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ON REGENERATION OF INJURED LEAVES

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Leaves that have been cut off in part, at right angles to the midrib, often produce a peculiar kind of "wing-"like ingrowth at the sides of the leaf which may in time, if the leaf is young when cut, very nearly produce the semblance of an entirely regenerated leaf. The surface and general shape of the leaf will not be at all perfect as compared to a normal uncut leaf, but to all intents and purposes a new leaf has been here regenerated from the cut-off stump. This occurs in a considerable number of plants. The writer found such to be the case in the *Fuchsia, Colcus, Kohl Rabi, Ruta Baga, Cabbage, Sweet Alyssum, Kentucky Wonder Pole Beans, Wax Bean, Mangel Wurzel, Rape, White Mustard, Bryophyllum, Honeysuckle, Viburnum, Cornus, Evonymous* and *Privet*. Others gave only slight trace of "wing growth" as in the *Sweet Briar Rose* and the *Witch Hazel*. In *Marrowfat Peas, White Pine* and *Tradescantia* no "wing growth" could be *observed. Smilex (Asparagus asparagoides)*, which produces leaf-like structures on its stem showed almost complete "regeneration" of cut-off portion, leaving only a slight scar visible in the mature leaf to show what had been done. These leaf-like portions therefore acted in much the same manner as leaves of other plants did.

The action of "wing growth" was carefully studied in some detail by the writer, using plants of *Fuchsia sp.* for observation. This plant was selected because of its ready growth in pots under laboratory conditions and because its well-shaped, rapidly growing leaves were found to exhibit "wing-growth" when cut. In one experiment various kinds of cuts were made on leaves of these plants. It was found from this that old leaves did not respond well when cut off and produced but little "wing growth." Young leaves on the other hand tended to respond quickly and visibly to cutting. Such were accordingly used in the work. In all cases leaves of similar size and nature were used as checks against those cut. For one thing leaves were carefully dotted with India Ink at regular intervals both as to the checks and to those cut off. Cuts were then made at various angles to the midrib, in various ways, at different distances from the apex and base of the leaf. It was determined from this that growth in *Fuchsia* leaves took place normally, mainly at the basal region and that little growth occurred at the apical region. When cuts were made therefore in the apical region very little "wing growth" could be expected and found, while cuts near the base produced great "wing growths" that would swing out, up and inward so as to nearly reproduce the growth made by the uninjured check leaves. Cuts were made at right, acute and obtuse angles to give these results. Some leaves also were cut parallel to the midrib, removing material on both sides but preserving the apex, some of the base and the area close to the midvein. Here again growth was largely made at the base and the upper areas were not changed. It was also found that whenever one side of a leaf so cut was somewhat greater in area than the other side that resultant growth on the greater side would tend

to curve the leaf over toward the lesser side. Cutting off of one-half of a leaf by a cut paralleling the midrib had the same effect in that the tip of the leaf turned towards the cut-off side demonstrating that the large area of uncut tissue had been held in check by the area now removed. It was found by dotting with ink that young leaves grow faster than old; that greatest growth occurs in the basal regions of the leaf; and that the outside marginal areas of the leaf grow the fastest. This last condition was evidently neutralized in normal leaves by the slow growth of the apical areas which held back the more rapid growth of the basal margins. Upon cutting of the leaf at the base this check was removed and the basal areas immediately moved around in a semicircle toward the midrib so as to fill the space formerly occupied by the apex, and at the same time were advanced forward or apically by the growth of the basal area.

Further experiments will be made to determine growth rate in cut and uncut leaves.