

Course of Plant Study.

SQUEERS.—"Where's the second boy?"

SMALL BOY.—"Please, sir, he's weeding the garden."

SQUEERS.—"To be sure, so he is. Bot, bot, t-i-n, tin, bottin-ney, ney, bottinney, noun substantive, a knowledge of plants. When he has learned that bottinney means a knowledge of plants, he goes and knows 'em. That's our system, Nickleby, what do you think of it?"

NICKLEBY.—"It's a very useful one, at any rate."—"Mr. Squeers's Educational System" in *Nicholas Nickleby*.

It must be confessed at the outset that no direct application can be made of the above. Mr. Squeers is too radically phonetic as a speller to hold him up as an example. And although he cites a maxim that all practical educators will hail with delight—"he goes and knows 'em"—there is a strong suspicion left by Nickleby's answer that Mr. Squeers, who owns the garden, has a selfish end in view.

But Mr. Squeers certainly had a definite plan, and that is something. Nothing—or next to nothing—can be accomplished by giving a few object lessons on plants without any more definite end in view than merely to satisfy the requirements of the school curriculum.

It is time now to arrange your plan of work for classes in plant study. If your plan of work is carefully arranged and faithfully carried out, the interest will be great and increasing, and the value of plant study as a mental discipline for your classes will be unquestionable.

HOW TO PROCEED.

Turn up your files of the REVIEW for the spring of '88 and '89 and read what is there given about planting seeds in boxes so that plants may be ready for study in classes a few weeks hence. Make a list of plants in the neighborhood that flower early, such as the willow, alder, red maple and others, and though these are too difficult for younger pupils, a glance at their simpler characters, with notes on their time of flowering, drawing their parts, will pave the way for closer and fuller study next year.

Buds.

This subject can well be taken up in March. (See "Leaves and Flowers in their Winter Homes," March REVIEW, 1889.) A talk on buds, showing that the miniature leaves and flowers they contain were formed last year and are securely folded up and protected during the winter, cannot fail to arouse an interest in nature and her plans.

For this and one or two succeeding lessons a few twigs will furnish abundant illustrations for the arrangements of buds.

Buds that grow at the end of stems and branches are called *Terminal*. The buds that grow on the sides are called

Lateral. Lateral buds usually grow in the axils of leaves; they are then called *Axillary*. These buds are formed during the summer, and may usually be seen long before the leaves fall. Each leaf, as it falls, leaves a little scar where it grew. These scars may be seen just below the buds.

Buds are differently arranged on different species of plants. Look at the Lilac or the Maple, and you will see on each joint of the stem two buds, standing just opposite each other. This is called the *Opposite* arrangement. Each pair seems to be turned just half way round the stem from the pair below it. In the Cherry, Currant, Apple, etc., only one bud is found on each joint of the stem; and each bud is turned partly around the stem from the one next below it, so that no bud is borne on the same side of the stem as the one next above or next below it. This we call the *Alternate* arrangement. It is also called the *Spiral* arrangement; for if a string be wound spirally around the stem, it will touch each bud. These buds are arranged according to fixed laws, which are very mysterious and interesting. The arrangement is always the same in the same species of plants. If there seems to be any variation, it is only because some of the buds have failed to grow. Sometimes we find each bud just half-way round the stem from the one below it, so that the third bud stands over the first. In other cases we find each bud just one-third of the way around the stem from the one below it, so that the fourth bud stands exactly over the first. Again, we find each bud two-fifths around the stem from the one below it. In this case we have to take two turns around the stem to find a bud that is exactly over the one from which we started. The first is called the half, or *Two-Ranked*, arrangement; the second, the one-third, or *Three-Ranked*; the third the two-fifth, or *Five-Ranked*, and so on. These different modes of arrangement may be expressed by the following fractions: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{8}$, $\frac{5}{13}$, $\frac{8}{21}$, $\frac{13}{34}$, etc., each fraction being formed by taking for its numerator the sum of the two preceding numerators, and for its denominator the sum of the two preceding denominators. The numerator of each fraction shows the number of turns we have to make around the stem to find a bud exactly over the one from which we started, and the denominator shows how many buds are found in the cycle. No other arrangements than those indicated by fractions formed in this way are ever found.

Sometimes three or more buds are found in the axil of a leaf. In most cases the middle one is a *leaf-bud*, while the others are *flower-buds*. These additional buds are called *Supernumerary*, or *Accessory*. In the butternut and in some other trees, two or three buds are often found one above another. The upper one is usually the strongest, and the only one that grows; but if it be destroyed, one of the others takes its place. Some buds remain alive year after year without growing. These are called *Latent* buds. When the top of the tree has been broken off, or in any way destroyed, these latent buds grow, to supply the deficiency. Some kinds of trees, such as the Beech, Willow and Poplar, form buds and send forth shoots wherever they are bruised or cut. Such buds are called *Adventitious*. Adventitious buds sometimes grow even on roots, which do not usually produce buds. In cold climates, buds that are to survive the winter are covered with scales to protect them from sudden changes of temperature. These are called *Scaly* buds. The buds of herbs, and of trees in warm climates, have no scales, and are called *Naked*. In some species, the terminal buds are much stronger than the lateral; and then the tree forms a tall, spire-shaped top, as in the Hickory, Spruce and Poplar. In others the lateral buds are stronger; and the tree forms a broad, spreading top, with delicate sprays, as in the Elm and the Willow.