

*On the Potato Grub of Tasmania.* By Capt. H. BERTHON,  
H.E.I.C.S. [*Read 14th March, 1855.*]

THE grub, which did so much injury to the Potato crops in certain parts of this island last year, and which threatens during the present season to commit still further devastation, is the production of a small moth of the Tineidæ family, and appears to be identical with the insect which has of late years been making such ravages amongst the tubers in New Zealand. In fact, it is by no means improbable that it was introduced into Tasmania in some infected importations from that country.

The moth is about one-third of an inch in length, of a silvery grey colour, barred with brown, with the usual jointed antennæ, trunk, and other peculiarities of formation which characterise the order "Lepidoptera." It is distinguished from many others of the class by a peculiar pair of palpi, springing from the base of the trunk, and curving backward over the head. The ova are elliptical in shape, of the size of a very minute grain of sand, and pearly white in hue. The larva, when full-grown, are about five-twelfths of an inch in length, of a semi-transparent yellowish white, forcibly reminding one of the colour of the white currant, to which is occasionally superadded a tinge of pink. As in other members of the order, they are furnished with six thoracic legs; and four of the remaining eight sections of the body are provided with pro-legs. The pupa, or chrysalis, is of a dark amber colour, little more than half the length of the full-grown larva, and is ordinarily placed in one of the eyes

of the potato, or other convenient indentation of its surface, and protected by a cocoon of very flimsy and inartificial construction.

What may be the usual period that the ova lie unhatched, it would perhaps be assuming too much to assert on the strength of only a couple of experiments. It is probable that the time varies with the temperature, with the position of deposit, and perhaps also with other concurrent circumstances. All that can be confidently made known is this, that in the experiments, which were conducted under the eye of the writer of these notes, the time that elapsed between the laying and the hatching of the eggs was ten days.

The existence of the larvæ, from their birth to their transformation into pupæ, is of about a fortnight or three weeks' duration. Their voracity, however, is so great, and their diligence in their vocation so untiring, that a couple of individuals will thoroughly riddle and destroy a potato of fair size during their brief but mischievous career.

The pupa state, it is to be presumed, as in the case of other *Lepidopterous* insects, extends over a period of some months, and it were vain, therefore, on the part of the writer, to expect that any further transformation will take place in the specimens which he has preserved until the revolution of the seasons shall have brought round the appointed time of revival. The moth itself lives but a few days, and the deposit of its ova is speedily followed by death.

Under the supposition that the root of the potato is unapproachable, and safe from the attacks of the insect, it has been surmised by some that the moth deposits its eggs on the stalk of the plant, whence the larvæ continue to draw their nourishment as long as it remains sufficiently succulent

for the purpose, and whence they descend into the root itself, when desiccation ensues. This theory is opposed to the writer's experience. He has invariably found that the moth attacks the root. The uppermost potatoes, those that are nearest the surface, are of course most easily reached, nor is it by any means a difficult matter for the insect to penetrate to the depth of three or four inches when the soil is open, uncompressed, or lumpy. Not a single case of an infected stalk has been yet detected; but constant and numberless have been the instances in which, when uncovering the potatoes at the depths just indicated, moths have been dislodged, and flown uninjured away.

Before the writer correctly understood the nature and routine of the insect's tactics, and while he yet believed that its grub form was the only one in which the depredations were to be guarded against, he caused a crop of infected potatoes to be dug up, and exposed for some days to the effects of the atmosphere, thinking that the heat of the sun would put a stop to the further ravages of the larva: but this turned out to be a woeful mistake. The potatoes while lying thus exposed in rows were again attacked by the insects, and so insidious were their proceedings, that the damage had been greatly increased before their presence was discovered. And it is not unworthy of remark, that the underside of the potato, or the side in contact with the ground, was invariably the part that was selected by the moth for the deposit of the ova. This was doubtless owing to the greater security that the unexposed side of the potato afforded against the weather, as well as against birds and predatory insects, than the upper surface would have done; and it was afterwards noted, that the moths, when unengaged in laying eggs, were almost always to be found beneath the clods of earth with which the

ground was encumbered, where it is to be presumed they sought shelter from the sun's rays, and protection against their natural enemies.

From the facts just narrated, it would seem that the following conclusions may not unreasonably be drawn:—

*First.*—That the best soil to sow potatoes in, supposing that the sole object were to exempt them from the grub, would be that which is impervious to the moth; such, for instance, as sand, or a compact loam.

*Second.*—That if no such soil be available, the deeper the potatoes are sown, the safer they will be from the inroads of the moth.

*Third.*—That when there is reason to apprehend the presence of the moth, not a moment should be lost in housing the potatoes after they are dug up.

It has been stated in the course of these notes, that the transformation of the larva into the perfect insect is not to be expected for some months to come—not, indeed, till the ensuing winter and spring shall have run their accustomed course. Such is the ordinary routine of nature. Having found numerous empty pupa cases on potatoes of this year's growth, the writer has strong grounds for believing, however, that there has been more than one generation of the insect during the summer that is now drawing to a close; and if this be true, it can hardly be doubted that the long continued drought, and unchequered heat of the weather, must have been the immediate cause. Rain or variable weather would in all likelihood have diminished their fecundity, and it is possible that a severe storm at the proper time might have annihilated them altogether.

Previous to concluding these notes, the writer cannot refrain from drawing attention to the peculiar palpi before

alluded to, which doubtless are designed to answer some useful purpose to the insect. It may not be too fanciful a theory to suppose that they may be of great advantage to the moth in penetrating the earth, and in lifting or partially removing such particles as would otherwise impede its progress in its descent to the roots of the potatoes. This must at present be received, however, as an unsupported conjecture, for the writer has not yet been enabled to establish the fact by ocular demonstration.

But it is the only portion of the notes which partakes of the nature of theory or conjecture—all the rest are ascertained facts; and it is to be hoped that they may not only be of sufficient interest to attract the attention of the naturalist and the practical farmer, but that their further consideration and discussion may lead to the discovery of some effectual means of putting a stop to the ravages of this rapacious insect.

As a precaution against the spread of the infection throughout the island, all seed potatoes coming from places where the insect is known to prevail should be carefully sorted, and the bad ones rejected; and not only should the potatoes themselves be scrutinized, but the bags or baskets which contain them should be also closely examined, and, if infected, burnt or cleansed.

Any one who will be at the trouble of carefully inspecting a basket or sack in which infected potatoes have lain for some time will find a lot of little earthy-looking excrescences adhering to the inside;—these are the cocoons of the chrysalides covered with and concealed by earthy matter. They are the media through which the evil is spread throughout the country, and conveyed from one country to another; and they are the pests in embryo, of which every one ought to try and make a clean sweep.