

an armour of spines arranged in clusters, and, as the fruit matures, they are sloughed off. The mechanism involved has not, to my knowledge, been studied. It would be useless to speculate on the "biological significance" of this procedure.

THE ABSCISSION OF FLOWERS AND FRUITS.

The structure aggregates which, specialized with reference to reproduction, take the form of flower-shoots, and, with the progress of events, of fruit shoots, simple (supporting a single flower) or compound, may or may not normally be shed.⁵ The cotton, peach and tomato, under, at present, little understood conditions, sometimes lose a very large proportion of their flowers before anthesis, to the great prejudice, as it is assumed, often not out of harmony with the facts, of the expected crop. Farmers and horticulturists frequently lose 50 per cent. or more of the theoretical returns for the labour expended.

Abnormal shedding of the entire and perfect flower *while open* is, for reasons not comprehended, relatively rare, though it is known to occur in cotton, as I have myself observed. *Mirabilis jalapa*, the well known Four-o'clock, does so phenomenally under untoward conditions, and has been studied particularly by Hannig (12), who furnishes in his paper a list of some twenty or thirty other species which may behave similarly. On the other hand, normal abscission intervenes, to remove staminate flowers after pollination has occurred, in the cucurbits, and before, and as a *conditio sine qua non* to it, in the hydrocharids. The eel-grass is a classic example, whose staminate flowers are loosened in the morning (Wylie, 13) and, floating on the surface of the water, open and bring their pollen by the chance of currents and surface tension into contact with the stigmas of the pistillate flowers. A still more remarkable behaviour is that of the closely related *Enalus acoroides*, of the eastern tropical shores. This has been more fully studied by Nils Svedelius (14), who points out, however, that Zollinger was the first to record the floating of the staminate flowers. These, according to Svedelius, are released at low tide. Having come into contact with the pistillate flowers, which reach to the surface only at this time, they are grasped by the petals, and in spite of the rise of the tide, are held firmly, and pollination proceeds below the water surface.

Just as abscission occurs before and during anthesis, conditions may be such as to induce the shedding of the developing fruit. The "boll-shedding" of the cotton intervenes chiefly during the earlier stages of development of the fruit or "boll,"

⁵With various form of dehiscence this paper has nothing to do.