

the condition under which the plant was found, with its colour, and any other information deemed necessary. Such information should also be entered in a note-book, with drawings, if possible. The collector should either have a tin case or a portfolio for preserving what he gathers. For the beginner the case is the best, as it allows him to study the fresh plants; but with plants like ferns, it is well to apply slight pressure in the field. This can be done by means of a portfolio arranged with straps. Some of the largest collections have been so made. One should have a large knife for digging up roots and cutting branches, a small knife, and perhaps a pair of scissors. The last, however, is a superfluity. A cane with a hooked end is desirable, not only for the assistance it affords in walking, but for pulling down impracticable branches, and for reaching aquatic plants. A few pill-boxes, a bottle of chloroform, and a paper of pins are often required for the preservation of insects, as in these days entomology is linked with botany. The student should let nothing escape him. No plant is too small or mean to study. Indeed, the most minute is often the most interesting.

After the day's collection has been brought home, the plants should be placed between folds of bibulous paper with mats of drying paper between. Moderate pressure should then be applied for some hours. Then look at the specimens again, and smooth out any upturned corners or wrinkles, change the dryers, and apply more pressure. The specimens should be left permanently in the folds of bibulous until perfectly dry, which will require with most plants about a week. The dryers should only be changed, at first often, but afterwards only occasionally. Thick, fleshy roots or tubes should be sliced into shape. In the absence of a regular press, it is easy to extemporize a weight with books, bricks, or stones.

The plants when finally moved should be sprinkled with a weak solution of corrosive sublimate to preserve them against the attacks of cabinet insects. When perfectly dry again, they can be mounted with glue upon sheets of thick white paper (16½ inches by 10½ is recommended by Gray), and labelled in the lower right-hand corner. A pocket or small envelope, made to open in all directions, contains small parts of the flower, seeds, spores, etc., for future examination. The glue used should be soaked in cold water for six or more hours, when it absorbs a large amount of water. It is then kept in a water-bath at or near 212° Fah., while in use. This prevents it from becoming stringy. In addition to gluing it is often necessary to bind down the ends of twigs with straps of paper. For this purpose court-plaster is good, and the albuminous paper used by photographers better.

The species should be arranged in genera, each under its own genus-cover of thick brown paper, and the whole in natural orders or families. Only one species should be attached to a sheet, although one can have any number of similar individuals, that the size of the paper will allow. When all is done, the collection may be packed in cases for ready access, and more or less convenient according to the means of the owner. Then, with a microscope of moderate power, arranged with a stage for dissecting, and with a pair of pincers, a knife and two needles, the collector is prepared for work. He will find his herbarium an increasing care, but at the same time a never-failing pleasure.—*W. W. Bailey in New Eng. Journal of Education.*

THE COLORADO BEETLE.

Among the many pests which have spread over this continent, destroying and ravaging the fruits of the earth, and bringing to naught the work of the farmer and all engaged in agricultural pursuits, none has created such universal consternation, as what is known as the Colorado beetle. Even in the old world the Governments have become alarmed, for fear it may in some way make its appearance among them, and are just now busy fortifying themselves against such an invasion should any take place. In England there is some hope that the dampness of the climate would be unfavourable to its rapid reproduction, but the continent offers no such obstacle, the climate there resembling that of this and the neighbouring country so closely, as to render it likely, should a foothold once be established of their remaining permanently among them.

A great deal has been written of late on this subject, and no paper has given more complete information than the *Chicago Inter-Ocean*. Fifty years ago the beetle was discovered by naturalists, on the Upper Missouri river, near the Rocky Mountains, and class-

ed among the genus *Doryphora*, or sword-bearers, but afterwards called by Mr. D. Walsh, the naturalist, *Doryphora decem lineata*, or ten-lined spear-bearer, from ten black lines on the wing cases.

Its principal nourishment appears to be a wild plant of the nightshade family.

As the western settlements of pioneers began to encroach nearer the base of the Rocky Mountains, and potato fields were planted here and there in close proximity, the beetle was attracted from its home in the highlands, and very soon discovered that potato vines were a much more palatable and desirable food than its primitive nightshade, and at once crowds of them began to move down into the lowlands like foraging parties in time of war.

They even went farther than the potato vines, becoming more and more luxuriant in their tastes and habits, and began to devour grass, the red currant, and even cabbage leaves. It is simply one of the penalties we have to pay for our insatiable ambition. Had those living in the east been contented, the Colorado beetle would probably have been feeding on its native nightshade to-day, but civilization having thus gone of its own accord to it, it is not surprising that it sought to make the benefits reciprocal, by setting out at once to explore the new world so deliciously and agreeably opened up to it. Its march of progress has been slow, however, but none the less sure. Twenty years ago we heard rumours of its devastations in Nebraska, and it was soon remarked that it was travelling steadily eastward. In 1869 it was one hundred miles west of Omaha. In two years more the State of Iowa was gained, and very shortly afterwards all the Western and Middle States were overrun. In 1870 it made its appearance in the western borders of Canada, and to-day it is thus far on its eastward journey. Mr. Walsh estimates that it travels about sixty miles per annum, and that it will reach the Atlantic Coast and overspread the Eastern part of Canada and the United States in 1877 and 1878.

It then remains to be seen—if it will make the ocean journey—and conquer the old world as it has the new.

The Colorado potato beetle is described as by no means a formidable-looking creature. When fully developed it is something like a large lady-bird, but oblong instead of round, and from two-fifths to half an inch in length. It is of a tawny or yellowish cream colour, with numerous black spots, generally a peculiar group of sixteen spots being marked on the upper portion of the prothorax, or part of the body immediately behind the head. On the wing-cases are the ten black stripes, running lengthwise from head to tail, from which it derives its distinctive name of *decem-lineata*. The edges of these black stripes are irregularly punctured, and the second and third stripes on each wing-case just touch one another at each end. Under the wing-case is, of course, a pair of membranous wings, which the insect uses freely, and which are described as giving the beetles a very beautiful appearance when flying in the sunshine. The insect has an immense capacity for reproduction. One female, the Department of Agriculture states, will deposit from 700 to 1,200 eggs at intervals during forty days on the leaves of the potato. In six days the eggs hatch into larvæ, which feed upon the vines for nearly twenty days. They then descend into the ground, and after remaining in the proper state to which the larvæ change for some ten or twelve days, they again come up as perfect beetles. By the time they are a week old the sexes are all paired off again, and in another week the females begin laying eggs for an addition to the family. One pair of these insects would produce in a single season, if undisturbed, a progeny of 60,000,000.

A curious fact connected with this insect is that it does not seem to be a favourite with the birds. It is even asserted that the insects are poisonous, and that people have been taken seriously ill after inhaling the vapours given off in scalding the larvæ, or in burning the potato-haulms which they have infested. At first, it is said, the domestic poultry refused to eat them, and that the flesh of the prairie hens which had fed upon the insects was rendered unwholesome. But some suspicion has been thrown upon these assertions, which are thought to be the result of the panic caused by the pest. In some localities the farmers have cooped their poultry in the potato fields, and in others the red-breasted grosbeak feeds on the larvæ, and has flourished so well and found such a plentiful supply of food as to have become numerous in districts in which it had previously been scarce. There are moreover, many insect enemies of the beetle which thrive where it abounds, and it is by no means improbable that in the long run nature will strike a balance between the contending forces, and prevent too great a devastation by the occasional excessive multiplication of the destructive insect. In the meantime the Department of Agriculture recommends a dose of Paris green, mixed with ashes, and dusted over the plants in the morning when the dew is on, as the most effective mode of destroying the pests.