THE NATURE OF THE INFERIOR OVARY IN AMARYLLIDACEAE

THE study of transections of flower buds of *Eucharis amazonica* (family *Amaryllidaceæ*) shows that the pedicel possess as a rule an undulating ring of twelve collateral vascular bundles. Six of these are somewhat bigger in size than the alternating six. Of the first six, three again are larger than the alternating three. At the very base of the inferior ovary, the three largest bundles, which are on the same radii as the outer whorl of perianth leaves, divide to form the midrib bundle of an outer tepal, the trace of the superposed stamen and the midrib bundle of one of the carpels on the same radius. The three alternating large bundles, which are on the same radii as the inner whorl of perianth leaves, divide to give rise to the midrib bundle of one of the perianth leaves and the trace of the superposed stamen. The division of the bundles takes place in the same manner as Arber[1] has described in *Hymenocallis*, *Narcissus*, etc. The six smaller bundles of the pedicel divide to form the marginal traces of the adjacent perianth leaves. Thus a transection of the ovary about the middle shows the vascular supply of all the floral whorls quite distinctly marked off from one another even in the wall of the ovary. And, just as Joshi and Pantulu[2] have shown in *Polianthes tuberosa* belonging to the closely related family, Agavaceæ, it is very clear that in *Eucharis amazonica* also the inferior ovary and epigyny have originated as a result of the adnation of the perianth leaves, stamens and carpels.

The author takes this opportunity to express his gratitude to Dr. A. C. Joshi for suggesting the problem and guidance during the progress of the work.

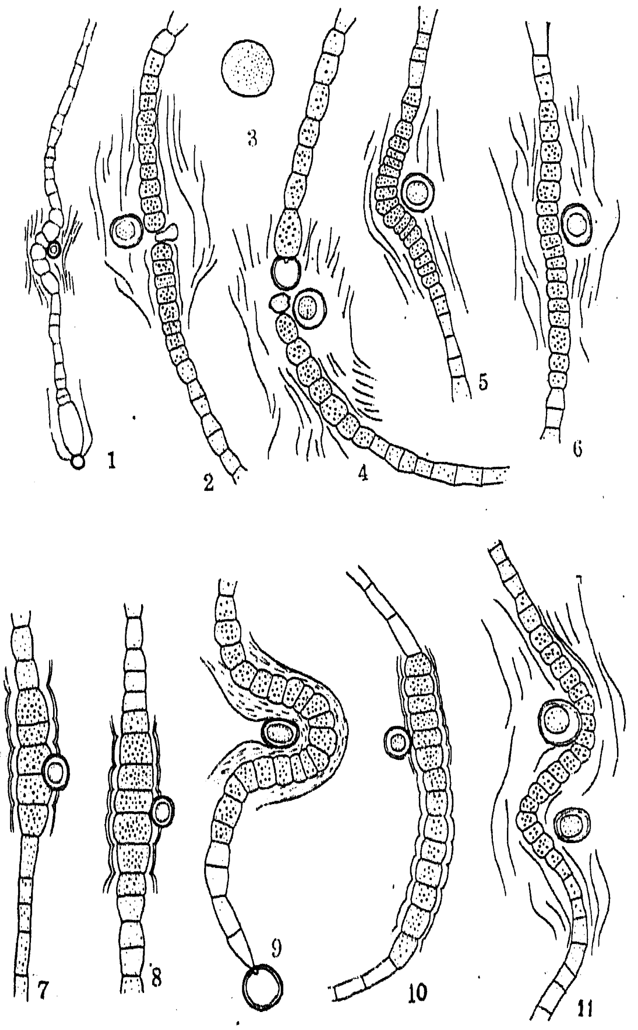
Department of Biology,
Maharaja's College,
Jaipur, S. B. CHATURVEDI.
March 15, 1945.

1. Arber, A., *Ann. Bot.*, N.S., I, 1937, p. 293–304.
2. Joshi, A. C., and Pantulu, J. V., *Jour. Ind. Bot. Soc.*, **21**, 31–71.

NOTE ON THE REACTIONS OF *GLOEOTRICHIA RACIBORSKII* WOLOSZ., TO A PARASITIC ATTACK

WHILE examining some preserved material of *Glœotrichia Raciborskii* Wolosz., collected from a lake at Chingleput, the writer came across filaments which were bent in various ways in the middle. A tiny, round, unicellular fungal (?) parasite was found attached to the filament laterally on the inner side of the bent portion (Fig. 1). At first sight this tiny parasite looked like a lateral heterocyst on the filament or a heterocyst of the alga lying loose at the side of the filament, since it showed a certain amount of resemblance to the heterocyst of the alga both in shape and size. A careful examination of the cell, however, showed that it was not a part of the alga, but some foreign organism attached to it. Its contents were more or less homogeneous and colourless and its wall was thin, firm and very finely punctate (Fig. 3). This parasite could not be identified as no other stage of its life-history could be seen in the material.

The chief interest lies in the reaction of the algal filament to the fungal attack. At the region of attachment of the parasite, the cells



FIGS. 1–11. *Glœotrichia Raciborskii* Wolosz.

Fig. 1. A filament showing the parasite inside the characteristic bend. Fig. 2. A portion of the filament, the cell attacked by the parasite dead and degenerating. Fig. 3. The parasite showing the punctate wall (cell contents not shown). Fig. 4. A portion of the filament with the adjoining cell above the dead cell converted into a heterocyst. Fig. 5. A portion of the filament bent round the parasite. Fig. 6. A portion of the filament just beginning to bend round the parasite.

Figs. 7 and 8. Portions of filaments showing larger and bigger cells with rich contents. Fig. 9. A portion of the filament showing the characteristic bend with the parasite well enclosed in the bend. Fig. 10. A portion of the filament with a number of cells becoming larger. Fig. 11. A portion of the filament with two parasites and two bends.

(Figs. 1–6, 11 from Chingleput lake material and Figs. 7–10 from Elliot's Beach pool material. Fig. 1 × 190, Figs. 2, 4–11 × 333·3 and Fig. 3 × 500).

of the filament increased in contents and became meristematic and soon began to divide repeatedly (Fig. 6). At the same time a dense mucilage was secreted round the filament at this region, and this mucilage later on became brown and lamellated. As a result of this increased growth the algal filament becomes more or less bent round the parasite (Figs. 5, 11). No haustorial connection of any kind between the parasite and the host filament could be made out in the formalin material, but it is reasonable to presume that some kind of haustorial connection probably of a very delicate nature existed in nature and was not preserved in formalin material. The particular cell to which the parasite is attached often degenerates and dies (Fig. 2) and the adjoining cell on the upper side of the filament then becomes converted into a heterocyst (Fig. 4). And the cell next to this heterocyst occasionally develops into a spore. In other words, after the death of the cell attacked by the parasite, the portion of the algal filament above the dead cell behaves like a new filament of *Glœotrichia Raciborskii* with a basal heterocyst of its own.

This parasite was found later on in another collection of *Glœotrichia Raciborskii* from a fresh-water pool near Madras. The alga showed the same reactions to the attack of the parasite (Fig. 7-10).

Instances of *Glœotrichia* being attacked by a parasite do not appear to have been recorded previously. No case of any fungus-attacking *Glœtrichia* is given by Lemmermann (1910), Oudemans (1919) and Seymour (1929).

The author wishes to express his indebtedness to Prof. M. O. P. Iyengar for his kind help and guidance during this investigation.

University Botany Lab.,
Madras, T. V. DESIKACHARY.
May 1, 1945.

1. Lemmermann, E., *Algen* I in *Kryptogamenflora* in der Mark Brandenburg, 1910, **3**, 7, Leipzig. 2. Oudemans, C. A. J. A., *Enumeratio systematica fungorum*, *I*, 1919, The Hague. 3. Seymour, A. B., *Host Index of the Fungi of North America*, 1929, Cambridge.

A MOSAIC DISEASE OF CARDAMOM

MOSAIC of cardamom, *Elettaria cardamomum* Maton, also known by the name of *"katte"* or marble disease, is a serious affection of this crop and extends over a wide area. It occurs in Travancore, Mysore and North Kanara, in which latter area it is not only the commonest disease but causes most severe damage to the plants, rendering them commercially useless in a few years after planting.

The first visible symptoms of the disease are manifested by general chlorosis of the entire leaf with slender interrupted stripes of deep-green tissues over its surface. These stripes follow along the veins and run parallel to each other from the mid-rib to the margin of the leaf. When the disease is fully developed, the stripes of green tissue are almost evenly distributed over the leaf, presenting a characteristic mosaic pattern. In nature, cardamom plants are susceptible to infection at all stages of growth.

Affected clumps deteriorate rapidly. The newly formed shoots from such clumps are reduced in size, and there is a gradual reduction in their productivity, followed by death. Many of the clumps wither before they begin to yield.

The disease was first reported by Mollison[1] who considered it a degeneration disease brought about by continuous culture of cardamom under the same conditions of soil and climate, and without any change in methods of propagation and reproduction. Later, Sahasrabuddhe and Bapat,[2] as a result of an investigation into the soils in the cardamom gardens in North Kanara, came to the conclusion that the *katte* disease was induced by an unfavourable soil condition associated with the prevalence of certain types of soil protozoa. Mayne[3] expressed the opinion that the disease was probably of virus origin.

The present experiments on transmission of the *katte* disease were done in insect-proof glasshouses at Sirsi in North Kanara. In some experiments 'sick' soil from diseased gardens or soil into which pieces of rhizomes and roots of affected plants were incorporated, was used to fill pots in which healthy seedlings were transplanted. In another experiment seedlings were directly planted in the garden in pits dug up to remove dead clumps and were carefully protected with muslin cages. In all cases plants under test remained healthy, showing that the disease is not soil-borne.

All attempts to transmit the disease by sap inoculation have so far been unsuccessful.

A survey of the insect fauna of the spice gardens in North Kanara revealed a species of thrips, *Tæniothrips cardamomi* Ayyer, two species of jassids, two species of white flies, and an aphid, probably *Pentalonia nigronervosa* Coq., commonly feeding upon cardamom plants. The aphids breed on the stems underneath loose leaf-sheaths, and large colonies of these insects are found on decaying cardamom plants. The aphids were also found breeding on banana plants.

In transmission experiments with the above insects, only the aphid, *Pentalonia nigronervosa*, readily transmitted the virus of cardamom mosaic. The disease developed in 21 to 46 days after the infective aphids were transferred to healthy plants grown in insect-proof glass-houses.

The above evidence shows that mosaic of cardamom is caused by virus and that it can be transmitted by *P. nigronervosa*, the insect vector of bunchy top disease of bananas. Experiments on transmission of the disease by sap inoculation and by seed are in progress.

Grateful acknowledgment is made of the facilities provided by Mr. Venkatrao V. Nilekani for carrying out experiments in his garden at Sirsi. This work is being carried out under the Plant Virus Research Scheme