DIMORPHIC CARPELLATE FLOWER OF ACALYPHA INDICA, *L.*

BY

L. A. KENOYER,

Agricultural Institute, Allahabad.

Acalypha indica L. is a common member of the Euphorbiaceæ growing over most of India as a weed on waste ground. It is said by Hooker to grow over a wide tropical area, from the Philippines to Tropical Africa.

The flowers are apparently in spikes; but a closer examination shows that the flower cluster is in reality a racemose cyme, each of the branches from the main axis being a cyme of three or more flowers. The lower branches, which are almost concealed by large bracts, bear trilocular carpellate flowers closely resembling in structure the carpellate flowers of *Ricinus* and the Euphorbiaceæ in general. Higher on the axis and with much smaller bracts are cymes of staminate flowers, while at the very tip without a bract is a peculiar bilaterally symmetrical unilocular carpellate flower which bears a single seed. This flower has three or four sepals which vary considerably in their position, and a monocarpellary pistil. The ovary is a transverse cylinder slightly depressed at either end and resembling a muff in appearance. The attachment of the stalk and sepals is to the curved surface midway between the ciliate-bordered ends. Arising from this point of attachment is the style. It resembles the style of a single carpel of the trilocular pistil except for its basal position and the fact that it is more fimbriate, having six to eight thread-like branches instead of three to five.

As the flower develops into the fruit the upper part of the cylinder elongates so that in its front or rear aspect the fruit is triangular with its apex downward. The edges are extended as hollow auricles which are fringed and rugose. The whole appears like a rhombic leaf bent so that the tip touches the base and enclosing a seed at its center.

To determine the significance of this terminal flower, inflorescence tips of various ages were killed in chrom-acetic acid, imbedded in paraffin, and sectioned. It was found that this flower starts as a

single carpel, there being no trace of other carpels, and that this carpel resembles in structure and appearance one of the three that make up the tricarpellary pistil. In both cases the style is terminal and the ovary orthotropous at the beginning. As development takes place in the monocarpellary flower, one side of both ovary and ovule greatly outgrows the other so that the micropyle of the anatropous ovule faces the style, which appears to come from the base of the ovary. In the polycarpellary flower, the conjunction with other carpels prevents any one carpel bending to bring the style into a basal position. But the ovule becomes bent in the same direction as in the terminal flower, the funiculus being lifted and folded against the ovule by the elongation of the common axis of the three carpels. The result is a half-inverted or amphitropous ovule with the funiculus joining the common axis about one-third the distance from its top, and with the micropyle at the upper end and not far from the base of the style. It will be seen that development in both cases keeps the micropyle near the base of the style in the most favorable position for the ready entrance of the pollen tube.

The obturator, a mass of cells observed by Baillon (1) as growing from the placenta toward the micropyle of certain Euphorbiaceæ, is conspicuous here. We also observe the beak-like tip to the nucellus which was noticed by Lyon (2) in *Euphorbia corollata* and by Schweiger (3) and Weniger (4) in other species of *Euphorbia*.

The difference in the shape of the ovary leads to interesting differences between the terminal and lateral seeds. On the lateral seed is a conspicuous white caruncle formed by the turgescence of the outer coat and occupying mainly the space between the funiculus and the micropyle. On the terminal seed, since the funiculus almost touches the micropyle, there is almost no caruncle. On the other hand its raphe is longer, extending the entire length of the seed.

Ten seeds of each type were selected at random from five different plants and were carefully measured. Those from terminal fruits averaged 1.247 mm. long by 1.047 mm. wide, those from lateral fruits averaged 1.447 mm. long by 1.115 mm. wide. The proportion of length to width of the former lot is 1.2 : 1, that of the latter is 1.3 : 1. It is also observable that the thickness of the terminal seed is about equal to its breadth, while that of the lateral seed is considerably less than its breadth.

In the material examined two interesting sports were discovered—one being a double flower of the terminal type occupying a terminal position, and the other a similar flower occupying a lateral position and lower down than other lateral flowers of the usual type.

D. C. FLOWER OF ACALYPHA INDICA, *L*

FIGURES 1—10.

FIGURES 11—21.

Explanation of the Figures.

1. Branch of Acalypha indica *L.* × ½.

2. Single inflorescence, showing side of the terminal flower with the much-branched style is on the right. × 8.

3. Terminal flower, viewed from the rear or face opposite style. × 8.

4. Mature terminal fruit, viewed from the front or style face. × 8.

5. Longitudinal section of an almost mature terminal fruit, showing the ear-like outgrowths. × 20.

6. Young staminate cyme. *C.* sepal, *s*, stamen of terminal flower. 1, lateral flower. × 50.

7. 8, 9, 10. Successive stages in development of a terminal flower. × 50.

11. Stage corresponding to 9 enlarged. *o. c.* outer coat, *i. c.*, inner coat, *o*, obturator, *b.* beak, *e.* embryo sac. × 220.

12, 13. Successive stages in development of a carpel of the lateral flower. 12 × 220, 13 × 50.

14, 15, 16. Side, front, and rear view of seed from a lateral flower. × 8.

17, 18, 19. Side, front, and rear view of seed from a terminal flower. × 8.

20. Double terminal flower. × 8.

21. Similar flower in a lateral position, an ordinary lateral flower above it. × 8.

Literature Cited.

1. **Baillon, E. H.**, Etude general du group des Euphorbiacees. Paris, 1858.

2. **Lyon, Florence,** Contribution to the life history of *Euphorbia corollata.* Bot. Gaz. 25 : 418-426. 1898.

3. **Schweiger, J.,** Beitrage zur Kenntis der Samenentwiklung der Euphorbiaceen. Flora 94 : 339-382. 1905.

4. **Weniger, Wanda,** Development of embryo sac and embryo in *Euphorbia Preslii* and *Euphorbia splendens.* Bot. Gaz. 63 : 266-279. 1917.