SIXTH, SEVENTH, EIGHTH AND NINTH

REPORTS

ON THE

Noxious, Beneficial and other Insects,

OF THE

STATE OF NEW YORK.

MADE TO THE STATE AGRICULTURAL SOCIETY, PURSUANT TO AN ANNUAL APPROPRIATION FOR THIS PURPOSE FROM THE LEGISLATURE OF THE STATE.

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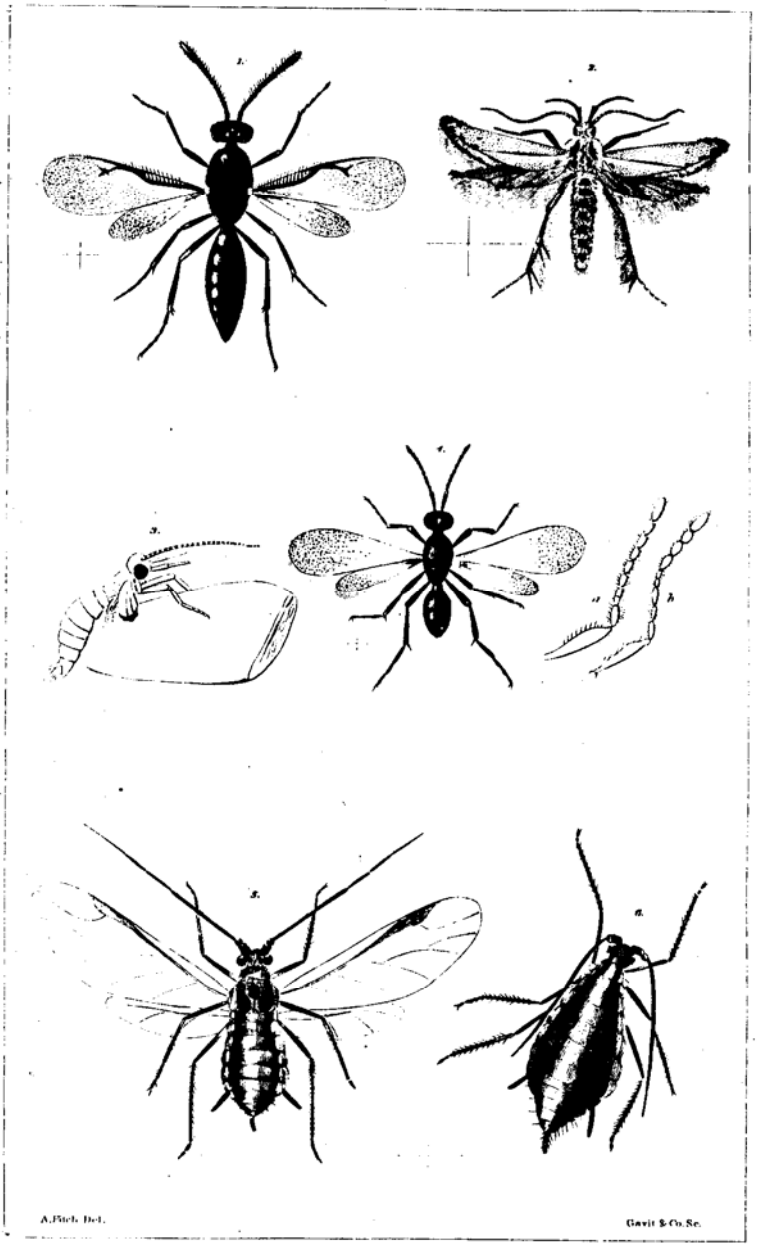
ALBANY:
VAN BENTHUYSEN'S STEAM PRINTING HOUSE.
1865.

INSECTS—PLATE 1.

Grain aphis &c.



A.Fitch Del.

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like the *tunica arachnoides* of the human brain, a mere film as thin as a spider's web. Eventually, the insect by gently writhing ruptures this film at its anterior end and gradually crowds it off downward to the lower end of the vescicle, carrying the minute black jaws of the larva with it. It there remains, becoming dry and torn into shreds which flake and fall off by the continued motions of the insect. At the same time, from the remainder of the surface not occupied by this vescicle, a still more slight and delicate film, appearing as though the worm had been wet in milk which had dried upon it, forming an exceedingly thin pellicle or scurf, becomes separated by the same motions of the insect and drops off in minute scales scarcely to be perceived with a magnifying glass. And now the insect has acquired its perfect pupa form, the moulting which occurs in this change being, not a throwing off of an entire skin like that which the larva often parts with when it is done feeding, and that which the pupa always leaves when it changes to a fly, but only a slight scurf-like exfoliation from the surface — so slight that in a small delicate species like the wheat midge it is doubtful whether any indications of it can be perceived.

Its Parasites and other natural destroyers.

In its native haunts on the eastern continent the wheat midge appears to be preyed upon by several other insects. Earwigs devour the larvæ, and the ravenous two-winged flies of the genus *Empis* seize and carry them away to suck out their juices. But by far the most important and serviceable of these destroyers are its parasitic foes. These are small four-winged flies having some resemblance to little winged ants, and are at a glance distinguished from the yellow flies of the midge by their black color. Their young subsist within and destroy the larvæ and eggs of the midge. And these insects increase or diminish in numbers in the same ratio with the supply of food which they are able to find for their young. Hence, when the midge chances to become numerous these parasites also rapidly multiply and thus immediately quell and subdue it, reducing it back within the sphere it was designed to occupy in the domain of nature; the same as the Hessian fly, once so frightfully destructive to our wheat crops here in America, has become subdued by its parasites, whereby it is seldom noticed now, or known to be present in our country,

although it can be found almost every year in our wheat fields, showing it is still with us, everywhere ready to again increase and become destructive, were it not constantly repressed and kept down by its parasitic foes. And as illustrating the efficiency of these parasites on the wheat midge, it has been stated that persons who have been desirous of seeing and obtaining specimens of the midge, on repairing to places where it had been plenty have been unable to find it, nothing but swarms of these parasitic destroyers coming out in the wheat fields in its stead. Mr. Curtis remarks, these parasites so effectually execute their mission, that it has often happened, a year or two after the midges were in excess, not a specimen could be found. And being usually present upon the wheat in so much greater abundance than the midge fly, it is often overlooked, and these black flies it is hence supposed must be the parents of the yellow maggots which occur in the ears. Thus Mr. Kirby remarks, it is singular, but most people who are acquainted with the larva of the midge mistake these friendly parasites for its parent, and thus impute all the mischief to the very creature which is appointed to prevent it. Even in our own times this same mistake continues to occur, as we are made aware by a writer in Loudon's Magazine of Natural History (vol. ii, p. 292), who, after describing the appearance of the yellow larvæ in the wheat ears, goes on to state that they become transformed into small black flies which appear in myriads on the outside of the ears and are not half the size of the yellow fly figured by Mr. Kirby; though in a subsequent communication (p. 323) he corrects his error, on coming to find that the yellow flies which he had not seen before also occurred on the wheat.

In England Mr. Kirby found three of these parasitic insects which he was sufficiently assured were destroyers of the wheat midge. That which he first noticed as being the most abundant, and which is regarded as the most important and useful, is the midge larva parasite, named *Ichneumon Tipulæ*, by Mr. Kirby. It now pertains to the genus *Platygaster* in the family *Proctotrupidæ* and order *Hymenoptera*. It is black and shining; its antennæ (see plate i, fig. 4, *b*,) are pale dull yellow and nearly as long as the body, becoming thicker towards their tips, composed of ten joints, of which the fifth and sixth are minute; its scutel is prolonged into a conspicuous conical spine of a rusty yellow

color; its abdomen is scarcely larger than the thorax, somewhat flattened and obovate; its legs are pale dull yellow with the shanks very much thickened towards their tips. Its length is 0.05, or to the ends of its wings, 0.07.

Mr. Kirby gives the following interesting account of the operations of this insect when depositing its eggs. "To see our little Ichneumon deposit its egg in the caterpillar of the wheat fly is a very entertaining sight. In order to enjoy this pleasure I placed a number of the latter upon a sheet of white paper, at no great distance from each other, and then set an Ichneumon down in the midst of them. She began immediately to march about, vibrating her antennæ very briskly; a larva was soon discovered, upon which she fixed herself, the vibratory motion of her antennæ increasing to an intense degree; then bending her body obliquely under her breast, she applied her anus to the larva, and during the insertion of her aculeus and the depositing of the egg her antennæ became perfectly still and motionless. Whilst this operation was performing, the larva appeared to feel a momentary sensation of pain, for it gave a violent wriggle. When all was finished, the little Ichneumon marched off to seek for a second, which was obliged to undergo the same operation, and so on to as many as it could find in which no egg had been before deposited, for it commits only a single egg to each larva. I have seen it frequently mount one which had been pricked before, but it soon discovered its mistake and left it. The size of it is so near that of the wheat-fly, that I imagine the larva of the latter could not support more than one of the former, and therefore, instinct directs it to deposit only a single egg in each; besides, by this means one Ichneumon will destroy an infinite number of larvæ."

Mr. Shirreff reports that he saw one of these parasites sting a larva a second time. The maggot writhed in seeming agony and straggled from the wheat ear on to his thumb nail, where it was again stung, three times by the same fly, and in another encounter both fell to the ground. But I cannot think an egg was inserted only in the puncture first made. The other stings were very likely made to drive the larva to wriggle and fall to the ground, lest if it remained, exposed as it then was, some other enemy should happen along and devour it and the offspring of the parasite with it. It is much to be regretted that this deeply

interesting subject, these parasites of the wheat midge, has never been more fully investigated, all we yet know of them being the little furnished us by Mr. Kirby.

The second or egg parasite, named *Inostemma inserens*, pertains to the same family and is of the same size and color with the preceding, from which it is most readily distinguished by the color of its legs, which are black with only the feet and the ends of the fore shanks rusty yellowish. Its antennæ are elbowed, having the first joint long, stout and club shaped, the second joint larger than the following ones and oval, the four next joints minute and globular, and the four remaining ones compacted together into a large egg shaped club. Its abdomen is shaped like the head of a spear and ends in a sharp point, and is furnished with a very long ovipositor resembling a fine hair.

This makes its appearance on the wheat ears quite as soon as the midge does, and before there are any larvæ for it to puncture. Mr. Kirby saw it inserting its long sting between the chaffs, at the top of the florets. Its eggs are quite unlike those of the midge, being extremely minute and globular. They are supposed to be inserted into those of the midge, and Mr. Kirby remarks it must require more than one egg of the midge for the growth of its larvæ, such is the size of this insect. But it is more probable that it is analogous to the egg parasite of the Hessian fly, which, as Mr. Herrick has discovered, does not prevent the egg from hatching nor its larva from growing so far as to elaborate the amount of nourishment which the parasitic larva requires for its own growth. Again we cannot but regret that so little is positively known and so much is left to conjecture with regard to the economy of this parasite.

The third pasasite pertains to the family *Chalcididæ*, and is the species on which Mr. Westwood has founded the genus *Macroglenes*. Hereby this species comes to be designated the *Macroglenes penetrans*. It is slightly larger than the other two and may be distinguished from them by being of a dark blue instead of a black color. Its antennæ are shorter than the thorax, elbowed, club shaped, ten-jointed, the three last joints being compacted into an egg shaped or conical knob. Its abdomen is compressed, and in the female is cut off in a straight line at its end, where are two projecting valves with a short sting visible between them.

Of this species our knowledge is still more meager than in the case of the other two. Mr. Kirby states that it made its appearance on the wheat on the same day with the larva parasite, and he saw it piercing the outermost chaff with its sting. Though he was not able to ascertain the fact positively, he presumes it lays its eggs in the larva of the midge. But as many of its kindred are now known to be parasitic destroyers of other parasitic larvæ, we are not without suspicions it may prove to be a destroyer of one or the other of the two foregoing species, and thus be in reality a friend of the wheat midge intead of an enemy.

Now that we thus know the parasites which attend the wheat midge on the island of Great Britain, let us next inquire what insects of this kind are found accompanying it on the continent of Europe. For an examination of this subject, the remittance of M. Bazin, heretofore mentioned, has placed in my hands materials which are most important and precious.

Upon opening the vial containing insects as they were promiscuously gathered by the net from the wheat at the time it was in bloom in the department of the Yonne in France, in the year 1860, and emptying a portion of its contents upon a sheet of white paper, what first arrests our notice is the excessive numbers of a minute black fly which we everywhere see in the mass, fully corroborating M. Bazin's statement that this fly exists in myriads on the wheat in all the fields he examined. Dr. Sichel has ascertained that this fly is the species named *Inostemma punctiger* by Nees d'Esenbeck, one of the first authorities of our day upon the minute insects of the Ichneumon tribe. And Dr. Sichel further states that according to the figure of Mr. Curtis it is also the same species with the *I. inserens* of the British entomologists. I see but one circumstance of so much importance as to excite a doubt as to this fly being the *inserens*. Mounted specimens sent me by M. Bazin have the sting or ovipositor of the female beautifully displayed, showing it when thus drawn out, to resemble a very fine slender hair more than twice as long as the body of the insect, and enlarged at its end into a conspicuous flattened spear-shaped head, which is black, the hair being rusty yellowish. Mr. Kirby, whose figures and description are copied by Mr. Curtis, does not represent the end of the sting as being thus enlarged in his species. And other examples from M. Bazin have the sting shorter and without this enlargement at its end, these correspond-

ing perfectly with Mr. Kirby's figure. It therefore appears that it is only when special care is taken to fully extend the sting that this spear head becomes expanded and visible at its end; and thus it might readily escape Mr. Kirby's notice. In all other respects, his description so fully coincides with these insects upon the French wheat that I am obliged to think they are the same, and that the *Inostemma punctiger* of Nees is therefore only a synonym of the *I. inserens* of Kirby.

The next species which we observe among these specimens is that which Dr. Sichel has determined to be the *Platygaster scutellaris* of Nees, a name evidently imposed from the circumstance of its having the scutel prolonged into a thorn-like point. In this character and also in the shape and colors of its body and legs, it is so strikingly like the *Platygaster Tipulæ* of Mr. Kirby that I am persuaded it is nothing else than the same species.

On looking over these specimens still further, I detect among them another species which the magnifying glass readily distinguishes from the two preceding by its blue black instead of pure coal black color. Its abdomen is also noticed to be strongly compressed and sharp edged along the top of the back instead of having the broad egg shaped and oval form of the others. The antennæ are also shorter, the feet are dull white, and the wings show a thick rib vein which is united with the outer edge along the middle, from whence it sends off a short branch almost in a transverse direction, this branch ending in a round head in the female while in the larger sized male this head is oval or thick lunate. This species it is very clear is the *Macroglenes penetrans* of Kirby and Curtis.

Thus, as the result of this examination, we learn that the same three parasites which Mr. Kirby found associated with the wheat midge in England upwards of sixty years ago, are common with it in the wheat fields of France at the present time.

Another most interesting enquiry presents itself in this connection. What is the relative number of these parasitic destroyers to the midge on which they prey, and what proportion does the midge itself bear to the other injurious insects upon the French wheat? Upon emptying one small parcel after another from this vial upon paper and then separating the specimens, placing each kind by itself and counting their number, until some hundreds have been enumerated, we obtain the following result:

Insects on the wheat in France at the time it was in bloom in the year 1860.

Wheat midge,	7	per cent.
Another Cecidomyia of a black color,	2	"
Egg parasite, *I. inserens*,	66	
Larva parasite, *P. Tipulæ*,	11	
Macroglenes penetrans,	8	
Total of parasites,	85	"
Other small flies, Thrips, &c.,	6	"

It thus appears that the midge was the most numerous of any injurious insect upon this wheat; but its parasites were vastly in excess of it, having been present in such numbers as would seem sufficient to immediately overwhelm and exterminate it.

On seeing the above results we at once are desirous of knowing how the insects in the wheat fields of our own country compare with them. In what proportion is the midge to the other imsects on our American wheat, and what part of our insects are parasites? I may remark that I have many times swept the net against the heads of wheat when it gathered no insects whatever but the midge; and often on seeing such a heap of these little rascals there, I have grasped the bottom of the net in my hand to crush and destroy them, whereby the net has acquired a yellow stain from their juices. To obtain the fairest comparison the case admits of, I aimed to sweep the wheat when it was at that stage of its bloom that the net would collect the anthers of the flowers and the insects in about the same proportions to each other that I found them in the vial from M. Bazin. It should however be observed that the present year has been a peculiar one, in that our wheat has been thronged with the grain aphis, whereby it has been impossible to sweep the wheat heads anywhere without gathering numbers of this insect which we have never had on our grain before. Although this insect had not become so multiplied as to attract notice the latter part of June, it was sufficiently common then to make the gatherings of the net different from what they would have been in any previous year. I would also state that I found the most common parasite upon our wheat to be so exceedingly active that it escaped from the vials if they were not instantly closed on receiving it or were opened afterwards; and thus it was only by giving particular care to

secure it regardless of everything else that accompanied it in the net that I was able to obtain a fair proportion of these insects. By collecting in this way nearly a thousand insects from the wheat heads, and counting the numbers of each kind, I found the result to be as follows:

Insects on the wheat in New York at the time it was in bloom in the year 1861.

Wheat midge	59 per cent.
Small gnats, (*Chironomus*, etc.)	12 "
Grain aphis	7 "
Thrips	4 "
Bugs, (Hemiptera and Homoptera,)	3 "
Chlorops and kindred flies	3 "
Mites and Poduræ	2 "
Mistaken parasite	9 "
Other parasites	1 "

Of these insects the gnats and Poduræ probably do no injury to the wheat; all the others are pernicious except the parasites, which are beneficial.

Let us now enquire what insects and other destroyers of the wheat midge we have here in America.

It is a subject on which I have often pondered: How does it happen that the midge in this country is so vastly more destructive than it is in its native haunts? There it has never been known to devastate the wheat crop to any extent approximating to its ravages here. Mr. Kirby after a patient gathering of the data, estimated that it destroyed about two kernels to each ear, or one twentieth of the crop. When it was so destructive in Scotland in 1828, Mr. Gorrie estimates it to have caused a loss of about a third in the late-sown wheats. Moreover when it chances to become so multiplied and injurious as to attract notice, it is but a transitory evil which subsides in a few years, after which it is scarcely known or heard of again till another generation has come upon the world's stage. Here, on the other hand, it persistently continues; seldom a year passes but that the wheat crop suffers greatly from it, and every few years a season comes when its ravages are enormous. We have now had thirty years experience with it, and know it continues to be as formidable and destructive at the present time as it has been at

any previous period. Why is it so severe and unremitting a pest in our country when it is so slight and transitory in its native land? There must be a cause for this remarkable difference. What can that cause be? I can impute it to only one thing. We here are destitute of nature's appointed means for repressing and subduing this insect. Those other insects which have been created for the purpose of quelling this species and keeping it restrained within its appropriate sphere have never yet reached our shores. We have received the evil without the remedy. And thus the midge is able to multiply and flourish, to revel and riot, year after year, without let or hindrance. This certainly would seem to be the principal if not the sole cause why the career of this insect here is so very different from what it is in the old world. If we have any insect in this country which lives upon and destroys the midge, with the abundance of food which has been furnished it, why has not that insect increased and produced some mitigation of this evil?

But it has repeatedly been reported that we have insects in this country which are parasitic destroyers of the wheat midge. I have myself heretofore supposed that we had such insects; and it was only when I perceived how utterly they failed to fulfil their mission that I began to distrust the correctness of this opinion.

In the early part of my researches I noticed an insect under such circumstances as led me to confidently regard it as a destroyer of the midge. I saw it was a member of the Chalcidian family, and supposing I should have no difficulty in always finding the same insect in the same situation, I neglected to preserve specimens of it, and thus am unable now to ascertain with certainty the species which I then observed. A few years afterwards, when the midge larvæ were crawling down upon the straw, I again noticed a parasitic insect examining these larvæ with its antennæ, and the larva with a skip throwing itself from the straw to escape from it. I captured and saved two specimens of this parasite, feeling confident I should meet with it multiplied and much more numerous the following year, whereby I could then investigate it to better advantage. But the next year I was unable to meet with it; and within the past few years I have strenuously endeavored to find this insect at the same operation again, but without success. And now, on hunting out

the old specimens of it in my collection, to see if I could from them draw up a suitable description of the species, I find on examining them they are the Hessian fly's parasite, which is represented on Plate III, fig. 1. And I suspect it was this same species which I saw the first year of my observations on the midge. The Hessian fly and this parasite were somewhat common in this vicinity for a few years at that period; and it is quite probable that the parasite, unable to find a sufficient supply of Hessian fly larvæ on which to bestow its eggs, was examining these larvæ of the wheat midge, to ascertain if it might not be able to rear its young in them also.

An insect which resembles the European parasites of the midge the most closely of anything which we meet with upon the wheat of this country is a species of *Platygaster*, so very like the *P. Tipulæ* of Mr. Kirby that no one but an experienced observer of these minute insects will be apt to recognize it as really differing from that species. In the volume of the State Natural History on Insects, page 180, a species is inserted under this name, *Platygaster Tipulæ*. I know of no species but the one to which I now refer that can be alluded to in the remarks there made. But if this is the species intended, it is evident the description there given has been compiled from Curtis or Kirby; it could not have been drawn from our insect. And I suppose it to be this same species which has in other instances originated the reports which have repeatedly run through the newspapers, that a parasitic destroyer of the midge had been discovered, whereby it was probable our wheat crops would soon be released from this enemy. The last of these reports came to us from Canada West, a year since. See Journal State Agric. Soc., vol. ix, p. 30.

As this insect is seen in company with the midge on the wheat ears, and is very numerous some years, I will here describe it, and present what observations I have thus far made with respect to its habits. A magnified view of it is given, Plate i, fig. 4, the cross lines below on the left side indicating its natural size, and on the right side at *a* is one of its antennæ greatly magnified, whilst *b* is the antenna of *Platygaster Tipulæ*, copied from Mr. Curtis's figures. It will be noticed that these antennæ differ very manifestly in their structure; *b* having the two middle joints very minute and globular, and the four last joints plainly thicker than the basal

ones. Moreover in *P. Tipulæ* the scutel is prolonged into a conical thorn-like point, whilst in our insect there is no projection of the scutel. The legs too, in our insect, are black instead of yellow. Having been such a fruitful source of error I name it accordingly.

The MISTAKEN PARASITE *Platygaster error*, new species. (Hymenoptera. Proctotrupidæ.) Plate i, fig. 4.

Black, shining. Head nearly globular, slightly broader than long. Antennæ inserted near the mouth, longer than the head and thorax, thread-like, clothed with a fine inclined beard, elbowed, ten-jointed; basal joint long and stout, nearly half as long as all the remaining joints, thicker towards its tip; second joint oval or somewhat obovate, twice as long as thick; third joint shortest, obconic, a little longer than thick, scarcely as thick as the fourth joint, to which it is compactly joined; fourth joint short cylindric, twice as long as the third joint and they together as long as the second; fifth to ninth joints short cylindric, about twice as long as thick, cut off transversely at their ends, their bases abruptly rounded, separated by very short pedicels; last joint twice as long as thick, cylindric, with its apex tapering to a rounded point. Thorax egg-shaped, smooth. Abdomen flattened, oval, twice as long as wide, as long as the thorax but scarcely as wide, its second segment forming more than half of the whole length. Legs pitchy black, thighs and shanks thicker towards their tips, feet five-jointed. Wings wholly destitute of veins, clear and glassy, irised red and green, the surface minutely bearded and the margin having coarse short inclined ciliæ. Length 0.05.

Although its hind legs are not thickened this insect often moves with a skip, particularly when it first starts to walk.

The observations which I have made upon the habits of this parasite will probably be best communicated to the reader by copying them directly from my memoranda.

"June 22. Meeting in a wheat ear with two young larvæ of the midge, I placed them in a vial and introduced a Mistaken parasite into the vial; but it walks hurriedly about, frequently passing them without noticing them in the least. As this may be owing to its alarm on finding it is in a strange situation, I find two other larvæ and breaking off the young kernel on which they are lying I introduce it into another vial in which a parasite has been imprisoned since yesterday. It comes to the soft kernel and appears to nibble or sip the juice of its broken end. It then walks around a few moments and comes back and nibbles the end of the kernel again, but pays not the slightest attention to the larvæ.

"June 29. Finding some eggs of the midge I introduced the chaffs to which they are adhering into a vial in which is one of these parasites; but it walks over the chaffs and the eggs without noticing them in the least. Thus it indicates no attachment to either the eggs or larvæ of the midge.

"July 3. I watched the motions of the Mistaken parasite in a

wheat field to-day, in which the midge flies are less numerous than they have been and the aphis is increasing. One, and sometimes two or three of these parasites were present, on many of the ears, particularly those ears on which colonies of the aphis had established themselves. They walked about upon the ears and down between the chaffs. They are very tame and familiar, not at all shy like the midge fly. On taking hold of a wheat ear the midge fly will walk away from the spot, whilst this fly will walk out upon the hand without any symptom of fear or alarm. In two instances I saw it pushing the tip of its body into the small orifice at the apex of the outermost scale of the chaffs. One of these I watched until she had crowded the end of her body into this orifice three times, holding it there a few moments each time as if feeling around or dropping an egg there. I then secured her in a vial, and carefully dissected this floret. With the single lens of my pocket magnifier I could not discover any eggs on either of the chaffs near this orifice, nor were there any eggs or larvæ of the midge there or elsewhere upon any of the chaffs or the kernel of this floret. After my return, in a vial into which I had emptied some sweepings of the net, I noticed one of these parasites clinging upon the back of a plump wingless aphis which is three times as large as the parasite. The aphis walks impatiently about, crawling under the rubbish in the vial to crowd the intruder off, and mounting up the sides of the vial, and tumbling down and rolling over, but still the parasite clings to it with an air of *non chalance*. It occasionally touches the tip of its body to the body of the aphis, here and there, but does not appear to insert any egg, and if it stings, the aphis is such a stolid and phlegmatic creature that it shows no manifestation of feeling the puncture. I watch this rider upon his horse more than ten minutes. He at length dismounts and walks away. Perhaps it was only to tease and annoy the aphis that he thus clung to it.

"July 9. Visited M's spring wheat. This field is surrounded by woods except on one side, and the midge does not appear to have found it, for I discover no flies upon nor larvæ in the ears. Both the aphis and the Mistaken parasite are more numerous here than I have seen them in any other field. This looks as though these insects belonged together. Chlorops flies are also plenty on this wheat."

From these observations it appears quite doubtful whether this

parasite pertains to the midge. There are more indications of its belonging to the aphis, though it may be the Chlorops or some other common insect of our wheat which attracts it into the fields of this grain. It is scarcely worth while to speculate upon this subject when the exact truth can be ascertained by careful investigation. Of one fact, however, we are sufficiently assured, if this insect is parasitic upon the midge it has not power to subdue it, or to make any sensible impression upon it, else the midge would not have been pursuing its career all along, so unchecked as it evidently has been.

[When on the point of dispatching these pages to the printer, I happen to notice some figures which were sent for my inspection in August, 1859, from J. M. Klippart, Secretary of the Ohio Board of Agriculture. Mr. Klippart found adhering upon a chaff of wheat several small black globules. On magnifying them they were seen to be flattened or sunk in at their summits, with a row of about fifteen little thread-like spines radiating from the edge of this flattened portion. On opening one of these globules he found it hollow and containing a little sac within, in which were wings and legs which in his view were "certainly portions of *Platygaster punctiger*," accompanid by "genuine antennæ of *Cecidomyia Tritici*." I assured Mr. Klippart the figure of the antennæ showed they were not what he supposed, but were unmistakably parts of the same insect to which the wings and legs belonged. And on noticing this antennæ figure now, I see it corresponds with my fig. 4 *a* of Plate i, in such particulars as assures me it pertains to the same insect. And this insect Mr. Klippart found in the little black globules. I now perceive what the facts are in this case. I think I informed Mr. Klippart that these globules looked to me like the eggs of a Hemipterous insect. Now that my mind is refreshed upon the different insects which occur on our wheat, I can state with a considerable degree of confidence that these globules, according to the figures given of them, are the eggs of the *Nabis fera* of Linnæus, a long narrow ash-gray bug slightly over a quarter of an inch in length, which is common on wheat and very common on grass, both in this country and in Europe. I hope to have the dissimilar habits of this and the other bugs which occur on our wheat sufficiently investigated, to present an account of them in my next Report. This Mistaken parasite, thus found in those eggs, sufficiently set-

tles the question which is now before us. It is the egg parasite of that bug. The parasite punctures and inserts an egg in each egg of the bug it can find. Its egg hatching, the minute larva therefrom feeds on the contents of the bug's egg till it gets its growth; it then changes to a pupa and finally to a perfect insect, when it gnaws an opening through the egg shell and makes its escape therefrom. Portions of one of these insects which had died before it made its way out of the shell, were found by Mr. Klippart. My acknowledgments are due him for enabling me to show so conclusively that this insect, which he is "certain" is the *Platygaster* (*Inostemma*) *punctiger*, has no connection whatever with the wheat midge.]

Several other parasitic insects may be met with upon the wheat. Some of these we know prey upon the aphis. These will be described in connection with that insect in a subsequent part of this report. The others occur in such very limited numbers that it is evident they pertain to species which are much less abundant in this grain than the midge is. For several years I have been searching to ascertain if we had any parasitic destroyers of the midge. The present year I have looked with particular care; and I now am more confident than I have ever before been that we have no insects of this kind in our country.

A few spiders and other predaceous insects may be noticed on the wheat, capturing and devouring all flies and other insects which they are able to master. But the only natural destroyer of the midge known to us here in America, which is worthy to be mentioned, is our common yellow-bird, the *Carduelis Americana*, as it was first named by Catesby (Nat. Hist. of Carolina, vol. i, p. 43.) Linnæus subsequently changed its specific name to *tristis*, the black portions of its plumage probably suggesting to him the idea of mourning weeds; but a more unfortunate name could scarcely be imposed upon this lovely bird, its bright colors, its sprightly motions and the lively song it sings rendering it impossible to associate with it any thoughts of sadness and melancholy.

This bird causes that rough and ragged appearance of the wheat heads which is the most conspicuous indication we have that the grain is infested by this insect. The bird alighting grasps the wheat stalk just below the ear, clinging fearlessly to

slightly upon the base of the third abdominal segment, whilst the wing-sheaths terminate at the suture at the anterior edge of this segment. These wing-sheaths are very faint and almost obliterated towards their tips, whilst their basal portion is more developed and is frequently marked with black lines on their edges and pale brownish lines upon the veins. The abdomen is white with a tinge of green, with the sutures, or at least the anterior ones, marked by a black line. The breathing pores form a row of oval black dots along each side, and a short distance above them the whole back is overspread with black, or varies in having broad black bands with the anterior portion of the segments white or on the fore part of the back tawny yellowish. The back is thinly covered with long white hairs, and on the sides and beneath are clusters of punctures forming round spots from which similar hairs radiate, these spots being placed in four longitudinal rows upon each side, the upper row above the breathing pores and the other three below, the lower spots smaller and with the hairs fewer and shorter. The tip of the body is black.

The Male Chrysalis differs notably from the female. It is a third smaller, glossy, and of a pale tarnished yellow color with the back black and clothed with long white hairs, thus differing from the European *antiqua*, which, according to Guénée, is black and bristly with reddish yellow hairs. It has the thorax much larger than it is in the female chrysalis, and the sheaths of the wings and legs are vastly more developed and larger, reaching two-thirds of the total length. On each of the three anterior segments of the back is an oval transverse spot, formed by short projecting crinkled scales of an ash gray color, which spots do not occur in the female chrysalis.

The moths come out from their cocoons in nine days, making their appearance about the middle of July. The caterpillars which are to become females feed longer and the moths are later in coming from their cocoons than the males. I have known male moths to come abroad before the last female caterpillars of the same brood had commenced forming their cocoons.

The MALE has the fore wings rust color or dull tawny yellow, largely clouded with blackish brown, which color forms a broad curved band extending across the wing forward of its middle, this band through the inner half of its length being forked or double, with the anterior fork broader. Beyond the middle a much broader wavy band crosses the wing, having upon its inner end a snow white spot shaped like a crescent, forward of which is a curved streak separated from the band except at its inner end. The outer part of this band is narrowed into a straight black streak, which extends obliquely forward and outward to the outer margin. And back of this is a brown cloud on the outer margin, reaching to the apex, forward of which it is cut asunder by an oblique grayish streak, a similar streak separating it anteriorly from the outer end of the brown band. A dusky cloud in the center of the wing extends lengthwise from one band to the other, and on its outer side is a paler rusty yellow spot, very faint, crescent-shaped, and margined by a brown line, which is more or less broken and irregular. The base of the wing is also brown on its outer side. The fringe is brown with a rusty alternation at the end of each of the veins. The hind wings are rusty brown, their fringe with very faint paler alternations towards the outer side. On the under side the wings are paler rusty yellow, and brownish on the outer side of the forward pair. The body is coated with hairs and the abdomen with scales of a smoky brown color. The latter has faint paler bands at the anterior sutures and a tuft of short black hairs on the back near its base. It is gray beneath and clothed with short rust colored hairs along the sides and longer brown ones at the tip. The broadly pectinated antennæ have the stalk gray and the branches blackish. My specimens of this moth measure 1.15 across the spread wings.

The FEMALE MOTH is wholly unlike the male in her color and form, and being destitute of wings she appears more like a short thick-bodied hairy worm than like a mature insect. When she comes out from the cocoon she is half an inch in length and half as thick; being broadest slightly forward of the middle. Her skin is black upon the back and dull greenish white upon the sides and underneath, and is coated over with short fine soft hairs

of a yellowish white color, which form pale bands on the edges of the abdominal sutures and a faint pale stripe along the middle of the back. The rudiments of the wings appear on each side of the thorax, in the form of small oval scales of a hoary gray color, which is the color of the legs also. The antennæ resemble short gray threads reaching only to the wing sockets, when they are turned backwards. Along their under side they are dark brown, with projecting sharp-pointed teeth, like those of a saw.

The female remains stationary upon her cocoon and there deposits her eggs, whereby her body becomes diminished nearly one-third from its original size. This operation so exhausts her that as soon as it is completed she looses her hold upon the cocoon and falls to the ground and dies. She thus lives only about twenty-four hours in her mature state, whilst the male continues to fly about, actively, for several days at least.

In one instance a female lost her foothold upon the cocoon, and falling, caught hold of the clapboard a short distance below it; and I relate the circumstance as showing how very little these wingless females are able to walk and move about, that she did not attempt to crawl back to the cocoon, but, clinging to the spot where she was, deposited her eggs there, upon the smooth surface of the board, only three inches below the cocoon.

The Eggs are placed in a cluster side by side, in nearly regular rows upon the outside of the cocoon, to which they are firmly glued. They are of a white color, like enamel, and of a globular form, with their upper part constricted and flattened, resembling a lid placed upon the summit of the egg. This lid is of a purer white color and opake, with a discolored band around its outer edge and with its center strongly depressed, forming a dimple, in which is a glossy pale brown dot.

The eggs are left naked and not covered over with the white frothy substance with which the female of the *leucostigma* covers and hides her eggs. And being left thus exposed, these eggs fall a prey to a minute parasitic insect, a black shining four-winged fly with pale tarnished yellow legs, which pertains to the Order HYMENOPTERA, the Family PROCTROTRUPIDÆ and the group PLATYGASTRIDES. In its size and general appearance it is very similar to the Mistaken Parasite, figured in my Sixth Report (Plate 1, fig. 4), and I name it the Egg-Parasite of the Vaporer Moth, although it is quite probable that future researches will show that it is not restricted to these insects but preys also upon the eggs of other moths of similar size. It differs generically from the Mistaken Parasite, in having a straight oblique branch given off from near the middle of the outer marginal vein of the fore wings. I present a detailed description of this fly.

EGG-PARASITE OF THE VAPORER MOTH, *Telenomus Orgyiæ*, new species. (Hymenoptera. Prostotrupidæ.)

Length 0.03, or to the end of the closed wings 0.05. Black and shining, with the legs dull pale yellowish. Head as broad as the thorax, twice as broad as long, convex in front, concave at base, and rounded on each side, its surface sparsely bearded, at least in places, with short inclined hairs; the eyes more densely and evenly bearded with short erect hairs. Antennæ black, clothed with a short inclined beard, half as long as the body, inserted near the mouth, elbowed, clavated, ten-jointed, the five last joints forming an elongated egg-shaped club. Basal joint long and thick, occupying one-third of the total length, slightly curved, rather thickest in the

middle, narrowing towards the base and very slightly towards the tip. Second joint twice as long as thick, obconic, and a third narrower than the basal joint. Third joint similar in length and thickness to the second, cylindrical. Fourth and fifth joints globular and of the same thickness with the preceding two. Sixth joint a third thicker, globular. Seventh and eighth joints thickest of all, their outline square, opposite sides straight and parallel, base and apex slightly convex. Ninth joint of the same form but a little smaller. Tenth or last joint narrower and a very little longer than the ninth, egg-shaped. Thorax broad egg-shaped with a deeply impressed transverse line across its disk back of the center. Abdomen sessile, smooth and highly polished, similar to the thorax in its size and form. Wings horizontally incumbent upon the back when at rest, smoky hyaline, the fore pair with a straight stigmal branch arising near the middle of the outer margin and running obliquely inward and backward, ending abruptly without being enlarged into a knob or head, its length about equal to one-third of the width of the wing. Legs much more slender than the antennæ and rather long, the forward pair shortest, with their shanks thick, elliptic-obovate, and having a strong curved spur on the underside towards the tip. Shanks of the other legs long and slender, and gradually thicker towards their tips, the hind ones longest. Feet long and thread-like, longer than the shanks on which they are respectively inserted, their basal joint longest and occupying a third of the total length, the second and fifth joints about equal in length and perceptibly longer than the third and fourth.

This parasite passes around and punctures the shell of each egg of the Vaporer Moth, inserting a minute egg of its own inside, from which hatches a maggot which feeds upon and consumes the contents of the moth's egg. Each one of the latter eggs is supposed to contain the exact amount of nourishment required for the growth of one of the parasites. Hence the parent fly is cautious to never puncture an egg which is already occupied, being aware that its young will perish from starvation should two of them happen to be placed in the same egg. In the instance which came under my observation, seven of these minute flies were engaged upon one cluster of eggs, walking slowly about and around them, and examining them with their antennæ; and with a magnifying glass I could distinctly see one and another of them with its sting inserted into an egg, thus leaving no doubt as to the nature of the work in which they were engaged. I managed to capture two of these flies, and being called away from home, on my return three days afterwards the remaining five were still present, busily engaged in their operations. On the following day, however, only two of them were remaining. That such a number of these flies should continue day after day upon the same cluster of eggs shows how pertinaciously they follow up this work, never abandoning it until they become fully assured that the last egg in the cluster has been ferreted out and inoculated. Although there were two other clusters of eggs at distances of only six and ten feet, not one of these flies discovered them—which indicates that there was some peculiarity about that particular cocoon, whereby such a number of these flies were able to find it and failed to detect the other two in its vicinity.

As the Common Vaporer Moth, *O. leucostigma*, covers her eggs copiously with a white frothy substance which dries and hardens upon them, completely enveloping and hiding them from the view, this parasite is unable to come at them to destroy them; and this is no doubt one of the causes if not the sole cause why that species is so much more numerous than the present one in our country.

It is rarely that the caterpillars of this moth will occur in such numbers on our trees and shrubbery as to excite any solicitude. Should they do so

our readiest mode for lessening their numbers will be to pick off each leaf on which one of them is standing and trample it under the foot, if one can find it in his heart to thus treat such beautiful objects as they are. Their numbers around our dwellings may also be lessened by searching for their cocoons under the edges of clapboards, in the grooves of the rough bark of trees, and similar situations, and wherever one of them is found with a cluster of eggs upon its surface, tearing it from its place and throwing it into the fire.

In conclusion, I may add that the Common Vaporer Moth has been very abundant in the city of Albany for several years past, where its larva has acquired the name of the Little Yellow Caterpillar. It here appears to be increasing with each succeeding year, and has this season (1863) been so numerous that in some of the yards and gardens I have seen large plum trees wholly stripped of their leaves by it and the rose bushes similarly defoliated. On this the 21st of July the caterpillars have nearly all disappeared for the season, and I have to-day met with the insect in all its different stages—some of the CATERPILLARS still remaining out upon the rose bushes, whilst most of them have formed their cocoons and changed to PUPÆ, some of which have already given out the PERFECT INSECTS, and the winged males, recognized by their smoky gray color and the white dot on the inner hind corner of their wings, are seen at rest on the shaded side of buildings, and occasionally a cocoon shows on its surface the milk-white patch of dry frothy matter under which the female has hid her EGGS. As these eggs will remain unhatched until next spring, this nuisance, the Yellow Caterpillar, might be greatly abated, were every person after the leaves have fallen, in autumn or in winter, to search for these cocoons under every projection in the walls of his buildings and in his fences, and upon every dead leaf which remains hanging upon the limbs of the trees and shrubbery, and wherever one of the cocoons is found having this white foam-like substance upon it, making it a point to tear it from its place and burn it.

8. HAIR-NECKED ROSE-BUG, *Macrodactylus barbatus*, new species. (Coleoptera. Melolonthidæ.)

Associated with the Rose-bug, devouring the leaves and fruit of roses, grape vines, apple and other trees, the latter part of June, a beetle like it in every respect, except that its thorax is slightly more broad than long, and is bearded with small erect short bristles.

As this report is being closed for the press (June, 1863,) specimens of the Rose-bug are sent me from Stillwater, Saratoga County, as an insect which is there making its appearance in vast numbers in the fields of young rye, corn and potatoes; and a gentleman from Saratoga Springs calling upon me, states that in some of the gardens there the grape vines are so thronged with these beetles, eating the fruit and leaves, as to threaten to ruin them, whilst there are great complaints of it also as devouring the young plants of Indian corn in the fields.

In my Second Report was given a description and figure of the Rose-