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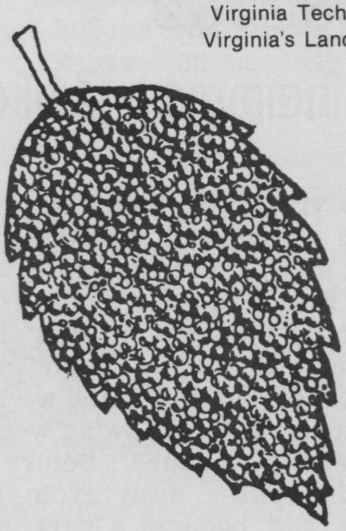
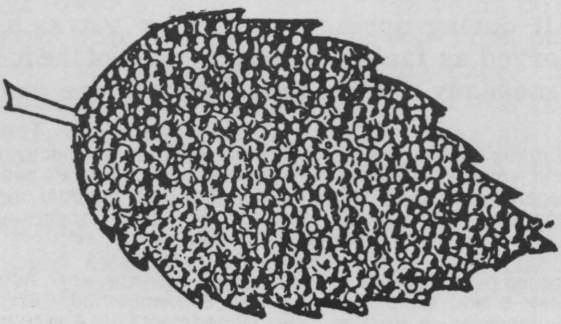


WHY LEAVES CHANGE COLOR



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Why Leaves Change Color

It requires no vivid imagination to picture Mother Nature going about on autumn days with a liberal supply of paint, with which she colors the leaves of the trees and other plants and thereby produces the riot of red, purple, orange, and yellow found in the woods. Every year at this time we revel in the beauty of the trees, knowing well that it is only a fleeting pleasure. Before long the leaves will flutter away from their summer home and become a part of the rich carpet that covers the forest floor.

Many people suppose that Jack Frost is responsible for the color change, but he is not. Some of the leaves begin to turn before we have any frosts. According to an Indian legend, celestial hunters slew the Great Bear in the autumn, and his blood, dripping on the forests, changed many leaves to red. Other trees were turned yellow by the fat that splattered out of the kettle as the hunters cooked the meat. Other peoples had other legends, but we now know that change in coloring is the result of chemical processes which take place in the tree as the season changes from summer to winter.

All during spring and summer leaves have served as factories where most of the foods necessary for the trees' growth are manu-

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factured. This food-making process takes place in the leaf in numerous cells containing the pigment chlorophyll, which gives the leaf its green color. This chlorophyll absorbs energy from sunlight and uses it in transforming carbon dioxide and water to carbohydrates, such as sugars and starch. Along with the green pigment leaves also contain yellow or orange carotenoids--which, for example, give the carrot its familiar color. Most of the year these yellowish colors are masked by the greater amount of green coloring. But in the fall, partly because of changes in the period of daylight and changes in temperature, the leaves stop their food-making process. The chlorophyll breaks down, the green color disappears, and the yellowish colors become visible and give the leaves part of their fall splendor.

At the same time other chemical changes may occur and cause the formation of additional pigments that vary from yellow to red to blue. Some of them give rise to the reddish and purplish fall colors of leaves of trees such as dogwoods and sumacs. Others give the sugar maple its brilliant orange or fiery red and yellow. The autumn foliage of some trees, such as quaking aspen, birch, and hickory, shows only yellow colors. Many oaks and others are mostly brownish, while beech turns golden bronze. These colors are due to the mixing of varying amounts of the chlorophyll and other pigments in the leaf during the fall season.

Fall weather conditions favoring formation of brilliant red autumn color are warm sunny days followed by cool nights with temperatures below 45 degrees F. Much sugar is made in the leaves during the daytime, but cool nights prevent movement of sugar from the leaves. From the sugars trapped in the leaves the red pigment called anthocyanin is formed. Familiar trees with red or scarlet leaves in autumn are red

maple, silver maple, flowering dogwood, sweetgum, black tupelo or blackgum, northern red oak, scarlet oak, and sassafras.

The degree of color may vary from tree to tree. For example, leaves directly exposed to the sun may turn red, while those on the shady side of the same tree or on other trees in the shade may be yellow. The foliage of some tree species just turns dull brown from death and decay and never shows bright colors.

Also, the colors on the same tree may vary from year to year, depending upon the combination of weather conditions. When there is much warm, cloudy, rainy weather in the fall, the leaves may have less red coloration. The smaller amount of sugar made in the reduced sunlight moves out of the leaves during the warm nights. Thus, no excess sugar remains in the leaves to form the pigments.

Only a few regions of the world are fortunate in having these showy displays. Eastern United States and southeastern Canada possess large areas of deciduous forests with broad-leaved trees and favorable weather conditions, including ample rainfall for vivid fall colors. Some western areas, especially in mountains, have bright coloration too. Eastern Asia and southwestern Europe are others. The broad-leaved evergreen trees in the tropical rain forests shed their leaves very gradually, one at a time turning yellow and falling. In the seasonal tropical forests the foliage becomes parched and brown with the coming of the dry season.

As the fall colors appear, other changes are taking place. At the base of the leafstalk where it is attached to the twig, a special layer of cells develops and gradually severs the tissues that support the leaf. At the same time Nature heals the break, so that

after the leaf is finally blown off by the wind or has fallen from its own weight, the place where it grew on the twig is marked by a leaf scar.

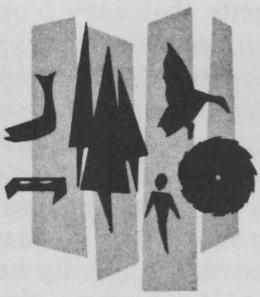
Most broad-leaved trees in the North shed their leaves in the fall. However, the dead brown leaves of the oaks and a few other species may stay on the tree until growth starts again in the spring. In the South, where the winters are mild, some broad-leaved trees are evergreen; that is, the leaves stay on the trees during winter and keep their green color. Most conifers--pines, spruces, firs, hemlocks, cedars, etc.--are evergreen in both the North and South. The needlelike or scalelike leaves remain green or greenish the year round, though often becoming browish green where winters are cold. Individual leaves may stay on the tree for 2 to 4 or more years.

Through fallen leaves, Nature has provided for a fertile forest floor. Fallen leaves contain relatively large amounts of valuable elements, particularly calcium and potassium, which were originally a part of the soil. Decomposition of the leaves enriches the top layers of the soil by returning part of the elements borrowed by the tree, and at the same time provides for more water-absorbing humus.

It is easy to copy brightly colored leaves with crayons or colored pencils. Place a leaf lower side up, because the veins on the lower side are usually raised. Then put a sheet of thin paper or writing paper (not thick drawing paper) on top of the leaf. Next, holding the paper and leaf so that they do not move, color the paper on top of the leaf. Use fast, slanting strokes as in shading. The shape and markings will be copied exactly. The veins and leaf border will show as heavier lines. Different colors can be used to match the shades or markings. After you have colored over all the leaf, cut

out the paper leaf with scissors. Of course green leaves can be copied at any time in the same way.

Leaf prints can be made also with a stamp pad. Press the leaf lower surface down against the stamp pad, with a piece of paper on top to avoid soiling the fingers. Then place the leaf, inked side down, on a sheet of white paper with another sheet of paper on top. Hold the leaf firmly and rub hard over it. When the upper sheet of paper and the leaf are removed, a printed copy of the leaf will remain. A scrapbook of leaf prints with names of the trees is an interesting project for any boy or girl.



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