found in the fleece of the lamb. Coarse fibred arrays occurred on regions which grew much more rapidly after the 80th day, that is, after the completion of the trio stage of follicle development³.

From ' α -with-time' calculations⁴ (the curves for which did not vary markedly from the α -curves) it was possible to demonstrate that changes in follicle density regions were associated with changes in the growth rate of that region. Further, from the curves it was shown that on regions with a large number of pre-curl tip fibres—for example, poll and neck regions—follicle initiation commenced when the growth rate of that region was at a maximum.

Full details are contained in my D.Sc. thesis for the University of Edinburgh, and will be published in the form of papers.

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¹ J. S. Huxley and G. Teissier, *NATURE*, **137**, 780 (1936).

² Nancy Galpin, *Emp. J. Agric. Sci.*, **4**, No. 14 (1936).

³ Nancy Galpin, *J. Agric. Sci.*, **25**, pt. 3 (1935).

⁴ O. Richards, Carnegie Institution of Washington, Pub. No. 452.

Growth Hormones and Development of Plants

LATELY great attention has been paid to vernalization of various agricultural plants. Vernalization essentially consists in retarding the germination of seeds by means of insufficient soaking, low temperature, etc. When afterwards the seeds are subjected to normal conditions, further development of the plants proceeds at a greater rate, flowering and fruiting taking place earlier than in control plants.

The physiological nature of this phenomenon is not yet clear. Some experiments have led me to suggest that vernalization is accompanied by an increase of the concentration of growth hormone in the cells of the embryo¹.

This hypothesis suggested that it would be worth while to soak seeds in concentrated solutions of the growth hormone and examine the effect on the development of the plant. On the basis of previously published data² it was to be expected that in this case, at least in the Gramineæ, there would be an accumulation of the hormone in the tissues of the developing embryo.

The following sources of the growth hormone were used for the experiments: a solution of β -indolyl-acetic acid (1–2 mgm. per 10 c.c. water) and also the finely cut and moderately moistened endosperm of maize (without the embryos). The seeds of experimental plants were soaked in these substrates for 24–48 hours at 18°–20° C., and then they were planted out into the soil in flower-pots, and cultivated in a greenhouse. The seeds of the control plants were soaked for the same period of time in distilled water or in moist sawdust.

The most interesting data were obtained in the experiments with oats (Siegshafer). The plants which developed from seeds 'hormonized' in the endosperm of maize at first lagged behind the control ones in their growth, but later on they were far ahead of them and bloomed twelve days earlier.

From the seeds of oats which were soaked in the β -indolyl-acetic acid, considerably stronger plants developed than from the control ones. Blooming took place simultaneously in both groups. The

quantity of grain which was collected from the experimental plants (when calculated per plant) was greater than in the control ones by 55 per cent.

Thus we see that 'hormonization' of the seed before planting sometimes influences the further development of the plants and causes in some cases an acceleration of their development and a shortening of the vegetative period; in other cases a stimulation of growth, accompanied by an increased crop, is observed. It seems possible that treatment of seed by the concentrated solutions of various growth substances may find its application in agriculture.

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¹ *C.R. Acad. Sci. U.R.S.S.*, 1936 (in press).

² *Planta*, **23** (1935).

Divergent Physiological Effects of Synthetic and 'Natural' Ascorbic Acids

DEPENDING upon the concentration of the active substance, the effect of ascorbic acid upon the growth of seedlings may be either stimulatory or inhibitory. It has been noticed before^{1,2} that, at a given concentration, the effects of the synthetic product and of the acid crystallized from a natural source were not identical. We have endeavoured to investigate the reason for the discrepancy.

Commercial synthetic ascorbic acid sold by British Drug Houses, Ltd., and the ascorbic acid isolated from paprika and kindly given by Prof. A. Szent-Györgyi, were compared. Pure-line Wilhelmina wheat, which we owe to the kindness of W. H. Parker of Cambridge, was germinated, after external sterilization, on filter paper in Petri dishes. 3–5 ml. of an aqueous solution of ascorbic acid was added daily to the Petri dishes, each containing 30 wheat seeds, aseptic precautions being used throughout. The experiment was concluded after 12–14 days, when the food reserves of the seeds were exhausted. The effects of substances intermediate in the synthesis were also tested. The accompanying table gives our results:

Substance	Concentration	Average length of one shoot (mm.)	Average weight of all shoots (gm.)
Ascorbic acid synthetic	5/1,000	49	0.70
Ascorbic acid natural	5/1,000	72	1.05
Ascorbic acid synthetic	1/1,000	66	1.08
Ascorbic acid natural	1/1,000	97	2.10
d-Glucose	5/1,000	104	1.84
d-Sorbitol	5/1,000	80	1.48
L-Sorbitol	5/1,000	68	1.25
Water (control)	—	90	1.95

The previously noticed inhibitory effect of natural ascorbic acid at a concentration of 5 in 1,000 has been confirmed. This inhibition is nevertheless much inferior to that produced by the synthetic product of the same concentration.

In previous experiments, natural ascorbic acid was found to exert optimal stimulation at a concentration of 1 in 10,000; from the above results, stimulation by the natural product can be discerned at 1 in 1,000,