

40. Notes on the Pollination of *Colocasia Antiquorum*.

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(With Plate XVII.)

*Colocasia Antiquorum*, Schott. is an Arum which grows throughout the greater part of tropical India, and is cultivated on account of its corms which are an important article of diet when boiled. It is known by the name of Taro, Egyptian Arum and Coco, and is called Kachu in Bengali. The plant grows all the year round, but flowers only in the rainy season from July to September. It is a near relation of the familiar English Cuckoo-pint (*Arum maculatum*), and although the flower is not so conspicuous, it is interesting on account of its peculiar device for entrapping insects and compelling them to perform the function of cross-pollination.

The flower or rather inflorescence of the Kachu consists of a spadix which is almost completely enclosed in a long narrow yellow spathe. The spadix is much shorter than the spathe and consists of four distinct parts:—

- (i) An upper smooth pointed portion about an inch or two in length which bears no flowers, called the appendage.
- (ii) A long and fairly thick cylindrical portion of about two and a half inches in length, consisting of numerous closely packed pale yellow staminate flowers. Each staminate flower consists of about 6 (3-8) sessile anthers which are all united into a single structure (synandrium), and opens at the top by six minute pores. Each pair of minute openings, with the lobes on either side of it, really represent the top of one of the sessile anthers which make up the synandrium.
- (iii) A slender middle portion, about an inch long, and corresponding in height to the constricted part of the spathe, composed of a few elongated and irregularly shaped bodies - rudimentary flowers.
- (iv) The lowest part of the spadix which is rather thick and about an inch and a half long is enclosed in the lower compartment formed by the spathe. It consists of numerous rounded bodies of a glossy dark green colour, constituting the mass of pistillate flowers. Each pistillate flower consists of three united carpels forming a one-celled ovary and a

sessile slightly three-lobed stigma. Within the ovary are numerous orthotropous ovules arranged on three parietal placentas. Neither the staminate nor pistillate flowers have any perianth.

In the Kachu plant, as in other Arums, the flowers are protogynous, a condition in which the stigmas ripen first. To adapt this condition to the employment of insect agency for the purposes of cross-pollination the inflorescence of the *Colocasia* passes through three stages. In the first stage the lower dark green part of the spathe partially opens and exposes the mature stigmas of the pistillate flowers, during this period a rather strong and unpleasant odour is observed which has a peculiar attraction for insects, and several flies are usually found during the day alighting near the opening and crawling inside. In the afternoon the scent becomes fainter, and the lower part of the spathe gradually closes, and by the evening the flies are completely imprisoned in the spathe. The spathe is erect, and the narrow portion is not sufficiently constricted to prevent the flies passing into the upper portion. On the following morning the upper part of the spathe will be found to have partly opened, but the lower part remains tightly closed. This is the second stage; the staminate flowers are mature, and the anthers have commenced to shed their pollen, and the upper part of the spathe begins to turn yellow. The flies remain imprisoned until this stage is reached, they feed upon the pollen as soon as it appears, and at night they crawl up into the apex of the spathe and seek shelter from the damp and cold. On the day after, when they have had a surfeit of pollen, they fly through the opening, and visit another inflorescence where the stigmas are exposed and the odour attractive. In the third stage the upper part of the spathe turns yellow, falls away at an obtuse angle from the spadix, exposing the staminate flowers. At the same time the constriction of the spathe is narrowed so as to prevent the pollen falling upon the stigmas of the same plant, and any pollen falling from the anthers collects at this constriction. The lower portion of the spathe remains closed over the pistillate flowers which have been pollinated by the agency of the flies, and the fruit is allowed to form without further disturbance. The flies, which have been revelling in the staminal chamber, become covered all over with fine pollen and fly off to another inflorescence. Here the grains adhere to the sticky stigmas as they crawl over the newly opened flowers, and after divesting themselves of the pollen, crawl into the upper chamber and obtain more pollen when they are again ready to convey it to another plant. In this way cross-pollination of the Kachu is effected.

In the cuckoo-pint the flies and other insects enter from

above and passing downwards reach the pistillate flowers, where they are imprisoned until the pollen is ready for disposal. In the Kachu the lower part of the spathe deliberately opens and closes to capture the flies, and again opens above to release them. The floral mechanism of the Kachu differs therefore from that of the cuckoo-pint.

In *Arum maculatum* the primary attraction is the thick, dark-purple end of the spadix which projects out of the spathe at a very early stage, and the subordinate attraction is the decomposing smell of the inflorescence. In the colocasia the primary attraction is the strong and unpleasant odour issuing out of the partially opened spathe in the first stage, and the subordinate attraction, the colour of the appendage and the food for the flies, in the form of pollen.

During the rains when the air is very damp the upper part of the spadix while still attached to the plant commences to decompose, and the flies lay their eggs on it before flying off. If a rather mature spadix, in which the fruits are forming, be examined under a lens, it will be found to be full of the minute maggots of these flies. It seems, therefore, that the life of the flies, which have been identified in the Indian Museum as a species of *Acalytrate Muscidae*, is closely associated with that of the Kachu for the purposes of cross-pollination.

