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TORREYA

Skunk Cabbage, Symplocarpus Foetidus

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This is the time of year when people who enjoy the out of doors begin looking hopefully for spring flowers. One of the most reliable plants to produce such flowers at an early date is the skunk cabbage (*Symplocarpus foetidus*). Pollen was obtained from such a flower in Hutcheson Memorial Forest, East Millstone, N.J., on Jan. 1, 1954. The earliest recorded appearance of an inflorescence at the forest was September 5, 1952. Inflorescences have been seen invariably during January for the many years that the forest has been under observation. There is this early burst then a period when no more flowers appear. The winter's coldest weather is often between late January and early March. Then follows a rapid appearance of flowers and the unfolding of leaves.

Not all plants produce inflorescences in a given season. Any individual plant may

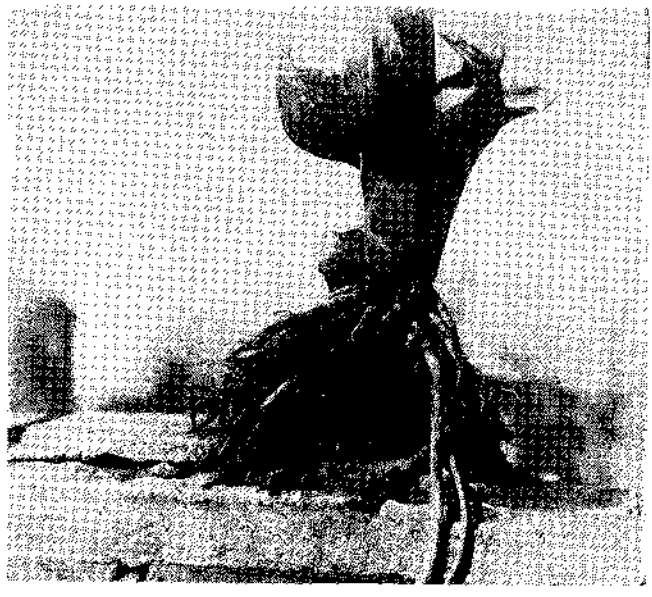

FIG. 1. *S. foetidus* plant lifted March 1955. The numerous large roots are contractile. Note sheathing base of petiole remaining from 1954 leaf; 3 spathes.

have from none to as many as three inflorescences, (Fig. 1) each a spadix of many flowers, enclosed loosely by the familiar mottled spathe. Soon the leaves increase in number and size until the whole area may be a continuous green cover. A plant may produce as many as eight leaves in addition to the two or three green bud scales which first opened. Leaves have been measured with petiole 50 cm. (19.7 inches) and blade 54 cm. (21 inches) long by 37 cm. (14.6 inches) across. Eight of these leaves expanded in all directions from the base will completely cover a lot of ground. By this time, first week of May, the short stalked inflorescences are entirely hidden and most people have

lost interest in skunk cabbage flowers until next winter. But that leaves a lot of questions unanswered. What became of the inflorescences? What percentage of them produced fruit? If a plant had three were they all successful? Do plants in the sun have any advantage or disadvantage over plants growing in the shade? These and other questions prompted the establishment of two plots on the Hutcheson Forest tract. One was in the marsh along Spooky brook near a culvert where the highway crossed the brook. The plants here had full exposure to sunlight all day until the other marsh plants such as *Asclepias incarnata*, several species of *Polygonum*, and sedges overtopped them in late June. By that time the leaves had deteriorated materially. The second plot was upstream in the forest. Even here the plants had a high percentage of available sunlight until the overhead leaf expansion was completed in early May. But the total radiant energy impinging upon the leaves here was much less than in the open marsh.

There were 57 plants on the marsh plot. Twenty-four (42.1%) were sterile in 1959 and thirty-three (57.9%) were fertile–produced inflorescences. A total of 65 inflorescences were produced, averaging 1.97 per fertile plant. Most of these withered or decayed but 9 of them (13.85%) developed into fruits by July 29. Ten plants produced two inflorescences. One of these plants developed 2 fruits but the others were completely unsuccessful. Eleven plants produced three inflorescences. One of these plants developed two fruits, three others developed one fruit each, and seven failed to develop fruit at all.

Within the forest, on a much smaller area, there were 105 plants. Fifty (47.6%) were sterile in 1959 and fifty-five (52.4%) were fertile. A total of 68 inflorescences were produced, averaging 1.24 per fertile plant. Although many of the inflorescences decayed on the forest-grown plants too, there was a markedly greater number of successfully fruiting ones, 26 (39.4%), as of July 24. Nine plants produced 2 inflorescences, three lost both of them subsequently, four produced 1 fruit each, and two succeeded with both fruits. Two plants that produced three inflorescences each were both unsuccessful in producing fruit. In this experiment it can be seen that: 1. plants grew more densely in the forest location, 2. there was slightly more fertility of plants on the marsh, 3. there was a much higher ratio of multiple inflorescences on the marsh and 4. there was a much higher percentages of decaying inflorescences (86.15%) on the marsh as compared with the forest (60.6%). Rosendahl (1911) after studying *Symplocarpus* in Minnesota reported: "In no case have more than two flowering shoots been observed above ground on one plant." He explains that the first flowering shoot to appear comes from the portion of the rhizome "that bore the last two foliage leaves of the previous season" and it has been protected over winter only by the decaying remains of these petiole bases. In our study these were the early flowering shoots which appeared outside of the dormant bud and before the scale leaves of this bud had opened. But we frequently found two inflorescences developed from within the bud, making a total of three inflorescences. Shull (1925) states that "an extreme of four has been reported."

Inflorescences that did not become fruit went in two ways. Mostly they became soft and degenerated rapidly, but a few withered and dried. These could be found for as much as a month after flowering. The spathe decayed soon after fertilization of the successful flowers and the compound fruit began to enlarge. Sometimes it became buried due to flooding by the stream after a heavy rain. Others were fully exposed, though on the marsh they were covered by the associated plants. The rate of growth and eventual size did not seem to correlate with forest or marsh, buried or exposed.

The matter of decay is interesting in this species and invites attention. The rapidity with which a large percentage of the inflorescences disappear, with no sign of mold prompts a query about autolysis and bacterial decay. No study of this was made. The leaf blades likewise disappear quickly and the petioles only somewhat more slowly through the summer, leaving no litter. The plant area is clear come September, except for fruit and buds. The fruits soften and more or less disintegrate with maturity of the seeds. A flower can produce only one seed but this is well imbedded in the enlarged compound fruit (spadix), and is liberated by decomposition of the latter. This decomposition may extend from late August into December. The seed, about a quarter inch in diameter, does not decay readily. Fruits brought to the laboratory in autumn

and left standing in water promptly began to decompose but the seeds remained firm through the winter. They did not germinate under these crude laboratory conditions.

Germinated and ungerminated seeds can be found along the brook, in the mud, or on logs, etc., in the vicinity. They have been found in late autumn, winter, and early spring but, though observed for weeks (they always disappeared eventually) the growth was so small that neither time nor stimulus of actual germination was determined.

Nature tends to be productive. The organisms produced ultimately become the food of other organisms, larger or smaller. Skunk cabbage appears to feed few herbivores

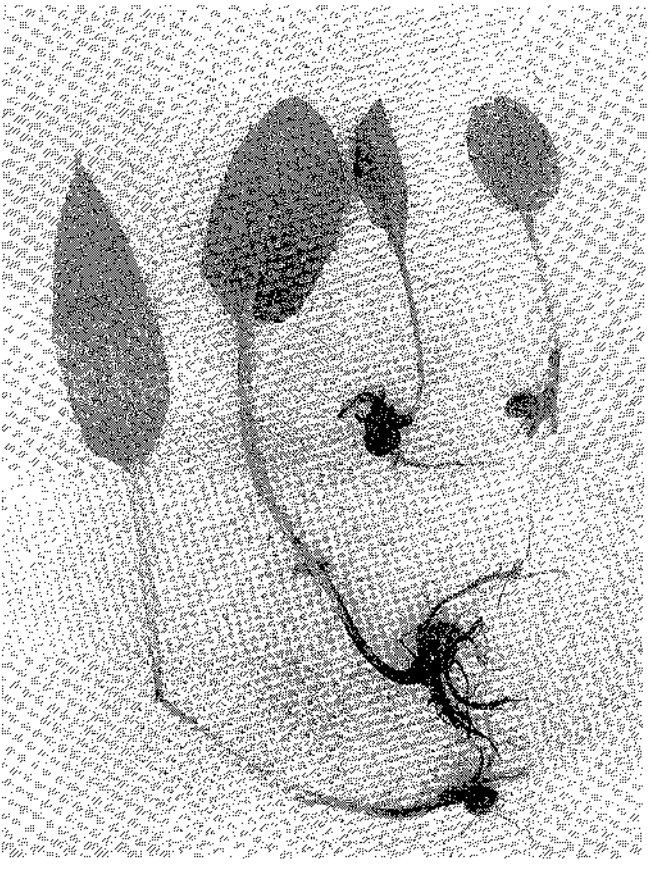

FIG. 2. Young plants lifted May 25, 1955, showing seed and beginning of rhizome formation.

unless it be the organisms of decay. The leaves have not been grazed upon. The fruits have not been found chewed or cut up as are those of May apple. Only rarely has there been evidence of "nibbling." In late winter whole buds have been found floating in the water. They appeared as though cut off, they were not chewed. They have been more numerous some seasons than others but no explanation has been conclusively apparent. Frost has been considered. Frost heaving of germinated seeds has been observed.

The seed is occasionally at least an item of diet. Whole seeds have been recovered from the crop of pheasant. Small piles of seeds have suggested the accumulating instinct of rodents. Further evidence of this has been the presence of seedlings at con-

siderable distances from the seed producing area, but neither chewed seeds nor rodents working on the seed producing area have been obsrved, though fruit has been found from which some seeds had been removed.

The seeds that have germinated after transportation from the producing area appear to develop plants which persist for more than one season. Such plants have been found with seed attached and also with a short erect rhizome but no sign of seed. One or two small leaves have been found on such plants (Fig. 2). No flowering or thrifty adult plants have been found more than a few meters from the stream or its seasonally flooded area. So the skunk cabbage remains confined to wet, muddy areas of woods or marshes.

This plant is common in many places over its range. Fernald (1950) describes the range as across lower Canada from western Nova Scotia to southeastern Manitoba, southward across Iowa, Illinois, Indiana, Ohio, West Virginia and in the uplands of Tennessee and Georgia. But what about the Costal Plain? Stone (1911) reports: [New Jersey] "Frequent . . . throughout the Northern, Middle, and Cape May districts." But also: "The Skunk Cabbage is not found in Pine Barrens" . . . . And again: [It] "is apparently absent from the coast strip, as diligent search has failed to detect it between Cape May Court House and Bay Head." Fernald (1950) includes Long Island, but what parts? What is the situation with Staten Island? What is the environmental tolerance of this plant?

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Field Trip Reports

May 17. Dobb's Ferry, N. Y. The area visited was an old estate of eighty acres with many exotic trees and shrubs, 135 forms identified, and we had a time searching through the literature for some of the varieties. A beautifully shaped northern spruce, *Picea abies*, and a 65 foot cucumber magnolia, *Magnolia acuminata*, were found. *Conium maculatum* and *Hydrophyllum virginianum* were the most obvious herbaceous plants at the time. There were acres of pachysandra and myrtle. These plants, with Japanese honeysuckle and poison ivy, account for about 80% of the ground cover. We found a neglected "formal garden" with an arbor of espalierd apple trees, trained to arch over the path, with the tips grafted overhead. Bird migration was at a minimum but we did identify 56 species during the day. The trip ended with a visit to the Boyce Thompson Institute grounds to see the tree peonies display, courtesy of Miss Polly Storrs. A delightful day with a grand group of people. Attendance 34. Leader, E. Whelen.

May 24. Franklin Lakes, N. J. The most spectacular part of this trip is always the walk through the Clove, long may it remain. A stand of six or eight persimmon trees were of particular interest to the group. Ten fern species were noted, including all three Osmundas. Six species of *Viola* were recognized, and twenty-five other species of "spring flowers" of which the following are less frequently encountered. Purple virgin's bower, wild columbine, naked miterwort, wild ginger, bloodroot, blue cohosh, shin-leaf, rattlesnake weed, red baneberry, and white baneberry. Attendance 14. Leaders, Harry and Lucy Kemp.

May 31. Ward's Point, Staten Island, N. Y. Walking down to the shore through the old Butler Estate, the members noted a number of native and introduced trees: