Observations of the Growth of an Injured Plant of Dirca Palustris

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It is generally thought that an injury to a living organism would decrease its vitality and interfere with its continued growth and development. The following is the story of a five year observation of the relative growth of four plants of *Dirca palustris* (Leatherwood), one of which was injured.

Prior to measuring, the plants were established as follows. In the spring of 1936, three plants of *Dicra Palustris* were taken from a creek bottom of moist alluvial soil in a partly shaded locality, their natural habitat, and placed in an open location of a rather dry silt loam. In the autumn of the following year, 1937, only one of the three plants had survived, and it was somewhat deficient in vigor. In the spring of 1938, the two plants which died were replaced by three others of about the same size taken from the same habitat. During the winter of 1937-38 the surviving specimen of the first replanting was accidentally broken over a couple of inches above the ground. In the spring this plant was straightened and given support to hold the broken parts together until they were repaired. During that summer, 1938, the four plants grew but were not normal as to vigor. The growth of the following summer, 1939, was improved over that of the previous year. The injured plant showed improvement in growth and vigor and the three uninjured ones were in good condition, though not as good as those in their natural habitat. The summer of 1940 showed a noticeable improvement in growth of all four plants. The fracture of the injured plant seemed to have been repaired, only a scar in the bark remaining in sight. All four of the plants, the injured and the uninjured ones, grew well and blossomed. In the autumn of 1941 it was observed that the injured plant had made more growth than any one of the uninjured plants. No measurements were made at this time. The growth of all the plants seemed normal; they all blossomed that season.

At the close of the growing season of the next summer, 1942, measurements were started. Ten of the main branches of each of the four plants were selected as nearly uniform as possible; these were marked with wire rings. At this time measurements of the 1941 growth were made, as well as that of 1942. Total growth measurements were made each succeeding year, including 1945, a total of five years.

The measurements of the total growth in inches for each plant are tabulated below.

Uninjured plants	1941	1942	1943	1944	1945
No. 1S	24.7	24.7	25.2	21.2	15.0
No. 2E	36.0	31.0	24.7	18.5	20.0
No. 3N	27.2	17.2	31.0	22.2	26.0
Average per plant	29.3	24.3	26.9	20.6	20.3
Injured plant	52.7	34.5	27.5	23.2	18.8
Difference	23.4	10.2	00.6	2.6	—1.5

It is fully understood that there are not sufficient data from this one set of observations to make safely any satisfactory deductions as to the causes involved, yet that does not preclude suggestions as to the probable factors. Holeman and Robbins (1939, pp. 39-40), in a discussion of tropisms in relation to the curvature of plant tissue, state, "In the case of tropisms a 'one-sided' external stimulus is responsible for the occurrence as well as the direction of the curvature but the plant itself curves by reason of a different rate of growth on the two sides of the organ." After raising the question as to the cause of the different rate of growth on the two sides of the organ, they say, "It has been demonstrated that growth hormones play an important role in this phenomenon. A hormone is a substance which produced in one part of an organism is moved to another part and there is capable of influencing a specific physiological process."

From Smith, Gilbert, *et al* (1942, p. 66) this statement is quoted, "When the stem, roots or even leaves of some plants are exposed to unusual stimuli such as wounding, as for example when a branch is cut from the stem, the exposed thin-walled cells are stimulated to divide." From these two references we might be warranted in suggesting the following application to the injured *Dirca palustris* plant.

First. When this plant was broken it received an unusual stimulus which caused an unusual accumulation of growth hormones around the fractured tissue which resulted in the formation of an unusual amount of thin-walled growing tissue. The amount of growing tissue decreased each succeeding year as indicated by the table.

Second. When the fractured tissue became repaired there might have been a surplus of growth hormones which stimulated the additional growth. This surplus might have been reduced each succeeding year as the need became less after the repair was made; thus in a few years the difference between the amount of growth between the injured and the uninjured plants would be removed and a balance reached as indicated by the table.

References

Holeman, Richard, and Robbins, Wilfred W.

1939. A textbook of General Botany for colleges and universities.

Smith, Gilbert M.; Gilbert, Edward M.; Evans, Richard I.; Duggar, Benjamine M.

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