34. ON THE GERMINATION OF COCOA SEEDS

(With a photograph)

The Institute of Science garden has probably the only Cocoa (*Theobroma cacao*) plant in the city of Bombay. It has been bearing flowers during the last 9-10 years, and the number of flowers produced has showed a steady increase year after year. Up to the 1967-68 flowering season, there was no fruit-bearing in spite of abundant flowering. In the year 1969-70, about 100 fruits, 5-8 cm in length were observed on the plant. After a few days these changed colour from yellow to red and later all of them shrivelled, became black, and dropped. There were no signs of any embryo within them. Wright (1907) in his monograph on Cocoa, as quoted by E. E. Chessman (1927), states that these cases may be regarded as cases of succulence without fertilization.

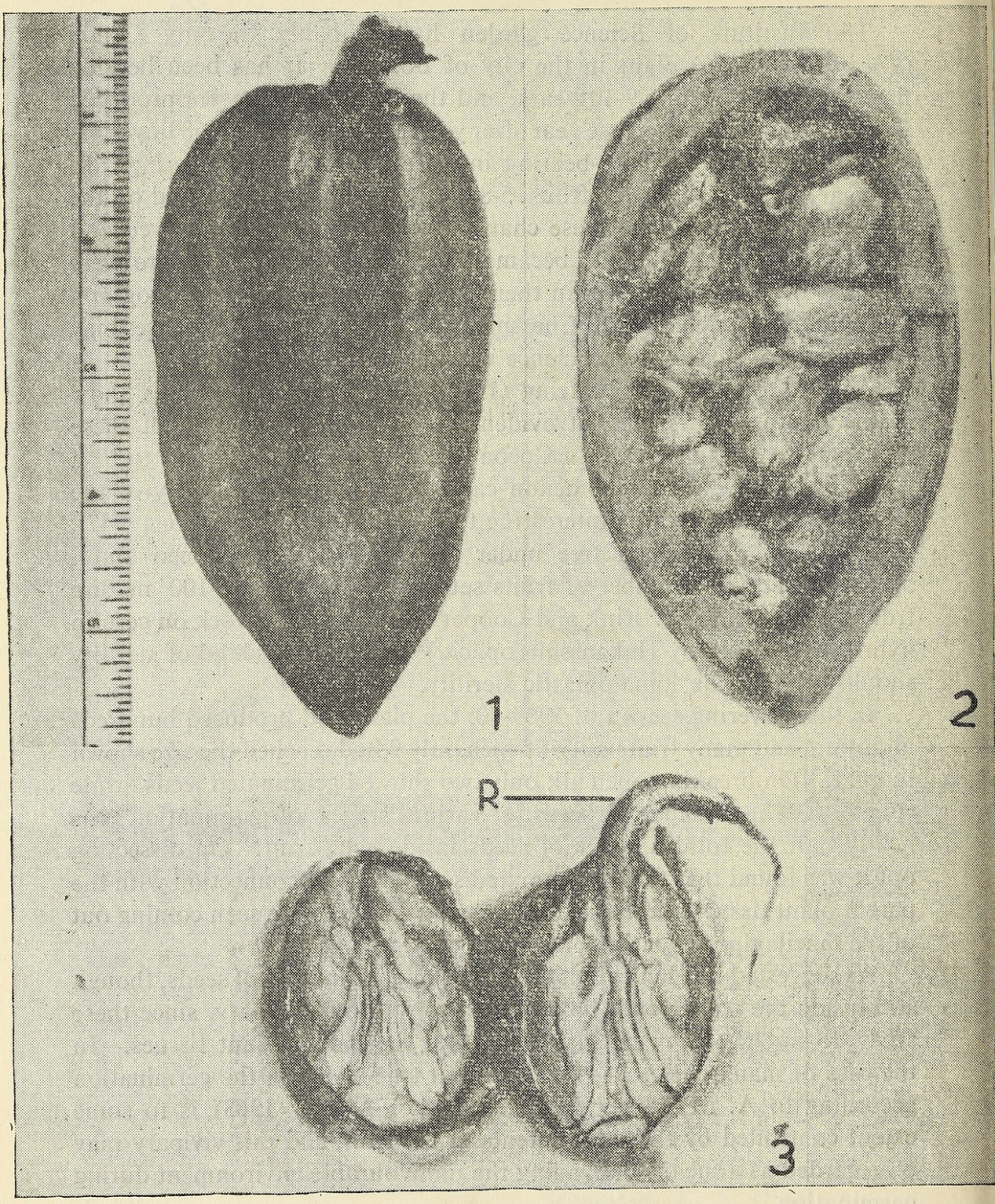
According to Arne Muntzing (1947) ' self-incompatible trees show a very profuse flowering but evidently only a small fraction of these flowers gave rise to fruits. In Cocoa this wilting of fruits seems to be a normal physiological phenomenon caused by the limited ability of the tree to bear fruits '. It is interesting to quote Arthur Hakansson (1947), who states that a cocoa tree under his observation produced about 50,000 flowers, the number of fruits set was 6000 and only 100 mature fruits were obtained. Brink and Cooper (1941), in their work on certain hybrids, as quoted by Hakansson (op. cit.), state that this kind of sterility should be called as somatoplastic sterility.

In the flowering season of 1969-70, the plant had produced hundreds of flowers and many fruits out of which only 9 had reached the size shown in fig. 1. On breaking open all, only two showed germinated seeds inside (Fig. 2). The number of seeds in various stages of germination was nearly half the total number of seeds inside each fruit. On dissecting out it was found that these germinated seeds have no connection with the parent plant tissues and radicles of varying lengths were seen coming out of the mucilaginous coating of each seed (Figs. 2 & 3).

As suggested by Khan (1945) this type of germination of seeds, though still inside the fruit, could be classified as spurious vivipary, since these seeds do not take any nourishment from the parent plant tissues. In the case of mangrove seeds, which exhibit true vivipary, the germination according to A. M. Mayer and A. Poljakoff-Mayer (1963), is to some extent controlled by the salt contents of the fruit, and this vivipary may be regarded as a means of evading the unfavourable environment during germination.

Singh & Lal (1937) have found that viviparous varieties of mango showed splitting of the endocarp at the broader end. This split endocarp was found to favour germination and thus it might account for the pheno-

menon of vivipary in mango. Kelkar & Navalkar (1958) have shown spurious vivipary in *Erythrina indica* where it is found that the curved and



splitted halves of the legume, provide a suitable place for germination during favourable climatic conditions. No such split was observed in the fruits of Cocoa.

What exactly causes the germination of seeds without having any dormant period, within a fruit, is summarized by A. M. Mayer and A. Poljakoff-Mayer in their book THE GERMINATION OF SEEDS: 'Many extracts from fruits and seeds have shown that they contain mixture of substances, some of which inhibit, while others stimulate germination, while yet others are active in affecting growth. The amount of these substances changes with time and with treatment of the seeds. It seems likely that germination is not simply controlled by inhibitors but that the interaction of both promoting and inhibitory substances regulate it'.

No independent plants could be grown from these germinated seeds. What stops this activity is not clear. The material shown in Fig. 2 is kept in the Institute of Science Botanical Museum.

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