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WHAT IS AN INSECT?¹

It is a lovely summer morning. Let us shut our books and wander in the garden and field, in search of insects. The best way is to take a few matchboxes with us and drop one insect into each as we find them. Then when we get back to school, we can put them separately under tumblers. Insects are so small that we often pass them by. But they form three-fourths of the whole animal kingdom, and they do us so much good and so much harm that we ought to know about them. As we start I see a cabbage butterfly in the kitchen garden, and a beautiful red admiral flitting about among the flowers. We will take the cabbage butterfly, so that she may not lay her eggs on our cabbages. Next, stop at this rose tree, there are a number of tiny insects on the flower stalks. If you look closely, you will see that each one has his beak buried in the stem, so as to suck out the juice. These are plant lice. Each one is called an aphid, and in the plural they are called aphids. We must syringe the tree with soft soap and tobacco water, or it will soon be covered with these insects, for they increase at the rate of more than a million in a month, and they suck out all the sweet sap from the plants to which they cling. On the same tree you will very likely find a ladybug, for she feeds on aphids. Now look into the flower of this old cabbage rose, which grows in most cottage gardens. You are almost sure to find in it a lovely rose beetle with green shining wings shot with gold. Take it up and look at the bright wing cases. While you are looking, it may open these cases and spread out the transparent wings underneath; but if it flies away you can easily get another.

Now, look! At your feet runs a beetle which is not half so pretty. It is the cocktail, or rove beetle, often called the devil's coach-horse. As you pick him up he will cock up his tail and squirt out a very disagreeable fluid over your fingers, while he

[1] Lesson I of *Insect Life* by Arabella Buckley.

raises his head and snaps with his jaws. So drop him in his box quickly. The fact is, he is terribly frightened, and hopes to make you set him free.

Now we will go out into the newly mown field, and there you will see a number of small green grasshoppers hopping about. They have been hatched under the earth clods, and are eating the tips of the young grass. Some will have wings, but others, which are not fully grown, will have none.

I have not asked for a spider. You had better get one, and also a hundred-legs or centipede, if you can find it. When you have put these specimens under their glasses, look carefully at them. You will find a difference between the spider and the centipede.

Pick one up and make him too a prisoner. Next try to find a wasp or a bee. You can pick it up in your handkerchief and drop it in its box. We must go down to the river to find a mayfly or a dragonfly, and near there we shall easily get a daddy-longlegs. But if there is not one to be seen, a bluebottle or a gnat will do. You will wonder at the hundred-legs and all the others. The spider has eight legs and the centipede a very great many, while all the others have only six.

Now look at the grasshopper, the wasp, and the daddy-longlegs. You can see very clearly that their bodies are divided into three parts (a) the head, (b) the front body, on which the six legs and the wings grow, (c) the hind body, which has no legs on it, even when it is very long, as in the daddy-longlegs and the mayfly. You cannot see these divisions quite so well in the beetle because its wing cases cover the joint between the front and hind body.

We had better call these three divisions by their right names (a) head, (b) front body, or thorax, (c) hind body, or abdomen. It is because insects are cut into these three parts that they have their name. It comes from the Latin "inseco" (cut into). The spider's head is not clearly divided from its body, and a centipede has not three divisions. For this reason, and

because they have not six legs, some naturalists separate them from the true insects. This is why I did not call them insects.

Another thing you can notice well in the little green grasshopper: his body is divided into rings, from his tail up to his head; and you can see the same in the wasp and the daddy-longlegs, the aphid and the cocktail beetle. All insects have ringed bodies.

It is these rings which enable the wasp to bend her abdomen when she wants to sting and to breathe. You can see, as she stands, how it keeps moving up and down all the time. This is because she is breathing. How do you think she does it? Not through her mouth as we do, but through her sides.

If you look closely at the grasshopper you will see along the sides of his body some little black dots, one in each ring. These are breathing holes, and through them the air goes in and out. They are smaller in a wasp, but they are there, and she is pumping the air in and out of them.

Not that we have put aside the spider and the centipede, those that remain are true insects. But there is a difference between the daddy-longlegs and the rest, which you must notice. This is that they all have four wings and he has only two. This would be very strange if it were not that we can find some remains of the right number. He has two little knobs behind his front wings, and with these he balances himself. So he has two wings and the stumps of two more.

There is a great deal more to be learned about these insects. But I want you to remember now that they have six legs; that their body is divided into three parts; that you can see the rings in their hind body or abdomen; that their legs and wings grow on the front body or thorax; and that they never breathe through their mouths. Also that while bees, butterflies, and beetles have four wings, flies have two wings and two stumps.

Find as many insects as you can, and notice their different parts.

INSECTS AND OTHER ANIMALS²

Arthropods

Let's take a trip to the zoo. At the entrance, we are welcomed by jabbering monkeys. They swing from tree to tree with their limber arms, grabbing vines with their five-fingered hands. The monkey is able to hold the vine like a man because of his fingers and thumb. Other animals cannot. Take the next animal, for instance.

Perched on a different tree, taller than that of the monkeys, is a great eagle. He has no hands to swing with, but with two feet he is able to perch securely. The eagle is not made to swing in trees, but to perch and to fly. He is given wings to soar in the clouds. His body is made just right for it. Animals are made to fit the place where they live. While the monkey's place is the forest jungle, the eagle's is the sky.

It's getting hot on our stroll, so let's cool off in the reptile reserve. Here we see snakes, frogs, and all sorts of creeping creatures. The word reptile means "to creep." Lizards, turtles, and crocodiles move about not by swinging or soaring, but by slithering, sneaking, and sliding from place to place. They like to live in places where they can keep their temperatures steady. They need to do this because their temperature is changed by the temperature of their surroundings.

Animals are made to fit the places they live. This is true for all animals, including those called Arthropods. What are Arthropods? The word means "jointed legs." Their legs have joints, and so they get this name. Of course, humans have jointed legs too, but we are not Arthropods. So, why should these animals get the name to themselves? Arthropods are lower animals. They are not as advanced as reptiles, birds, or mammals like monkeys,

[2] Supplement by Brett Vaden.

and they are certainly much lower than humans. Nevertheless, Arthropods are more advanced than some animals. They are higher than these others because of their jointed legs.

Some Arthropods

You already know several kinds of Arthropods, even if you do not know that you know them. If you start thinking about all the lower animals with jointed legs, you will probably name some Arthropods. If you add the fact that all Arthropods have a hard outer skin, or exoskeleton, you are sure to think of some. For example, among creatures that live in the sea, what are some Arthropods? Did you guess crabs or lobsters? These have jointed legs and a hard shell. You may have had to crack the shell if you have ever eaten them at a restaurant. Crabs and lobsters are a set of Arthropods called Crustaceans.

Another kind of Arthropod is usually smaller than Crustaceans. They live in house corners, attics, and near the window sill. Their jointed legs are used for wrapping up food in cases of web, and their outer skin is not as tough as a crab's, but more flexible. Did you guess the spider? Spiders are a set of Arthropods called Arachnids.

Spiders are a favorite food of the next Arthropod: the centipede. Scratch around under some large rocks or loose mulch near your house and you might find one. Centipedes have a creepy way of crawling and may scare you if you find them accidentally. They have many jointed legs going down their long body, and they have fangs filled with venom. But do not worry, because centipedes have too small a bite to hurt you. A close relative of the centipede is the millipede. This Arthropod has even more legs, but they are tucked under its long tube-shaped body. If you touch one, it might curl up into a little ball. This posture helps them defend against predators, and their tough skin also helps.