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DISTINGUISHING MARKS OF OUR
NATIVE ELMS IN THEIR WINTER CONDITON

Thesis for the Degree of B. S.

Seymour L. Ingerson

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SENIOR THESIS

On

DISTINGUISHING MARKS OF OUR NATIVE ELMS

In Their

WINTER CONDITION.

By

S. L. Ingerson.

Michigan Agricultural College,

1899.

THESIS

DISTINGUISHING MARKS OF OUR NATIVE ELMS.

In Their WINTER CONDITION.

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This study of the elms was undertaken for the purpose of determining; (1) the characteristics which distinguish the elms from our other trees,-- and (2) the characteristics peculiar to the individual species. The former appears quite easy, for any woodsman is able to recognize an elm without difficulty. However, it might not be so easy for him to tell how he knew an elm from any other tree, or, in other words, what distinguishing characteristics the elms possess. It would be still less easy for him to name the individual characteristics of the different species of elms, though he could pick out the trees at a glance.

The elms belong to the order URTICACEAE, the nettle family. The name of the genus to which they belong is Ulmus. The three elms in Michigan are:-- Ulmus fulva, Michx., the red elm or slippery elm;-- Ulmus Americana, L., known by various names as, American elm, white elm, gray elm, soft elm, swamp elm and water elm;-- and Ulmus racemosa, Thomas, the cork elm or rock elm.

One of the general characteristics of the elms is the wide, spreading form of the tops. This, however, is most noticeable in the American and red elms. It may be observed to some extent in the older trees of rock elm, but the younger specimens show a rather compact, conical form. In the American and red elms the side branches are comparatively few, giving the young trees a rather unsymmetrical appearance. This probably accounts for the fact that comparatively few of these

trees are planted for shade or ornament. As they grow older they take on a more graceful appearance, and their wide, spreading tops make them among the most beautiful of our trees.

Another and a very strongly marked characteristic of the elms is the arrangement of the leaf scars on the twigs and of the side branches along the main stems. The arrangement of the branches of course follows that of the leaves of the previous season, since they are developed from buds in the axils of the leaves. The arrangement is alternate and two-ranked. It is especially noticeable in rapidly growing, upright stems. When the stems are much inclined from a vertical position this arrangement is not so apparent. In such cases the tendency of the twigs is to turn upward, and thus they all appear to start from near the upper side of the branches.

The two ranks of buds from which the twigs grow are in fact less than one half the circumference of the branch apart. The buds on one side are slightly to the right of the center of the leaf scars and those on the other side to the left. See plates I. and II. It is thus a shorter distance between the ranks of buds one way around the branches than it is the other way, and thus the buds all seem to turn toward one side which, for want of a better term, may be called the face side. In the lateral branches this face side is the upper side; in the upright shoots I have found nothing to determine on which side it will be. In plate I., figures 1, 3, 4, 6, and 7 show the face side and figures 2 and 5 the opposite side.

The bud scales of the elms are arranged in two ranks making a cross section of a bud somewhat oval. This is shown in plate III., figure 1, which is a cross section of a leaf or branch bud.

The tendency in all the elms is to produce more flower buds on the short, side twigs than on the central shoot. Those that are found on

the central shoots are usually along the middle portion of the yearly growth, the buds at the base and tip being leaf buds. In the side twigs the arrangement is the same, but the flower buds may often be found almost to the base and the tip of the twig. The last bud is usually, if not always, a leaf bud. The leaf buds and flower buds are easily distinguished by their shape, the leaf buds being much more slender. Below the strong well-developed buds are usually found one or more small latent buds. See plates I. and II.

The last bud on each twig appears at first to be a terminal bud, but closer examination shows it to be axillary. The real terminal bud dies at the end of the season and drops off, leaving a very small scar. The location of this scar is shown at (a), in plate I., figure 6.

The lenticels appear at first as minute dots, being in fact very small masses of cork just underneath the epidermis. They gradually enlarge and finally break through the epidermis. They are circular in outline, but, owing to the cracking of the bark, appear more or less elongated along the stem. As they develop they become more prominent and gradually change in shape from oblong to circular, and finally, by the swelling of the bark, become elongated across the stem. The lenticels are usually more numerous just below the leaf scars.

In distinguishing the species of elms the general shape and appearance of the trees are first to be noticed. The red elm usually has but few large branches which form a rather loose, unsymmetrical top. The branches very often start from the trunk at long intervals. Where they leave the trunk they form with it a rather small angle, but usually they gradually curve downward till, in long branches, the tips show a decided droop. The American elm has usually the most spreading habit. The top is often large, symmetrical, and urn-shaped, especially in isolated specimens in the fields. The rock elm has a larger number

of branches and is of a less spreading habit than the other two. The masses of cork on its branches also serve to distinguish it.

The appearance of the twigs is also of use in determining the species. Those of the red elm are quite thick, with large nodes, the internodes making a slight angle with each other. They are light gray, covered by a white down which has a decidedly bluish appearance, more noticeable on the face side. The twigs of the American elm are slender, the internodes, especially the younger ones, somewhat spool-shaped. All the younger nodes are of about the same size. See plate I., figures 1 and 2. The twigs are brownish in color, often covered by a downy growth in the older portions. In the rock elm the small branches are corky, often very much so. See plate III. The younger twigs not covered by cork are usually slender, each internode making a decided angle with the preceding. See plate I., figures 3, 4 and 5. They are grayish in color and are covered by a fine, white down.

Some differences may also be noticed in the lenticels of the three species. Those of the red elm are at first very light in color, but later assume a slightly yellow color. They are much larger than those of the other elms though not nearly so numerous. See plate II., figure 3. In the American elm the lenticels are light in color and small. They are quite numerous except on the very young twigs. On a few of these I have been unable to find them. See plate II., figure 1. In the rock elm they are of a yellowish color, rather smaller than in the American elm, usually of about the same number. On some of the smallest twigs they are very small, and in some cases none could be found.

The buds of the different species show marked differences. Those of the red elm are very large, 4 - 10 mm. long, and often nearly as broad as long, blunt, pubescent, brown except for a blue bloom like that seen on the twigs. The buds, including the latent buds, are

somewhat more numerous in the red elm than in the other species. See plate II., figure 3. In the American elm the buds are slightly flattened, pointed, 2 - 3 mm. long, brown, smooth or nearly so, shining. See plate II., figure 1. The buds of the rock elm stand out well from the internodes. They are 2 - 3 mm. long, and pointed. Their color is a reddish brown. They are smooth at the tip, but downy below except on the edges of the scales. See plate II., figure 2.

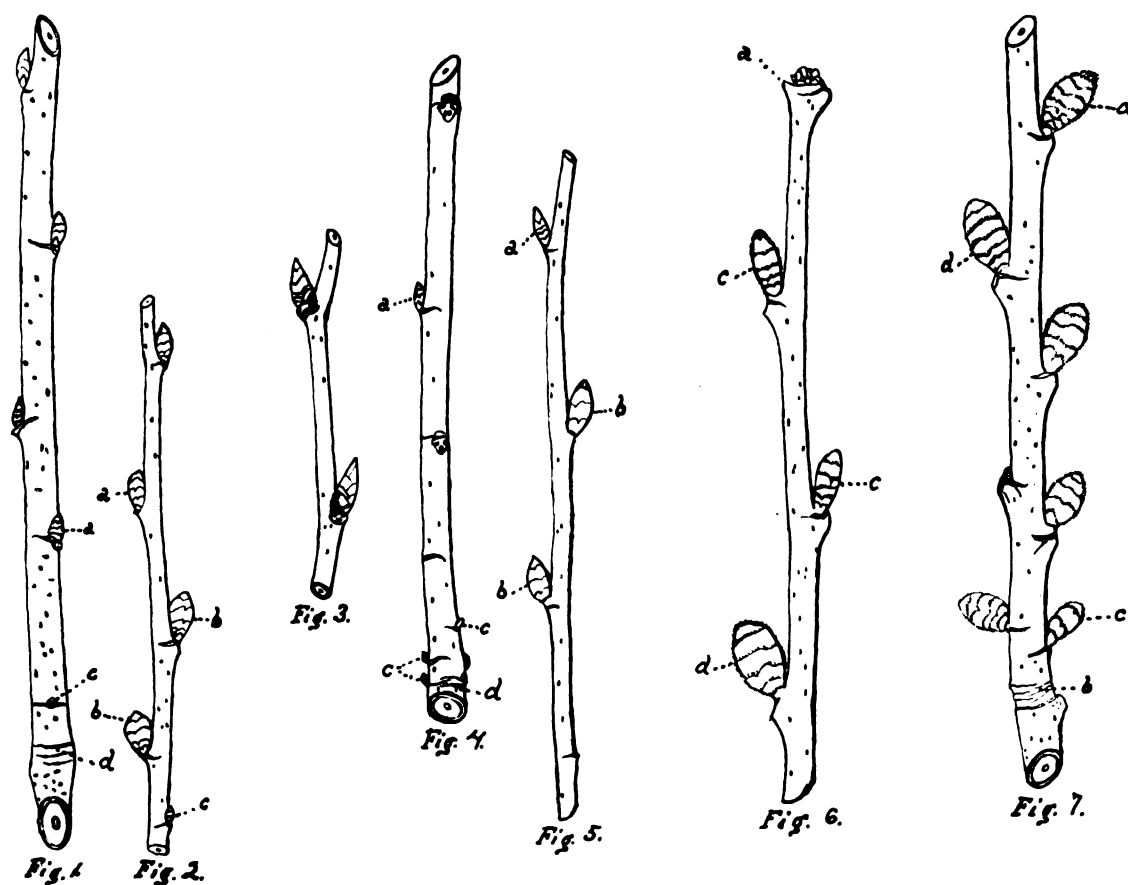
The bud scars present few points of difference which would be of use in distinguishing between the species. Those of the red elm are perhaps a little shorter and more oval in shape.

In the bud-scale scars, too, there is little to distinguish the species. In all, the bud-scale scars extend about one-half way around the twigs, sometimes considerably more than half way, so that they overlap, as shown in plate I., figure 7, (b). In the red elm they are somewhat larger, and the lower ones often appear much like folds of the bark.

The leaf-scars present marked differences in the three species, and are a valuable means of determination. In the red elm they are large, broad, often elliptical, or sometimes slightly reniform in shape. They have a convex surface with a rim around the edge. They are of a gray color, somewhat lighter than the bark. See plate II., figure 3. Those of the American elm are very broad, sometimes slightly reniform, sometimes elliptical or oblong-elliptical, quite prominent and convex. Their color is brownish, nearly the same as that of the bark. See plate II., figure 1. In the rock elm they are more or less cordate in shape and not so prominent as in the American elm. In color they are gray, much lighter than the bark. See plate II., figure 2.

These are among the marked characteristics which serve to distinguish the elms. These characteristics should make the determination

of the species of elms comparatively easy. It is hoped that this study may have shown not only the differences existing between these particular trees, but also that even the commonplace things about us are well worthy of our careful study.



Elm Twigs. $\times \frac{1}{7}$.

Figures 1 and 2; Twigs of American elm: a, leaf buds;

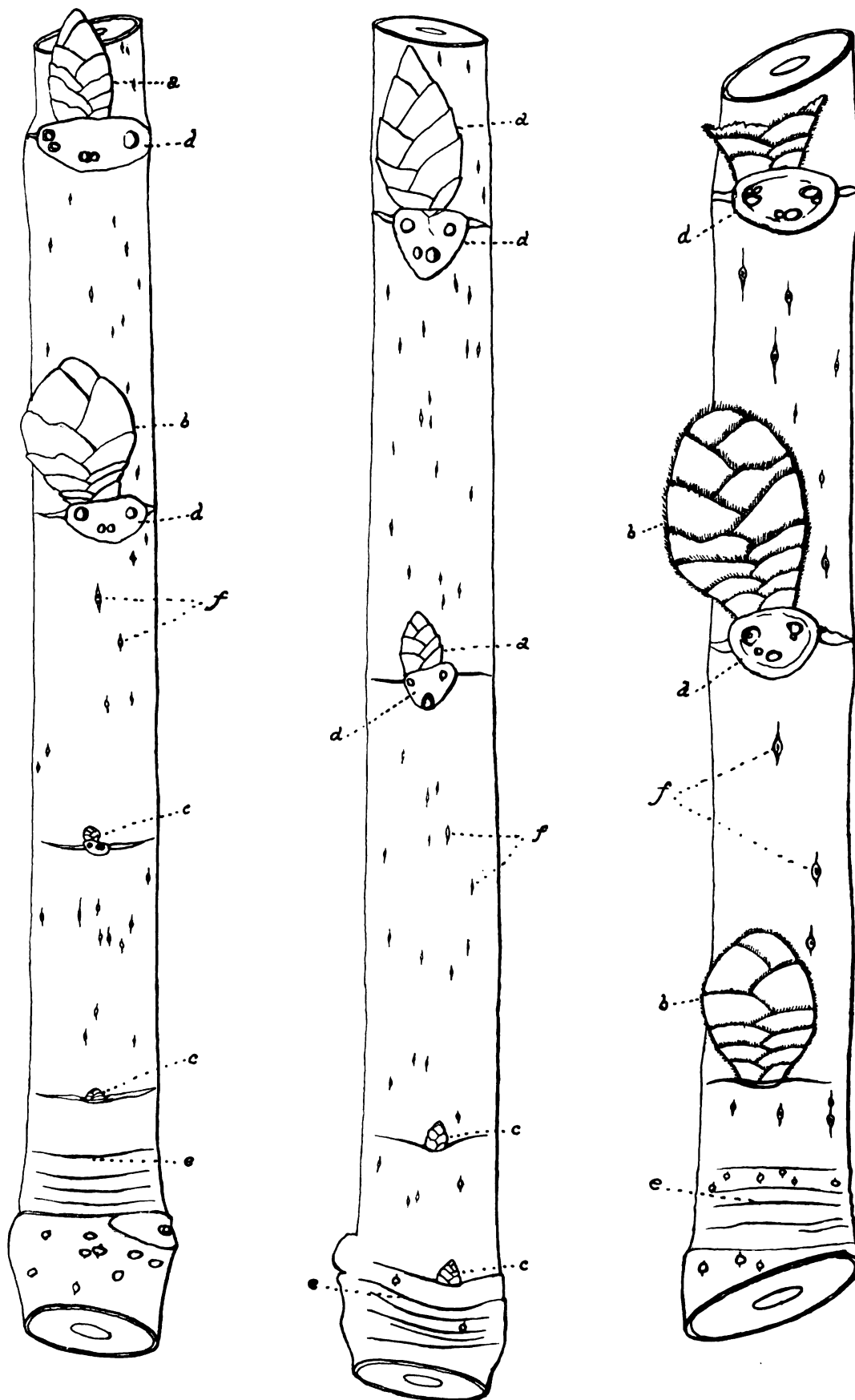
b, flower buds; c, latent buds; d, bud-scale scars.

Figures 3, 4 and 5; Twigs of rock elm: a, leaf buds;

b, flower buds; c, latent buds; d, bud-scale scars.

Figures 6 and 7; Twigs of red elm: a, scar of terminal

bud; b, bud-scale scars; c, leaf buds; d, flower buds.



Elm Twigs. $\times \frac{5}{1}$.

Fig. 1, American elm. Fig. 2, rock elm. Fig. 3, red elm.

a, leaf buds; b, flower buds; c, latent buds; d, leaf scars; e, bud-scale scars; f, lenticels.

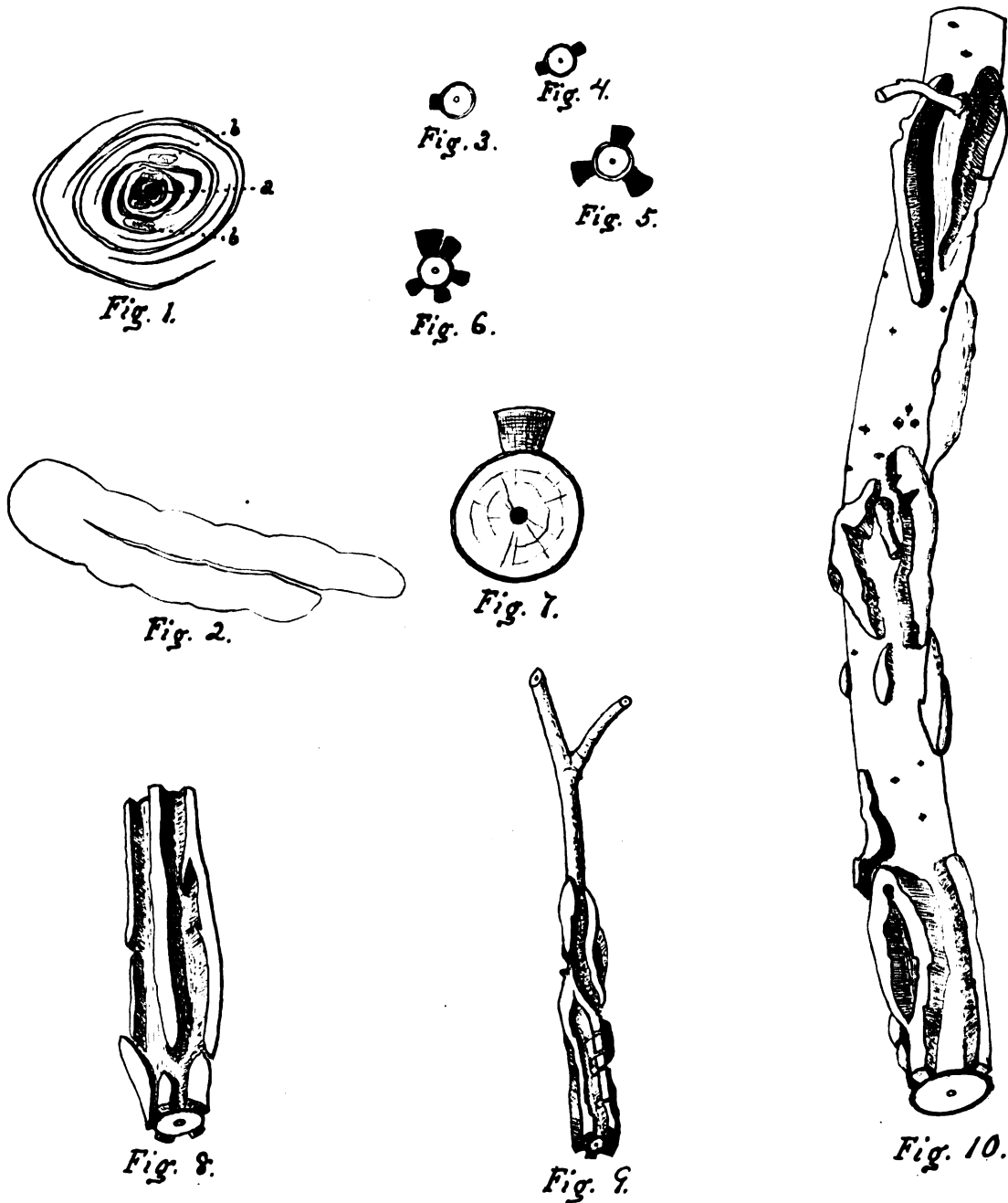


Fig. 1, Cross section of a leaf bud. a, the central shoot. b, leaves.

Fig. 2, A leaf more highly magnified.

Fig. 3-6, Cross sections of rock elm twigs, showing cork.

Fig. 7, The same more highly magnified.

Fig. 8-10, Portions of rock elm branches.

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