fall color

by Dr. William C. Burger

One of the most spectacular sights that nature has to offer is the spectacle of fall color. This is found only in those broad-leaved trees and shrubs that lose their leaves as the cold season approaches. These plants "sense" approaching cold weather not by temperature but by the shortening of day-length in late summer. Preparations must be made in advance —the leaves cannot just fall off.

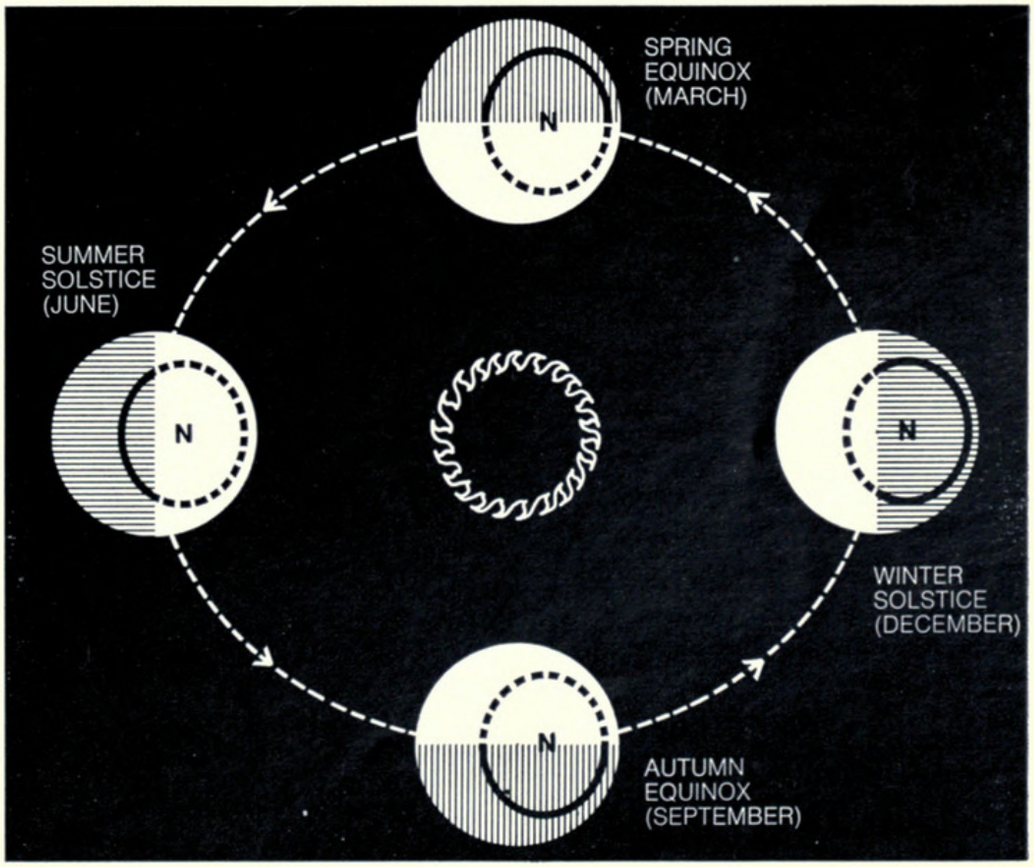
An abscission layer must first be formed at the base of the leaf-stalk. This abscission layer will allow the leaf to break off easily and it will seal off the small veins that carried water and nutrients in and out of the leaf. These veins must be sealed off to prevent water-loss and invasion by fungus or insects. As the abscission layer is formed the leaf continues to produce sugars which now, unable to leave the leaf, build up in concentration. This build-up of sugars is, in part, responsible for the production of anthocyanin pigments, which produce the dark reds and purplish colors. There are yellow pigments also present in the leaf. These are usually hidden by the bright green of chlorophyll in summer. As chlorophyll breaks down in early fall, these carotenoid pigments become visible and produce the yellow and orange colors of fall.

There are other factors contributing to the presence and intensity of fall color in a given plant. Heredity is very important. Some species produce deep brilliant reds such as the sour gum (*Hyssa*) and sugar maple, others bright yellow as in the tulip tree (*Liriodendron*). Light itself can play a role. Leaves in bright light often exhibit more intense colors than those in the shade. And, in addition, some people claim that cool weather is important. However, frost can cause the leaves to turn brown more quickly. Damaged branches or trees often turn color early.

There are only a few areas in the world where fall color gives a truly spectacular display. These areas are the northeastern United States and adjacent Canada and northeastern Asia. The reasons for this are several. Both these areas have broad-leaved forests with many different kinds of trees giving a great variety of colors. Another reason is the tendency for the weather to be clear and cool in late September. In Europe the weather is often cloudy and not as cold at this time—and the colors are usually much less intense. We are lucky to be so close to one of the best areas for seeing the display of fall color.

Fall color begins at first in the north and then "travels" south. In northernmost Wisconsin and adjacent Michigan the first week of October is usually the peak of color-intensity. Coming southward, the second week of October is usually best for central and southern Wisconsin, and the last two weeks of October for Illinois and Indiana. The color show can vary greatly from year to year—depending on conditions. Let's hope that this will be a good year—and if it is, don't miss it!

Dr. William C. Burger is Assistant Curator, Vascular Plants in the Department of Botany at Field Museum.



This diagrammatical representation shows the relationship of the earth to the sun at each of the four seasons. The seasons are caused by the 23° 27′ degree tilt of its axis (relative to the plane of the earth's orbit), and the revolution of the earth around the sun. The North Pole points toward the sun at the summer solstice (around June 22), but away from the sun at winter solstice (around December 22). The angle at which the sun's rays strike the earth is critical in determining the earth's seasonal changes in temperature. At the spring and autumn equinoxes the length of the day (represented by the dashed line) is equal to the length of the night (solid line). Plants, sensing approaching cold weather by the shortening of the day-length in late summer, start making preparations for the fall.