
THE SIGNIFICANCE OF STIPULES IN THE LEGUMINOSAE

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From the various articles written concerning evolution of plants and from the fossil record, practically all botanists agree that the ferns are more primitive than the seed plants. Eames (1936:160) in discussing the leaves of leptosporangiate ferns, says: "Comparative study indicates that the large compound leaf is primitive, and that the simple and smaller forms have been derived from such leaves by reduction and simplification; that dichotomy is primitive; and that from this have been derived the pinnate and other types of division."

True leaves are confined to the sporophytic phase in the life of higher plants. All such leaves have a vascular system which is not found in the so-called "leaves" of mosses in the gametophytic phase. Such structures of the gametophyte should not be called true foliage leaves.

Very little, it seems, has been written concerning the evolution of leaves in the spermatophytes. Some say the simple leaf is the more primitive, while others regard the compound leaf as more primitive. Both may be correct in part, but in regard to the leaves of the Leguminosae, the compound leaves seem to be more primitive. Coulter and Chamberlain (1910: 412-413) say: "The leaves of gymnosperms may be used to illustrate a structure that exhibits no general evolutionary tendency, but responds more or less directly to the conditions of living. The most ancient gymnosperms possessed ample, fernlike leaves, and under appropriate conditions this type of leaf persisted, as in the tropical cycads of today."

The world-wide distribution in particular and other evidences indicate that Leguminosae are a very old family. From the knowledge gained from paleontology and from plant geography, it appears evident that the growing conditions for plant life are less favorable today than formerly. Whenever a plant is confronted with unfavorable growing conditions, which leaves does it lose as a general rule? It sheds those leaves which are situated in an unfavorable position to receive light for food manufacture. It would appear that the basal and inner leaflets of a compound leaf would function less efficiently than the outer and apical leaflets. Therefore through the centuries as general growing conditions became less favorable, the primitive compound leaf would lose the basal and inner leaflets first. Before disappearing entirely these leaflets would become reduced in size, and their consistency might change. Therefore, I believe that so far as the Leguminosae are concerned, the stipules and stipels represent disappearing lateral leaflets. The disappearing of the inside leaflets of a decomposed leaf is represented by stipels. Therefore the odd-pinnately compound leaf may be reduced to a unifoliate compound leaf and finally to a simple leaf. The abruptly pinnate compound leaf may be reduced to a pair of leaflets regarded incorrectly by some as enlarged stipules as, for example, in *Lathyrus Aphaca*.

From this discussion one should not define a compound leaf as one having its blade divided into leaflets, but rather, one should say that a compound leaf is one showing evidence that its blade is composed of one or more parts called leaflets.

In conclusion I believe that, at least in the Leguminosae, the stipules and stipels represent disappearing leaflets; also that the cotyledons are modified leaflets.

LITERATURE CITED

- Coulter, J. M., and C. J. Chamberlain. 1910. Morphology of gymnosperms. Chicago: University of Chicago Press.
- Eames, A. J. 1936. Morphology of vascular plants, lower groups. New York: McGraw-Hill Book Co.
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