the cells were in the thymidine for ½ hr. and the duration of mitosis is about 35 min.

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Induction of Parthenocarpy in *Rosa arvensis* Huds. with Gibberellic Acid

As has been previously reported[1], parthenocarpy may be induced in the two non-apomictic species, *R. rugosa* Thunb. and *R. spinosissima* L., by means of α-naphthaleneacetic acid, α-naphthaleneacetamide and 2 : 4 : 5-trichlorophenoxyacetic acid. Similar experiments were carried out in an attempt to induce parthenocarpic development in a third non-apomictic species, *R. arvensis*.

The auxin was applied in two ways to the unopened flower-bud, which was emasculated by cutting off the 'disk' (including the head of stigmas) immediately prior to treatment. In early experiments aqueous solutions of the auxins mentioned above and indoleacetic acid were injected into the cavity of the receptacle in concentrations ranging from 2 to 25 p.p.m. In later work the auxin was applied to the cut surface as a lanolin paste in concentrations of 0·025–1·0 per cent. Since *R. arvensis* differs from the other two species in having a much lower ascorbic acid content[2,3], additional mixtures, including ascorbic acid, were used.

Almost all these experiments produced negative results, the emasculated control hips usually surviving longer than those treated with auxin. Out of a total of about 300 buds treated, only four showed any signs of growth; these had received the lowest concentration of auxins in lanolin and two of them had had ascorbic acid.

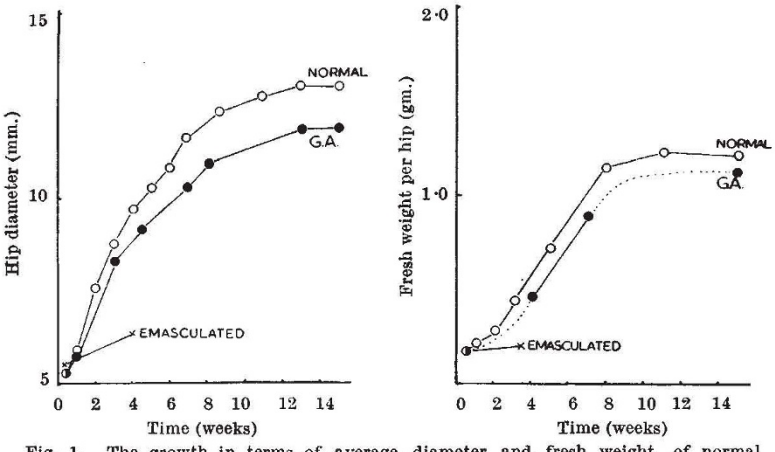

Fig. 1. The growth in terms of average diameter and fresh weight of normal hips, ○—○; emasculated flower-buds ×—×; and emasculated flower-buds treated with 1·0 per cent gibberellic acid in lanolin, ●—●

Since the development of rosaceous fruit after fertilization is characterized by increase in cell size rather than in cell number, the properties demonstrated for gibberellic acid suggested that it might be effective in inducing parthenocarpic development. In February 1958 parthenocarpic hips of *R. rugosa* were produced in the greenhouse by the application of gibberellic acid and shortly afterwards similar results were recorded for *R. spinosissima*[1].

In June 1958, 200 flower buds on a bush of *R. arvensis* were emasculated and 1·0 per cent gibberellic acid in lanolin was applied. Control groups of normal and emasculated buds were also selected; it had previously been shown that the application of lanolin alone produced no response. Samples from each group were harvested at intervals for determinations of fresh and dry weight, and Fig. 1 shows the development of the different groups of hips in terms of average hip diameter and fresh weight.

The main period of fruit-drop in *R. arvensis* is 3–5 weeks after flowering; 46 days after treatment with gibberellic acid 107 out of 150 hips were developing parthenocarpically, which represented a fruit-set of 71 per cent compared with 45 per cent for the normal, fertilized hips under these field conditions. None of the emasculated buds developed. Of the 57 parthenocarpic hips allowed to remain until maturity at 14 weeks after treatment, 48 had the appearance of normal, ripe hips while the other nine were smaller and not fully pigmented.

The *Triticum* coleoptile straight-growth test of Luckwill[4,5] showed that normal hips appear to contain two acidic, growth-promoting substances having R_F values of 0·1–0·2 and 0·4–0·5 in *iso*propanol/ammonia/water, and a neutral, growth-promoting substance with an R_F of 0–0·1 which is present in small quantities in the bud and flowering stages but which could not be detected 17 days after flowering, or in subsequent assays. None of these three substances was found in either parthenocarpic hips or emasculated controls, but a neutral growth-substance (R_F = 0·4–0·6) was present in the emasculated hips and an apparently identical substance was found in the parthenocarpic hips. A consistent growth-inhibitory effect was present in the tests, predominantly in the acid fraction and centred at R_F 0·8 in all stages of normal, emasculated and parthenocarpic hips.

The relationship between achene development and variations in the amount of growth regulators will be reported elsewhere.

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