

soria in chalk and other minerals, some of which contain them to an extent perfectly incredible, until proved by ocular demonstration. The mineralised skeletons actually in many cases have contributed to form solid strata of the earth. There is a kind of siliceous stone from Tripoli, which is completely made up of skeletons or sheaths of infusoria. A single cubic inch of bog iron ore contains about two millions of millions of microscopic animalculæ. Of the species of fossil infusoria thus discovered half at least still exist. In their dead state, and fossil condition, they doubtless contribute to the growth of vegetable substances. We shall now see the wonderful functions they perform during life, for the benefit of us all.

These curious infusorial animalculæ are found living in all the stagnant waters with which we are acquainted. It may be truly said,—

“———where the pool
Stands mantled o'er with green, invisible
Amid the floating verdure millions stray.

Every fluid drop of the ocean contains them; and they abound in mud.

Like the eels of the wheat again, some of these maintain a torpid existence, when dried up by the summer's sun; and in this condition countless myriads of them are raised up with exhalations into the atmosphere. The *guano*, so extensively used for manure, is full of the most beautiful infusoria, some of them splendidly iridescent; and there is no better method of testing the genuineness of this useful substance than by the microscope. A small portion of guano dust, viewed with a quarter of an inch achromatic, affords a surprising spectacle, as any one who pleases may prove. In short the whole creation teems with life.

“Link after link the vital chain extends,
And the long line of being never ends.”
(To be continued.)

From the Farmer's Gazette.

EXTRACTS FROM PROFESSOR ALLMAN'S LECTURE ON INSECTS INJURIOUS TO AGRICULTURE.

WIRE WORM.

In the two insects which have just been brought before your notice you must have been struck with the fact that their ravages were confined to a single kind of crop—namely, the turnip; that, however, to which I now request your attention is omnivorous, and many very different kinds of crops become its victims.

You will, perhaps, have already anticipated that I allude to the *wireworm*. Now, under this name very many different grubs and worms have been confounded, and it is important that you should know the true wireworm from those animals with which it has been falsely associated. The proper wireworms are of a nearly cylindrical form, covered with a hard, shining skin of a yellowish brown colour, and divided into numerous distinct rings or segments. Six short legs are borne by the three segments which immediately succeed the head.

Now, all the true wireworms are insects in an imperfect state, and, like the black caterpillar just described, are larvæ destined to undergo a series of metamorphoses before they arrive at their completely developed condition.

The perfect insects of which the wireworms are larvæ, belong to a tribe of beetles, called from a remarkable power which they possess of springing with a peculiar snapping sound, when placed upon the back or otherwise annoyed, *Elaters* or click-beetles.

Among the parents of wireworms are several species of *Elater*, but those which at present chiefly demand our attention, as being the most numerous and destructive, are the two species called by Linnæus, *Elater obscurus*, and *Elater lineatus* and indeed many entomologists are of opinion that these are varieties of the same species. They may be found in abundance from April to midsummer under stones, and in fields, woods, hedges; and gardens.

Whether the parent beetle lays its eggs in the earth or in the under-ground portion of the plant, which is to become the

food of the wireworm, has not been accurately determined.—The eggs, at all events, are very minute, and from these proceed the little worm, at first almost invisible to the naked eye. It grows slowly, but in time acquires the length of about three-fourths of an inch. During its growth it frequently changes its skin, and it is ascertained that it remains in the condition of a larva, or wireworm, for five years, becoming more and more voracious as it grows, attacking the roots and under-ground portions of the stem of almost every crop it has once got possession of—wheat, oats, barley, mangle-wurzel, turnips, potatoes, cabbage, grass, and the flowers and culinary vegetables of the garden.

On the expiration of its five years of larva-life, the wireworm penetrates to a considerable depth in the soil, and there forms for itself a little earthen cell, in which it undergoes its metamorphosis into the *pupa*, and from that moment the agriculturist has nothing more directly to fear from it. This generally occurs about the end of July or beginning of August. It would seem that they continue in the *pupa* state generally for two or three weeks; but Mr. Curtis is of opinion that many remain buried throughout the winter. At length the period of their final change arrives, and, bursting the *pupa* skin and the earthen chamber which imprisoned them, they emerge into air and light, with propensities and habits totally changed, an elegant and active little beetle, no longer the terror of the agriculturist, and appeasing its easily-stated appetite on the delicate organs of a few flowers.

For arresting the ravages of the wireworm numerous methods have been adopted. The use of the roller is by some strongly recommended, as well as the folding of oxen and sheep on the infested fields.

Various chemical applications have been found useful, such as lime, soot, the refuse lime from gas-works, chloride of lime, nitrate of soda, and common salt.

It is a curious fact that there are some crops which have the effect of expelling the wireworm. Of these, *woad*, a plant cultivated in some parts of England as a dye, and *white mustard*, have been highly spoken of. “I learn from Dr. Roy,” says Mr. Curtis, “that on breaking up damp meadow and pasture land in Lincolnshire, if it be sown with woad instead of corn, the wireworm will be got rid of; and about Boston it is found to be a very profitable crop. It may be repeated for two years, after which splendid crops of oats and potatoes may be obtained from the land.” Sowing white mustard seed on the infested land was attended with results to the succeeding crop of wheat equally beneficial.

Few modes of destroying the wireworm, however, are to be preferred to the obvious and most effectual process of hand-picking. “Mr. G. Pearce, of Pennare Goran,” says Mr. Spence, as quoted by Curtis, “saved an acre and a half of turnips sown to replace wheat destroyed by the wireworm, and attacked by hosts of these larvæ, by setting boys to collect them, who at the rate of 1½d. per 100, gathered 18,000; as many as fifty having been taken from one turnip. Thus, at the expense of only £1 2s. 6d., an acre and a half of turnips, worth from £5 to £7 or more, was saved; while, as the boys could each collect 600 per day, thirty days' employment was given them at 9d. per day, which they could not otherwise have had.”

Not only in the case of the wireworm, but in that of almost every other noxious insects, the different species of insectivorous birds, and, above all others, the rook, are our best friends, and should always enjoy the careful protection of the farmer; and nothing deserves stronger reprobation than the wanton destruction which is but too often practised of these faithful allies of man.

APHIDES.

The next insect pest to which I shall for a few moments request your attention, belongs to a family in some respects the most remarkable of the whole class. I allude to the different kinds of *aphides*—a race from whose attacks there is scarcely a single species of terrestrial plant that can claim exemption.

It is, however, the turnip, and pea, and bean crops on which