

REPORT

ON THE

MEASURE WORM,

OR THE

GEOMETRA NIVEOSERICEARIA,

WHICH

INFEST THE TREES OF BROOKLYN ;

SUGGESTING

REMEDIES FOR THEIR EXTERMINATION.

BY JOSEPH B. JONES, M. D.,

HEALTH OFFICER.

Health Department, June 1st, 1861.



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REPORT

MEASUREMENTS

OF THE

GEOMETRY AND STATISTICS

OF THE

HEALTH DEPARTMENT

OF THE CITY OF BROOKLYN

IN COMMON COUNCIL, }
Brooklyn, June 3, 1861. }

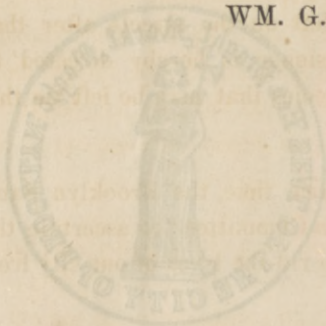
Resolved, That one thousand copies of the Health Officer's Report be printed in pamphlet form.

Adopted.

Attest,

WM. G. BISHOP,

City Clerk.



REPORT.

HEALTH DEPARTMENT, }
June 1, 1861. }

To the Hon. the Common Council:

GENTLEMEN—

Last June your honorable body referred to the Health Committee and Health Officer the following :

“ *Resolved*, That the owners of property having Linden trees on the streets are hereby ordered to remove them within ten days after the passage of this ordinance, and failing to do so, shall be liable to a fine of five dollars for each tree left on the streets, after that date. The Street Commissioner is hereby directed to remove all trees of that species that may be left on the streets after that date.”

About the same time, the Brooklyn Sanitary Association appointed a Committee “to ascertain the best method to be adopted to rid the trees of our city from the measuring worm.”

A Committee was also appointed, from a meeting of citizens, to investigate the nature, habits, &c., of these worms, and ascertain the best means of ridding the city of them. Several members of these Committees have given considerable attention to the subject, and it is with

pleasure I hereby acknowledge my indebtedness to Messrs. GEORGE W. MEAD, J. W. WEIDEMEYER, A. N. BELL, M. D., for valuable information furnished me on this subject.

Mr. J. W. WEIDEMEYER remarks, that "Little care and attention have been bestowed upon the shade trees that line the streets of Brooklyn. They have at length become almost abandoned to destruction; for a month in early summer, trees are leafless, localities impassable, creeping insects crackle under foot, nestle in silks and laces, or decorate the parasols and bonnets of our fair companions.

"Many have been the well-meant articles that have from time to time appeared in our city journals, in some of which, the insects in question have figured as 'millers,' 'grubs,' 'worms,' and 'poison bugs.' We have there been told how to smoke them out of their lodgings—how to physic them with sulphurous preparations—how to bird-lime them with tarred ropes; the latest expedient is the oil can—into it it is hoped the insect may crawl and find a suicide's grave.

"For at least twenty-five years past the insect in question has infested the trees of our New York City Park and Battery. Owing to watchfulness on the part of public employees, it has there never been suffered to riot in its depredations. Watchfulness, cleanliness and solicitude, understandingly directed, will prove a barrier to the spread of the evil. Mere fly traps, however, will not prevail against it.

“ Unlike the fruit tree borers, *curculio*, &c., this insect is a comparatively large and conspicuous object in all its various stages of existence—fluttering white moth among the green leaves and the ever dangling black caterpillar—neither seek concealment, nor shun the approach of man.

“ Before entering into details concerning the habits of this insect, it is proper to state that I have not had sufficient opportunity as yet to watch its habits with precision. However, simple observation will determine the exact period of the year during which it occurs in its various stages, so that to a week—nay, almost, to a day—in the egg, caterpillar, chrysalis and winged state, it may readily be found and exterminated.

“ Both males and females of the perfect insect are of an immaculate white color, with a somewhat greenish gloss when the moth is fresh and bright.

“ The males are smallest in size, have feathered antennæ, and of the sexes are the most active. The females, larger in body and wings, more sluggish in motion, with thread-like antennæ. Both sexes have the full use of wings; they copulate on the first or second day of their winged condition, after which the female deposits small clusters of bright green eggs on the trunks and branches of the infested trees. She may be often noticed, quietly fulfilling her maternal mission; soon after, exhausted, she drops from the trees and dies. The males sport a somewhat prolonged existence.

“ It may be well to understand that the eggs are tightly

glued on the bark, and that their outward coating is quite impervious to water. The eggs, after being deposited by the female moth, remain torpid until revived by the mild atmosphere of the following May.

“The young caterpillars, on being hatched, soon crawl to the upper branches, and scatter about the young shoots in the tree tops. Here they live quietly and unobserved for a week or two. When about half-grown they become more conspicuous, their voracity is increased, and they commence their saltatorial exercises. The latter are continued until they have attained full growth, prior to transformation; in the heat of day they delight to hang from their threads, but at dark spin up into their homes in the tree branches. It may be observed that the caterpillar, during growth, sheds its skin several times, and before each process becomes weak and inactive for a day or two.

“Finally, the caterpillar undergoes its transformation in open network between leaves.”

THADDEUS WILLIAM HARRIS remarks, concerning this worm, “That it is found chiefly upon the elm, weeping willow, and linden; but attacks the silver-leaved poplar, balm of gilead, white maple, and horse-chestnut, and occasionally fruit trees, shrubs and herbage. It comes forth in the spring as soon as the buds begin to expand into leaves, and increases in size and voracity with the growth of the foliage; and, in its progress to maturity, wherever it abounds it despoils the trees of the greater part of their leaves in a few weeks. It has the power of spinning threads, and by the help of one of these it will drop and

hang suspended from the branches when disturbed by the shaking of the trees, or from any other cause; gathering up the thread with its teeth and forefeet, it can remount again at pleasure by this silken clue. People, passing under the trees, are often much annoyed by the worms spinning down upon them, or dropping upon the walks when the threads are broken.

“Towards the end of June, the insect finishes its career in the worm state. It then encloses itself among the half-eaten leaves at the end of a branch, in a kind of cocoon, consisting of a silken network of irregular meshes. Within this loose web it casts its skin, and takes the chrysalis form. It remains in this state about a week, when the insect emerges from its cocoon, transformed to a winged miller or moth of a white color. Both sexes are equally well provided with wings. The females deposit their eggs upon the branches and trunks of the trees, the bark of which is sometimes thickly sprinkled with these eggs.

“The millers seen this year, fluttering in the evening about the trees, or pairing upon the branches, as early as the third of July; and most of them had finished laying their eggs before the middle of the same month. As only one brood has been observed during the summer, the eggs must remain unhatched, from the time when they are laid, through the rest of the summer and the whole of the autumn and winter.

“The measure-worm belongs to the order of *Lepidopterous* insects, and to that great division of the *Phalænæ*, or moths, which Linnæus called *Geometra*. Insects of this kind,

in the worm or caterpillar state, have legs at their two extremities only, and none beneath the middle of the body. Hence, in creeping, they are obliged to arch upwards the middle of the back with every step they take; seeming, in this way, to span or measure over their course, inch by inch, as they move along. The scientific name *Geometra*, signifying ground measurer, was applied in allusion to the peculiar gait of the insects; and the popular name, measure-worm, given in New York to the insect under consideration, as well as span-worm and inch-worm, bestowed upon other species, doubtless had a similar origin.

“Most geometers have only ten legs, whereof six are horny, jointed and tapering, and are situated in pairs beneath the first three rings immediately behind the head; and four are fleshy, jointless, and thick prop-legs or holders, placed beneath the hinder extremity. Many geometers, when at rest, are enabled to support their bodies in a more or less erect position by means of their four posterior legs alone; others rest, stretched out at full length, in a recumbent position upon the leaves or stem of plants.”

From an examination of some dried remains of the measure-worms, I find that it had ten legs, situated as above described, but have yet to learn what is the posture of the living insect when at rest. The head of the measure-worm, as appears from the remains, is roundish, very slightly furrowed above, and of a pale red color. Dr. GARDNER describes the worm, from recollection, as being of a dark brown or slate color, approaching to black, occasionally greenish, with the head of a salmon color, and the whole body, when fully grown, from an inch to nearly two inches in length.

I regret not having had an opportunity to obtain a living specimen, from which to make up a more complete description of the measure-worm.

In a set of unpublished colored drawings of insects of Georgia, by Mr. JOHN ABBOT, now before me, there are figures evidently intended to represent this species in its various stages. The larva or worm is drawn in a half erect or an oblique posture, supported by its four hindmost legs. It is two inches long, of a greenish color, with a smooth cylindrical body, and two very slight tubercles on the top of the last ring. It is figured upon the American Olive. I have not much confidence in the authenticity of this figure, having found some figures in the collection which are faulty and defective, and others that could never have been drawn from the larva of the particular species that they profess to illustrate. Mr. ABBOT's drawings of the chrysalis and of the male and female moths, correspond tolerably well to those from the New York measure-worm. The chrysalis of this insect measures nearly five-eighths of an inch in length, but sometimes exceeds and often falls short of this measurement. The body is rough, not polished, obtuse and rounded before, pointed behind, and terminates with about six little brown hooks. The cases of the antennæ and wings are strongly marked and prominent. Its color is a pale brown, (perhaps greenish or olive when living,) and sprinkled with numerous blackish dots, which, in some parts, are confluent and run together. It is fastened very strongly by silken threads, attached to the terminal hooks and to the meshes and fragments of leaves, forming its large and irregular cocoon. The moths are snowy white color.

Their wings have the lustre of satin, and so thin and delicate as to seem almost semi-transparent, and have very minute brownish spots on the lower surface of each of them, and the middle of their hinder margin is somewhat angular, and that of the posterior part being also slightly scalloped. The head and thorax are covered with white and downy hairs. The palpi or fulci are conical and scaly at tip, and project a little beyond the hairs of the front. The tongue consists of two short and membranous threads. The anterior shanks are brownish on the outer side. The antennæ of the males are feathered or pectinated beneath to the tip; those of the female are thread-like, but subserrated or minutely notched beneath. The stalks of the antennæ are white, but the pectinations and notches are brown. Their wings expand from 1.5-2.0 to 1.6-1.0 of an inch. The position of the wings, when at rest, is not known to me.

This species, not having been scientifically described or named before, may be called *Geometra niveosericearia*, the snow-white, silky geometra. I am not able satisfactorily to refer it to any of the numerous genera proposed by English and French entomologists.

HUEBNER, whose classification is based chiefly on the color and markings of the wings, would probably have placed this species in his genus *Gypsochroa*. It probably has a wide range in the United States.

Mr. ABBOT'S drawings were made from specimens found in Georgia; and a single male in my collection was taken many years ago by my friend, the Rev. L. W. LEONARD,

D. D., in Dublin, New Hampshire. I have not yet seen it in Massachusetts.

The eggs, as before stated, are deposited during the first half of July, on the bark of trees, and mostly in clusters of fifty or more together. A writer asserts that the females lay their eggs before their wings are developed. The eggs are a little more than one-twentieth of an inch in their longest diameter, are olive colored, and in shape oblong oval, slightly compressed, with the upper end truncated and closed with an oval flattened lid. They are placed on their lower rounded ends, and incline a little obliquely on each other.

A large proportion of the crysalids, sent to me by Dr. GARDINER, failed to yield any moths, having perished in this state, probably in consequence of having been previously preyed upon by internal parasites. In fact, two kinds of parasitic insects have been obtained from them. One of these is a small ichneumon fly, described by Mr. SAY, in the first volume of the Boston Journal of Natural History, under the name of *cryptus conquisitor*; the other, a smaller and much rarer insect, was described by Mr. SAY, under the name of *chalcis ovata*.

My friend, A. N. BELL, M. D., kindly furnished me the following account of his observations: "I have carefully studied the nature and habits of this insect, the *geometra niveosericearia*, in all its stages of existence, and shall feel fully rewarded for my labors, if I can in any way contribute to its extermination from Brooklyn.

“In the month of June, last year, I collected a number of full-grown measuring worms, some of which I placed into clean glass jars ; others, I placed in jars, containing a quantity of green leaves and twigs from a snow-ball bush ; and others, into a jar containing leaves, twigs and turf. The jars were closed by tying over the tops a piece of perforated white paper. The worms in the clean jar speedily began stretching zig-zag ladders of web up the sides, and shortly reached the rim of the covering. At this place, most of them prepared ingeniously constructed hammocs, into which they carefully secured themselves and went into the *chrysalis* sleep. Others secured themselves to the sides of the jar ; none remained at the bottom.

“In the other jars, most of the worms rolled up the leaves for a bedding. As a beautiful example of instinct, I cannot forbear describing the process : After first crawling over the leaf, as if for the purpose of a critical examination, the worm begins her work by spinning a silken thread, one end of which she makes fast to the edge of the leaf, the other end she attaches to the middle portion, and now squaring herself she lays hold of the centre of this cable, and sways away laterally, first pulling at one end and then at the other, with such force as to turn up the edge of the leaf ; and now pulling away with all her might, she secures the loop at as great a distance from the centre as possible. She then proceeds to make a second attachment with a new cable, a little beyond the first, and so on successively, so that at each effort the leaf is bent more and more inwards, until it is rolled up into a cylinder, and secured in that position by numerous silken fila-

ments of such strength as to resist the elasticity of the leaf. Into this the caterpillar enscones herself; completely closes one end of her habitation, while in the other end she carefully constructs a door in such a manner as to be easily pushed open from the inside when she has acquired wings and wishes to escape. This is the usual habit of the worms in our trees. I carefully watched to see if any of the worms went into the turf—in no instance was this the case. The duration of the chrysalis state is variable—from two to four weeks. Immediately on the escape of the *imago* or winged insect, it is more active than at any other period, both sexes at that time flying with equal agility. The sexes of the millers are easily distinguished from each other, the males by their smaller size and large feathered antennæ; and the females, by larger bodies, small and smooth antennæ. In from two to five days after they escape from the chrysalis state, the females become impregnated, and from this time they progressively lose their activity, to such a degree that, for a few days before they deposit their eggs, they are almost wholly incapable of flying. The places of election for the deposit of eggs by my encaged pets, were first the coarser twigs, and next the roughened surface (by the perforations) of the paper covers. In the jar which was not provided with twigs, all the eggs were deposited on the under surface of the lid. Most of the eggs were deposited during the first week in July, some a little later. The eggs are of an olive green color, about half the size of a pin's head, and deposited in closely adherent clusters of from four or five to over a hundred in a cluster. They are so firmly agglutinated to the rough bark of the trees that after a little time to dry, they can scarcely be removed without

peeling off the bark. On numerous clusters of these eggs, I tried many experiments, with a view to their destruction. The most efficient remedies, which will not injure vegetation, are alkaline solutions, lime, potash and soda, or these substances in the form of soap. Yet, I found some prolific eggs which had been dipped in strong soft soap, covered with white wash or steeped several days in strong solutions of potash and soda. Most of the eggs so treated, however, were destroyed, and most effectually by the white wash. During the first week of May (ult.) I carefully observed the minute larva escaping from the eggs. Thus showing the period of incubation to be *ten months*, and the season of their vitality *two months*.

“The benefits deducible from my observations are: 1. The chief time for effectually attacking this pest, namely, in the larva or caterpillar state, during the month of June and the early part of July; and 2. By the use of such means as will most effectually prevent the deposit, and provide for the destruction of the millers’ eggs. Under the first head, your own suggestions for shaking off, gathering up and destroying the worms, is both comprehensive and practicable. Under the second head, I advise a thorough *whitewashing* of the bodies and limbs of trees, where practicable; the first whitewashing to begin as early as the middle of June, and to be repeated every ten days until the middle of July. Bearing in mind, that the millers chiefly deposit their eggs on the coarse bark of the trunks and lower limbs of trees, it will be easily perceived that the coating of whitewash will be a shield against the agglutination of the eggs; and that on the subsequent scaling off the whitewash,

the eggs will be carried off with it and destroyed. True, many eggs are deposited on fences and other painted surfaces, but on carefully watching such clusters, I find that they rarely last through the winter ; and that these, like clusters attached to window curtains and clothing, generally perish."

It will be seen, from the foregoing remarks, that our worm differs from those of other localities in several respects. The description given by HARRIS is, in my opinion, nearly correct ; what is deficient in it, is fully supplied by Dr. BELL and Mr. WEIDEMEYER'S observations. Our worms elect the Linden for food and habitats, but deprived of this, they will migrate to, and feed upon, the horse-chestnut, cherry, maple, and even, the ailanthus trees, &c. They are winged, deposit their eggs during the winged state, mainly upon the trunks of the Linden tree, but will deposit them upon almost anything, even hats, coats, fences, houses, &c. They will make an election, however, if they have an opportunity.

They make their appearance about the first week in May, as measurers or creepers, caterpillars, and continue as such, until about the 7th of July, when they appear as millers, and deposit their eggs ; the entire process ending before the close of the month.

Mr. WEIDEMEYER proposes the following plan : "When the caterpillar first makes its appearance, a jet of water, directed into the trees, will detach many from their threads and cast them upon the ground ; but it will neither drown them, nor render them altogether helpless. Beating the branches will disconnect some from their threads,

and jar down the sick, molting individuals ; but so great is the tenacity of the geometra caterpillar's hind legs to the object on which it rests, that it cannot be beaten, jarred down, nor even by main force, torn from its place without severing its body.

“ During its transformation, in open net-work between leaves, no remedy appears practicable—neither climbing, nor the use of ladders and poles, will be of avail for attacking the insects in its fastnesses and concealment ; persevering warfare in this instance would only mutilate the object designed for preservation.”

Dr. HARRIS is of the opinion that the best method for getting rid of these worms is the one suggested by Alexis, namely: “ At mid-day, or during the hours of warmest sunshine, when the worms are most active, a sudden jar with the hand upon small trees, with a mallet on large ones, repeated at intervals, if necessary, will dislodge and bring down hosts of the insects. All their threads, by which they have let themselves down, are to be broken by a sweeping, horizontal blow, and all the fallen insects are to be destroyed upon the ground. This operation, repeated three or four days in succession, will effectually clear every worm from the trees, according to the above-mentioned writer's testimony, founded on his own experience. The same method has been long practised in New England, and with good success, for the destruction of the canker-worms. In some cases it may not be possible to discover and destroy all the worms that have come to the ground, especially beneath large trees, growing among grass ; and the insects will attempt to regain the leaves by creeping up the trunks.

“By surrounding the latter at the bottom with a thick coat of tar, the upward progress of the worms will be effectually prevented. In this way, tens of thousands of canker worms have been caught in the College grounds in Cambridge during the past spring, and have perished in the tar.

“Early in the spring, while the worms are young and tender, they may be killed by syringing the trees with a solution of whale-oil soap, made in the proportion of two pounds of the soap to two gallons of water. As the insects undergo their transformations mostly upon the trees, in a loosely netted cocoon, secured among the half-eaten leaves, or affixed to the limbs, many of them may be destroyed in the chrysalis state, by gathering and crushing, or burning their cocoons before the insects begin to emerge in the miller form.

“Attempts may be made with some advantage to destroy the eggs, by scraping the bark, or scrubbing it with stiff brushes, or applying thereto a wash of strong potash water.”

The following plan, in my opinion, if adopted and carried into effect, will be the most judicious and effectual in accomplishing the object sought. The worms at this time, June 1st, should be detached from the trees, collected and destroyed. The former can be accomplished by shaking or beating the trees, and the latter, if your honorable body would offer a sufficient inducement, say a reward of from ten to twenty cents per pint for them. Many persons out of employment, particularly boys and girls, and even those who are in the habit of picking berries,

would engage in this business in preference to their usual occupation. Myriads of them would thus be destroyed. As they become less numerous, increase the amount of the reward.

When the pregnant female makes her appearance, offer a reward of twenty-five cents per pint for them.

A sufficient force of persons should be employed about the last week in June, and the first week in July, to whitewash the body of all infested trees, and those also in their immediate vicinity, with a thick coating of lime, repeating the application several times. The miller will deposit her eggs upon this, and as it wears off the eggs will fall with it.

In the latter part of July, or the first part of August, the bodies and main branches of these trees should be thoroughly scraped and subsequently scrubbed with a stiff brush, well steeped in turpentine. This would nearly free the trees from the egg deposits or destroy any remaining upon them.

In early spring, the trees should again be carefully and tenderly scraped and washed, and another coating of whitewash applied. If those infested trees, which are surrounded by grass, should have a coating of tar about a foot wide applied to them during the last week in May, it would be effectual in destroying many. Trimming the trees at the proper season would also aid in the destruction of these pests.

It was suggested by Mr. GEORGE N. MEAD, that the

importation of birds, who feed upon this genera of worms, would be a movement in the right direction. I have not much faith in their efficiency, although numbers of these worms are now being destroyed by our usual spring chip-bird, who have appeared this season in large numbers, and every means should be adopted to protect these little welcome and useful visitors. Whale-oil soap, alkalies, infusion of tobacco, &c., and Taylor's Tree Protector, have been used with some effect. Private citizens might use these in addition to other remedies, but the plan I have suggested, I think, will prove all-sufficient.

Respectfully submitted,

JOSEPH B. JONES, M. D.,

Health Officer.