

New York City EcoFlora



Symplocarpus foetidus (L.) Salisb. ex W.P.C. Barton
Skunk Cabbage

Description: Perennial herbs from thickened vertical rhizomes and numerous fleshy roots with contractile rings; leaves crowded at the apex of the rhizome, appearing after the flowers, on short petioles, the blades fleshy, bright green, hairless, ovate or elliptic, 2 feet long and 1 foot wide (50 × 30 cm), reticulate veined, malodorous when crushed; inflorescences produced in winter; outer covering (spathe) mottled maroon and yellow-green, bulbous at the base, curved and twisted, tapering to a point; floral stalk (spadix) inside the spathe, globose, producing crowded bisexual flowers; fruit a mass of fused ovaries, 2–4 inches long (8 cm), developing slowly through the year, turning black and ripening in fall;

seeds to 1/4 to 1/2 inches wide (1 cm).

Where Found: Native to North America from Nova Scotia to Minnesota, south in the Appalachians to Georgia; swamps and wet woods in saturated soils; most abundant in New York City on Staten Island and in the Bronx, uncommon in Brooklyn, Queens and Manhattan. The plants are important for preventing erosion and maintaining water quality.

Natural History: The perennial stem of the plant is an enlarged, starchy, underground organ called a rhizome. Rope-like contractile roots anchor the plant and pull the growing rhizome firmly into the muck. Dandelions (*Taraxacum officinale*), another rosette forming plant with starchy rhizomes and contractile roots is subject to grazing pressure and protects the growing crown (meristems) by maintaining it below the soil surface safely out of reach from grazing animals. The contractile roots are thick and fleshy and may be 1/4 inches in diameter and several feet long and terminate in mass of fibrous branches. Specialized tissues arranged rings near the top of the roots shrink as they lose water, shortening the root. Because the tip of the root is anchored firmly by a network of fibrous root hairs, the contracting action pulls the plant downward. It is thought this prevents the plants from being heaved out the ground by frost.

The first part of the plant to emerge each year are the inflorescences, sometimes pushing up through snow and ice from November to March or April, followed by the leaves beginning in late April and May. The outer floral coverings (spathes) may be maroon with pale green mottling or pale green with maroon mottling. The spathes are made of spongy, insulating tissue that protect the spadix inside. The twisting of the spathe and the orientation of the opening are aerodynamically optimized to retain heat even in strong wind and possibly facilitate the transfer of pollen (Camazine and Niklas, 1984). Most plants and animals such as reptiles are poikilothermic, adapting to cold temperatures by physiological and metabolic changes but not changing body temperature. Thermogenesis is a mechanical or metabolic process enabling animals and plants to actually change their body temperature for example by shivering or burning fat. Only birds, mammals and some plants exhibit homeothermia, a special class of thermogenesis enabling the organism to maintain a body temperature higher than that of the environment (Connolly et al., 1989)—Cycad cones, Water Lily flowers and Philodendron inflorescences are some examples. Unique among the plants, Skunk Cabbage can not only raise and maintain a temperature far above freezing, it does so with precision unknown in the plant kingdom (Seymour, 2004). Homeothermic thermogenesis in Skunk Cabbage occurs independent of light and all temperature sensing, heat production and regulation occurs entirely within the spadix. Carbohydrates (polysaccharides) transported from the rhizome and burned in the presence of atmospheric oxygen producing heat as a byproduct (Seymour, 2004; Ito et al., 2004). Operating on a 60-minute cycle, the spadix “perceives”

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temperature changes of 0.3°C or less and regulates heat production up or down accordingly, producing up to 0.67 Watts (Ito et al., 2004)—that's 2.2 BTU. The Titan Arum (*Amorphophallus titanum*) holds the world record at 34.53 Watts. But the Skunk Cabbage is unmatched in the plant kingdom in its amplitude of heat production. It can raise the temperature within the spathe 30°C above ambient temperature (up to 78.1°F in the field and 89.6°F in the lab) and maintain that for up to three weeks (Seymour, 2004; Gracie, 2012)!

Flowers produce a feint odor, contradictorily described in terms of rotting flesh or perfume (Gracie 2012). Heat production is hypothesized to help disperse the floral scent. Flowers mature first as all female (protogynous) with the males developing later, facilitating cross-pollination. Following pollination the spathe disintegrates and pebble-like seeds mature inside the pineapple-like fruit cluster through summer and fall. Germination occurs that fall or next spring.

Young plants are monopodial, meaning that the terminal bud is dominant and produces only leaves and leaf sheaths. Two to five leaves are successively rolled one inside the other, always in the same direction. Following an extended period in the juvenile state, the plants produce their first inflorescence, after which the axillary buds become dominant (sympodial growth) and the leaves switch the direction of their rolling (Shull, 1924). Flower and leaf buds lateral to the crown and lower on the rhizome ensures new growth in case the crown is damaged (by Bears perhaps). Leaves, petioles and spathes decompose entirely through the summer, leaving no trace of their former existence in the fall and winter woods. Age of the plants is obscured because the oldest part of the plant—the lower rhizome—is continually worn away as it is pulled through the gritty soil and it is not possible to count the yearly growth events. The peace activist, USDA botanist and foremost student of Skunk Cabbage morphology, James Shull said this about the plant's age... "[T]he Skunk Cabbage that is seen today growing in unpretentiousness in any bog may possibly outlive the sturdiest of the oaks in point of age, may not improbably have occupied that very spot long years before Columbus set foot upon our shores and may continue there a thousand years and more from now if only the fates be kind." (Shull, 1924).

Honeybees in search of pollen and carrion flies are frequently observed visiting the flowers inside the warm, protected spathes; other invertebrates include Springtails, Beetles, Sow Bugs, true Bugs, and Moth and Butterfly larvae. The larvae of 19 species of flies belonging to 7 families were found to feed in the rotting portions of leaves, petioles, and flowers of skunk cabbage (Grimaldi and Jaenike, 1983). Spiders sometimes spin webs inside the spathes to catch prey. Wood Ducks, Ring-Necked Pheasants, Ruffed Grouse and Bobwhite Quail feed on the seeds. Black Bears consume great quantities of Skunk Cabbage in spring, comprising 50–99 percent of their spring diet, depending on the availability of acorns, beech nuts and other mast fruits (McDonald & Fuller 2005). It has been hypothesized that the plants are laxative and help clear the Bear's systems after a long hibernation without eating, drinking, urinating or defecating (Armstrong, 2021).

Cultural History: The plants were used by Native Americans for food and medicine. Caution is advised as the plants contain calcium oxalate crystals that can irritate soft tissues of the mouth, throat, esophagus and intestines.

Name Notes: The genus name means fused (sym) fruit (karp). The epithet *foetidus* is Latin for stinking. The dense, upright green leaf clusters resemble cabbages. Undisturbed plants are not malodorous, but when crushed produce a pungent odor, hence the common name. Early Swedish settlers around Philadelphia called the plant Bear-Weed observing that bears feasted on the abundant cabbage-like shoots and leaves (Williams, 1919). A somewhat related plant in the Pacific Northwest (*Lysichiton americanus*) also goes by the name Skunk Cabbage.

Species Notes: The genus *Symplocarpus* is in the Arum family (Araceae) and contains 3–5 species (1 in our flora). Other Arum relatives in our area include Jack-In-The-Pulpit (*Arisaema triphyllum*), Duckweed (*Lemna* spp.) and Tuckahoe (*Peltandra virginica*). Like May Apple (*Podophyllum*), Ginseng (*Panax*), Sassafras, Magnolia and many others, species of the *Symplocarpus* genus are found almost exclusively in eastern Asia and eastern

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North America. For many years the Asian and American plants were considered one species. The species have been placed in the genus *Spathyema* and *Dracontium*.

Links: iNaturalist [observations](#) from New York City. [Specimens](#) from the Mid-Atlantic Herbaria Consortium. Global biotic [interactions](#) from GloBI.

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