

The value of $2V$ (optic axial angle) required in this calculation was determined on the Federov's Stage by the method of direct measurement of the optic axial angle by sharp extinction at the emergence of the optic axes, in the 45° position.⁵ The value of $2V$ for the Halagur hypersthene is $54^\circ 42'$. The extinction angles calculated by the Ferro-Brandavo formula for (111) and (232) are $28^\circ 3'$ and $11^\circ 15'$, assuming the cleavages to be pyroxenic. Since the calculated values agree closely with the observed values in hypersthene of Halagur (26° and $11^\circ-13^\circ$), it is hereby inferred that the oblique extinction observed in the hypersthene are on the pyramidal faces and that the cleavages are pyroxenic.

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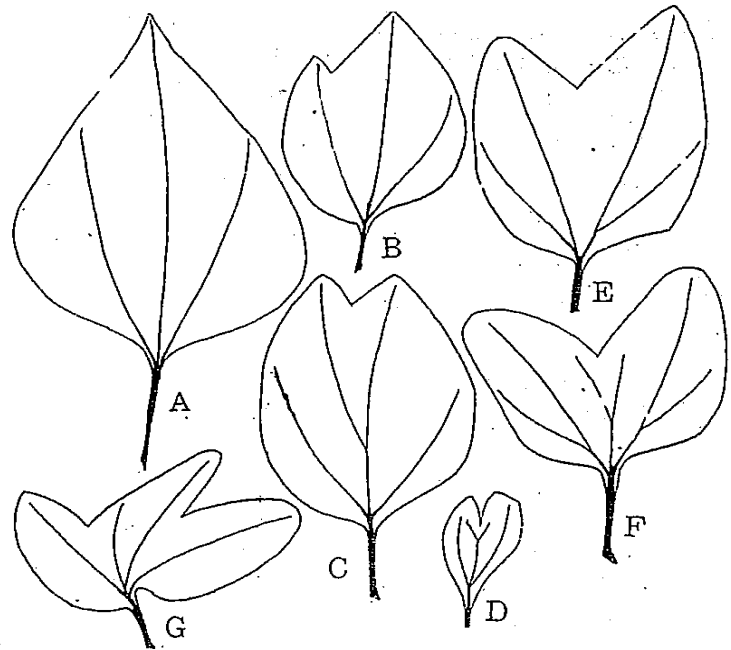
ANOMALOUS LEAVES OF *HELLANTHUS ANNUUS* LINN. N. O. COMPOSITÆ

The abnormal bilobed opposite leaves (Figs. B-G) differ from the normal leaf (Fig. A) in shape, size and venation. Out of 323 seedlings only seven had such abnormal leaves, one on each seedling. There was one trilobed leaf; others were bilobed. It was observed that leaving aside the cotyledons third, fourth, fifth, sixth and seventh leaves showed abnormality of one of these types. Either one leaf or both the leaves at a node was found to be abnormal.

The arrangement of the leaves was at first opposite and decussate but later it became alternate. It has been observed that in a plant growing under normal conditions, the change of phyllotaxy begins after about four pairs of opposite leaves have appeared. Out of the seven seedlings described above, four were of that type. The fifth one had the change of phyllotaxy after the first pair of opposite leaves had appeared. In the case of the sixth one alternate leaf intervened between the first and the second pair of opposite leaves. The last one did not agree with those already described. It had two leaves at a node, one at right angles to the other. These intervened with the alternate leaf of the second and the fourth, and the fourth and the sixth nodes.

Similar instances are recorded by Masters,¹ Worsdell,² Sabnis,³ Singh,⁴ and Singh and Sinha.⁵ The abnormalities recorded in this plant are the presence of three cotyledons

instead of normal two,⁶ insertion of leaves and head,⁷ leafy growth in the centre of the inflorescence and fasciation of capitula.⁸



The leaves described may be taken as the case of fission of foliar organs. According to the view expressed by Masters¹ "fission is due perhaps as much to the absence or relatively small proportion of cellular as compared with vascular tissue". This view is further supported by Goebel,⁹ who has shown that there is a definite relationship between the shape and form of the leaf and its vascular distribution or venation. Hence the present abnormal leaves may be due to the plan of arrangement of the venation.

From the study of venation, phyllotaxy and absence of any sign of union in any part of the leaf, the leaves described may not be taken as the case of fasciation.

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