*, *Echinocystis lobata*, *Dioscorea villosa*, and *Hedera helix* as well as non-climbing species in the genus *Aristolochia*.

**Habitat Preference:** Rich mountain woods, mesic woodlands, banks of streams (1, 6, 7).

**Geographic Distribution in Michigan:** Escaped from cultivation in Washtenaw County (3, 16).

**Known Elevational Distribution:** 50-1300m (4)

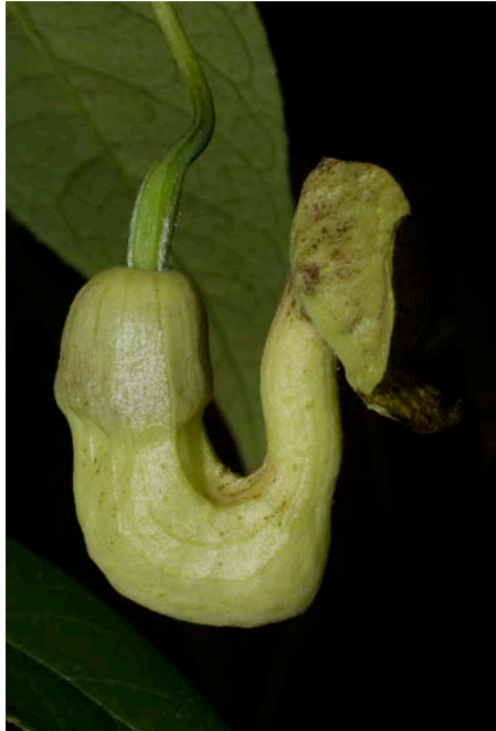
**Complete Geographic Distribution:** This species is native to the eastern United States and is found in at least a few counties in every state along the eastern seaboard as well as a few counties in PA, MI, KY, and TN as well as southern Ontario (5,6).

**Vegetative Plant Description:** Liana, woody up to 20 m in length, twining around other plants and structures with the apex of its stem. Young stems are ribbed and glabrous. Leaf petioles are 4-6 cm long. The leaf is 7 to 34 cm long and 10 to 35 cm wide, with a cordate base and sinus depth of 1-4.5 cm. The leaf surface is glabrous to slightly puberulent. There are three major veins radiating from the base of the leaf, with smaller veins branching off of them toward

the margin (1, 3, 4).

**Climbing Mechanism:** Apical stem twiner (6).

**Flower Description:** The axillary flowers have a three-lobed irregular calyx up to 3cm wide.



They are green to purple, sometimes yellow or brown and with a u-shaped or pipe-shaped tube at least 4cm long; its constricted tube and odd shape resembling a smoking pipe. There is no corolla. Six stamens are adnate to the ovary and the ovary is mostly to completely inferior. The flower emits the smell of rotting meat to attract

pollinators (presumably carrion-eating flies), although it is not as pungent as others in the same family (6, 7, 9, 15).

**Flowering Time:** Late May to early June (1), site unspecified.

**Pollinator:** The strong, pungent odor attracts flies, probably carrion flies, and the modified perianth and hairs inside the floral tube trap the insect; soon the hairs wither and release the fly, covered in pollen (10).

**Fruit Type and Description:** Fruit a 6-angled cylindrical-ovoid septicidal capsule opening from the base. It is 5.5-8cm long and 2.5cm in diameter. It is firm and the valves separate with age, with about 90 seeds per capsule (6, 7, 10, 11).

**Seed Description:** Seeds are flat and triangular, 1cm by 1 cm (1, 4). Facultative dormancy has been reported (17).

**Dispersal Syndrome:** The flat aerodynamic seeds are wind dispersed short distances, as they are shaken out one by one from the downward hanging, dehiscent “parachute-like capsules” (10). The flattened seeds are easily air-borne (pers. obs. RJB) and other seeds of species in the genus are clearly wind dispersed, bearing a thin marginal wing.





**Distinguished by:** *A. macrophylla* is a twining woody vine with flowers larger than 3 cm long, and leaves wider than 8 cm. The fact that it is a vine distinguishes it from the other two *Aristolochia* species in Michigan, *A. clematitis* and *A. serpentaria*, both of which are herbaceous and have smaller leaves and flowers (3). However, in comparison to the vine species in Michigan with which it might be confused, it is distinguished from *Menispermum canadense* by the lack of a peltate leaf attachment, which

*Menispermum* has. It can be distinguished from both members of the Cucurbitaceae, *Echinocystis lobata* and *Sicyos angulatus* because it twines with its apex and bears no tendrils. Unlike *Dioscorea villosa*, the strong lateral veins in *A. macrophylla* do not converge on the apex – rather they bifurcate with the branches ending at the margins of the leaf. *A. macrophylla* can easily be distinguished from *Hedera helix* by the apical climbing mechanism (instead of adventitious roots) and the softer, deciduous leaves.

**Other members of the family in Michigan (number species):** *A. clematitis* and *A. serpentaria* are both in the same genus. *Asarum canadense* (Wild Ginger) is in the *Aristolochiaceae* (3).

**Ethnobotanical Uses:** The Cherokee were rumored to use an infusion of roots topically to treat swelling in the extremities (2).

**Phylogenetic Information:** Kelly and González (12) present the following discussion: “Aristolochiaceae consist of 4–8 genera and ca. 500 species...the family has been the subject of much recent attention because of suggestions that these basal angiosperms are phylogenetically close to the divergence of monocots from dicots. Aristolochiaceae, traditionally placed in Magnoliidae, are thought to be related to woody members such as Annonaceae; however, the first morphological cladistic analyses of basal angiosperms supported relationships of the family with other predominately herbaceous magnoliids (Piperale, Nymphaeales, Lactoridaceae) and the monocots. Subsequent phylogenetic studies supported relationships of Aristolochiaceae with a more restricted set of paleoherbs (Lactoridaceae, Piperale, monocots), as well as Magnoliales, Laurales, and Chloranthaceae.” The closest members of the genus to *A. macrophylla* are *A. tomentosa*, *A. californica*, and *A. serpentaria*, all of which are included in the subgenus *Isotrema* (17).

**Interesting Quotation or Other Interesting Factoids not inserted above:**

- The Pipevine butterfly (*Battus philenor*) feeds on *A. macrophylla*, accumulating aristolochic acid in its body, which makes it unpalatable to birds (4).
- Aristolochic acid has effects on humans. Some claim it stimulates white blood cell activity, giving it remarkable healing powers, but it is carcinogenic and may damage the kidneys. (13). Other claim that it acts against tumors, but is too toxic to be used. It is said that aristolochic acid has anti-cancer properties when used with chemotherapy and radiotherapy. It does this by increasing the cellular immunity and the phagocytosis function of the phagocytic cells.
- Most species of the genus have poisonous roots and stems.



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