

Botany for Public Schools.—V.

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Among suggestions left unanswered last month were, (1) whether red maple twigs differed in structure from those of rock maple; and (2) the nature of *lenticels*.

On examination, I find, very often, two or three buds in one leaf-axil of the red maple. I have not noticed the same in the rock maple. Have you? These extra buds are called *accessory buds*. What is their probable use?

Lenticels are the so-called "breathing pores" of the twig. When a twig is very young, it takes part in the work of the leaves. Have you not noticed that young twigs are often green? Later in the season, these openings expand with the expanding twigs, and cork cells form. These cork cells crowding out through the openings make the spots visible. You will notice that on the trunks of birch trees, these lenticels are much elongated crosswise on the stem. This is due to the fact that the tree grows in diameter, but does not grow lengthwise. [How, then, can a tree grow tall?] Have your children observe that the lenticels can be traced through the whole thickness of bark. Then show them the pores through an ordinary bottle-cork, which is the thick bark of an oak tree.

Every living thing, whether plant or animal, needs air. The trunk of a large tree is living. Therefore, it needs air. How does the air enter? Possibly through the lenticels. Can you find lenticels on the main trunk of an elm tree? No. But we notice the bark is deeply furrowed; and the new or inner bark has lenticels. These lenticels and the cracks in the outer bark together allow passage of air to the growing sap-wood.

In teaching lessons on twigs, any tree or shrub can profitably be used. One could teach a good lesson with alder branches; for, here, one may find four kinds of buds on the same branch. The small, pointed leaf-buds are, perhaps, most abundant. Nearly every branch has, however, the cylindrical staminate flower-buds—catkins—about an inch long. The pistillate catkins are shorter and stouter. Besides these, one can readily find the old pistillate catkins of last year. Their scales are now spread open. They resemble pine cones; but are only about three-fourths of an inch long.

You will see I have called these catkins "buds." A bud is an undeveloped branch; and always

grows in the axil of a leaf. Is there not a leaf scar below each catkin? [Read the Botany article in the October number again.]

No lesson on twigs will be of great value in itself. But if it leads to further observation for comparison and contrast, both in the growing and the dormant seasons, the work of teaching the lesson will not be wasted. After studying the alder twigs, therefore, put some of them in water in the school-room, to see if the catkins will open before spring. Study them again after they open. Try the same with willow twigs. How many kinds of buds can you find on a single branch of willow?

If any reader is unacquainted with willow flowers, I suggest getting the objects and a text-book; and, with the aid of these, learn to distinguish the staminate and pistillate catkins. Put both kinds in water. When they open, notice the yellow stamens on some twigs and the greenish pistils on others. Don't gather all your twigs from the same tree.

Rub a staminate catkin (when the pollen shakes out easily) over a pistillate one, and leave another pistillate one untouched. To insure pollination, repeat this once or twice. Then watch for a week or two the growth of the pollinated and of the unpollinated catkin. From this experiment, do we learn the use of pollen? Such work could better be carried on next spring; but it is worth trying now. If not satisfactory, try it again next spring. Exercises on artificial pollinations in the field would be useful in spring or early summer. [See Bailey's *Beginners' Botany*, page 153 for suggestions.]

Further reference to buds and twigs is, I think, unnecessary. I take for granted that those interested in Botany have Bailey's book referred to above. It is worth having. Surely, however, no teacher is so mechanical as to follow the order of subjects found in that or any other book. Rather use the book for supplementary reading, after the real objects have been studied in class. Following this and the preceding lesson on twigs, I suggest Bailey, page 111-120.

A logical sequence to lessons on branches would be a study of the whole tree. To distinguish trees in winter is more difficult than in summer. No leaves aid us now. From observing the general shape of the tree as seen at a distance, would it not be well to examine in detail its mode of branching? For, after all, that decides its shape. Notice the arrangement of buds, and the angle at which branches meet the main stem. If the terminal bud