Autumn Colorations.

IN investigating this subject the first question is, What causes the variation in coloration? This may be answered by saying that it is a natural ripening of the leaf, a change in the coloring matter of the leaf called chlorophyl. One botanist has said: "The green matter in the tissue of a leaf is composed of two colors, red and blue. When the sap ceases to flow in the fall, and the natural growth of the tree ceases, oxidation of the tissue takes place. Under certain conditions, the green of the leaf changes to red; under different conditions, it takes on a yellow or brown tint. This difference in color is due to the difference in combination of the original constituents of the green tissue, and to the varying conditions of climate, exposure, and soil. A dry, cold climate produces more brilliant foliage than one that is damp and warm."

It is said by some who have visited England that in many places the ivy, so much cherished by the English people, is being replaced by our American ivy, Ampelopsis quinquefolia, although in that climate it does not take on as beautiful tints as it does in this country, but yet is far ahead of the English ivy. Another botanist, who has visited southern Germany and Switzerland, says that our American ivy is used very extensively in that country for decorating all sorts of buildings, and that the leaves take on more beautiful tints than he ever saw in this country. This may be partially due, however, to the contrast between the vine and the almost universally white color of the buildings in those river valleys.

We may conclude, then, that climate has much, but not all, to do with the variation in coloration for different plants of the same species in the same locality; in fact, different parts of the same plant vary in coloration. Just what makes this difference is an open question. It will be noticed that in many places where one leaf overlaps another that the under leaf is variable in color and that some are variable where they have not been thus immediately overlapped. So we see that in some respects it resembles the coloring of the skin of the apple. For, if an apple naturally red at maturity, is partially covered, the covered portion remains green. So far is this true that if a paper band is put around the apple before it begins to turn the skin will not color under the band. In this way a person can put his initials or his full name upon an apple. This might also be done with the leaf, but the covered portion would not remain green, and might be of the same shades as the exposed portion. This shows that the coloring of the leaf resembles, but is not identical with, that of the apple. The same may be said with reference to the grape. It has been proven time and again that the grape colors fully as well partially or completely covered as when exposed and, too, to just the same color. This is probably due to the fact that the grape skin itself is nearly transparent and the coloring matter is in the pulp immediately next it. The coloring of the leaf resembles these sorts of coloring more than it does the coloring of flowers. For, if a rose be naturally red, it is thought, I believe, that it will be brighter red when fully exposed.

Just here we might suggest that by propagating from individual plants that bear very bright, highly-colored leaves, in a few generations it might be possible to get a tree the leaves of which would be much brighter than the one with which we started.

The general brightness of the coloring of the leaves probably depends largely upon the weather during the time of the ripening of the leaves. This present autumn of 1891 is a poor season for bright colorations in the vicinity of Columbus, Ohio, at least. This may be partially due to the dry weather late in September and early in October.

It would require careful observation on particular plants for a number of years to prove that the weather has the greatest influence. Two plants in particular may be noticed. One is a Japanese species of Ampelopsis on the west side of a brick building. Last autumn the leaves showed great variation in color, making the vine attractive, but this autumn the leaves turn brown and dry up on the vine, and are rather unsightly. The other is a small tree, generally known as "sweet gum," or "American liquid-amber" (L. styraciflua), standing in an exposed position. Last autumn the tree showed great variation in coloration, but this autumn nearly all the leaves turn a dull yellow or brown.

By referring to my diary, I find that in 1890, from Sept. 15 to Oct. 31, there are fifteen days where the weather is recorded as more or less rainy, namely, Sept. 26, 27, Oct. 4, 5, 11, 14, 15, 16, 25, 26, 28, 29, 30, 31; while for the same time in 1891 only seven days are recorded as more or less rainy, namely, Sept. 30, Oct. 4, 6, 14, 18, 19, 20. We may infer from this that wet weather makes bright colored leaves. Jack Frost probably plays his role, and the food of the plant in all probability is an agent in the matter. However, even this fall our trees and shrubs are affording us many specimens of Nature's handiwork worthy of the highest admiration. Dame Nature does not venture to denude all her trees and shrubs without making some to please the eye of man.

This leads us to the question, Is this all mere chance, or is it done for a purpose? In the case of the coloring of the fruits and flowers, it is evident that it is for the reproduction and distribution of the species. But in this case it can scarcely be for either of these purposes. If it is for the protection of birds or insects by resemblance, it serves its purpose very poorly indeed. However, let the cause be what it may, let the purpose be what it may, we always enjoy them, and thus they serve a purpose.

It is surprising how little attention our authors have given to this subject. They have found "sermons in stones and books in running brooks." Is there not enough of beauty in it to give a poet the inspiration, if that is what is wanting? One poet has said,—

> "Heaped in the hollows of the grove,
> The withered leaves lie dead;
> They rustle to the eddying gust,
> And to the rabbit's tread."

Longfellow's words are familiar to all:—

> "The day is cold and dark and dreary;
> It rains, and the wind is never weary.
> The vine still clings to the mouldering wall,
> And at every gust the dead leaves fall,
> And the day is dark and dreary."

We do not find even an allusion to the beautiful coloring of the leaves no more than if they were always brown and sear.

Lastly, we might ask,—

> How might not the trees have been made?
> Intransplantable by shovel or spade,
> Not one twig on a leafy bower,
> Blooming in beauty or bearing a flower;
> Not one leaf changing its hue
> To blend so beautifully with heaven's own blue,
> Not one form to please the eye
> While towering upward toward the sky.

E. E. BOGUE.

Ohio State University, Columbus, O., Nov. 11.

Beech-Tree Struck by Lightning.

I SEND you an additional note on the beech-tree struck by lightning in July (*Science*, Aug. 11). The tree in question was one of a group of four beech trees and one ash tree, it was an old tree and only in half leaf at the time. It has since withered almost entirely. That it really was struck there can be no doubt, as I was sitting at a window within fifty yards of it, and I knew by the sound that something had been struck, as the report was sharp and sudden, not reverberating, and was simultaneous with the flash, and, upon going out immediately afterwards, I found the upper part of the trunk and branches freshly bared and the bark strewed at the foot of the tree. T. D.

York, England.

The Crescent Moon with a Star within its Rim.

THERE is one passage in the poem of the "Ancient Mariner" which had always been a puzzle to me until a few years ago, when I observed a phenomenon which I think supplies a satisfactory explanation of the meaning of the author. The lines referred to are those in which the crescent moon is described as having a star within its rim. I was in the south of England at the time, and the phenomenon which I saw was as follows: One clear evening,