UNUSUAL STIPULES OF ACER NIGRUM MICHX.

Flora Anderson, Indiana University.

In the autumn of 1921 when the leaves began to fall, some leaves of *Acer nigrum* were noticed that had very prominent stipules. The tree from which these leaves came is just north of Biology Hall on the Indiana University Campus. Since it is 45 to 50 feet to the first limb, no leaves were studied while on the tree. By examining the fallen leaves one could find almost all variations, from those having no noticeable stipules to those having very prominent aecidulated stipules on long slender stalks. The place of attachment of the stipules varied from the base of the petiole to the base of the blade (figs. 4 to 9). The blade of the stipule was either straight or aecidulated. Figures 3 and 4 show both types on the same leaf.

Britton[1] in his description of *Acer nigrum* says . . ; "the leaf-stalks are also hairy, at least when young, and are expanded at the base, often bearing stipules which are sometimes 3 or 4 cm. long". On a single tree one may find leaves with the petioles scarcely expanded at the base, and other leaves with very large, conspicuous stipules—the blade of the stipule sometimes 6 or 7 cm. long—on slender stalks (fig. 13). Then there may be found all gradations between these. Hough[2] says . . ; "petioles stout and generally bearing stipules at the enlarged base". He figures a branch and calls attention to "the presence of a few small stipules. They are occasionally much larger". Deam[3] in his description of the species says . . . "petioles usually 3-15 cm. long which are more or less swollen at the base and by maturity develop a scale-like appendage on each side of the petiole at the base—especially on each of the terminal pair of leaves, sometimes with foliar stipules which are 2-3 cm. long on stalks of equal length". His plate 114 is a photograph of a branch of *Acer nigrum* which shows two leaves with unusual stipules—one at the base of the petiole, the other near the blade of the leaf. Gray[4] mentions; "stipules often conspicuous" and again[5], "Stipules large, early deciduous." Quite a number of authors make no mention of stipules in their description of *Acer nigrum.*

Since the taxonomist had made no special note of these unusual stipules, the writer thought they might be "early deciduous", and in the spring of 1922 began to examine *Acer nigrum* trees for leaves with stipules of unusual character. During the spring and summer, trees on the Indiana University Campus and on the streets of Bloomington were observed. On almost all of these trees were found leaves of different types, varying from those with practically no stipules to those with large foliar aecidulated stipules on slender stalks. The point of attachment of

[1] Britton, Nathaniel Lord. North American Trees. p. 651. 1908.

[2] Hough, Romeyn Beck. Handbook of the Trees of the Northern United States and Canada. pp. 326-327. Fig. 382. 1907.

[3] Deam, Chas. C. Trees of Indiana. p. 246. pl. 114. 1921.

[4] Gray, Asa. New Manual of Botany. 7th Ed. p. 558. 1908.

[5] Gray, Asa. Field, Forest and Garden Botany. Revised. p. 112. 1895.

"Proc. 38th Meeting, 1922 (1923)."

Figs. 1-14. Types of stipules of *Acer nigrum Michx.* x ½.

these stalks to the petiole ranged from the base of the petiole to the base of the blade of the leaf. Observations made on trees in the state park at Spencer, Indiana, and on street trees in Crawfordsville and Ladoga, Indiana, revealed the same conditions. Neither the age nor the vigor of the tree seemed to make any difference in the relative number or kind of stipules produced.

When one sees a leaf with stipules like those in figures 1 and 2, there seems to be nothing unusual; but on observing one with stipules like those in figures 3, 5 and 11 where one sees apparently the normal stipule plus something else, there is a question. Are these structures a part of the so called "normal stipule", or are they structures originating in the axils of the stipules? Some leaves would seem to indicate that they were simply enlargements of the normal stipule (fig. 12). But other leaves show the slender stalks of the unusual stipules coming from the axils of the normal stipules. Even when these stalks come apparently from different places on the petiole, they can usually be traced by a ridge on the petiole back to the axil of the normal stipule (figs. 10 and 11). Sometimes three of these stipules may be found on one leaf (fig. 14), or one may fork as is shown in figures 10 and 13. Or, this stipule may be sessile at the base of the leaf blade, appearing at first glance as a lobe of the leaf (fig. 9). The blade of the stipule may be very simple and entire as is seen in figure 4, A; or it may be aecidulated and variously lobed as is shown in figure 6. The lobes of the stipule are frequently similar to those of the leaf blade.

By late summer, a few of these stipules had fallen, leaving only a slight scar. As far as the writer could ascertain, only a very few of these unusual stipules might be classified as "early deciduous". A great many of the leaves examined late in the autumn still retained their stipules. There seemed to be no tendency, except in a few instances for the stipules to be shed before the leaves fell.

In conclusion it might be said that all the trees examined had at least a few leaves with unusual stipules, but some trees showed a much larger proportion of stipulate leaves than others. Whether or not there is something inherent in the tree that causes it to produce these unusual stipules is not known. Observations of certain trees of opposite tendencies made from year to year, and seedlings from these trees might in a measure help to solve the problem. But before a definite conclusion can be formulated, it seems necessary to study a large number of trees of different localities, and also to study the origin of these unusual stipules morphologically.

DEVELOPMENT OF SPOROGENOUS TISSUE IN THE FOOT OF THE SPOROPHYTE OF PORELLA NAVICULARIS.

FLORA ANDERSON, Indiana University.

From fresh material of *Porella navicularis* sent from Corvallis, Oregon, in the fall of 1920, quite a number of young sporophytes were