

## NATURE STUDY AND SCIENCE.

## Autumn Lessons on Insects.

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## The Grasshopper.

One of the most interesting insects for a September lesson is the grasshopper. The grasshoppers are easily procured, too, and in sufficient numbers for any school, either in town or country. A few pupils will volunteer to catch and bottle the insects—one for each member of the school. Wide-mouthed bottles should be used, with some fresh grass placed in them. When the grasshoppers have been secured, thick paper, punctured with small holes for ventilation, should be tied over the mouths of the bottles. The grasshoppers should be collected on the evening or morning before the lesson is to be given, so that their imprisonment may be as short as possible. Even though it should appear that they are harmful insects, it would not be a chivalrous thing to injure or kill those which you use to teach the children—for true nature study appeals not only to the senses and the reason, but to the emotions.

The ideal way would be to give the first lesson in a meadow with the children seated on a grassy bank. And this may be done in many rural schools.

But for the first lesson in the schoolroom, each pupil is provided with a small wide-mouthed bottle containing a single grasshopper, whose escape is prevented by stopping the mouth of the bottle loosely with paper. The insects can be observed through the glass; but may be taken out for a minute to have their wings counted. The teacher should call upon the pupils *individually* to state any interesting points they notice about the insects, and any enquiries that arise in their minds suggested by the organs and actions of the grasshoppers. Be sure that every member of the class verifies the observations of those who answer. Any teacher can see the higher educative value of this method which gives the initiative to the pupil, and stimulates his self-activity. But the teacher will doubtless have to propose some questions herself in regard to particulars which would otherwise escape the observation of the children.

At the first lesson the following points (and perhaps others) may be noted:

Whether the grasshopper can travel up the glass, and how it holds on. How many legs it has on each side. Which are its longest legs.

Of what advantage are these longest legs.

How many principal joints (bending places) there are in each leg.

How many feelers it has, and how it uses them. Where the feelers are set.

How many eyes it has, and how often it closes its eyes.

How many wings it has, and how many of them it shows when at rest.

Why the front wings are called *wing-covers*.

How many rings make up the hinder part of the body?

How many rings bear legs and wings, and how many legs there are on each of the leg-bearing rings?

Let each child try to make a rough drawing of the grasshopper in the bottle.

The children may be told that those grasshoppers which had feelers shorter than their bodies are called short-horned grasshoppers or *locusts*; but that long-horned grasshoppers (that is, those whose feelers are longer than their bodies) should not be called locusts.

At the end of this first lesson, a few of the grasshoppers are placed in an insect cage or a glass jar which has been prepared for them by covering the bottom with a piece of grassy sod.

Tie to the cage or jar cards bearing the following directions and questions to be worked out by the children as far as possible, by personal observation of the grasshoppers in the cage (or jars) and in the field:

What do grasshoppers eat, and *how* do they eat?

How do they hold a piece of food while eating it?

Where do they lay their eggs? Do they deposit them singly or in groups?

Find whether grasshoppers have any voice or make any sound corresponding to one, and if so, whether they make this sound when flying or when at rest?

What is the color of their spittle?

Find some other animals whose bodies like those of grasshoppers, are made up of rings, and which have the same number of legs and wings?

What three ways do grasshoppers have of getting along from one place to another?

Why are locusts called *grasshoppers*?

Find whether locusts live all winter?

Where do the grasshoppers (locusts) come from next year?

Find whether grasshoppers are harmful or useful to the farmer.

An examination upon, and discussion of, these questions will be the second lesson, which may be appropriately concluded by a talk about the ravages of locusts in other countries, as in Eastern lands and on the Western plains of North America.