Botany. — *The influence of growth-promoting substances on decapitated flower-stalks of Bellis perennis.* By INA E. UYLDERT. (Communicated by Prof. F. A. F. C. WENT.)

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The fact is well-known that the growth of flower-stalks is greatly retarded by the removal of the flower-buds. Sometimes the growth may even come to a complete standstill.

SÖDING (1926) showed that this retardation does not take place when the flower-bud is fixed again on the stalk by means of gelatine.

CHOLODNY (1924) removed the tops of Lupinus hypocotyledons. In also removing the central portion of the organ, he obtained hollow cylinders incapable of geotropic curvature. If the coleoptile tips of Zea mays were placed in these stumps, the curvature could be induced again. In this way he stimulated the organs to resume their growth.

In view of these experiments it seemed feasible to induce growth in decapitated flower-stalks by means of growth-substances from other plants. The experiments described in this paper were carried out with the decapitated flower-stalks of Bellis perennis and growth-substances prepared from the coleoptiles of Avena sativa by Dr. F. W. WENT and Mr. H. E. DOLK.

Intact plants of Bellis were planted in zinc boxes. The boxes were placed in a glass-covered glass basin and placed in the green house. In this way they were kept in a moist atmosphere at a temperature of about 20° C. Large flowerbuds were cut off with a rasor, 5 to 7 millimeters below the bud. The remaining stalk was marked with India ink 15 millimeters below the wound. Three series of growth measurements were carried out.

A. By shoving a tightly fitting glass capillary over the stumps, the buds could be fitted on the stump with a drop of 15 % gelatine.

B. By sealing the capillary with wax on one side, and filling them with agar which contained the growth-substances one could observe the influence of foreign growth-substances.

C. Pure agar was used as control.

The increase in length was measured with a millimeter scale; tenth of millimeters were estimated.

In series A the flower-buds were replaced.

In series B agar with growth-substances from Avena was put on the

TABLE I (flowerbuds, cut off with 7 millimeters of flower-stalk)

	A. flowerbuds increase in length in millimeters in 24 hours		B. agar with growth substances increase in length in millimeters in 24 hours		C. Control increase in length in millimeters in 24 hours	
1	2.6		0.7		0.2	
2	0.5		0.4		0.4	
3	1.1	average	1.3	average	0.2	average
4	0.7	1.36	1.5	1.09	0.5	0.39
5	0.8		1.2		0.6	
6	2.8		1.5		0.5	
7	1.0		1.0		0.3	

The increase in length of a 15 millimeter zone was measured.

flower-stalks. The quantity of growth-substances amounted to 3500 tip-minute [1]) per flower-stalk.

Serie C were the control experiment without flower-buds or growth substances.

This table shows that the flower-stalks in column B have grown considerably more than in column C and as much or a little less as in column B.

TABLE II (flowerbuds cut off with 5 millimeters of flower-stalk)

	A. flowerbuds increase in length in millimeters in 24 hours		B. agar with growth substances increase in length in millimeters in 24 hours		C. Pure agar increase in length in millimeters in 24 hours		D. Control increase in length in millimeters in 24 hours	
1	1.8		5.0		0.2		0.1	
2	2.2		1.8		0.7		1.1	
3	1.8	average	1.3	average	0.4	average	0.9	average
4	1.0	1.43	1.6	1.93	0.2	0.40	0.6	0.65
5	1.2		1.1		0.5		0.7	
6	0.6		0.8		0.4		0.5	

The increase in length of a 15 millimeter zone was measured.

[1]) One "tip-minute" is the amount of growth-promoting substances, which diffuses out of the coleoptile-tip into an agar disc in one minute. 600 tip-minute may mean therefore the amount diffusing out of 6 tips in 100 minutes or out of 12 tips in 50 minutes.

In series A flower-buds were replaced.

In series B agar was put on with growth-substances, 2000 tip-minute per flower-stalk.

In series C pure agar, without growth-substances, was put on.

D is another control in which the buds were simply cut off.

Then again pure agar was put on 12 flower-stalks (A) of 6 flower-

The increase in length of a zone of 15 millimeters in 24 hours amounted stalks (B) the flower-bud was simply cut off.
to 0.38 millimeters at A and 0.33 millimeters at B as an average.

This shows that in harmony with table II, pure agar has no influence on the growth.

Therefore the result of this experiment is, that flower-buds as well as growth-substances from Avena accelerate the growth considerably.

The table shows the remarkable fact, that the increase in length of B 1 was exceedingly great. It may be observed that the increase in length with normal plants measured over the same zone, in the same time, amounts to 3—10 millimeters. It therefore appeared possible to make use of such experiments to demonstrate the presence of growth-substances. For, at the beginning of the experiment, it was unknown to me, in which agar the growth-substances were present; I received the information after the measurements were completed.

The growth-substances present in the coleoptiles of Avena and the flower-buds exert an analogous influence on the flower-stalks of Bellis perennis; they both accelerate the growth.

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LITERATURE.

CHOLODNY N. 1924. Ueber die hormonale Wirkung der Organ-Spitze bei der geotropischen Krümmung. Ber. d. Deutsch. bot. Ges. **42**, p. 356.

SÖDING H. 1926. Ueber den Einflusz der jungen Infloreszenz auf das Wachstum ihres Schaftes. Jhrb. f. wiss. Botan. **65**, p. 611.

WENT F. W. 1928, Wuchsstoff und Wachstum. Recueil d. Trav. bot. néerl. Vol. **25** p. 1.