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THE VALUE OF TWIG AND BUD CHARACTERS IN
KEYS FOR THE IDENTIFICATION OF TREES
IN SUMMER CONDITION

HAROLD D. HARRINGTON

The purpose of the following presentation is to call attention briefly to the value of the twig and bud characters used commonly in winter keys, as supplementary or secondary characters in the keys for the identification of trees in summer condition. For the past few years the writer has been studying the winter characters of our woody plants. Many of the characters that are used to distinguish between difficult genera or species in winter were found to be present the succeeding summer and became a definite help in identification.

Many of the leaf characters used in the various "leaf" keys, even though they appear clear and definite to the maker with his intimate knowledge of the plants as they appear in the field, may prove difficult to describe in a way that the user can get a mental visualization of them. Furthermore many of the leaf characters are highly variable and unusual specimens may be thrown outside the correct category in the key. Leaf characters that may fall under these two headings are leaf shape, size, pubescence, and degree of lobing or color shades. It is with such characters that supplementary descriptions, if valid, prove of great value. Especially is this the case in simple keys without species description. Although shortness and conciseness may be somewhat sacrificed, the added evidence brought in by secondary characters makes possible more accuracy in decision.

With the exception of the buds, the structures by which trees are identified in winter are available throughout the entire summer period. Characters of the buds become prominent to be of diagnostic value early in the summer. It has become a usual custom of the writer, in determining specimens from unknown trees and shrubs collected during the summer, to disregard the leaves and identify the material to genus or species in winter keys.

Following is a list of characters used in winter keys that could be of value as supplementary or possibly main characters in summer keys. Only the trees of our area are considered, the list for the

shrubs would extend it many times. Many of these characters are already widely used in various keys. The characters are organized here and specific suggestions are presented for their use. The list is not intended to be exhaustive nor are the applications of each character limited to the ones that are mentioned here. These structures can be grouped under the main headings of characters of the bud, leaf scar, twig surface, the inner portion of the twig outside the pith, and lastly the pith itself.

BUD CHARACTERS

These include shape and color of the bud, presence of pubescence or resin, and number or rank of the bud scales. Such characters, as suggested before, appear early in the summer.

1. The genus *Salix* is commonly distinguished by the one visible bud scale.
2. The Norway Maple (*Acer platanoides*) from the Sugar Maple (*A. saccharum*) by the blunt bud of the former with its fewer, fleshy, bud scales.
3. The genus *Ulmus* from *Amelanchier* by the blunt bud of the former with its two-ranked scales as contrasted with the long, pointed bud of the latter with its scales in more than two ranks.
4. The genus *Tilia* from *Morus* by the unsymmetrical few scaled buds of the first.
5. The genus *Rhus* from *Sorbus* by the scaleless buds of the former.
6. The genus *Fagus* from *Castanea* by the long many scaled buds of the former.
7. Species in the genus *Carya* can be grouped by differences in shape of bud and number of bud scales.
8. Black Haw (*Viburnum Lentago*) from the Buckthorn (*Rhamnus cathartica*) by the long bud of the former with only two valvate scales visible on the lateral buds.
9. The genus *Ostrya* from *Carpinus* by the more heavily striated bud scales of the first genus.
10. The genus *Alnus* from *Prunus* by the stalked buds of the first.
11. Horse Chestnut (*Aesculus Hippocastanum*) from the Buckeye (*A. glabra*) by the resinous buds of the first.
12. Species in the genus *Populus* can be separated by differences in pubescence or resin of the buds.
13. European Mountain Ash (*Sorbus Aucuparia*) from the American Mountain Ash (*S. americana*) by the densely wooly buds of the first.
14. The Black Oak (*Quercus velutina*) from the Red Oak (*Q. maxima*) by the downy pubescent buds of the former.

LEAF SCAR CHARACTERS

These are present in summer on the older twigs. In case of doubt cutting or tearing away the petiole base of the leaf where it joins the twig gives a good indication of leaf scar characters. These include shape and size of the leaf scar, its position in relation to the

bud and to other scars, presence and appearance of stipular scars, and number of bundle scars.

1. Butternut (*Juglans cinerea*) from Black Walnut (*Juglans nigra*) by the downy pad remaining above the last year's leaf scar of the former.

2. The genus *Phellodendron* from *Fraxinus* by the leaf scars of the former which almost completely surround the bud.

3. The genera *Cladrastis* and *Platanus* can be marked off by the leaf scar surrounding the bud which is accordingly concealed in the petiole base.

4. Box Elder (*Acer Negundo*) from the genus *Fraxinus*. The petiole bases and hence the leaf scars of the former almost meet from opposite sides of the twig while in the latter genus they are rather widely separated.

5. The genus *Cornus* from *Chionanthus* by the leaf scars of the former which are connected from opposite sides of the twig by transverse lines.

6. The genera *Magnolia*, *Platanus* and *Liriodendron* have clearly defined stipular rings encircling the twigs.

7. The genus *Diospyros* from *Cornus*. The first has one bundle scar in the leaf scar or petiole base, the second has three.

CHARACTERS OF TWIG SURFACE

These characters may sometimes be of great value but are often rather variable or difficult to describe. They include differences in color, size or pubescence of the twig. The thorns are of value if they are present but may be absent entirely. The lenticels and the character of the bark of the older twigs may be useful.

1. Wild Crab (*Pyrus iowensis*) from the genus *Crataegus* by the downy twig end of the former.

2. The Blue Ash (*Fraxinus quadrangulata*) and the Wahoo (*Evonymus atropurpureus*) have lines running longitudinally which are of value.

3. The genus *Halesia* from *Amelanchier* by the silky shreddy bark on the older twigs of the former.

4. The genus *Staphylea* from *Ptelea* by the white streaks on the older twigs of the first.

5. The Shining Sumac (*Rhus copallina*) can be marked off from sister species by the large characteristic orange-colored lenticels.

6. The Choke Cherry (*Prunus virginiana*) from the Wild Black Cherry (*P. serotina*) by the longitudinally elongated lenticels on the young twigs of the former compared with the transversely elongated lenticels on the twigs of the latter.

CHARACTERS OF THE TWIG'S INNER BARK AND WOOD

These could be of some importance but seem to be little used. They include color of cortex or wood and prominence of wood rays.

1. The genus *Phellodendron* has an inner bark of the twig that is bright yellow in color.

2. The Smoke Tree (*Rhus Cotinus*) will show a yellow color in the wood of the older twigs.

3. The wood rays are broad and noticeable in some genera like *Fagus* and **might be used with caution.**

CHARACTERS OF THE PITH

The pith characters seem to be reasonably constant and are usually capable of clear description. If several examinations are made along the same twig or upon different twigs the characters of the pith are usually definite. These are present through the entire summer period and include the size, color, shape in cross section, and texture of the pith.

1. Honey Locust (*Gleditsia tricanthos*) from the Kentucky Coffee Tree (*Gymnocladus dioica*) by the small white pith of the former in contrast to the large salmon-colored pith of the latter.

2. The Butternut (*Juglans cinerea*) from the Black Walnut (*Juglans nigra*) by the dark brown pith in the older twigs of the former in contrast to the light brown pith of the latter.

3. The genus *Gymnocladus* from *Ailanthus*. The first has salmon-colored pith, the second brownish pith.

4. The genus *Alnus* has pith triangular shaped in cross section.

5. The genus *Carya* from *Sorbus* by the five-pointed pith of the former.

6. The genera *Populus*, *Castanea* and *Quercus* have five-pointed pith which may help mark them off.

7. The genus *Celtis* from *Tilia* by the pith of the former which is partitioned at the nodes.

8. Many genera have spongy, diaphragmed or chambered pith in all or a part of their species. Examples are *Liriodendron*, *Eucommia*, *Halesia*, *Symplocos*, *Zelkova*, *Celtis* and *Juglans*.

These are some specific examples of how twig and bud characters may be available in marking off certain genera, distinguishing between difficult species and assisting in the identification of trees in summer condition. Let it be emphasized in conclusion that practically all the characters by which most trees can be successfully identified in winter are available from early summer on, and many of them are present throughout the entire growing season. Many of these "winter" characters such as number and rank of bud scales, number of bundle scars, relative position of leaf scar and bud, and the color or texture of the pith are of such a nature as to be definitely described. It is the purpose of this article to call attention, by listing specific examples of possibilities, to the value of such twig and bud characters in the identification of trees in summer condition. Although many of these characters are in use in summer keys at present, the writer believes that they could have an even greater value in supplementary or if necessary replacing many of the uncertain leaf characters in use at the present time.

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