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IOWA'S EARLIEST SPRING FLOWER

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At a time when most wild flower fanciers have only memories of spring blooms, one of Iowa's less known plants is pushing up the earliest flowers of the season. The Eastern Skunk Cabbage can begin blooming in Northeast Iowa before mid-February, even when air temperatures are near -18°C . It continues to produce new flower structures until late March or early April. During the blooming period the flowers generate enough heat to create a small, near-tropical environment for the plants and their pollinators.

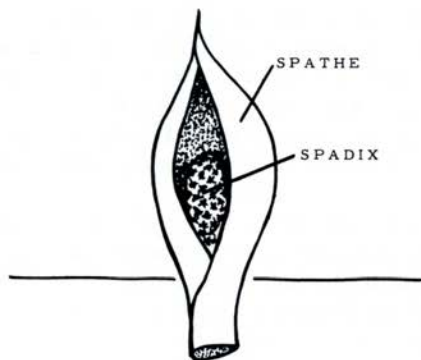


Fig. 1 - Spathe and spadix of Eastern Skunk Cabbage. Height of the spathe varies from 7-14 cm. The horizontal line indicates the usual ground level at blooming time.

The scientific name of the Eastern Skunk Cabbage is *Symplocarpus foetidus* (L.) Nut. It is a member of the Arum Lily or Jack-in-the-Pulpit family. The generic name refers to the fused fruits which develop from the tightly packed cluster of flowers and the specific name means foul or bad-smelling. Most parts of the plant have a more or less unpleasant skunk or onion-like odor.

The Eastern Skunk Cabbage is found in two widely separated parts of the world. It has a center of distribution in Northeastern North America and also occurs in Northeastern Asia and Japan (Soper and Rao, 1958). In North America the range is from Western Manitoba and Southeastern Nova Scotia south to North Carolina (Voss, 1964). It reaches the western limit of its range in the United States in Minnesota and Eastern Iowa. I have seen herbarium

specimens from only 5 or 6 counties in the state, and none west of Iowa County. The plant is infrequently collected and almost certainly has a wider distribution in the state than collections indicate. More information about Iowa distribution would be valuable.

The earliest above ground part of the plant is usually a 10-15 cm spire of tightly rolled leaves which is produced the previous fall and survives unchanged through the winter cold. The time of first appearance of the horn-shaped purple to greenish-yellow striped spathes varies considerably. First flowers appeared any time from February 6 through February 23 in four years of observation of the same population in Winneshiek County. Near the turn of the century 10 years of records from New England indicate that first blooming varied from 22 November to 9 March (Williams, 1919).

Usually only one or two spathes are produced per plant, but clusters of 5-7 or more may be found where plants are growing close together. The colorful spathe surrounds a pale, yellowish cluster of 25-100 fleshy, tightly packed flowers called the spadix. Anthers protrude from the spadix and pollen is shed within a few days of spathe emergence. If pollination occurs the spathe withers and disappears within a few weeks. The large (40-70 cm long) oval leaves unroll and enlarge some time after the spathes appear and persist through the early summer while seed clusters develop from the spadixes. Usually 6-8 leaves are produced per plant. They wither by late September and decay quickly in the mucky soil preferred by the plant. The spadix decays somewhat later, leaving a pile of dark, pebble-like seeds on the wet soil surface.

Below ground the plants have a very large (3-4 x 40 cm) upright rhizome with numerous pencil-sized roots extending out to the sides for 30 cm or more. The roots are contractile and during the growing season shrink in length to pull the rhizome a distance into the ground roughly equal to the vertical growth of the rhizome for that year. The swampy environment and soft soil which the plant requires allows for this periodic vertical movement of the rhizome.

Once the flowering sequence has begun with the emergence of the spathe, a rapid and unusual process of cellular respiration begins in the flowers of the spadix (Bendall and Bonner, 1971). Respiration is rapid enough to maintain the spadix and surrounding tissues at temperatures that are as much as 30°C above ambient air temperature even when the air temperatures drop to -14°C. By some mechanism as yet not clearly understood the rate of respiration of the spadix tissue varies inversely with the air temperature, with an approximate doubling of the rate of respiration for a ten degree drop in air temperature (Knutson, 1974). The high rate of respiration and its control maintains something approaching a constant temperature in the spadix during a period of about two weeks. Many other members of the Arum Lily family

produce some heat during the early stages of flowering, but the process in these other plants continues for only a few hours and does not usually occur at low air temperatures. In many of the tropical members of the family, the heat generated serves to vaporize insect attractants at a precise time when pollination is possible. In the Eastern Skunk Cabbage the heat production occurs at low temperatures, is maintained for more than the initial stages of flowering, and serves to speed development of pollen and the processes of fertilization.

Insects visit the skunk cabbage flowers, attracted by the warmth, and may accomplish pollination. Pollination and seed set is rare in the earliest blooming flowers in most years, even though insects have been observed in and around the spathes on sunny February days. Pollen from Skunk Cabbage provides some of the earliest spring food for honey bees. They have been observed foraging on these plants at air temperatures below 18°C. (Morse, 1974). They apparently gain sufficient heat inside the spathe to fly to the next flower and back to the hive.

If you are fortunate enough to live in or visit parts of Iowa where these interesting plants occur, plan an early spring field trip to the site. If there has been a recent snowfall during the blooming season you will find each of the spathes centered in its own heated patch of bare earth. You might take a thermometer along to measure the temperature of these "warm-sapped" flowers, but even with a thermometer the heat is easily felt. Anyone who has held a 26°C spadix in a February chilled hand is unlikely to forget Iowa's earliest spring flower.

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Editorial Note: Dr. Knutson has recently received a \$5000 grant from the Research Corporation to study the biology of the thermoregulating mechanism in Skunk Cabbage. The implications of such studies are of more than academic and scientific interest. A better understanding of the regulating mechanism may lead to the possibility of breeding agricultural crops with frost resistant characteristics, allowing for improved yields as a result of a longer growing season.