ETIOLATION.

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A large amount of work has been done on the subject of etiolation. Its connection with light was observed by Ray,[1] from that time on by various investigators, chief among whom was Sachs,[2] G. Kraus[3] and others. As is well known, light affects the shape of plants. While etiolated plants generally grow taller, this is not always the case. Exceptions to this are to be seen in *Beta vulgaris* the leaves of which are not diminished in size by darkness.[1] The same holds true of Cucurbita. Sachs found certain flowers of normal size while Vöchting under certain conditions of darkness observed only small cleistogamous flowers. Certain flat stems of cacti in the dark may even become shorter or somewhat radial in structure. Some subterranean structures show no increase in length.[1] The internal structure especially the pallisade parenchyma, is frequently considerably changed as shown by Stahl[2] and others. Some leaves remain of normal size in darkness, as Jost[3] found in *Mimosa pudica*. Wiesner[4] found, however, that growth was stopped by a light of 1,300 to 5,000 candle power, yet Oltmanns[5] found growth continued when light equal to 500,000 candle power was used.

The present investigation deals with measurements of seedlings of *Vicia faba* under conditions of light and darkness. These data are, in part, founded on experiments by Miss E. F. Anderson, Miss M. H. Coddington and Miss M. E. Spencer. *Vicia faba* is especially well adapted to such tests. The seeds were soaked 24 hours before planting, and since they showed considerable difference in amount of swelling only those which were completely swollen were used for planting in soil. These seeds have a large amount of food stored and were grown for several weeks in darkness for comparison with controls grown in light. The height of the stems was as follows,

Age of Plant	Height of Control Plant	Height of Test Plant
1 day	1 cm.	2 cm.
2 days	1.5 cm.	4 cm.
3 days	2 cm.	9 cm.
4 days	3 cm.	12 cm.
6 days	3.5 cm.	18 cm.
12 days	5 cm.	30 cm.

[1] Pfeffer, W.: Pflanzenphysiologic Bd. II, 1904, pp. 98-99.

[2] Pfeffer, W.: l. c., p. 100.

[3] Jost, L.: Jahr f. wiss. Bot. 1897, Bd. 27, p. 478.

[4] Wiesner: Ueber die heliotropisch. Erscheinungen im Pflanzenreich, 1878, I, p. 37; 1880, II, p. 13.

[5] Oltmanns, Flora, 1887, p. 20.

The stems of the control plant were, on the average, 7 mm. in diameter after the third day and were at all times erect. Those of the test plants were 3 to 4 mm. in diameter, weak, and nearly procumbent. When brought into light, even when four days old and 12 cm. long, they never regained the erect habit.

The terminal leaves of the test plant were small, but larger than those later formed on the stem. These appeared in a measurable form by the sixth day and averaged 3 mm. wide and 7 mm. long. When the test plant was placed in the light the leaves just mentioned attained the following dimensions: On the second day 3 cm. long and 2 cm. wide, on the fourth day 3.75 cm. long and 2.5 cm. wide, on the fifth day 5 cm. long and 3 cm. wide, on the sixth day 6 cm. long and 3 cm. wide. Cross sections of the leaves showed the tissues much reduced and thinner in the test plant. There were only four rows of cells in cross section while the control had eight rows of cells which were for the most part larger and had heavier walls. When the test plant was brought into the light, a trace of chlorophyll was evident in 3 hours at 25° C. and in ten days all of its leaves were as green as those of the control.

A cross section of the stem of the test plant showed, in comparison to the control, a much reduced diameter, thinner cell walls, reduced parenchyma and a more poorly developed vascular system. The food substances in the seed of the test plant grown in darkness were exhausted at the end of 31 days. The volume of the plant then measured 130 cc.

MISDIRECTED LEAVES OF SETARIA GLAUCA.

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The writer has performed some experiments with pieces of *Setaria glauca*, each piece having one node and parts of two internodes. Twenty pieces were used. Some were placed horizontally and others vertically in moist sand. The leaves sheathed the stems in 15 of the specimens in the usual way. In three of the horizontal and two of the vertical pieces there was a departure from the usual position of the leaves on the stems. Instead of the leaves arising from the cushion like thickenings on the exterior of the stem, generally called nodes, I found an entirely different arrangement in five of the 20 specimens. In these five specimens the leaf arose in each case on the interior of the node-like cushion, growing through that part of the internode which was directed away from the moist sand. Each leaf finally emerged from the internode and projected from the cut end to a distance varying from one to three centimeters. In two of the five specimens the leaf was of the usual blade-like shape, while in the other three specimens, the leaf, after emerging from the internode, assumed a conical bushy or brush-like form composed of many fine divisions. In all five specimens, the part of the leaf, which protruded from the internode was green but was completely etiolated toward the node-like cushion.