

THE GERMINATION OF SEEDS OF ARISÆMA.

F. L. PICKETT.

The corms of *Arisæma triphyllum* grown for the study of form and development showed great variation in size, and there was a seeming discrepancy between the number of leaves above ground and the number of corms found in the soil after the leaves had withered. Following these observations arrangements were made to check up carefully the points suggested.

On December 26, 1912, 900 seeds of *Arisæma triphyllum* were planted in rich, loose loam in large clay flower pots and subsequently subjected to three sets of conditions as noted below. As leaves appeared above the soil they were counted, one to three times per week, until no more appeared, and a record kept for comparison with the number of corms found after the growing season was over. In every case the seeds were carefully washed from the fruit pulp before planting, and when planted were covered with sandy loam to a depth of 2 cm., this being approximately the condition in natural planting.

One bunch of 300 seeds was placed in the greenhouse at a temperature of 75 to 80 deg. Fahr. immediately after planting. From this planting 208 leaves appeared between January 15 and March 19, 1913. No leaves appeared after the last date.

A second bunch of 300 seeds planted as the first, was left in the greenhouse vestibule at a temperature of 50 to 60° Fahr. From this planting 226 leaves appeared between February 19 and April 25, 1913. No leaves appeared after the last date.

A third bunch of 300 seeds, planted as the first, was placed in a cold frame until March 13, 1913, where the temperature fell slightly below the freezing point, and was then removed to the greenhouse. From this planting 209 leaves appeared.

In the summer of 1913 when the leaves of the cultures were dead the corms were carefully removed and counted. The number of corms and the number of leaves from each culture are given below.

Lot No. 1 showed 260 corms, 208 leaves, i. e., 52 "blind" corms. Total germination 86.6 per cent.

Lot No. 2 showed 246 corms, 226 leaves, i. e., 20 "blind" corms. Total germination 83 per cent.

Lot No. 3 showed 261 corms, 209 leaves, i. e., 52 "blind" corms. Total germination 87 per cent.

It is not the purpose of this paper to discuss the variations which may be due to different temperature conditions, but merely to show the high percentage of germination and to indicate the fact that some seeds germinate "blindly," that is, the embryo grows, a corm and roots are produced, and food is transferred from seed to corm without the formation of leaves or other photosynthetic organ. At the end of the growing season the connection with the seed is broken off, leaving the new plant independent.

A glance at the corms from these cultures at once suggests a difference in their food supply and growth. Some are three to six times as large as others. While the numbers of large and small corms are not exactly the same as the numbers of leafy and leafless plants, they are nearly enough so to suggest a relation.

A similar set of experiments was arranged in which seeds of *Arisaema Dracontium* were used. The seeds were prepared and planted December 26, 1912, the same as in the case of *A. triphyllum*. Lot No. 1 was left in the main room of the greenhouse, and showed, between February 6 and March 8, 1913, eight leaves. On June 19, 200 corms and 24 seemingly good seeds were removed.

Lot No. 2 was left in the cold-frame from December 26 to March 15 and then removed to the greenhouse. This culture showed eleven leaves between April 3 and April 25. On June 20, 179 corms and one sound seed were removed.

Lot No. 3 was left in the greenhouse vestibule until March 12, and then removed to the greenhouse. Between April 23 and June 20 four leaves appeared, and on the last date 187 corms were removed. These results are tabulated below.

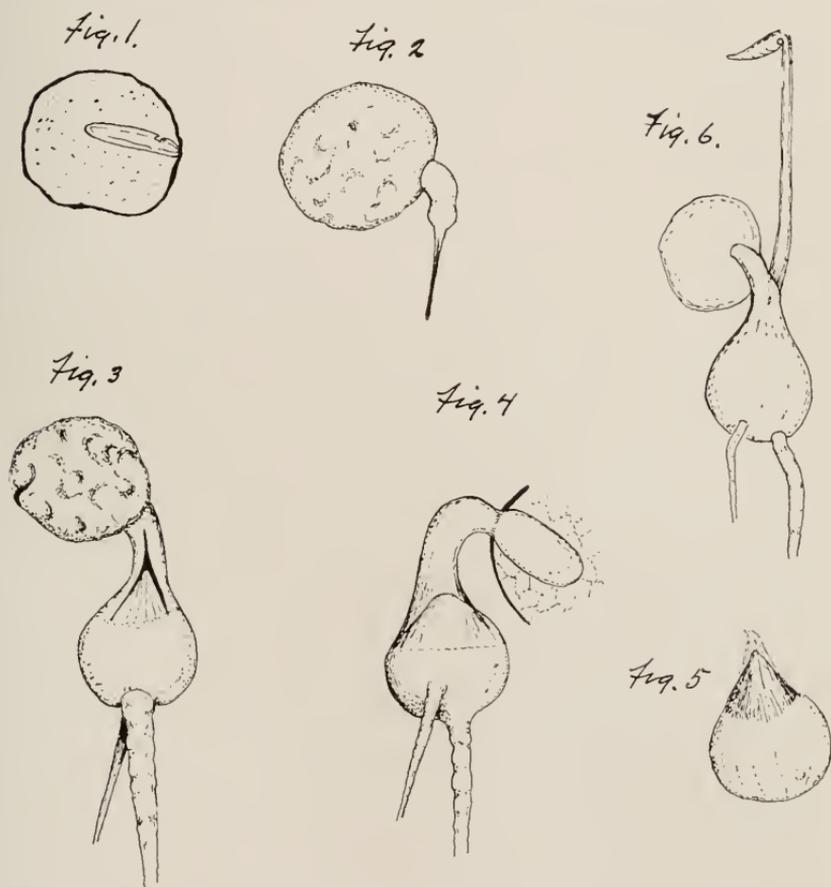
Lot No. 1. 300 seeds, 8 leaves (2.66 per cent.), 279 (93 per cent.) corms and viable seeds.

Lot No. 2. 200 seeds, 11 leaves (5.5 per cent.), 180 (90 per cent.) corms and viable seeds.

Lot No. 3. 200 seeds, 4 leaves (2 per cent.), 187 (93.5 per cent.) corms and viable seeds.

These corms have been replanted and their further development will be reported later.

Because of the "blind" germination seeming to be the normal thing with *A. Dracontium*, a brief account will be given.



The Germination of Seeds of *Arisæma*.

One to five seeds are borne in each berry of the aggregate fruit. Each seed is two to three millimeters wide and three to four millimeters long, and is composed of a hard testa covering a flinty gelatinous endosperm, in which is imbedded the almost straight, cylindrical embryo, Fig. 1. Under

proper conditions the seed absorbs water and the embryo lengthens by growth both above and below the plumule. The growth of the cotyledonary petiole is more rapid than that of the radicle, so that the radicle, with the plumule, is soon pushed outside the seed coat. The cotyledonary petiole reacts to the stimulus of gravity so that the radicle is soon directed downward, Fig. 2. The one cotyledon remains inside the seed as an absorbing agent, Fig. 4. The radicle grows down rapidly to form a primary root. Later one or two other roots may be formed. Immediately after the establishment of a root system or water absorbing system, the portion just below the plumule becomes enlarged by the storage of food stuff transferred from the endosperm of the old seed, Figs. 3 and 4.

In case the germination is complete, the formation of a root system is followed by the growth of the single simple leaf up from the plumule, through the cotyledonary petiole to the light, Fig. 6. Usually, however, only scales are formed around the bud. In either case, when the food material has been absorbed, the tissues connecting seed and seedling shrivel up, leaving the young plant independent. After a period of about eight weeks from the beginning of germination the corms will be found free from the seed and with the roots detached and broken down, all ready for a period of rest, Fig. 5.

It may be of interest to note that 1. *Dracontium* gives other evidence of incomplete response to seasonal changes. During the summer of 1913 the corms of a considerable colony were dug up for experimental purposes. Although these corms were scattered in the soil but a few inches apart, and some had shown very vigorous growth of stem and leaves, about half of them had made no start toward growth. The conditions were certainly the same for all individuals of the colony, and were good, as shown by the growth just mentioned. Whether this plant is subject to definite periodicity requiring more than the usual rest season, or is controlled by some as yet unconsidered influence, can only be left a question.