A REMARKABLE INVASION OF NORTHERN NEW YORK, BY A PYRALID INSECT:*

Crambus vulgivagellus.

(Abstract.)

By J. A. LINTNER.

About the middle of May, of the present year (1881), a serious invasion of St. Lawrence county, N. Y., and several of the adjoining counties, by the "Army Worm," was announced by the newspapers, and by letters addressed to me. It was stated that many pastures had been completely ruined, and the entire destruction of the pastures and meadows was feared. I had never witnessed the operation of the Army Worm—comparatively rare in the State of New York—and I at once visited the infested locality for personal observations.

The reports had not been exaggerated. The ravages were widespread and serious, already extending over eight of the northern counties. Hundreds of acres of grass presented a brown appearance, as if the grass had been winter-killed. A pasture lot of fifty acres, examined by me, which ten days before offered good pasturage, was now entirely brown from the complete destruction of the grass—so thorough, that in places not a blade could be discerned in an area of a square yard, by careful search. Numerous dead caterpillars were adhering to the dried stems of last year's grass, which, it is believed, had fallen victims to starvation.

Several interesting features characterized this attack. It appeared first on upland pastures, differing in this respect from the invasions of the Army Worm, *Leucania unipuncta*.

The progress was remarkably rapid. A browned patch would rapidly extend its area, until it overspread the entire field in ten or twelve days. It could not be ascertained if this was by the spread of the larvæ from certain points, or from the unequal hatching of the eggs, uniformly distributed over the field, as influenced by various conditions. The secresy of the depredation was unusual. The larvæ had seldom been seen and never observed in active feeding. It was believed that they fed at night, by drawing in the blades of grass to their subterranean retreats.

In two instances the larvæ were observed in immense numbers, collected on trunks of trees—so numerous that they could have been scooped up by handsfull. One of the reported localities was visited by me where the assemblage had been noticed three days before. The tree-trunk, at its base, was found to be enveloped by a web of silk, as was also an adjoining stump, of so firm a consistence that it could be lifted up in a sheet, like a piece of woven silk. The cause of the congregation at this point could only be conjectured, but it was thought it might have been for shade, after the complete destruction of the surrounding pastures. It was not for feeding on the foliage, for the grasses were alone eaten by the larvæ.

It was generally accepted throughout the entire region as an army-worm invasion, and the most disastrous consequences apprehended. The papers abounded with notices of it. Farmers commenced to dispose of their cattle, in the prospect of their ruined pastures and meadows. It became the one topic of village conversation, and general alarm prevailed.

The caterpillars observed and collected by me in Morley and Potsdam, by digging in the soil, and occasionally finding one on the surface, were slender, cylindrical, sixteen-footed, of a sordid or obscure greenish color, with a shiny black head. They were destitute of lines or other ornamentation than some verrucose spots on the dorsal portion. The average length was three-fourths of an inch.

I was unable to identify these with *Luecania unipuncta*, for they were quite unlike the mature form of that species which I had alone seen. Yet it was possible that they had additional moltings to undergo, which might result in a material change of appearance. Their habits seemed to be quite different from those of the army-worm, and it was nearly two months too early for an invasion of that species.

Of the larvæ which I had brought from Potsdam for rearing and ascertaining the species, nearly all died shortly thereafter, Only a single one developed, giving me a small Pyralid moth—*Crambus exsiccatus*. Additional ones were sent me, at my request, from Potsdam. They were quite different from those previously collected and observed by me, but it was believed by my correspondent, as the result of observations made, that the molting through which they had just passed had produced this change.

I suspected that two species were associated in the attack, but other pressing duties at the time prevented a decision upon this subject. Some of the examples received were submitted to Prof. Riley, who was able to identify them as the larvæ of a rather rare Noctuid—*Nephelodes violans*, which he had known in Missouri. The occurrence of the species in such numbers—more than a dozen in lifting a small piece of a rail—was an interesting discovery. In some communications contributed by me to some of the newspapers of Albany and Northern New York, I ascribed the above ravages to *Nephelodes violans*. Farther study led me to believe that I had been hasty in my reference.

Early in July, Mr. J. Q. Adams, of Watertown, N. Y., where the ravages of the same insect had also been observed, furnished me with information and material that convinced me that *N. violans* was only chargeable with a small portion of the above injuries, and that the principal depredator was the smaller larva observed and collected by me, which, from the cocoons forwarded to me at this time, undoubtedly belonged to the Pyralidæ. The cocoons were taken from the infested fields at Watertown, from just below the surface of the ground, where they were so numerous that a half dozen could be taken from a sod the size of a man's hand. On opening the cocoons, the larvæ were found lying within them, still unchanged, although they had been made over a month before, and they were identical with my Potsdam collections. Additional cocoons were opened by me early in July, when the larvæ were still in their untransformed state, in which they had at this time been remaining for from a month to a month and a half.

The delayed pupation is an interesting item in their history. It is known to occur in some of the Bombycidæ, among the Notodontas for example, when it extends over the winter, and the pupa state is assumed in the spring, a short time before the emergence of the perfect insect; but it was new to me at this season of the year.

Dr. Hagen, to whom I communicated the fact, was unable to find any record in the extensive library at Cambridge of such delayed pupation among the Pyralidæ, although Prof. Riley informs me that he had known of its occurrence in some of the species.

On the 6th of August, the first moth from the Watertown cocoons was disclosed, and it proved to be *Crambus vulgivagellus*. The interesting question as to which of our insect depredators was chargeable the ravages in Northern New York—more injurious in the extent of territory embraced than in an army worm invasion—was decided. The new enemy, the latest addition to our list of formidable insect pests, was found to be a modest, inconspicuous, hitherto unobtrusive little Crambus. It had long been known in our cabinets, but had never before presented itself as an injurious insect.

It is probable that several accounts of injuries to pasture lands, in New England States, during the last three or four years, which have been ascribed, either to the army-worm or an unknown depredator, are due to this

*Read before the A. A. A. S., Cincinnati, 1881.

species. In its subsequent appearance, hereafter, it may now be recognized.

The Crambidæ are small moths with narrow front wings, often marked with metallic spots and lines, which are frequently driven up for short staccato flights in our pastures and meadows during the fall months.

The paper concluded with a resumé of the history of the species, so far as known at present, which is omitted as not of general interest.

CAÑONS—THEIR CHARACTER AND ORIGIN.*

By Hon. William Bross.

To the professional geologist it may seem an impertinence for a layman to offer any opinions as to the character and the origin of cañons. He may, however, it is hoped, use his eyes without offense, and form such conclusions as the facts which he has observed, may appear to warrant. If they should not agree with the recognized principles of the science as now understood, he will be no worse off than scores of learned Professors in the past, for in this, as in almost every other science, nearly every conceivable absurdity was exhausted before theories were made to agree with acknowledged facts. And here, at the commencement, the conclusion to which the observations to be presented somewhat in detail have led, may as well be stated—viz.: that cañons were formed by some great convulsion of the earth's surface, or by the contraction of mountain chains from their igneous condition in the early history of the planet. Take, for instance, the cañon of the Saguenay—a vast fissure in the mountain chain that lies on the north side of and nearly parallel with the St. Lawrence. The fissure or cañon is some fifty or sixty miles long and lies nearly at right angles to the river. Something like a mile apart, the perpendicular rocks on the north side are, at some points, about 1,500 feet high, the water at their base being several hundred feet deep. No man in his senses, it seems to me, could possibly conceive that this gorge through the granite mountain could have been formed by the action of the insignificant river that empties into Ha-Ha Bay at the northern end of the cañon. The surface of the water, for the whole distance of sixty miles, is on a level with the St. Lawrence, in some places it is several hundred feet deep and the cañon is about a mile wide, through the solid granite rocks. And here another general principle may as well be stated, that, with a single exception, the width of this and the other cañons hereafter to be noticed, is scarcely ever more than a fraction of a mile; seldom a single mile—a fact that strongly indicates uniformity in their origin. And besides, the mountains on both sides are generally nearly of the same height.

TAKE THE CAÑON OF THE HUDSON,

where it passes through the Blue Ridge, above and below West Point. The channel is deep, the tide ebbing and flowing far upwards towards Albany; the mountains on both sides, though rounded off towards their summits, doubtless during the glacier period, are about of the same height, and there is a general correspondence in the dip and thickness of the vast strata of rocks on both sides of the river. With the exception that the cañon is far above tide water, the same general facts are witnessed in that of the Delaware at the water-gap through the same spur of the Allegheny Mountains. In this case there are two well-defined ledges corresponding with each other on both sides of the river; the water is deep and sluggish while passing through the gorge, and all the facts seem to point, with unerring certainty, to some great convulsion in Nature as the origin of the cañon. With the exception that the current of the Potomac is swift at Harper's Ferry, the break in the mountain there, so graphically described by Jefferson, is very similar to that of the Delaware. This gorge may not have been relatively as deep at its formation as those of the Hudson and the Delaware.

THE CAÑON OF THE NIAGARA

was confessedly formed by the action of the river; but, if the structure of the rocks forming the cañon between the falls and Lewistown be considered, the exception in this case, it is believed, will prove the rule enunciated at the beginning of this paper. The rocks underlying the country between Lewistown and Buffalo are nearly horizontal, and are, in round numbers, as indicated by the gorge below the falls, some 200 feet thick. The upper strata, for say half the distance, are solid limestone, underlaid for perhaps an unknown depth, by soft sandstone, scooped out with comparative ease by the great cataract. Hence, the support of the upper stratum of lime-rock is gradually worn away, and it falls into the gulf below. On the American side of Goat Island, where only a fraction of the river falls over the precipice, the lime-rock lies below in vast blocks, and a rapid is gradually forming, while on the Canada side, the immense river scoops out the sand-rock to a great depth, and the falling sections of the lime-rock are buried out of sight forever. Below the railway bridge, for a long distance, there is a terrible rapid, showing that some other rock at the bottom of the river was harder than the sandstone, or that the stream is partially damned up by the lime-rocks thrown down between the bridge and the present fall, forced to the position they now occupy by the water, débris, and ice pressing down from above as the river gradually receded towards Lake Erie. This recession will doubtless continue even back to Lake Erie, unless the sandstone dips deeper down into the earth, and the limestone strata become thicker or some other hard rock fills the entire face of the cataract. Then the fall would gradually wear away at the top and become a rapid of gigantic proportions. Now, if the Niagara River, with its vast volume of water at first falling over a lime-rock ledge, at Lewistown, underlaid by a friable sandstone base—a condition of things found, it is believed, in no other cañon upon the continent—has required untold ages to work its way up to its present location, how is it possible for the comparatively small rivers heretofore named, and those to follow, to wear away a pathway to the sea through great mountain ledges of the hardest rock? Such a conclusion would be absurd.

THE CAÑON OF THE MISSISSIPPI

extending, say from Dubuque to the head of Lake Pepin, some 200 miles or more, is an exception to the rule above proposed, mainly in its width, which is some five to seven miles. The sandstone bluffs on either side are generally perpendicular from the top downwards from 200 to 300 feet, when the débris slopes down to the bottom lands or to the majestic river as it sweeps through the alluvium from one side of this broad cañon to the other. There are doubtless good reasons for the opinion that the waters which now find their way from Lake Winnipeg to Hudson's Bay once flowed south and filled full the broad space between the beautiful bluffs of the Upper Mississippi.

THE GORGE OF THE UPPER MISSOURI,

situated about 100 miles below Fort Fenton, is one of the most marked, as it is one of the most beautiful, cañons on the continent. The walls are perpendicular, of white sandstone, scarcely a mile apart, and some eighty feet high. On the top of these walls there is a layer of clay, perhaps of the same thickness, rounded off gracefully by the winds and storms, while in some places it has been all worn away, and the tops of the white sandstone ledges appear as castellated forms, reminding one of the Milan Cathedral, or some of the old ruins

* Read before the A. A. A. S., Cincinnati, 1881.