

### NATURE STUDY OF ANIMALS.

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The Cabbage Butterfly is a good subject for nature study work, especially during late summer and early fall. In the first place, it is easily distinguished and widely distributed, being found everywhere where its food plants abound; secondly, it has a strong economic side, and every country boy knows something of its ravages among cabbages and cauliflowers; thirdly, it lends itself readily to life in insect cages and thus makes possible all sorts of experiments and close observation; and lastly, this insect furnishes us with many interesting biological phenomena, such as parasitism, dimorphic forms, variation, etc., all of which should be taken up in the work of advanced grades.

Most boys and girls are already familiar, in a general way, with the white butterflies that flit on bright days in numbers around mustard plants, over nasturtium beds, and about turnip fields and cabbage patches. Here is a good chance to review some botany and to become familiar with the chief representatives of the mustard family found in your locality. Most of these plants are wild — weeds about gardens and fields; some are cultivated — used by man as vegetables. Make your observations in the school garden if you are fortunate enough to have one connected with your school; if not, get permission to visit private gardens and fields near the school. A turnip field is a capital place for this outdoor study. If none of these sources is near, good work may be done with caged specimens. Reference will be made later to this phase of the study.

Cabbage butterflies are of medium size, white above, with a tinge of yellow on the under parts. Collect several and ask the pupils to do the same. Note the exact length of the insect, and the spread of its wings from tip to tip. Measure several. Are they all *exactly* of the same size, or do they show variation? Older pupils should be taught how to plot the curve of variation for this species, using one-eighth of an inch or one-sixteenth as the unit of measurement.

Examine the butterfly carefully. How many pairs of legs has it? Is it a rapid walker? Can you suggest a reason why? Note the shape of the feelers or antennae, and the position and form of its eyes. How many wings has it? Note the

fine dust that is so easily rubbed off the wings. Under the microscope this dust is shown to consist of very minute scales, all of a definite shape and size. The scales cover the wings in regular order, much like the scales on a fish or the shingles on the roof of a house. Examine them under a microscope or good magnifying glass and see them for yourself. Underneath the scales the wings consist of thin membrane stretched between hard firm rib-like parts, the wing veins. This veining is also arranged according to a particular pattern in each species. The mouth parts are much elongated and lie close together, so as to form a long tube or "tongue," which when not in use is coiled in a spiral on the under side of the head.

The body consists of three distinct parts — head, with its antennae, eyes and coiled tongue; the thorax, with its wings and legs; and the long tapering abdomen, without appendages. The abdomen is made up of ring-like parts or segments, and on the sides of each segment are small openings, breathing pores.

At first thought it seems strange that an animal should not breathe by its mouth, but through holes along its sides, but when we consider its arrangement of muscles for contraction and expansion of its body wall, and how they move by involuntary action, much like the movement of our own diaphragm and intercostal muscles, we see that this is only another plan of the Creator to provide the tissues with oxygen.

But there are other insects with scale-covered wings, that are not butterflies, that you should learn to distinguish; for example, the great group of moths, little and big, that are attracted by lights during summer evenings. Collect several kinds of moths and compare them with butterflies. In dead specimens the distinction is easily made, for the feelers of butterflies are always knobbed at the end, while those of moths are either simple or feathered; in free living specimens we find butterflies flying during the day, while moths fly mostly at night, in the dusk and on dark cloudy days; and further, the wings of butterflies at rest are held erect, while those of moths are held out flat, or folded closely over the back or by the sides.

Examine the markings on the wings. The tip of the fore wings is always black, and this is followed by one or two round black spots on the fore wing, and one on the fore part of the hind wing. The specimens with two round black spots in the