

shorter, usually not more than half the length of the body, they are locusts. Examine your collection, and accordingly divide them into two groups. Which are more numerous in your locality?

Insects are characterised by a distinct head, thorax and abdomen, with three pairs of walking legs, and usually with two pairs of wings. Examine and determine which of the following animals are insects;— toad, mouse, housefly, clam, starfish, lobster, dragon fly, potato beetle, butterfly and spider. Substitutions may be made, and the list extended for school work.

The wings of birds and insects should be compared as to form, structure and function. Are they homologous or analogous parts?

The hard parts of bodies of insects are on the side and so form an exoskeleton. This is a condition we find exactly reversed in many animals, where the hard part or frame work is an internal skeleton.

Test the hard part of the clam or oyster with hydrochloric acid. We find it is composed largely of carbonate of lime. In the same way test the dried exoskeleton of the sea urchin, starfish, and the shells of lobsters, crabs, snails, and several kinds of insects. The exoskeleton of insects is composed chiefly of chitin, and does not react to HCl.

Some of the locusts are gregarious and at times are very destructive, as they are herbivorous and feed upon almost any green part of plants. The Rocky Mountain locusts have at various times migrated eastward from their mountain homes in countless millions, and devastated various parts of Western Canada and the United States.

The locusts of the Old World are likewise frequently very destructive. The prophet Joel in the first nine verses of chapter 2, gives a very vivid description of the flight of a plague of locusts. Read other accounts of their devastations, and be sure to gather all local data available.

Has the locusts any enemies? Here is a chance for original work. It is quite safe to infer that if the locusts had no enemies they would soon become destructive pests in our own country. It is only through patient investigation that we may come to know something of the great debt we owe to birds and other animals of our woods and fields.

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## LOWLAND FERNS

J. VROOM.

An early start this morning, and a westerly route, if we are out walking for pleasure.

Why is it that idle footsteps always turn toward the west? In the morning, we let our shadows point the way that we shall take, if we have no definite object to lead us in another direction; in the evening we leave the shadows behind. Perhaps there is a natural instinct bidding us follow the course of the sun. We are all sun worshippers by nature.

So, after our greetings to the king of the day, we will turn our backs to his brightness and look to the westward, where each drop of dew reflects his glories in miniature so as to bring them within the range of our weak vision. Low lying fields, all their feathery grasses grey with beads of moisture, are iridescent in the morning light. As the sun rises higher, the greys and purples disappear, and vegetation is seen in its true colours. The greens and browns are richer now than at mid-day, for the lurking shadows bring them out more clearly; and the air itself has a colour which belongs only to the morning hours.

We are out again in search of ferns; and when the grasses along the roadside are dry it is time to take to the fields. Leaving the dusty road where it crosses the brook, we go up the meadows, of course; for there is another instinct which leads us up stream rather than down. And here we shall find all three of the Flowering Ferns. They differ from true ferns in having green spores which mature as the fronds unroll in early spring; but, though their fruiting season is past, and only the withered remnants of the fertile parts remain, they can still be easily recognized.

In the wettest places we shall expect to find the Royal Fern. This is the Flowering Fern proper, in distinction from the others of the group; and is so called because of the spore-bearing panicle at the summit of the fertile fronds, which looks like an inflorescence. The fronds, from two to five feet high, are pale green, smooth and delicate. They are bipinnate, the primary divisions distant and opposite, the secondary divisions alternate. If the fertile portion is not still remaining in a brown cluster at the top of the frond, the fern can be recognized by its oblong leaf-like divisions and its shining stalks.