

I roused myself again. The tired-out men were yet asleep amidst all the noise of creaking timbers and the splash of water about them, for sailors will sleep sound through the greatest accustomed noises, though awakening instantly when these cease. So I stepped cautiously over their forms, and crept on deck. It was still fearful. I could not stand erect, but had to crawl along, holding by whatever my hands could find yet secure amidships, till I reached the man at the pump. Him I relieved, casting his lashings off and putting them round myself; then bidding him crawl below, making sure to secure well the stout tarpaulin which covered the small opening that admitted one at a time to the cabin. And there I stood, working hard at the pump for dear life, and thoughts rushing through my brain the remembrance of which now seem to conjure up only a something so weird and maniacal, accompanied as it were by a sort of defiance of all the wild elements of destruction, that I almost fancy myself looking at a picture instead of a past reality.

As I was then, as I now can see my-

self on that night, so let others picture me. At that pump, alone on the deck of a mere wreck, only the lowermast standing, with a reefed storm-staysail to steady her, though the sail often flapped when we fell, literally fell, into the hollow of a sea, to rise again suddenly and meet the full blast, which came like thunder-bolts upon the stout little bit of canvas displayed; the rushing and tumbling about of the tiny craft; the night, black as jet—there I stood alone! Many similar have I seen since that night, but never one that more impressed me with the consciousness of what was a death by foundering at sea.

Soon I detected symptoms of a break in the gale; and when my turn came to be relieved, I was able to go below and give assurances of hope, even as my barometer indicated. The burst of the storm had ceased; and three days afterwards we made the land, got our wrecked craft into a shelter, and were saved!

Our little canary went other voyages with us, until, after being our companion for several years, it died quietly here at home.

## A NEW PLAGUE.



FEW years ago people were startled at the report that the Colorado Beetle, of whose devastation all had heard in America, had really found its way across the Atlantic, and had appeared at various places in Germany; and that there was every danger of the plague spreading:—"The justly dreaded addition to the plagues of thirty centuries," says the *Times*, "surpasses them all in its locomotive powers, in its versatility, in its power of adapting itself to circumstances, and in the determination with which it

compasses its ends. It can fly considerable distances, and has a wonderful instinct for directing its flight; it can take to the water and walk or paddle, if not on the open sea, which is not necessary, on rivers, pools, and docks, which is all that it wants. In this way it approaches a barge or a ship, walks up the sides, stows itself away in a crevice, a heap of dirt, or deep in the cargo, and disembarks with the passengers and crew, knowing well that wherever they go, board and lodging will be found. The Dominion authorities tell us we shall never keep it out. It has got down to Montreal, where it is impossible to

prevent it taking passage to this country. But it has already familiarized itself with the passage, and while we are all thinking only of the Russians crossing the Danube, the beetle has crossed the Atlantic.

Active as its habits usually are, it can also lie dormant and apparently dead for long periods. Under some circumstances it is watchful and suspicious, avoiding, like other beetles, the eye of day and the light of the sun. Yet it can be anything but shy, and will meet your gaze like a man of the world. It loves to frequent river sides, crowded quays, and railway platforms, springing into the carriages or the trucks with the passengers or the cattle, and issuing from the terminus into the quarter most to its taste. The authorities of Ontario might have added, but have not, possibly because they would spare us needless horrors, that this wonderful creature exhibits in rapid, indeed annual performances, the amazing changes which Mr. Darwin believes he has ascertained in the development of species taking, on his modest supposition, myriads of years. The Colorado beetle, like a harlequin, laughs in his face, and instantly transforms itself into a new coat, new limbs, new armour, new weapons, and new digestive powers. Man, it must be admitted, has an admirable gift that way.

Few diets found in creation can differ more than that of the English ploughman and that of the London diner-out, or, to confine ourselves to what may be called natural contrasts, the yam and plantain of the Negro and the blubber of the Esquimaux. It is said that this beetle can change its dietary from year to year. Indeed, nothing comes amiss with it; only that the diet fails, and the animal undergoes a visible adaptation. Another circumstance of terror is omitted in the account before us. Hitherto America, indeed all the world, has felt immense security in the fact that the

worst insect plagues can only exist within certain ranges of temperature, and that either intense heat or intense cold, or a long period of either, is fatal to them. In this country we read of countries devastated by locusts and caterpillars, as spectators on the coast see shipwrecks. A hurricane may blow a solitary locust to our shores, but it is a welcome specimen, not the dreaded harbinger of an invasion. There seems to be nothing whatever to prevent the Colorado beetle from entering this island by any port it may prefer, biding its time, recruiting itself after its voyage, taking possibly a new form, and acquiring some new accomplishment, and then suddenly showing itself in force in the midst of hundreds of acres of potatoes within sight of St. Paul's."

Again and again it has been proved that not only does this beetle move by flying, and by navigating, so to speak, smooth water, but also travels on common vehicles, railway carriages, and platforms, on decks of vessels, etc., especially during the months of August and September. In localities fully invaded, the beetles may be seen creeping on sidewalks, bridges, and wharves, crawling up buildings, occupying fences, lodging themselves in every crevice, penetrating houses and dwellings, ascending and occupying vehicles of all sorts, finding their way into boats and vessels, placing themselves on any and every article, and being found alive after a long sojourn in situations where there would seem to exist no chance for them to find any subsistence.

This destructive insect, first known in the neighbourhood of the Rocky Mountains, has been scientifically classed as *Chrysomela (Doryphora) decemlineata*. Its size, when full grown, is about half an inch. It is of an oval form, and somewhat shining body; its predominant colour is orange, but the thick end of the antennæ, the eyes, and a heart-like mark on its neck-shield, are black, as are the

fore and back margin of its body and its longitudinal stripes; underneath its body are numerous spots. The legs are provided with four joints; the underwings are of a pale red. It undergoes the same changes as the butterfly; its larva apparently requires a great deal of nourishment. After casting its skin its chrysalis state begins, and then this dormant non-feeding chrysalis changes to a beetle.

In the beginning of May, when the plant puts forth its young green leaves, the beetle comes out of the ground, in which it has wintered, and after about a fortnight the female lays a plentiful supply of orange-coloured eggs, of from twelve to twenty, on the underneath side of the young plant, during about forty days. After laying its eggs, estimated at between 700 and 1,200 in number, it feeds on the leaves in company with its consort. The young larvæ, when from five to eight days old, follow their example. When young they are of a darker colour, afterwards they become lighter. When the larva has attained its full length it resembles a caterpillar. Its hindermost ring, its head, and eyes are black, as well as two rows of protuberances, like warts, on each side of its body. Arrived at this stage of development, in about seventeen or twenty days this caterpillar descends from the plant into the ground and turns into a chrysalis. The beetle derived from it already begins to lay eggs in the middle of June, thereby producing a new generation of devourers, which, after having gone through their metamorphoses in fifty to fifty-five days, are succeeded, in the beginning of August, by a third generation. The beetles of this last-mentioned generation, which, until September, feed on the potato leaves, remain all the winter through under the earth, as before stated.

We cannot but reflect on this strange provision of nature, that the two first families of this tribe should remain above

ground, and that it is only the third and last generation which find their way into the earth, "when winter draweth nigh!" The whole number appearing during a summer season may easily be estimated. Thus, in the month of May, 100 females will have laid their eggs in a potato-field; their ravenous progeny, by the end of summer, will amount to from 7,000 to 20,000; and these again, in the months of June and July, will yield about 24 to 72 millions of eggs! The third generation (visible only till the end of August) may be reckoned by thousands of millions. It is not, therefore, a matter of surprise that in the month of June one already hears of the destruction of whole fields of potatoes in America. This increase, which almost exceeds belief, is owing to the plant on which they feed having become more succulent by culture than it is in its wild state.

Notwithstanding the havoc they have made, we are told that the most extensive fields are not sufficient to satisfy these swarming myriads of gormandisers. The want of nourishment impels them sooner or later to migrate. Their migration is effected in such numbers, and with a perseverance that is scarcely equalled by any other insect, if we except the locust. With the progress of culture in the West, the beetle, forsaking the plant on which it formerly fed, settled on the cultivated potato. Increasing depredations were first observed in Nebraska in 1859. Arrived thus far, there could be no doubt as to the direction of their onward flight. It was only eastwards that the potato-plant offered food for their progeny. In the year 1861 the Missouri was crossed, and they sought their food in Iowa. Soon after 1862 whole swarms were observed in Kansas. From Iowa their ravages extended 200 geographical miles towards Minnesota and Missouri on the west of the Mississippi. After crossing the Mississippi, Wisconsin, Illinois, and Kentucky were devastated; and in 1870 Indiana, Michi-

gan, and Ohio suffered to a still greater degree. The broad Lake Michigan proved no obstacle to their passage from Wisconsin to Michigan. From Ontario, south of Canada, reports arrived of the wide-spreading destruction of potato crops; from New York and Pennsylvania in the same year the boundary districts were invaded. In 1874 the vanguard of this insectivorous army reached the sea-coast of the Eastern States, although their main body had still a good space to traverse. Their arrival on the Atlantic coast had been calculated to take place in 1878-1880; but they have actually, in sixteen years, made their way over 360 geographical miles; while their extension throughout their course is estimated at 40,000 to 50,000 square miles! It seems certain that so swift and extensive an invasion could only have been accomplished by their having made use of their wings. It is reported that beyond Ohio multitudinous swarms of the beetle (each swarm numbering about 10,000) have passed on, one after the other, in the course of a few hours! But it must not be supposed, from these accounts, that the devastation committed by this voracious insect is only partial and transitory (as with the locust), or that in the same ratio that the swarms advance, they lessen or cease altogether in the districts they have left. It is easy to comprehend that the regions of which it has long been a denizen suffer more than those which have newly been attacked, and that a greater deficiency in collecting the crops is there observed. From twenty to thirty beetles have been seen on one potato-plant, in places, too, where the injury they inflicted was not considered particularly great.

It has been observed that when the crops of fields have been entirely eaten up, the larvæ resort to a different sort of plant. Among them are the thorn-apple, henbane, thistle, knotted grass, goose-foot, cresses, etc., and some weeds

of no account, excepting that they help to sustain so dangerous an insect. The larvæ in some places have been found on the tomato and cabbage, by the exportation of which this rapidly-increasing plague may be introduced into foreign lands.

There is one thing to add as a comfort. Where plant-devouring insects exist in large quantities, their natural enemies are sure to appear, and to rapidly increase to their cost. In Missouri an insect resembling the quick-fly, very like the common fly in size and colour, destroys the larvæ of the *Doryphora decemlineata* at the rate of ten to fifty per cent., by laying their eggs on the top of them. Also the larvæ of different kinds of ladybirds and several predatory beetles. It has been observed that toads and crows will feed on them; in the crop of a quail six beetles were found. While some domestic fowls ate the beetles with reluctance, and even got ill and died from their unaccustomed repast, others swallowed them as eagerly as the ducks, in proof of which we are told that thirty-one beetles were found in the crop of a Missouri fowl. Notwithstanding the appearance of their numerous enemies, and that a partial diminution of the beetle is caused by them, still no thorough and lasting effect ensued. It was proposed to adopt artificial means for their extinction; first, by collecting the beetles and their larvæ by hand, or by means of bags of particular construction, and by crushing the eggs deposited on the leaves; but as collecting them took up too much time, and caused considerable trouble and expense, without a real cessation of the evil, the remedial agency of various poisons has been taken into consideration. The application of arsenic and oxide of copper, strewn over the plants as a dry powder, by no means produced an entire removal of these encroaching insects, but served in some degree to restrict the evil.