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ERRATA.

- Page 9, column 1, line 1, for "chrysalises" read "four chrysalises."
 Page 9, column 1, line 12, for "1—5 inch" read "1-5th inch."
 Page 27, column 2, line 7 from bottom, before "6th, *Trogosita*" insert "5th, *Calandra (Sitophilus) granaria*, the Grain Weevil."
 Page 35, column 1, line 15, for "1861" read "1867."
 Page 50, column 1, lines 15 and 14 from bottom, for "flea-beetle, (*Haltica*)" read "snout-beetle, (*Apion*)."
 Page 56, column 2, line 35—36, for "I, p. 10," read "II, p. 10."

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The Practical Entomologist.

GRASSHOPPERS AND LOCUSTS.

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PHILADELPHIA, OCTOBER, 1866.

SALUTATORY.

On assuming the editorial chair, it is usual to make a great many promises, which may or may not be kept hereafter. I shall not follow that example, further than to say, that I shall use my best endeavors to make the PRACTICAL ENTOMOLOGIST what its name professes it to be—a real, live, PRACTICAL Paper. Those who have already made my acquaintance through the columns of this Journal, have of course formed their own opinion of what I am able to do; and subscribers who are thus far strangers to me, if they are as wise as I take them to be, would not be influenced by a whole gasometer of windy promises from an unknown individual.

What little I have hitherto done for the PRACTICAL ENTOMOLOGIST, has been done without any pecuniary benefit to myself, and solely with the object of furthering the interests of science, by proving to the people, that scientific truths are often of real, practical, dollars-and-cents utility. Whether my present position will be continued beyond the current year, will depend principally upon whether the American people endorse my poor efforts for their benefit by subscribing liberally to the PRACTICAL ENTOMOLOGIST. BENJ. D. WALSH.

Shakspeare has said that "a rose by any other name would smell as sweet," and I suppose that, by parity of reasoning, he would infer that "a skunk by any other name would stink as strongly." But Shakspeare was a poet, not a philosopher. There is a great deal in a name. Call any given kind of caterpillar the "Army-worm," and people are immediately alarmed about it, and fancy that it is going to sweep the whole country before it. Tell them of a swarm of "grasshoppers" alighting from the clouds in any country, and it excites but little attention. But call the very same insects "a devouring swarm of locusts," and they immediately think of King Pharaoh and the desolated land of Egypt, and are filled with horror and apprehension.

Now, at this present moment, enormous clouds of what are, properly speaking, "Locusts," are ruthlessly desolating Kansas and Nebraska, and some of them even passing into Missouri. Yet, as the American people choose to call these insects "grasshoppers," and grasshoppers are quite common throughout the United States, nobody thinks much about it. In reality, however, the species which is doing the damage, as well as most of the insects popularly known as "Grasshoppers," belong to the very same family of Insects as the Locusts of Scripture and of modern Europe; though, as is the case with about 95 per cent. of the various insects found in North America, the species differs from any that occurs in the Old World. It is to Prof. W. S. Robertson, of the Indian Orphan Institute, Highland, Kansas, that I am indebted for specimens of the very insect which is now actually infesting Kansas, though more than a year ago I had been supplied with specimens of the same species taken by my friend Dr. Velie in Colorado. Singularly enough, this insect has never yet, so far as I am aware, been scientifically described; but as Mr. Uhler, without describing it, has given it the name of *Caloptenus spretus*, we may designate it in that manner. It differs from the common Red-legged Grasshopper, (*Caloptenus femur-rubrum*), which occurs everywhere east of the Missis-

issippi River in great abundance, chiefly in all the four wings being very much longer, so that, instead of flying only a few yards at a stretch, it can with ease fly a great distance. In a female specimen of the former, which I have measured, the wings expand from tip to tip $2\frac{2}{10}$ inches, and the front wing is 1.03 inches long; in a female specimen of the latter of exactly the same size they expand only $1\frac{1}{2}$ inches and the front wing is only 0.80 inch long. In the male sex the difference is not quite so great, but still it is sufficiently characteristic. And these differences are found to be constant and permanent, and not to occur in a few specimens only of each species, and to pass by insensible gradations from one species to the other. Hence, in spite of the almost absolute identity of all the other characters, we are bound to consider the two insects as distinct species. Whether they have always been thus distinct for all preceding time, is another and a very different question. According to Dr. Velie, who supplied me with specimens from Colorado, it is this same *Caloptenus spretus*, which often does great damage in that Territory; and there can be little doubt that it is the same insect which has from time to time invaded Minnesota. The name "spretus" means "despised," and refers apparently to its having been hitherto despised or overlooked by Entomologists. In fact, as before stated, I believe that this is the first occasion, on which it has been mentioned in print in such a manner, that it can be scientifically identified. We may call it in English "The hateful Grasshopper."

Before I proceed to recount the ravages of this "Hateful Grasshopper," it may be as well to state for the thousandth time, that the insects popularly called "Locusts" in North America have nothing whatever to do with the Locusts of Scripture and of modern Europe, and do not even belong to the same Order, or to the same grand group of Orders. The former are "Suckers;" the latter are "Biters." The former belong to the Order Homoptera; the latter to the Order Orthoptera. The former have their front wings glassy and transparent; the latter have them more or less leathery and opaque. The former have a mere apology for antennæ, which the general observer would entirely overlook; the latter have quite conspicuous and rather long antennæ. It is to the former that the so-called "Seventeen-year Locust" (*Cicada septendecim*) belongs; but, as the term "locust" gives rise to so much confusion, it would be better to drop it altogether and call this insect "the seventeen-year Cicada." It is remarkable that, although these American bogus "locusts" (or cicadas) are physically incapable of eating, seeing that they have no jaws to eat with, yet the earliest account we have of them asserts, that "they did eat up the green things, and made such a constant yelling noise as made the woods ring of them and ready to deafen the hearers." (*Morton's memorial*.) This is an amusing specimen of the slipslop way in which Natural History was written by our grandfathers, and of the influence of a mere name upon the imagination. The insect being popularly called a "locust,"

Morton naturally inferred that it must act like the "locusts" of which he had read in the Bible.

But insects are not the only animals, among which popular names have caused great confusion in America. In some parts of the United States a species of Grouse (*Tetrao umbellus*) is called a "partridge," and in other parts the Quail (*Ortyx virginianus*) is called a "partridge." And almost everywhere two entirely different mammals, the thirteen-striped ground-squirrel (*Spermophilus 13-lineatus*) and the Pouched Gopher (*Geomys bursarius*) are confounded under the common name of "Gopher." Nor are similar cases wanting in Europe. In many English counties sheep of a particular age are called "Hoggets," and often for the sake of brevity "Hogs;" and on one occasion a London gentleman was recommended by a neighboring farmer to turn thirty or forty "hogs" upon his lawn, in order to improve the grass. As the Londoner understood the word "hogs" to mean "swine," and adopted his neighbor's advice to the best of his own understanding of it, the result may be readily guessed. Quite recently, in a grave English work on Architecture, I met with a similar story, which the author vouches for as true. It seems that in the Brewers' business molasses is extensively used in England, and is technically known as "Spanish." Sifted coal-ashes are also extensively used for grinding up along with clay in the manufacture of bricks, near London, and are likewise popularly known among the brickmakers as "Spanish." On one occasion a London brewer, being about to build a large brick house in the country, sent a master brickmaker down there to report on the quality of the clay. The answer was that he could make first-rate brick with it, if he only had a load or two of "Spanish," meaning of course coal-ashes. Greatly surprised at such a demand, but having much confidence in the man, the Brewer forthwith sent off to the Brickmaker two cart-loads of "Spanish" in his own sense of the term, i. e. molasses. The result may be easily imagined.

After these preliminary remarks, I will now give such details as I have been able to collect respecting these destructive "grasshoppers," which ought by rights to be called "Locusts," but which, if designated by that name in America, would make as much confusion as the English sheep-grower's "hogs" or the English brewer's "Spanish." It should be understood, however, that some of the insects which gather in great swarms in California and Utah, sweeping everything green before them, and are confounded with the true "grasshoppers" under the same popular name, belong to a closely allied family, the Catydids, (*Gryllidæ* Leach, or *Locustariæ* Latreille,) and are mostly only furnished with very short rudimental wings. To this family evidently appertains the insect rudely figured in the *Smithsonian Report* for 1860, (p. 424,) as infesting the Shasta Valley in California, and it is not improbably the *Anabrus purpuratus* of Uhler, which Dr. Velie took abundantly in Colorado. The "Catydids" may readily be distinguished from the true "Grasshoppers," (*Locustadæ* Leach, or *Acri-*

dæ Latreille,) by the female always having a long sword-shaped ovipositor projecting from the tip of her tail.

THE HATEFUL GRASSHOPPER IN MINNESOTA, 1856-7.

"For two years in succession—1856 and 1857—the grasshoppers destroyed our crops, and many resolved then to keep two years' supply of produce on hand afterwards. One fact I noticed: although they ate the bark from sapplings, and consumed our corn, tobacco, &c., ate holes in clothes hanging out to dry, and destroyed boots and shoes when they lit on them in the house, yet peas they avoided, and it was an odd sight to see the field completely stripped, even of the weeds, and the pea-patch left undisturbed. There was no turning to the right or left with them; they went hopping on to the tune of John Brown, and they may be hopping yet for aught I know." (From a letter by O. H. Kelley, of Anoka Co., Minn., printed in the *Country Gentleman*, July 31, 1862.)

THE HATEFUL GRASSHOPPER IN NEBRASKA, 1866.

"In Nebraska the grasshoppers, according to the papers of Leavenworth, Kansas, had crossed Salt Creek and Weeping Waters, having come from the West, destroying everything in their course." (*N. Y. Sem. Tribune*, Sep. 25, 1866.)

"The grasshoppers, which have devoured everything about Fort Kearny, [Nebraska,] are rapidly approaching the River, and may yet sweep over Missouri. A few days ago they appeared in clouds at Seneca, Kansas, five miles west of St. Joseph, Mo. It is said that they will average one hundred to every square foot of surface." (From the *Boston Cultivator*, Sep. 22, 1866.)

The following is from the Nebraska correspondent of the *Rock Island Union*, and was printed in that paper September 25, 1866:—

NEBRASKA CITY, September 8, 1866.

COL. BARNES.—Fourteen miles north-west of Nebraska City, I have lately been a witness to a sight, rare and singular to me. The last day of August, near the middle of the afternoon, quite a number of grasshoppers were seen alighting, and that number rapidly increased till a little before sunset. The next morning they appeared much thicker, but were only so from having crawled more into the open air to sun themselves. About nine o'clock they began to come thicker and faster from a northerly direction, swarming in the air by myriads, and making a roar like suppressed distant thunder. By looking well up to the sun they could be seen to good advantage, and could be seen as high as the eye could discover an object so small, in appearance like a heavy snow-storm, each hopper very much like a very large flake, save that it passed by instead of falling. The number was beyond imagination—the leaves of the timber in this section of the Territory would be but little in comparison. The air was literally full of them, and continued so till along in the afternoon, when the air was free of them, countless millions having passed on, leaving other countless millions covering the earth to devour vegetation. Sunday and Monday being cloudy and damp, they contented themselves by devouring every eatable thing that came in their way, but Tuesday brought a repetition of the scene of Saturday. Since then they have not flown so much, and at this writing there are millions of them in this neighborhood, fortunately working their way a little east of south. I could not say "go, erring sisters, go," but I could heartily say, "go, you famine-creating, pestilential, devouring nuisance, and as you pass over water, forest and prairie, may the fishes of the water, beasts of the forest and fowls of the air, grow fat upon your little carcasses, till the last one of you finds your last camping ground in the power of some hungry enemy."

Their present visitation may be for some good, but I am too blind to see it. Their ravages here have drawn down many a hearty, yet uncouth, expression of disgust and hate from honest and hard-working farmers. Go into the gardens, and see them stripped of nearly every vestige of vegetation, both stock and fruit; go into the field, and see the vines of all sorts stripped of all their leaves and eaten to the ground; go and see the corn, as completely naked as if some violent storm had torn every blade from the stalks, leaving it looking like a lot of de-

generate hoop-poles; go into the orchards and timber, and see many of the smaller trees especially, almost bare, the leaves having been devoured by these ravaging creatures. Many a sad sight and many a downcast countenance now fill the roll. May a new tide in the affairs of the farmers here better their footing next year.

Yours, as ever,

S. C. MAXIMA.

THE HATEFUL GRASSHOPPER IN KANSAS, 1866.

From a letter from Prof. W. S. Robertson, of Kansas, dated Sept. 12, 1866, and accompanied by numerous specimens of the perfect insect:—

The Grasshoppers sent herewith are popularly known here as the "Mormon," "Western" or "Colorado" Grasshoppers. Last month they made their appearance in the frontier settlements of Kansas and Nebraska. To-day I was expecting specimens to send you, and they came—not a pill-box full, but in clouds. As high as the eye could reach, the air was filled with them; and they came down glittering in the sunlight like huge flakes of snow, and at once commenced their vocation of destroying every green thing. Indian corn, however, seems their favorite food, and they promise to be as destructive to it as their neighbors, the Sparmen, have been to the potato. On the Nemaha the late corn has been entirely destroyed by them. Even where some men hastily cut up and shocked their corn, the grasshoppers continued their depredations, until only the bare stalks remained. Wheat when sown was eaten up, if left uncovered.

In many places the ground is fairly honeycombed by their egg-cells, which are from 3-10ths to 5-10ths of an inch in depth. The common length of the egg-cells is 1 and 3-10ths of an inch; but by calling on a number of boys for a large one and a small one, I found the extremes to be 1 and 6-10ths and 9-10ths of an inch. I have observed that these grasshoppers are preyed on by certain species of *Libellula*, (Dragon-fly or Snake-feeder.)

The following is from the special correspondent of the *N. Y. Tribune*, and appears in the *Semi-weekly* of September 28, 1866:—

COUNCIL GROVE, Kansas, September 8, 1866.

Soon after noon on Saturday, Sept. 1, a tremendous shower of grasshoppers came from the South, completely filling the air as high as one could see, and looking like a driving snow-storm. In a few moments the ground, trees, bushes and everything green was completely covered. In less than two hours the leaves of trees, bushes, corn and everything green was devoured. The weather since then has been cool and wet, so that they could not leave, as they move only in hot, dry weather. The grasshoppers are now lying thick over everything, eating the ears of corn, oats, all the bark off the trees and shrubs, water-melons, cucumbers, cabbage-heads, pumpkins, &c. It will be impossible to sow Fall wheat here unless they leave soon. The wheat, oats, rye and barley crops were first-rate here this year. Corn is cut a little short by dry weather, and is cut down by grasshoppers; still there will be enough.

The following is from the *N. Y. Sem. Tribune* of October 5, 1866:—

JOHN A. NOTTENSTEIN, Humboldt, Allen County, Kansas, writes, Sept. 11:—"Yesterday the red-legged locusts made their appearance in this vicinity, and are devouring everything green. They almost darken the sun in their flight. I put in 65 acres of wheat in the last week of August, which looked fine, but it has nearly all disappeared. By to-morrow night there will not be a spear left. Early sown wheat will be totally ruined. You will probably hear that they (the locusts) are grasshoppers, but rest assured they are not." We suppose this to be the same pest which has devastated portions of Utah, Colorado, Nebraska and Minnesota.

The Lawrence (Kansas) *Journal* of September 12, 1866, speaks as follows of the grasshopper invasion:—

In Brown County they covered a track twelve miles in width, and consumed pretty much everything green. Trees were stripped of their leaves, grass eaten up, and corn-fields literally stripped to the stalk. It is fortunate they have come so late in the season as they have, after

the crops have been principally gathered. They will, however, probably do great damage to wheat fields, and if the fall should remain dry and warm, they will deposit their eggs, and, we fear, give trouble next year. A severe frost, followed by cold weather, would probably destroy these insects. They are now coming in this direction in swarms, and will doubtless be here in a few days. In North-western Kansas they fill the air so as to obscure the sun. They have been traced for a distance of two hundred miles above Fort Kearney. The Marysville *Enterprise* says of the grasshoppers in that section: "They alighted upon fields, gardens, fruit-trees, and everything green or eatable, and like a march of two hundred and fifty army-corps, devoured everything they touched. This whole country has been taken by them, and the rear-guard is still with us, guarding what vegetables and green leaves the army has left. Farmers are seriously alarmed lest the corn should be totally devoured. They seem to be passing in a south-west direction."

The following is from the *N. Y. Sem. Tribune* of September 25, 1866:—

GRASSHOPPERS IN KANSAS.—The Leavenworth papers report, that a vast army of grasshoppers have reached Lawrence from the West. They had cleaned out Topeka, the Capitol, of garden vegetables, grass and clover, and left the ground as if burned with fire. Corn is eaten to the roots. How widely they extend is not stated. They travel four or five miles a day.

Mr. Wm. H. Lykins of Lawrence, Kansas, writes to me as follows, under date of Sept. 27, 1866:—

With this I send you a few specimens of the Grasshoppers or "Locusts" of the ancients, which are now covering the land. [These have failed to arrive. B. D. W.] All that you have ever heard or read of their vast numbers can now be seen in Kansas. Coming so late in the season, they have not done much damage, except in a few cases where they have attacked fall wheat, corn-blades and tobacco. One gentleman informed me, that they arrived on his farm about daylight, and before breakfast had completely eaten up a patch of tobacco of about five acres, and then sat on the fence and begged for a "chaw" from every one that passed. The latter part of the story is rather doubtful. They first made their appearance about Salina, high up on the Smoky Hill fork of the Kansas River, and from thence have spread over Eastern Kansas. There is something weird and unearthly in their appearance, as in vast hosts they scale walls, house-tops and fences, clambering over each other with a creaking, clashing noise. Sometimes they march in even regular lines, like hosts of pigmy cavalry, but generally rush over the ground in confused swarms. At times they rise high in the air, and circle round like gnats in the sunshine. At such times I think they are caught by currents of our prevailing westerly winds, and are thus distributed over vast tracts of country. They are now depositing their eggs, and we shall probably have a second edition of them next spring. One farmer informed me, that on his place there were about four holes to every square inch; and in some places I have seen their nests even thicker than this. At what time do the eggs hatch out?

The following letter is from M. M. R., of Douglas County, Kansas, and bears date October 1, 1866:—

The grasshoppers have made their appearance in this part of Kansas by the billion. They are now depositing their eggs in the ground, and almost every person is wondering if they will make their appearance next summer. We apply to you for information. Will their eggs hatch out next spring, and can they survive the winter without being destroyed? Farmers are predicting, that we shall not be able to grow anything next summer on account of the grasshoppers.

How remarkably do the above graphic descriptions agree with that given by the prophet Joel of the locusts of Scripture! "A day of darkness and of gloominess, a day of clouds and of thick darkness. * * * The land is as the garden of Eden before them, and behind them a desolate wilderness; yea,

and nothing shall escape them! * * Like the noise of chariots on the tops of mountains shall they leap, like the noise of a flame of fire that devoureth the stubble, as a strong people set in battle array. * * Before their face the people shall be much pained: all faces shall gather blackness. They shall run like mighty men; they shall climb the wall like men of war; and they shall march every one on his way, and they shall not break their ranks. * * They shall run to and fro in the city; they shall run upon the wall; they shall climb up upon the houses; they shall enter in at the windows like a thief." (*Joel*, Chapt. II, 2-9.)

The facts referred to above, coupled with the circumstance that Dr. Velie found this same insect very abundant in 1864 in Colorado, and heard that it was by far the most troublesome and prevalent grasshopper there, indicates that it must have travelled from Colorado to Kansas and Nebraska in 1866, being probably assisted in passing the intervening barren plains by westerly winds.

There can be little doubt, I think, that wherever the insect has laid eggs this autumn, there the great bulk of the eggs, unless previously destroyed, will hatch out next spring. In this event, the mischief will be a hundred-fold as great as any inflicted in 1866. * For then the country will have to subsist them, not only for a few weeks in the perfect or winged state, but for several months, while they are slowly and gradually attaining maturity. In confirmation of this theory, it may be observed, that in the case quoted above of their infesting Minnesota, they occurred in two successive years. It is possible, indeed, that some very peculiar weather, for instance very heavy rains, followed immediately by very heavy frosts, might destroy their eggs; but I would give but very little for such a chance. As to their natural enemies—skunks, shrew-mice, moles, birds, toads, spiders, cannibal and parasitic insects, &c., &c.—it is out of the question that they can exist on the spot in sufficient numbers, to make any impression upon such hosts of egg-cells as are stated to be already constructed. In a year or two's time such enemies might multiply, so as to form an efficient check to the future multiplication of this grasshopper. But, in their present numbers, which are of course proportioned to the numbers of the various species of insects, &c., usually found in Kansas and Nebraska, it is impossible that they can exert any influence upon so multitudinous a foe.

It might be supposed at first sight, if the Hateful Grasshopper can hatch out in Kansas and Nebraska in the spring of 1867, from eggs laid in the autumn of 1866, by females which had travelled thither from Colorado, and if, as I have stated to be likely, they can arrive at maturity during the summer of 1867 in Kansas and Nebraska, that in the autumn of 1867 they will lay a fresh stock of eggs there and propagate thus indefinitely from year to year. But there are scientific considerations which make such a contingency highly improbable. Dr. Velie, the Illinois Ornithologist, and Dr. Parry, the Iowa Botanist, both of whom

were personally witnesses of the operations of this insect in Colorado in 1864, assure me that it breeds there in the mountains and comes down into the settlements in vast swarms through the canons (kanyons) or deep perpendicular cuts, leading from the mountains to the more level country. Hence, it is evidently a strictly alpine insect; and when it arrives in Kansas and Nebraska it arrives at a point many thousand feet nearer the level of the sea than its native home, and where consequently the "conditions of life," as they are called by naturalists, i. e. food-plants, climate, density of the air, temperature, moisture, &c., &c., are very different from those of its native home. Now, it is a general law in Organized Nature, as has been clearly expounded by Darwin, (*Origin of Species*, chapter I,) that changes in the "conditions of life" often operate peculiarly and exclusively upon the generative system, so that an animal or a plant, otherwise apparently healthy, becomes unable to reproduce its species. For example, various kinds of Hawks and Falcons have been tamed in very large numbers for the last thousand years for the sport of hawking. Their general health does not appear to suffer at all in confinement. Yet, from the changed "conditions of life" to which they are thereby subjected, they almost invariably become barren; and there is scarcely an instance on record, of any Eagle, Falcon, Kite, Buzzard or Hawk having ever bred in a state of domestication, though from the very great price formerly given for the rarer and more highly esteemed species, it must of course have been a pecuniary object to induce them to do so. Experiments in different Zoological Gardens have led to the same result. Applying these general principles to the case of the Hateful Grasshopper, we may reasonably expect that the constitution of the insect will be so affected by the great change of climate, air, &c., which it experiences in Kansas and Nebraska, that it will become barren in the autumn of 1867, and consequently that the race will then and there die out. And this theory is confirmed by the fact, that although the people of Minnesota were afflicted by what was probably this same insect in 1856 and 1857, so that "many resolved then to keep two years' supply of produce on hand afterwards," yet that after 1857 it totally disappeared there. Indeed, since in the course of the last century or two, many swarms of this insect have probably descended into Kansas and Nebraska from Colorado in different years, if it was physically capable of propagating for an indefinite number of years in those countries, we should in that case have found it there long ago. But this does not appear to have been the case.

For these reasons I do not consider that the Hateful Grasshopper is at all likely to infest Kansas and Nebraska after the season of 1867, unless fresh swarms should descend upon those countries from Colorado; but that it will, if not artificially checked, terribly infest those countries in the summer of 1867, I have but little doubt. In the words of the prophet, as already quoted—"The land will

be as the Garden of Eden before them, and behind them a desolate wilderness."

Under these circumstances, and as no plan for destroying the eggs can be effectual, unless it is generally adopted, I should strongly recommend the authorities, in Kansas and Nebraska, to offer a bounty of so much a bushel for grasshopper eggs, on the same principle that bounties are offered in most new States for wolf scalps. This plan has been often tried in European countries, and found to work well. Women and children, who would otherwise be earning nothing, engage in the work; and after all, though it might perhaps cost the State a few hundred thousand dollars, yet the money does not go out of the State, and the crops of next year will be saved. It is better to feed poor people than to feed grasshoppers, and according to the homely old adage "a stitch in time saves nine." Without waiting for the Legislature to take action, let the County Court of each infested County at once offer a suitable bounty, and appoint men at suitable points to receive and measure the eggs and pay for them in County Orders. The eggs could probably be utilized by feeding them out to hogs; but this could be easily ascertained by a few experiments. If something of this kind is not done, folks in Kansas and Nebraska had better lay in supplies of provision for two years ahead, wherever the grasshoppers have swarmed this autumn; for in all probability there will be a partial famine in that country in 1867.

I do not think that it is at all probable, that these Colorado grasshoppers will ever cross the Mississippi, as the Colorado Potato Bug has done, and pass onward to the Eastern States. In the latter case there were physical obstacles to the eastward spread of the insect, previously to the settlement of the Rocky Mountain Region. But, in the case of the Colorado grasshoppers, there was no such obstacle; and as they not hitherto spread eastward, there is no reason to believe that they will do so hereafter.

B. D. W.

The Striped Cucumber-bug.

On p. 110 of Vol. I, of the PRACTICAL ENTOMOLOGIST, I stated that the Editor of the *Western Rural* had "apparently" confounded the "12-spotted Flower Beetle" with the true "Striped Cucumber-bug." In his issue of Sept. 12, 1866 he shows that he has not, and I have no doubt that he is right. Hence it results that the Striped Bug does really infest German Asters, which I was not previously aware of. As to Dahlias, it is not stated to attack them; and it was to Dahlias that my observations more particularly applied.

B. D. W.

The sign (♂) is used in Natural History as an abbreviation for the word "male;" the sign (♀) for "female." In Astronomy the former sign denotes the Planet Mars, and the latter the Planet Venus. The sign (♀) occurs profusely in old Egyptian monuments in company with other "hieroglyphics," as they are called, or the sacred language of the ancient Egyptians, and has been known for centuries by the name of "crux ansata," or "the cross with a handle to it."

[From the Western Rural, June 23, 1866.]
The Canker Worm.

OFFICE OF STATE BOARD OF AGRICULTURE,
LANSING, MICH., June 11, 1866.

I visited Calhoun county last week, chiefly for the purpose of ascertaining the condition of the canker-worm colony, near Marshall, about which I wrote you a year ago.

The orchards where I saw the worms last year are still infested, and they have also appeared this year on several orchards where they had not been seen before; but where they prevailed in the greatest numbers in 1864 and 1865, they are less numerous this year. The cause of their diminution in their old haunts, is obscure. It is possible that in some instances the ground was over-stocked last year—that is, the foliage was not sufficient to carry to maturity all the worms that fed upon the trees—and that many of the starved larvae died before they reached the perfect state. It may be that the frosts and unusually cold weather which occurred last Spring, soon after the insects hatched, destroyed many of them.

I could not learn that means either of destruction or prevention had been much used. Edwin Wilson, of Marengo, whose orchard has suffered most, dug the earth away from the trees last Fall, after the ground had been somewhat frozen, and put round each tree about a peck of strong wood ashes, which lay there till the trees leaved out, last Spring, when they were spread about. It was supposed that the ashes had killed the insect in the pupa state, to some extent; but it does not appear that the decrease in the number of worms this year, as compared with the last, is any greater in this orchard than in others where no ashes, or anything else, were applied.

Gideon Townsend, of Marshall, whose fine orchard was completely defoliated last year, put round his trees in the Spring of 1865, a good mulch of straw as a manure for the trees. He allowed swine to run in the orchard in the Fall, and they rooted in the straw almost constantly. His poultry, too,—barn-yard fowls and turkeys,—were busy day after day, scratching in the straw and earth about the trees, from which they appeared to obtain food which they liked much. It is probable that the pigs and poultry devoured many canker-worms in the pupa state. The worm, as it drops from the branches to secure for itself a lodgement in the ground, where it may undergo its transformation, generally moves towards the tree, so that the chrysalides are chiefly formed within a comparatively small distance from the trunk.

Effect of the Worm on the Tree.—It is plain that the fate of trees whose foliage is year after year destroyed by this insect, is to be the same here that it has been elsewhere—it is death. People seem to have been slow to believe this. They saw their trees, whose leaves had all been eaten by the canker-worm, put forth a new set; sometimes they had a few unseasonable blossoms which were followed by worthless fruit, and from this show of life and vigor, it was inferred that the trees were not much

injured. But experience dissipates this hope, and proves that the apple tree furnishes no exception to the rule, that plants long deprived of their leaves must die.

Two or three trees in Mr. Wilson's orchard, on which the canker-worm first appeared, are totally dead—the bark cleaving from them in strips. These were first attacked in 1862. I was informed last year that it was in 1863, but this was a mistake. Several other trees, some of the largest and best in the orchard, are nearly dead—will inevitably die this season. In fact, the vitality of all the trees is so weakened, that though on many of them there are not worms enough this year to do much injury to the foliage, they will bear no fruit. Many of the best trees in Mr. Townsend's orchard show that they are fatally injured, and this will soon be the result wherever the insect has established itself, unless preventive measures against its attacks are used, or some unusual causes should greatly diminish its numbers. Its ravages are now obvious in at least six different orchards, and it is spreading year by year. It should not be overlooked, that according to information published by Mr. Lyon, of Plymouth, through your columns, the insect has appeared in other localities in the State.

What should be done?—This important question may be answered by saying:—Adopt the best means of preventing the female insect from ascending the tree. Various contrivances have been invented for this. In my Report for 1865, as Secretary of the Michigan State Board of Agriculture, I have given an article on this insect, with figures of it in various stages, together with descriptions of apparatus for protecting trees. A cut is given (at page 27) of "Merritt's Patent Tree-Protector," made and sold by the American Tree Protector Company, No. 19 Phoenix Buildings, Boston Mass., from whom a pamphlet may be obtained gratis, on application, giving a particular description of the apparatus, and directions for applying it.

I have not yet learned the full results of last year's experience at the East with the different "Protectors," but I intend to obtain as correct information as practicable on this subject, and when it is obtained, I will lay it before your readers.

Next Fall and the early part of Winter, if mild weather should occur after the ground has been frozen, will be the time when the trees should be protected against the female canker-worm in its perfect state. It may be that, as last year, the insect may not be matured at the time mentioned; but the trees should be protected as a safe-guard; and the protection should be continued until the *running season* of the insect in Spring is over. It should, therefore, be kept constantly in mind that the coming fall is the time to begin the defence against this dangerous enemy.

And here it may not be inappropriate, to use a word of caution against the use of alleged remedies, which either do no good, or are worse than useless. Of this character is the putting of sulphur into the trunk of the tree, to *poison* the canker-worm and other insects. A prescription of this kind goes the

The Hessian Fly.

Wheat growers suffer greatly by the ravages of this insect. It can be easily destroyed in the following manner:—About the middle of August sow a strip of wheat adjoining where you intend to put your crop—say one or two acres. About the middle of September sow your field. When that has come up and shows cleverly, plow under deeply the first sown. The fly is headed, and your crop is safe.—*Colman's Rural World.*

REMARKS BY B. D. W.—I suspect that the whole virtue of the above prescription lies in sowing the crop in the middle of September, and that the strip sown in the middle of August does little or no good, except by preventing a man's home-grown Hessian Flies from straying away to trouble his neighbors. It has long been known that wheat, that does not appear above ground till after the Hessian Fly has disappeared, escapes the ravages of that insect. Five years ago I found that the farmers in Southern Illinois were fully aware of this fact, and governed their time for sowing accordingly. Usually the Fly comes out about the first few weeks in September and disappears in a week or so, the time varying a little according to the latitude. But the safest rule is to notice in each neighborhood, at what date the latest sown wheat that is taken by the Fly was sown, and to sow for the future a little later than that particular date.

ANSWERS TO CORRESPONDENTS.

To MICHIGAN CORRESPONDENTS.—A Michigan firm, doing business in the nursery line, sent me their subscription for six copies of Vol. II, of the PRACTICAL ENTOMOLOGIST. This I duly forwarded to Philadelphia, along with other matter, but it failed to reach head-quarters, through the fault of the Post-office. Will the firm please repeat their subscription, as I carelessly omitted to take a note of their names?
B. D. W.

T. M'Graw, Wisc.—The black worms, striped lengthways with many narrow yellowish lines, with two long black horns on their necks, and about an inch long, are the larvae of a large reddish-brown Moth, *Dryocampa senatoria*, and they feed exclusively on the Oak. You say yourself that you took the specimens sent, off an Oak. There is a very similar worm, as to its black color and yellowish lines, but differing in having no black horns on its neck and in the neck itself being usually bright yellow, whence it has been called in English "the yellow-necked worm" by Dr. Fitch. It has the singular habit of generally sitting when at rest with its head and tail each cocked up in the air, which the other one never does. This "yellow-necked worm" feeds indiscriminately either on the Apple-tree or on the Oak, as I have recently proved by shifting a large brood of them, taken off the Oak, on to a diet of apple-leaves, upon which they thrive most admirably. It is also found on several other trees, Thorn, &c., and Dr. Warder says that he found it to infest the Peach. It produces an entirely different moth from that produced by the first worm, and its scientific name is *Datana ministra*. As you may see from the back numbers of the PRACTICAL ENTOMOLOGIST, Dr. Warder of Ohio finds this insect a terrible pest in his orchards; and no doubt it was this species, and not the one which you sent me, which, as you say, "stripped all the leaves off your apple-trees and is now feeding on Burr Oak." Mind now, I do not at all dispute the fact, that "yellow-necked worms" migrated from your Apple-trees on to your Oaks—for I know they can do this by actual experiment. All I say is, that you sent me by mistake specimens which are entirely different from those that really stripped your apple-trees, and which never will and never can feed upon apple-tree leaves. If you doubt this, try the experiment yourself, and you will soon see that the worms with two long black horns on their necks will die before they will eat apple-leaves.

rounds about as often as it is supposed a new set of readers have grown up, who never heard of it. At every period of its appearance it has been followed by proof that it was good for nothing, but it will come round again. It was last started by a correspondent of the *Prairie Farmer*, and was extensively copied.

To know that such things not only do no good, but do positive harm, I would merely refer to the issue of the paper above mentioned of the 9th inst., in which a correspondent states, that when he saw the story of destroying canker-worms with sulphur, he thought it was so plausible that he determined to try it, and accordingly "put twenty-seven pounds of flowered sulphur in and on about one hundred and twenty trees; and the result is, that the foliage of the trees is nearly all eaten up and the fruit nearly all destroyed." Just as might have been expected.

Permit me, in conclusion, to acknowledge the obligations I am under to Allen T. Lacy, Esquire, of Marengo, and Hon. S. S. Lacy, of Marshall, for valuable information and assistance rendered me, in the prosecution of my inquiries respecting the appearance of the canker-worm in the locality above mentioned.
SANFORD HOWARD.

Fire-blight.

Recently we have had accounts from Northern Ohio and other sections, speaking of a blight affecting the ends of all young twigs in pear, apple and quince trees. In some cases not only is this year's growth affected, but more or less of the last year's growth, until the trees look as if a big fire had been made near and scorched them. Can our entomologists tell us if this be not (as we suspect) the attack of the *Scolytus pyri*, and is it not because of the crude sappy condition of the tree?—*Horticulturist*, August, 1866.

REMARKS BY B. D. W.—Unless the writer refers to the curling up of the leaves by the common *Aphis* or Plant-louse, this must be the notorious Fire-blight, which has for years been the scourge of Pear-growers, and in a far less degree of Apple-growers. Whatever be the cause of this Blight, it is most certainly not produced, as Harris and Fitch supposed, by the minute Boring-beetle known as *Scolytus pyri*. For I have searched whole orchards perishing by the Blight in Illinois, and failed to find this insect or the slightest indications of its work. As to Mr. Downing's theory that it is sometimes caused by "Frozen sap," it is pure unmixed hypothesis unsupported by a single fact. Indeed both facts and common sense are opposed to it. In a pear-orchard of fifty trees, five or six trees perhaps are blighted every year, not in any particular corner, but promiscuously. Why should Jack Frost select these particular trees to freeze their sap and let the others alone? Besides, if frost caused Blight, we should have Blight most prevalent in the summer following a severe winter; which is not found to be the case. "What then," it will be asked, "is the cause of Fire-blight?" I can only answer that I do not know. I have, indeed, an opinion on the subject; but believing is not knowing, and faith is not science.

There is a worm very similar to the "yellow-necked worm," which feeds exclusively upon Hickory and Walnut, and differs chiefly in having no yellow neck and in often wanting the yellowish stripes. Respecting this last see the answer to Samuel S. Lacy, Michigan, in No. 11 of the PRACTICAL ENTOMOLOGIST. Unlike the "yellow-necked worm," it cannot feed upon anything but Hickory and Walnut; and if you have Hickories full of them close to your Orchard, you need not be at all afraid that they will attack your Apple-trees. Whereas if you have Oak-bushes full of the "yellow-necked worm" close to your Orchard, and if, as I have often seen them do, they should strip the Oak-bushes clean, they will be just as likely as not to invade your apple-trees in the course of their travels in search of food. "A word to the wise is sufficient." Kill the "yellow-necked worms" wherever you find them, without mercy; but unless you are anxious about your Hickories and Walnuts, you may safely leave the black worms without any yellow necks severely alone.

You send me also some large red Plant-lice which are infesting your Cranberries, and along with them a small oval larva over $\frac{1}{2}$ inch long and with his back covered, as you say, "with a white fuzz," which fuzz, if closely examined, looks like short pieces of cotton thread growing out of his back in regular rows and shorn off evenly like the hairs of a cloth's brush. This larva you suppose to be also doing great damage to your cranberries. You never made a greater mistake in your life. HE IS YOUR FRIEND, INSTEAD OF YOUR ENEMY; for he feeds exclusively on the plant-lice that do the real mischief in your cranberry-patch. To make quite certain of this I put the specimen, along with seven or eight of the Plant-lice, into a vial last night, and by six o'clock this morning he had killed and eaten them every one, leaving nothing but their empty skins. Yet last night when I received them from you—thanks to your care in packing them all in a tight little tin box—they were all alive and kicking and in vigorous health. Hence you must see, that, instead of killing off these "fuzzy white worms," you should cherish them as the very apple of your eye. There are a great many different species of them, varying in the fashion of their "fuzz," but they all belong to the genus *Scymnus* of the great Family of Ladybirds (*Coccinella*) and the Order of Beetles (*Coloptera*). The perfect beetles, produced from these different "fuzzy" larvae, are all of them small, obscure-looking, round, brownish insects, many species with a reddish tail; and are quite unlike those gaily-dressed gentlemen, the true Ladybirds. I have bred a species closely allied to the *Scymnus hemorrhous* of LeConte, in prodigious numbers, from a Cock's-comb-like gall on the leaf of a species of Elm made by a Plant-lice, (*Thalaxius ulmicola* Walsh). The larva of this last lives inside the gall, feeding on the bodies of the poor Plant-lice at his leisure; but I know several other species that live at large on the surface of oak-leaves, feeding no doubt on the various plant-lice that afflict that tree. I cannot tell, without rearing the perfect beetle, to what species your larva belongs, as I never saw one exactly like it before. I notice that you say that you put two of the "fuzzy" larvae in the box. There was but one in the box when I opened it. Hence I infer that one of the two ate up his brother on the road. This is an unamiable propensity to which a great many of these Cannibal insects are addicted. But we must bear with their little failings in this respect, in consideration of the great good that they do us by making war on the Plant-lice.

A. A. Jackson, Wisc.—The green worm as big as a boy's finger and with a horn growing on its tail, that you find on the Tomato vine, is the common "Potato worm," which would be more correctly called "Tomato worm," because for one found on Potato vines there are a hundred found on Tomato vines. It is occasionally found on Tobacco plants also. About this time of the year it goes underground, and changes into a mahogany-brown pupa with an appendage like the handle of a jug growing out of its head, and containing the long proboscis of the future moth, which will appear near summer. (See the Answer to F. W. Noble, Missouri, in No. 11 of the PRACTICAL ENTOMOLOGIST.) The worm is not in the least poisonous, neither is the horn on its tail a sting, as many suppose. I have handled hundreds with my naked hands without their ever attempting to bite, much less sting. You may see from an Article in No. 1 of the PRACTICAL ENTOMOLOGIST (p. 5), that folks in the East are no wiser than folks in the West about this stinging humbug. There are no insects

common with you that you need be afraid to handle, except the different kinds of wasps and bees; and even with these it is only the females that sting, the males having no stings at all, like the drones or males of the Honey-bee.

Rev. Jas. B. Fisher, N. Y.—I sent some of the large larvae, that you found adhering to the head and body of a young swallow, to Baron Osten Sacken, who is the great authority on the Order Diptera in North America, and he has obligingly replied as follows:—"The larvae found on the head of the Swallow probably belong to one of the genera of the great *Musca* family in the vicinity of *Musca* or *Sarcophaga*, and certainly do not belong to the *Cestrus* family. Larvae of the *Musca* family looking like those of the *Cestrus* family, are very common. Brauer, who published a Monograph of the *Cestrus* family in 1863, acknowledges this resemblance of the two classes of larvae, and adds that no thorough distinctive character can be established at present. As to the occurrence of larvae of the *Musca* family on Swallows, Dufour found larvae of *Lucilia dispar* in the nests of that bird. (*Ann. Soc. Entom. France*, 1845, p. 205.) Another instance of these larvae killing birds in nests is to be found in Rossi (*Dipt. Austriaca*, p. 59.) He says that Mr. Schaffer found larvae of *Musca erythrocephala* and *M. azurea* in birds' nests. Young birds, apparently thriving at first, suddenly succumbed to them." In neither of these instances, however, as you will observe, were the larvae found actually adhering to the body of the young bird, as in the case which you have been the means of recording. Hence your observations are especially valuable. It cannot be impressed too strongly upon the minds of those who are not professed entomologists, that by carefully observing and stating facts, and forwarding specimens along with those statements to reliable Entomologists, they advance the interests of Science fully as much, as if they were themselves as well read in Coleoptera as Dr. LeConte, or as learned in Diptera as Baron Osten Sacken.

E. Daggy, Ill.—I forwarded a specimen of the minute two-winged fly, bred from the larva, that attacks so ferociously the bark-lice inhabiting the leaf-galls on the Clinton grape-vine, to Baron Osten Sacken. He has been kind enough to inform me, that "it belongs apparently to the genus *Leucopis* of Meigen, which is known to live on *Coccus* and also on the genera *Aphis* and *Chermes*," which last also appertains to the *Aphis* family, though it has some strong relations with *Coccus*. "To what family," he adds, "Loew would refer this genus *Leucopis*, I do not know; but it is to be placed somewhere in the vicinity of *Chlorops*, *Agromyza*, &c." Loew has split up the great *Musca* family into a large number of smaller families; and *Chlorops* belongs to his *Oscinis* family, which is immediately followed by the *Agromyza* family.

Thos. C. Wright, Ohio.—The "green worm resembling a Tobacco worm" found on Tomato vines is the common "Potato-worm," respecting which see PRACTICAL ENTOMOLOGIST, No. 1, p. 5, and answer to F. W. Noble, Mo., in No. 11, p. 115, and to A. A. Jackson, Wisc., in this present number. Respecting "the white cocoons or eggs" which you found attached in great numbers to it, see answer to M. S. Hill, Ohio, in No. 6 of the PRACTICAL ENTOMOLOGIST, p. 46. The specimens sent me by Mr. Hill were precisely similar to those which you send. If you had closely examined the worm, you would have noticed a little black speck at each spot where a cocoon was attached, which represents the hole through which each *Microgaster* larva emerged from the body of the worm to spin its white silken cocoon. The reason why, after the cocoons were detached from the worm Oct. 3, you found on Oct. 4 a fresh lot adhering to it, is that all the parasitic larvae did not emerge on the same day. The clinging of the worm with such tenacity to the vine, just before its death on Oct. 9, is the rule with ichneumonized larvae, as I long ago observed in a Paper of mine, on the Army-worm and its parasites, published in the *Transactions of the Illinois State Agricultural Society*, Vol. IV, p. 363. You will find a case of the same kind explained in the last paragraph but one of the answer to W. H. S., Ill. in No. 11 of the PRACTICAL ENTOMOLOGIST, p. 112. I do not at all wonder at your being greatly puzzled by such phenomena as these, though to me they are of such daily occurrence, that I have almost ceased to be astonished by them. It is only within the last 100 years that the thing has been satisfactorily explained. The naturalist Swammerdam, for instance, bred in the last century 545 small ichneu-

mon-flies from chrysalises, which in the ordinary course of nature would have changed to butterflies, and records it as a "thing very wonderful" that "the life and motion of the four butterflies seems to have transmigrated into those of the 545 others." Perhaps the puzzle was greater to him, because, on his supposition, one life must apparently have "transmigrated" into 136 $\frac{1}{2}$ lives—thus showing life to be sometimes a fractional quantity.

Chas. H. Peck, N. Y.—The caterpillars sent are the larvae of *Dryocampa senatoria*, respecting which see Answer to Thos. McGraw, Wisc., in this No. of the PRACTICAL ENTOMOLOGIST. The dull brick-red beetle about 1-5 inch long, found in June on buttercups (*Ranunculus acris*) is *Galeruca rufosanguinea* (Say). The rather elongate black beetle about 1-10th inch long, with the sides of the thorax and four stripes on the wing-cases yellow, which you find in July and August on Azalea nudiflora and other plants growing in marshes, is commonly considered to be *Chrysomela trivittata* Say, but I believe it to be an undescribed species. I have a specimen in my Cabinet taken near Chicago. Both these insects belong to the great *Chrysomela* family, which are all leaf-eaters, and many of them injurious to cultivated plants.

Since the above was in type, I have been favored by Dr. LeConte, to whom I forwarded a specimen of your *Chrysomela*, with the following clear, brief, and very valuable synopsis of the group to which it belongs. As I supposed, your species is determined to be undescribed, and must now be known as *P. varipes* LeConte:—

"A. Elytral vitta united with the yellow margin both at base and tip, crossing obliquely from the humerus to the space between the 2nd and 3rd striae.

1. Body robust, blue-black and yellow above, black beneath. Thorax nearly twice as wide as long. Length .18—.22 inch.....*Prasocuris obliquata* n. sp., LeConte.

2. Body more elongate, greenish-black and yellow above, beneath black. Thorax a little wider than long. Length .14—.18 inch.....*Prasocuris varipes* n. sp., LeConte.

Var. a. Tibias pale, tarsi ferruginous, femora black.

Var. b. Tibias, tarsi and femora black.

B. Elytral vitta not united at the base with the margin, straight and parallel, occupying the space between the 2nd and 4th striae.

3. Body very elongate, thorax not wider than its length. Length .20—.24 inch.....*Prasocuris phellandrii* Eur. & N. A.

Var. a. Feet varied with testaceous.

Var. b. Feet black. *Helodes vittata* Oliv. *Helodes trivittata*? Say."

E. E. Sheldon, Mich.—The "flying-bug" about $\frac{1}{2}$ inch long, that you send, and that you suppose may possibly be the Hessian Fly, is a harmless dung-feeding beetle belonging to the genus *Aphodius*, which includes a very large number of species, some of them very closely allied to each other. I cannot determine the species with certainty, as your specimens reached me all broken to pieces, and pressed as flat as a pancake; but I believe it is *Aphodius serual* (Say.) You should have enclosed them either in a quill or in some small paste-board box with cotton-wool or some such matter. The Hessian Fly is as unlike this "flying-bug" as it is possible to conceive, being shaped almost like a common Musketo, only much smaller.

Henry B. Howarth, Wisc.—What you take for the eggs of some insect, found on the ground and also on unbound oats, are not eggs, but the white silken cocoons of a small *Ichneumon* fly, probably belonging to the genus *Microgaster*, though the genus *Pezomachus*, a kind of *Ichneumon* fly that has no wings at all, nor even any rudiments of wings, also makes just such cocoons. All the *Ichneumon* flies are parasitic insects, chiefly preying upon different kinds of caterpillars, and should be carefully encouraged in their good work. See the answer to M. S. Hill, in the PRACTICAL ENTOMOLOGIST, Vol. I, No. 6, p. 46.

Thos. Meehan, Penna.—The bark-louse (*coccus*) found on red oak reached me in very bad order, owing to bad packing. I am acquainted with a very similar species, found on white oak. On the general history of Bark-lice see the answer to L. E. Harmon, in No. 10 of the PRACTICAL ENTOMOLOGIST, p. 100. The brown specimen over $\frac{1}{2}$ inch long, is the pupa-shell of some two-winged fly belonging to the *Syrphus* family. I have bred a species of *Xylota* from somewhat similar pupae found under loose bark, and have often noticed specimens like yours attached to the twigs of different trees, especially birches.

W. H. S., Bloomington, Ill.—In the second batch of the tendrill galls which you send, there are plenty of the larvae of the *Leucopis* fly; so that there is now no doubt that they attack the louse of this gall as well as that of the *vitifolia* gall. I have since discovered tendrill-galls precisely similar to yours on a Clinton vine badly infested by the *vitifolia* gall; so that I begin to doubt now whether both galls may not be produced by the same insect. To determine the point with certainty, it would be necessary to breed the winged insect from each.

I find these same *vitifolia* galls pretty abundant on a large fruit-bearing Delaware grape-vine in the garden of Geo. Mixer, Esq., of Rock Island, Illinois—which vine, by the way, is not shaded by anything. It is not to be found, after a careful examination, on any of the cultivated varieties of the wild Northern Fox-grape (*Vitis labrusca*), such as Isabella, Catawba, Concord, &c., even when they grow intertwining among Clintons infested by this gall. Once or twice, indeed, where Clinton and Catawba vines grew promiscuously intermixed, and the Clinton was swarming with these galls, I have found a few imperfectly developed galls on Catawba leaves, but they were of very small size and widely open above, and seemed to be mere abortive attempts of the insect to establish a gall there. Hence, as the fully developed gall seems to occur solely on the wild Frost-grape (*Vitis cordifolia*), and on the tame Clinton and Delaware grapes, and as the Clinton is known to be a cultivated variety of the Frost Grape, I should infer that the Delaware is so likewise. At present, all that is known about this last is, that it originated in New Jersey, whence it was removed to Delaware, Ohio, and finally disseminated over the whole Union. The Germans, however, claim that the Delaware is identical with an exotic grape—known as "Traminer" in Germany. But it is a very general, though not a universal rule, that each species of gall-making insect is confined to one particular species of the genus of plants inhabited by the genus of insects to which it belongs, including, of course, all the varieties, whether cultivated or otherwise, of that particular species; and I do not know of a single instance where an exotic species of plant has been attacked by a Native American gall-maker. For example, there are twenty-five or thirty different kinds of American galls growing on different American Willows; yet I cannot find any galls at all on the exotic White Willow, even where it grows side by side with gall-bearing American Willows. You remark that you know of "two acres of Clinton grapes, near Bloomington, planted 6 by 4 feet apart, that are about ruined by this *vitifolia* gall." Perhaps, therefore, as the Clinton is otherwise very objectionable on account of its ripening so unevenly, it would be best to give up growing it.

Thos. M. Harvey, Penna.—The robust grass-green worms about $\frac{1}{2}$ inch long, with prickly horns before and behind, and a round brown mark on the middle of their backs, are the larvae of *Empretia stimulea* (Clemens), commonly known as the "saddle-back" from the mark on their backs. They feed not only on grape-vine, where you found them, but on different fruit-trees, the rose, Indian corn, and a variety of other plants. The prickles on the horns operate like a nettle on any part of the body where the skin is not thickened. They belong to a very remarkable family of moths, the larvae of which have no legs, and glide along with a snail-like motion. I have never met with the insect out West and was glad to get your specimens, several of which spun up on the road. It is the same insect referred to in the answer to S. M. P. of New York, in Vol. I of the PRACTICAL ENTOMOLOGIST, p. 34.

J. B. Ellis, N. J.—Six years ago there was a larva answering tolerably well to the description of yours, that almost entirely ruined the corn-crop in Kansas by burrowing into the ears. You will find a wood-cut of it and of the moth produced from it, in the *Prairie Farmer* of Jan. 31, 1861. It was popularly known as the "corn-worm." We have another worm in Illinois which has the same habits, but has never hitherto appeared in such numbers as to attract much attention. It is, however, altogether distinct from the Kansas "corn-worm," and likely enough there are several species that attack corn in this manner. Please send me a dozen or two of specimens, that I may examine into its Natural History. If possible, pack them in a little tin box, along with some of their natural food. You need not leave any air-holes.

Willie C. Fish, Mass.—Your figure No. 1 is a geometer moth, but I cannot name it. No. 2 appears to be *Datana ministra*, but it is difficult to name insects with certainty even from the very best colored figures. No. 3 is undoubtedly *Limacodes scapha*, the larva of which was first described by Harris and the perfect insect by myself. The "bunches" upon oak-twigs are a species of *Lecanium* (bark-louse) apparently undescribed. In the fore part of the autumn you will find underneath the dry body of the female, great numbers of minute eggs. The moth you bred from one of these bunches was undoubtedly, as you infer, an intruder. The tree-hoppers taken on potato-vines, Sept. 10, are the *Entilia sinuata* of Fabricius, rather a rare insect, though the allied *Entilia concava* of Say is very common. The former is readily distinguished by having the ridge on its back scooped out deeply in a complete semicircle, instead of being only slightly scooped out. The small blood-red beetle with four steel-blue spots upon the wing-cases, is *Collops 4-maculatus* (Fabr.). The lady-bird is *Hippodamia glacialis* (Fabr.). The two-winged horse-fly is *Chrysops vittatus* (Weidem.); it is often called the "ear-fly" in the West, from its habit of attacking the ears and head of horses. The small brown beetle taken under pine-bark is the *Hylastes pinifex* of Fitch, as kindly determined for me by Dr. LeConte.

J. H. Garman, Ohio.—The yellow worms over half an inch long with a row of velvety black dots placed crossways on each joint of their bodies, are the larvae of *Procris americana*—an old and well-known enemy of the grape-vine. You say that you "found them August 29 on the leaves of the Isabella grape-vine, which they had almost eaten up, on the underside of the leaf, their heads to the edge, where they continue to eat and back out till the leaf is consumed. They are often side by side and a dozen to the square inch." This agrees exactly with the account given of their habits by Harris. In July I received from Mr. Borden, of Pennsylvania, the larva of another but smaller species of *Procris*, which infested his grape-vines, and in the Answer to that gentleman (PRACTICAL ENTOMOLOGIST No. 11, p. 111), you will find an account of the moths produced from the different larvae of the genus *Procris*.

The elongate jumping yellow insect about $\frac{1}{2}$ inch long is the pupa of some species of the Leaf-hoppers (*Tettigonia* Family), and most probably of *Proconia undata*, which I know to infest the grape-vine and to deposit its eggs in slits cut in the bark of the twigs. I have never known it, however, to occur in such numbers as to be greatly injurious. There are several very much smaller species of Leaf-hoppers, (*Erythroneura vitis* Harris, *E. tricolor* Fitch, *E. vulnerata* Fitch, *E. zizac* Walsh and *E. 8-notata* Walsh), which often swarm on grape-vines and injure them greatly, sucking the sap from the leaves till they turn completely brown. Cases are even on record where they have actually killed grape-vines.

I should not recommend you to go to the expense of buying a microscope for the practical study of insects. A good one costs a great deal of money, and a poor one is good for nothing. You will find what the opticians call "lenses" much more cheap and convenient; and what are known as "Stanhope" and "Coddington" lenses magnify enough for any practical purpose. You can procure any kind of lens you wish for from Messrs. James W. Queen & Co., of Philadelphia, whom I know to be reliable men.

J. B., Iowa.—The two caterpillars you send are the larvae of *Datana ministra*, which seems to be increasing of late years throughout the United States, so as to be getting quite a pest. They differ from all "measuring-worms" in having their full complement of legs—sixteen—instead of having only ten, and in not "looping" or "measuring" as they walk along. Respecting this insect, see the answer to Sam'l. S. Lacy, in No. 11 of Vol. I of the PRACTICAL ENTOMOLOGIST, and to T. McGraw, in this number.

Thos. Wiggins, Ohio.—The dark-brown cylindrical thousand-legged worm $\frac{3}{4}$ inches long, is rather a large specimen of the *Iulus marginatus* of Say. It is not a true insect, but belongs to a Class called "Myriapoda," all of which have a very large number of legs; whereas no true insect has more than six true legs, what are known as "prolegs" in the larvae of moths, &c., being mere fleshy excrescences which disappear in the perfect insect. Your species feeds on decaying wood, in which it forms extensive burrows, and is perfectly harmless.

Wm. G. Morris, N. Y.—The midge about $\frac{1}{2}$ inch long, which you say often appears with you in such dense clouds as to have been on one occasion mistaken for smoke coming from a grain-stack half a mile off, is a *Chironomus*, and I believe, the *stigmaterus* of Say. The larva lives in the water and is quite harmless. In many species of *Chironomus* the larva is very worm-like and blood-colored, when it goes by the popular name of "blood-worm." You say that these midges are known on Long Island as "Merry-wings" and "Fuzz-bills," the latter name of course applying to the beautifully feathered antennae of the males.

J. A. Lapham, Wis.—The rat-tailed grub with the body about $\frac{1}{2}$ inch long, and the tail as long as the body, which, as you say "was found in a trough of maple-sap," is the larva of a two-winged fly belonging to the Order Diptera and the *Syrphus* family, and probably to the genus *Helophilus* or *Eristalis*. There is a larva very similar to yours, which is known in Europe to inhabit cesspools, and produces a large brown fly, that at first sight would be readily mistaken for the drone of the common honey-bee. The use of the long tail is to enable the larva to breathe, while its body is under the surface of the liquid which it inhabits. All these larvae crawl out of the water to assume the pupa state. I have bred rat-tailed larvae much smaller than yours to the perfect fly state; but I never met with one as large as yours. Consequently I cannot say what particular species it belongs to.

Prof. W. S. Robertson, Kansas.—The elongate, pale glaucous-green *Chrysomela* nearly $\frac{1}{2}$ inch long, which you say "is found on the Imphee in very large numbers, its usual home being a large thistle," is the *Phyllobrotica longicornis* of Say. I took three specimens of it many years ago on flowers in Central Illinois. Say credits it to Arkansas. Respecting your grasshoppers, see my Article on that subject in this number of the PRACTICAL ENTOMOLOGIST.

T. J. Finnie, Va.—"The large worm very like a tobacco-worm" that you say is now destroying your tomato-vines is the larva of *Sphinx 5-maculata*, a moth which is very closely allied to that of the Tobacco-worm, *Sphinx Carolina*. Respecting the "jug-handled" pupa of these two insects, see the answer to F. W. Noble, in No. 11 of the PRACTICAL ENTOMOLOGIST, p. 113. The economical manufacture of manures is quite out of our line.

H., Ill.—What you take for a new *Aphis* infesting tame grape-vines is precisely identical with the species I have described as *Aphis vitis* Scopoli. (See *Proc.*, &c., I, p. 299.) You say it has done much damage with you to the terminal shoots of the vines. It appears to be much more common and abundant in the Border States. (See answer to C. S. Jackson, Ky., PRACTICAL ENTOMOLOGIST, No. 10, p. 100.) The small moth you send is, I believe, a *Crasia*, but it is too much rubbed and mutilated to determine even the genus with any degree of certainty. Several species of *Crasia* are described by Dr. Clemens, in the *Proceedings*.

Peter Ferris, N. Y.—I hope you will not forget next year to send me plenty of specimens of the larva that infests your orchards, and which seems to be undescribed, or at all events cannot be recognized from your description.

ERRATA.

In Vol. I, No. 12, p. 118, column 2, line 37, for "single mammal" read "single genus of mammals."

Page 123, column 1, line 37, for "similar" read "singular."

Page 125, column 2, line 22 from bottom, for "1860" read "1840."

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NOVEMBER, 1866.

WHOLE No. 14.

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PHILADELPHIA, NOVEMBER, 1866.

THE NEW POTATO BUG.

The following figures, which are slightly magnified, give a very good idea of the New or Colorado Potato Bug, the left hand figure showing the larva and a bunch of the eggs, the right hand figure the perfect or winged beetle. Of the native home, the



Colors—cream-color and black.

eastward migrations, and the natural history of this insect, I have already treated at great length. The story of its having already made its appearance in Maine was a mistake; but no doubt in 10 or 12 years from now it will be there.

It was the uniform habit of the great Napoleon, after a battle had been fought, to pass personally over the field of battle, ascertain the number of killed and wounded, and then issue his Bulletin, giving in detail the results of the contest.

Exactly 13 months ago, in the first number of the first Volume of the PRACTICAL ENTOMOLOGIST, I showed that this new and very destructive foe to the Potato, had passed from the Rocky Mountain re-

gion into Iowa, and had already crossed the Mississippi into the State of Illinois at at least five different points along a line of 200 miles. From entomological data I predicted also, that it would gradually advance eastward at the probable rate of at least 50 miles a year, till it reached the Atlantic Ocean, and that wherever it was introduced, there it would remain as a permanent colonist.

Having recently attended the Illinois State Fair, and conversed with men from all parts of the State, I am now enabled to state approximately the region of country which has been already occupied and possessed by this little pest. Not to weary the reader with a long list of counties and towns, it will be sufficient to state, that if we draw a straight line connecting Chicago and St. Louis, the country to the North West of this line, or fully one-half of the State, is already occupied and possessed by the gentleman from Colorado, and the country to the South East of it is generally as yet untouched. There are, it is true, as we might naturally expect, some irregularities in the march of this grand army; but on the whole, the above statement gives us a tolerably correct view of its progress. For example, in Putnam County, which lies a little to the Northwest of the line of demarcation, I could hear of no Colorado bugs, although plenty were found in Marshall and Bureau counties, which lie respectively south and north of Putnam; but on the other hand, in Champaign and Coles Counties, which lie considerably to the South-east of the dividing line, and are only separated from Indiana by a single tier of counties, I heard of them from several quarters; and the *Prairie Farmer* has published accounts of their occurring at two distinct points in the latter county, Milton Station and Charleston. (*Prairie Farmer*, June 30, 1866, and June 23, 1866.) I have myself received specimens from Half Day, in Lake County, which occupies the extreme North-east corner of the State and abuts on Lake Michigan; and I heard at the Fair that it had been found at Waukegan, in that county, which lies actually upon the Lake. Mr. C. V. Riley, of Chicago, has also assured me, that he himself found immense numbers of them in a large

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PHILADELPHIA, NOVEMBER, 1866.

THE NEW POTATO BUG.

The following figures, which are slightly magnified, give a very good idea of the New or Colorado Potato Bug, the left hand figure showing the larva and a bunch of the eggs, the right hand figure the perfect or winged beetle. Of the native home, the



Colors—cream-color and black.

eastward migrations, and the natural history of this insect, I have already treated at great length. The story of its having already made its appearance in Maine was a mistake; but no doubt in 10 or 12 years from now it will be there.

It was the uniform habit of the great Napoleon, after a battle had been fought, to pass personally over the field of battle, ascertain the number of killed and wounded, and then issue his Bulletin, giving in detail the results of the contest.

Exactly 13 months ago, in the first number of the first Volume of the PRACTICAL ENTOMOLOGIST, I showed that this new and very destructive foe to the Potato, had passed from the Rocky Mountain re-

gion into Iowa, and had already crossed the Mississippi into the State of Illinois at at least five different points along a line of 200 miles. From entomological data I predicted also, that it would gradually advance eastward at the probable rate of at least 50 miles a year, till it reached the Atlantic Ocean, and that wherever it was introduced, there it would remain as a permanent colonist.

Having recently attended the Illinois State Fair, and conversed with men from all parts of the State, I am now enabled to state approximately the region of country which has been already occupied and possessed by this little pest. Not to weary the reader with a long list of counties and towns, it will be sufficient to state, that if we draw a straight line connecting Chicago and St. Louis, the country to the North West of this line, or fully one-half of the State, is already occupied and possessed by the gentleman from Colorado, and the country to the South East of it is generally as yet untouched. There are, it is true, as we might naturally expect, some irregularities in the march of this grand army; but on the whole, the above statement gives us a tolerably correct view of its progress. For example, in Putnam County, which lies a little to the Northwest of the line of demarcation, I could hear of no Colorado bugs, although plenty were found in Marshall and Bureau counties, which lie respectively south and north of Putnam; but on the other hand, in Champaign and Coles Counties, which lie considerably to the South-east of the dividing line, and are only separated from Indiana by a single tier of counties, I heard of them from several quarters; and the *Prairie Farmer* has published accounts of their occurring at two distinct points in the latter county, Milton Station and Charleston. (*Prairie Farmer*, June 30, 1866, and June 23, 1866.) I have myself received specimens from Half Day, in Lake County, which occupies the extreme North-east corner of the State and abuts on Lake Michigan; and I heard at the Fair that it had been found at Waukegan, in that county, which lies actually upon the Lake. Mr. C. V. Riley, of Chicago, has also assured me, that he himself found immense numbers of them in a large

field of potatoes a little to the south of Chicago; and that even so early as 1865 a few specimens were caught in that vicinity.

Hence, if we assume that it was the column that, as I have shown, crossed the Mississippi at Warsaw in 1864, that marched upon Champaign County, it must have travelled about 150 miles in two years, or at the average rate of 75 miles a year, instead of 50 miles a year, as, to be on the safe side, I had originally calculated. But the probability is, that the insect really crossed the river in 1863 in very small numbers, so as not to be noticed by farmers, a few specimens accidentally lighting upon wagons about to be ferried over into Illinois, and thus effecting their passage without wetting their wings. Some few also might have been blown into the river by a westerly wind, and carried over to the Illinois shore by the same cause. For, like almost all insects, they will come to life again after a very long immersion in water. Still, it must be evident that, to ascertain the rate at which the insect really marches, we ought only to take into the account its first occurrence in noticeable numbers at any given point. On the whole, we might say, in military phrase, that they are marching through Illinois in many separate columns, just as Sherman marched to the sea, but always "refusing the right flank." They do not appear to have as yet invaded Egypt or the extreme south point of Illinois, the southern columns of the Grand Army lagging far behind the northern columns. In Missouri, Mr. Huron Burt says, that they made their appearance in Calloway County, which is about 80 miles west of St. Louis, in 1865; (Colman's *Rural World*, Sept. 15, 1866;) and Mr. Carew Sanders says that he himself observed them for the first time near St. Louis in 1866. (*Ibid.* Sept. 1, 1866.) They are also recorded as having appeared "in great numbers," and so as to be very destructive, in 1866, at Hannibal, Mo., a town which lies on the Mississippi, over 100 miles above St. Louis. (*N. Y. Sem. Tribune*, August 10, 1866.) Hence, we may infer that they must have infested that point in smaller numbers in 1865; for uniformly, wherever this insect has prevailed, the second year's crop of them has been much larger and more generally destructive than the first year's crop. As to the State of Iowa, we may consider it as fully subjugated, possessed and occupied by the enemy; and as that enemy first invaded it in 1861, and has never hitherto, so far as I can find out, given up a single post that he has once occupied, we may reasonably infer that he will pursue the same course in other subjugated States; and that our remotest descendants will continue for all time to suffer from his ravages. Of course, as with all Noxious Insects, the Colorado bug will be worse some years than others, from the complex and varied operation of the various insect foes that prey upon it, and of the other insect foes that prey upon these last, wheel within wheel, check upon check, and countercheck upon countercheck. But that we shall always have the Colorado Bug in smaller or larger numbers among us, I have no more doubt, than that we shall al-

ways have more or less thunder-storms every year in the Valley of the Mississippi. With regard to Wisconsin, it appears to have crossed the Mississippi into Grant County, in the South-west corner of the State, but in what year is not specified; (*Wisconsin Farmer*, July, 1866;) and to have also occurred at various other points, not far from the southern borders of the State, in 1866. (*Ibid.*, July and August, 1866.) As to its occurrence in 1865 in Mosinee, Wisconsin, (which is in Marathon County, towards the middle of the northern borders of the State,) as referred to in my former article, the fact needs further confirmation. Possibly Mr. Priest mistook the old Potato Bug for the new one, and when they disappeared from natural causes, supposed that his turkeys had eaten them all up.

All accounts seem to agree that neither lime, nor ashes, nor any available external application is of the least use in checking the depredations of this insect. The *Prairie Farmer* says that "Mr. Jones found, after many experiments, that neither hot lime, lime-water, brine, tobacco-water, wine (?) nor sulphur had any effect on them; that turpentine, benzine and kerosene would kill them when copiously applied, but also killed the potatoes," and that "coal-oil mixed with water is ineffectual." (*Prairie Farmer*, June 30, 1866.) Although there is some contradictory evidence, yet the general result of all the testimony is, that neither domestic fowls, nor ducks, nor turkeys will eat them, at all events to any very extensive amount. Indeed they appear to be, to a certain extent, poisonous, at least to the human species. For I was informed by a very trustworthy gentleman at the State Fair, that a whole family were taken sick in consequence of using water, in which only three of the insects had been accidentally boiled; and that his own wife, after scalding a pailful of them and inhaling the fumes from their bodies, was prostrated by a severe illness which confined her to her bed for several days. Be this as it may, it is well known to Botanists, that the family of plants upon which this insect exclusively feeds, contains many genera of a more or less poisonous nature (Nightshade, Henbane, Tobacco, &c.), and it was long ago asserted that the water in which potatoes are boiled is unwholesome. Hence, for those who grow potatoes in a small way, we are thrown back upon that most universal and infallible of all remedies against our Insect Foes—hand-picking, whether in the egg, larva or perfect state, and brushing them into pans. But even this remedy, in cases where one's neighbors grow potatoes and allow the insect to increase and multiply without let or impediment, sometimes becomes practically unavailable, or in other words "costs more than it comes to." I know of several cases near Rock Island, Illinois, where the owners of potato-patches, after persevering in a course of hand-picking for fully a month, finally gave up in despair, because as fast as they killed off their own bugs, a fresh supply from their neighbors' potato-patches kept flying in upon them. Indeed, so migratory are these insects in their habits, that I have scarcely taken a single walk in any di-

rection this summer, without seeing one or more of them, either flying across my path, with their beautiful striped wing-cases and rose-colored wings glittering in the sun, or crawling on the ground, or lit upon fences, weeds, &c. It really seems a pity, that like a certain portion of the fairest part of the creation, they should be at one and the same time so beautiful and so mischievous. I may add here that the Peach-blow variety of potatoes is less liked by these little pests than any other, and that so long as there are other kinds to feed on they will not feed on the Peach-blows. Of course I am speaking here of the Bugs and not of the Ladies.

But although hand-picking will probably still continue the only effective remedy, for those who grow potatoes on a small scale, yet, for extensive growers, machinery can be called into play to destroy the Bug. A horse-machine for this purpose has already been invented in Iowa; and even if this particular machine does not prove effectual, there can be no doubt that it may be finally improved, so as to answer completely the purpose for which it is intended; just as the old original Reaping and Mowing Machines have, of late years, been so greatly improved upon, that no farmer now would take one of the old-fashioned Machines at a gift. Having heard of the above Machine at the State Fair, and been referred to Dr. James Weed, of Muscatine, Iowa, for further information, I wrote to that gentleman on the subject; and having seen the operation of the Machine with his own eyes, he has obligingly furnished me with the following account of it. It is, I believe, the first that has hitherto appeared in print:—

The machine was invented by Mr. Benson, of Muscatine, Iowa, and he intends manufacturing it for next season's use. The cost will be about thirty dollars. It consists of a frame-work, which moves astride the row of potatoes, on which is mounted longitudinally a reel somewhat like the one on McCormick's old Reaper, which knocks the bugs off the plants into a box on one side. This box is of course open on the side next the row nearly down to the ground, but is some two feet high on the outside and at the ends. The reel works over the inner edge of the box, and the bugs are whipped off the vines pretty clean; and the most of them are thrown against the higher side of the box, which converges like a hopper over two four-inch longitudinal rollers at the bottom, between which the bugs are passed and crushed. These rollers are some three or four feet long. Those insects which are perched low down on the plants are frequently knocked on to the ground; but I think they would soon crawl up again; and repeating the operation at intervals would very greatly reduce their numbers, and lessen very much the labor of hand-picking, which I think would be advisable in conjunction with the use of the machine, in order to destroy the eggs and diminish the young brood, which is most destructive to the foliage of the plant.

We give Mr. Benson the benefit of the above notice of his Machine gratuitously. Of course, when his terms and prices are finally fixed, he will know enough to advertise what he has got for sale. The world certainly does move. Who would have believed fifty years ago, that in the year 1867 we should be slaying Bugs by Horse-power?

It may be as well to warn the people of Michigan, that the new Potato-bug will probably invade their State sooner than it does Indiana. I know from personal observations—and the Chicago-ento-

mologists are well aware of the same fact—that many insects not usually found in Illinois, but common in Michigan, are washed up on the Lake shore near Chicago in very large numbers by easterly gales, and come to life again in spite of their apparently drowned condition. Hence, as the new Potato-bug is now quite abundant in that part of Illinois, which abuts on the western borders of Lake Michigan, it is reasonable to infer that westerly gales have already carried a few specimens into the State of Michigan; and that it will not be long before these few specimens "increase and multiply and replenish the earth."

Let us now endeavor to calculate the pecuniary damage so far inflicted by this insect upon the country. Upon inquiry I find that the average wholesale price of potatoes, in the infested district, has been in the year 1866 about 70 or 75 cents a bushel, and at Indianapolis, in Indiana, about 45 or 50 cents, being a difference of 25 cents a bushel. Manifestly the difference in price could not be much greater than this; for if potatoes fetched say only 20 or 25 cents in Indianapolis, they would be shipped from that point into North-western Illinois, until the difference in price did not materially exceed the cost of shipment from one point to the other. Hence, it follows that the above difference in price, but for the modern facilities of shipment from one part of the country to the other, might possibly have exceeded 25 cents a bushel; and that this estimate must be rather below than above what it would have been, if we had no great Rail-road system in the West. Now, the season having been about the same, so far as I am aware, in the infested district and in Indiana, and the soil and climate being about the same, the above enhanced price can only have been caused by an artificial scarcity produced by the ravages of this insect. Let us assume that the whole of Kansas and Iowa, one-half of Illinois, a fourth part of Wisconsin, and a tenth part of Missouri, form the infested district for the year 1866. If, from the U. S. Census Report for the year 1860, we take the entire potato crop of Kansas and Iowa (283,968 and 2,700,515 bushels), one-half of that of Illinois (2,899,982 bushels), one-fourth of that of Wisconsin (962,126 bushels), and one-tenth of that of Missouri (199,085 bushels), we shall find the sum total to be 7,045,976 bushels, which represents the total potato crop of the present infested district for A. D. 1860. Suppose that this amount, instead of largely increasing from 1860 to 1866, as in the ordinary state of things it would do, has, in consequence of the ravages of the new Potato Bug, remained nearly stationary. Then it results that in the infested district the consumer has had to pay in 1866, on about seven million bushels of potatoes, an enhanced price of 25 cents a bushel, in consequence of the presence of the new Potato Bug—making a total loss to the consumer of 1 1/2 millions of dollars, in one single year, and in one small corner of the United States; which loss has been inflicted by one single insect, out of the scores or rather hundreds that attack the Farm, the Garden, and the Orchard. Of course, it must

not be imagined that the loss of the consumer is here the gain of the producer. For although the farmers in the infested district get an enhanced price for their potatoes, yet their crop is so much lessened in quantity, that on the average they gain nothing at all, many of them actually losing their entire crop, although individual farmers, whose crop happens to have escaped the scourge, do, of course, gain by the enhanced price.

The whole potato-crop of the United States, if it continues to increase at the same rate as it has hitherto done, will be in the year 1880 about 186 millions of bushels. Suppose it is only 100 millions of bushels in 1880. By the year 1880, at the latest, I have calculated that the new Potato Bug will have reached the Atlantic Ocean and occupied the whole country. Whence it follows that an enhanced price of 25 cents a bushel on the greatly reduced crop of 1880 would foot up *twenty-five millions of dollars*; and that, judging of the future from the past and the present, we may anticipate some such enhanced price, in consequence of the continued migrations of this insect. And yet we are often told by men, who never look two inches beyond the tips of their own noses, that insects are little contemptible vermin, unworthy the notice of any grown man!

B. D. W.

The Canker Worm.

I have already in sundry "answers" to Correspondents expressed my belief, that the reason why tarred bandages were found an insufficient protection against this insect was, that *they were not applied early enough in the season*. All the best authors say, that many of the wingless female moths come out late in the autumn, and even on fine warm days through the winter; and consequently that the tarred bandages, or the leaden troughs full of oil, or the Patent Protectors, or whatever else you use to prevent the female moths from climbing the trees to lay their eggs thereon, must be applied as soon as these female moths begin to come out. The following extract from an Article on the Canker-worm by Col. D. S. Dewey, of Connecticut, shows that he, at all events, made the mistake above referred to. Like some unreasonable patients, he does not take the medicine at the time that the Doctor orders it to be taken, and then blames the poor physician because he is not cured.

Failing as above stated, in my review of the volumes of the Horticulturist, to find printed testimony, recourse was next had to parole evidence. The only knowledge thus attainable was that tar was the remedy. So, tar it was; and, for sixteen successive evenings, (commencing MARCH 17, 1865,) the application was faithfully made, upon some sixty choice apple trees. Many neighbors followed suit; "any quantity" of grubs were caught; but the result uniformly showed a perfect waste of time and money.—*The Horticulturist*, July, 1866.

Col. Dewey will probably say, that it is altogether too much trouble to tar his trees both spring and fall and on warm days through the winter. Perhaps it may be so. Very well. Then let the Canker-worm take his natural course, and see if he does not ruin all your trees in three years. Perhaps the medicine is too nauseous to swallow. Very well.

Then throw it out of the window and see if you will get cured without it. But do not be unfair enough to halve the dose, and then blame the physician because he does not cure you.

But is it too much trouble to tar all the trees in an orchard according to the most approved directions? or, to speak more rationally, will it pay, as a question of dollars and cents? The Colonel can calculate better than I can, what is the money value in Connecticut of an average crop of apples from sixty average trees, less the expense of harvesting and marketing and the rent of the land they grow on. He can also calculate what will be the money cost of tarring sixty trees, say, to be on the safe side, ninety different times. I take it the apples will out-foot the tar at least ten-fold. And if he can only persuade his immediate apple-growing neighbors to follow the same plan, honestly and faithfully, for one or perhaps two seasons, he will—provided there are no forest-trees in his immediate neighborhood afflicted by the Canker-worm—be rid of this pest probably for half a lifetime. For the Canker-worm Moth cannot fly in upon him from the other end of the county, as the moth of the common Caterpillar (*Clisiocampa americana*) would do, if he and his immediate neighbors were honestly and faithfully to destroy every single caterpillar-nest on their trees for one or two years. "Curst cows have short horns;" and the female Canker-worm Moth cannot fly at all.

Another thing. It is demonstrable that the Colonel is in error when he asserts, that applying the tar, even in the perfunctory manner he adopted, was "a perfect waste of time and money." He expressly says that the tar stopped "any quantity of grubs," (meaning, I suppose, the female Canker-worm Moths,) from climbing the trees. Now if there had been no tar on his trees, all these hateful "grubs" would have mounted his trees and laid their eggs there, and instead of measuring his Cankerworms by the bushel, he would have had to measure them by the wagon-load. Even half a dose of quinine will help the ague a little; but that is no reason why, when the physician orders a full dose, the patient should, out of wilfulness, or conceit, or sheer carelessness, take only half a dose, and then grumble because he is not completely cured.

B. D. W.

The Cankerworm Again.

The Secretary of the Michigan State Agricultural Society, finding that "that pest of apple-orchards in Eastern Massachusetts, the Canker-worm, has been colonized in Michigan," writes to the *New England Farmer* for advice as to the best mode of attacking it. In reply, the Editor of the *Farmer* states that "tarring the trees is effective, if it is effectually done," i. e., as is afterwards explained, if the process is continued "from November to April." He thinks, however, that oil and rosin, boiled together in certain proportions which have to be ascertained by "the rule of thumb," answers a better purpose than tar, because it does not dry up so much on hot days, and therefore does not

require to be renewed every day as tar does. On the other hand he says that "he is not aware that any Tree-protector has proved *entirely* effective in preventing the ascent of canker-worms."

But although the Editor of the *Farmer* concedes that tar, properly applied, prevents the female moth, or the "grub" as he calls it, from climbing the tree to lay her eggs thereon, yet he afterwards gives up tar, rosin and oil, and all the Patent Tree Protectors as unavailable, and actually advises the Michigan folks to cut down, burn and destroy all their infested trees from one end of the State to the other, by virtue of a special law to be passed for that purpose, "even if it takes all summer and every militia man in the State to execute the order." And what is the reason assigned for such a course? Simply this:—

Those grubs which do not ascend must and will lay their eggs somewhere—upon the bark of the tree beneath the protector, or upon something else. This spring, eggs thus deposited were hatched in countless numbers; and although the worms were at first scarcely more than a sixteenth of an inch in length, and not so large as a cambric needle, they immediately ascended the tree in swarms; the glass grooves [of the protector] being, of course, no impediment to their march.

Now I must candidly confess that I should not have anticipated this; and it certainly is most surprising that larvæ, which Nature intended to hatch out on the twigs of the tree on which they feed, should, when compelled by man to hatch out on the ground, know enough to seek out the trunk of the tree and then climb it and pass on to the twigs, their normal station. Still I have no reason to doubt the fact. But what then? We have effectually stopped the Mother-moth from laying her eggs on the tree by tarred bandages. Will not the same tarred bandages, if daily renewed through the hatching time, stop her children also from climbing the tree? Most certainly they will, if only proper care be taken to whip the bandages fast to the tree, so that even the minutest larva cannot crawl under them. And if the tar is applied directly to the bark, without any intervening bandage, as appears to be the usual practice in Massachusetts, of course there is no possibility of their surmounting the obstacle.

To head the Cankerworm, therefore, effectually, the trees must be tarred afresh every day from the latter end of October to the middle of May or to about the time that the apple-leaves are completely put forth, omitting to do so on cold days in the dead of winter. Call the whole nett time 150 days, to be on the safe side. A man could certainly tar 100 trees in an hour, which would make 150 hours or fifteen days' work for saving the Apple-crop of 100 trees. Put work as high as you please, and apples as low as you please, and the operation, viewed as a question of dollars and cents, is most certainly a paying one.

Instead of advising the Michigan Legislature to pass a law for cutting down and destroying all trees infested by the Canker-worm, why not advise them to pass a law compelling the owners of infested trees to tar them as above specified? Or—better still, because more certain to be effectual—to pass a law

organizing a paid corps of men in the infested districts to do the work? *There would then be no occasion to call out the militia*. A man might shoulder his rifle, if he saw the Sheriff and his posse coming, axe in hand, to cut down his orchard; but he would only laugh, when he saw them charging double-quick upon his apple-trees, with presented tar-brushes.

B. D. W.

THE GRAPE LEAF GALL-COCCUS. (*Pemphigus vitifoliae* Fitch.)

BY HENRY SHIMER, M. D.

It is more than three years since my wife first called my attention to a few galls on her grape-vines, in the grounds of Mt. Carroll Seminary. Since then I have been a close observer of the Coccus, that inhabits the gall and its enemies. Now, as the insect is making its appearance in other parts of the West, in vineyards, and attracting a good deal of attention, it occurs to me as not improbable that some extracts from my notes might be of value to the public.

The galls when first observed here were few, but have constantly increased up to the present time. Generally early in June a few scattering galls can be seen; but by the last of June and early in July they become very numerous. In August they appear in unnumbered millions, so that the young leaves turn black, die and fall off, from exhaustion of sap, even before the gall is fully formed.

This is the fourth year of their presence here, and the leaves are covered with galls—often 500 to 1000 galls on a single large leaf. They breed with alarming rapidity. Mr. Walsh, in his answer to correspondents in the 11th number of the PRACTICAL ENTOMOLOGIST, makes quite a generous estimate of the breeding capacity of this insect—"50 eggs on a rough calculation." I have many times made a very close estimate by counting; and although sometimes I find as few as he does, yet more frequently I find many more—as for instance July 27, 1865, 500 eggs in a single gall, the parent so full as not to be able to move, and laying continually, the act of ovipositing actually observed. August 15, 1865, upon examining some of the best developed galls, not visited by enemies, I find by counting and close estimation, over 5000 eggs and young ones just hatched, in a single gall with but one parent insect; and as the young are constantly leaving, to say that each parent becomes the mother of 10,000, and in another month grand-mother to 100,000,000, is, if at all incorrect, below the true estimate; and as they produce about five perfect generations in one season, it needs little mathematical knowledge to see that one parent, not affected by enemies and other misfortunes, will, in a single season, become the progenitor of 10,000,000,000 000,000—a number sufficient to encompass the earth 1,250,126,277 (over one and a quarter billion) times; and allowing that we crowd 50 into a square inch, enough to carpet all the land portion of the earth from pole to pole. And all these, un-

not be imagined that the loss of the consumer is here the gain of the producer. For although the farmers in the infested district get an enhanced price for their potatoes, yet their crop is so much lessened in quantity, that on the average they gain nothing at all, many of them actually losing their entire crop, although individual farmers, whose crop happens to have escaped the scourge, do, of course, gain by the enhanced price.

The whole potato-crop of the United States, if it continues to increase at the same rate as it has hitherto done, will be in the year 1880 about 186 millions of bushels. Suppose it is only 100 millions of bushels in 1880. By the year 1880, at the latest, I have reached the Atlantic Ocean and occupied the whole country. Whence it follows that an enhanced price of 25 cents a bushel on the greatly reduced crop of 1880 would foot up *twenty-five millions of dollars*; and that, judging of the future from the past and the present, we may anticipate some such enhanced price, in consequence of the continued migrations of this insect. And yet we are often told by men, who never look two inches beyond the tips of their own noses, that insects are little contemptible vermin, unworthy the notice of any grown man!

B. D. W.

The Canker Worm.

I have already in sundry "answers" to Correspondents expressed my belief, that the reason why tarred bandages were found an insufficient protection against this insect was, that they were not applied early enough in the season. All the best authors say, that many of the wingless female moths come out late in the autumn, and even on fine warm days through the winter; and consequently that the tarred bandages, or the leaden troughs full of oil, or the Patent Protectors, or whatever else you use to prevent the female moths from climbing the trees to lay their eggs thereon, must be applied as soon as these female moths begin to come out. The following extract from an Article on the Canker-worm by Col. D. S. Dewey, of Connecticut, shows that he, at all events, made the mistake above referred to. Like some unreasonable patients, he does not take the medicine at the time that the Doctor orders it to be taken, and then blames the poor physician because he is not cured.

Failing as above stated, in my review of the volumes of the Horticulturist, to find printed testimony, recourse was next had to parole evidence. The only knowledge thus attainable was that tar was the remedy. So, tar it was; and, for sixteen successive evenings, (commencing MARCH 17, 1865,) the application was faithfully made, upon some sixty choice apple trees. Many neighbors followed suit; "any quantity" of grubs were caught; but the result uniformly showed a perfect waste of time and money.—*The Horticulturist*, July, 1866.

Col. Dewey will probably say, that it is altogether too much trouble to tar his trees both spring and fall and on warm days through the winter. Perhaps it may be so. Very well. Then let the Canker-worm take his natural course, and see if he does not ruin all your trees in three years. Perhaps the medicine is too nauseous to swallow. Very well.

Then throw it out of the window and see if you will get cured without it. But do not be unfair enough to halve the dose, and then blame the physician because he does not cure you.

But is it too much trouble to tar all the trees in an orchard according to the most approved directions? or, to speak more rationally, will it pay, as a question of dollars and cents? The Colonel can calculate better than I can, what is the money value in Connecticut of an average crop of apples from sixty average trees, less the expense of harvesting and marketing and the rent of the land they grow on. He can also calculate what will be the money cost of tarring sixty trees, say, to be on the safe side, ninety different times. I take it the apples will out-foot the tar at least ten-fold. And if he can only persuade his immediate apple-growing neighbors to follow the same plan, honestly and faithfully, for one or perhaps two seasons, he will—provided there are no forest-trees in his immediate neighborhood afflicted by the Canker-worm—be rid of this pest probably for half a lifetime. For the Canker-worm Moth cannot fly in upon him from the other end of the county, as the moth of the common Caterpillar (*Clisiocampa americana*) would do, if he and his immediate neighbors were honestly and faithfully to destroy every single caterpillar-nest on their trees for one or two years. "Curst cows have short horns;" and the female Canker-worm Moth cannot fly at all.

Another thing. It is demonstrable that the Colonel is in error when he asserts, that applying the tar, even in the perfunctory manner he adopted, was "a perfect waste of time and money." He expressly says that the tar stopped "any quantity of grubs," (meaning, I suppose, the female Canker-worm Moths,) from climbing the trees. Now if there had been no tar on his trees, all these hateful "grubs" would have mounted his trees and laid their eggs there, and instead of measuring his Cankerworms by the bushel, he would have had to measure them by the wagon-load. Even half a dose of quinine will help the ague a little; but that is no reason why, when the physician orders a full dose, the patient should, out of wilfulness, or conceit, or sheer carelessness, take only half a dose, and then grumble because he is not completely cured.

B. D. W.

The Cankerworm Again.

The Secretary of the Michigan State Agricultural Society, finding that "that pest of apple-orchards in Eastern Massachusetts, the Canker-worm, has been colonized in Michigan," writes to the *New England Farmer* for advice as to the best mode of attacking it. In reply, the Editor of the *Farmer* states that "tarring the trees is effective, if it is effectually done," i. e., as is afterwards explained, if the process is continued "from November to April." He thinks, however, that oil and rosin, boiled together in certain proportions which have to be ascertained by "the rule of thumb," answers a better purpose than tar, because it does not dry up so much on hot days, and therefore does not

require to be renewed every day as tar does. On the other hand he says that "he is not aware that any Tree-protector has proved entirely effective in preventing the ascent of canker-worms."

But although the Editor of the *Farmer* concedes that tar, properly applied, prevents the female moth, or the "grub" as he calls it, from climbing the tree to lay her eggs thereon, yet he afterwards gives up tar, rosin and oil, and all the Patent Tree Protectors as unavailable, and actually advises the Michigan folks to cut down, burn and destroy all their infested trees from one end of the State to the other, by virtue of a special law to be passed for that purpose, "even if it takes all summer and every militia man in the State to execute the order." And what is the reason assigned for such a course? Simply this:—

Those grubs which do not ascend must and will lay their eggs somewhere—upon the bark of the tree beneath the protector, or upon something else. This spring, eggs thus deposited were hatched in countless numbers; and although the worms were at first scarcely more than a sixteenth of an inch in length, and not so large as a cambric needle, they immediately ascended the tree in swarms; the glass grooves [of the protector] being, of course, no impediment to their march.

Now I must candidly confess that I should not have anticipated this; and it certainly is most surprising that larvæ, which Nature intended to hatch out on the twigs of the tree on which they feed, should, when compelled by man to hatch out on the ground, know enough to seek out the trunk of the tree and then climb it and pass on to the twigs, their normal station. Still I have no reason to doubt the fact. But what then? We have effectually stopped the Mother-moth from laying her eggs on the tree by tarred bandages. Will not the same tarred bandages, if daily renewed through the hatching time, stop her children also from climbing the tree? Most certainly they will, if only proper care be taken to whip the bandages fast to the tree, so that even the minutest larva cannot crawl under them. And if the tar is applied directly to the bark, without any intervening bandage, as appears to be the usual practice in Massachusetts, of course there is no possibility of their surmounting the obstacle.

To head the Cankerworm, therefore, effectually, the trees must be tarred afresh every day from the latter end of October to the middle of May or to about the time that the apple-leaves are completely put forth, omitting to do so on cold days in the dead of winter. Call the whole nett time 150 days, to be on the safe side. A man could certainly tar 100 trees in an hour, which would make 150 hours or fifteen days' work for saving the Apple-crop of 100 trees. Put work as high as you please, and apples as low as you please, and the operation, viewed as a question of dollars and cents, is most certainly a paying one.

Instead of advising the Michigan Legislature to pass a law for cutting down and destroying all trees infested by the Canker-worm, why not advise them to pass a law compelling the owners of infested trees to tar them as above specified? Or—better still, because more certain to be effectual—to pass a law

organizing a paid corps of men in the infested districts to do the work? *There would then be no occasion to call out the militia.* A man might shoulder his rifle, if he saw the Sheriff and his posse coming, axe in hand, to cut down his orchard; but he would only laugh, when he saw them charging double-quick upon his apple-trees, with presented tar-brushes.

B. D. W.

THE GRAPE LEAF GALL-COCOON. (*Pemphigus vitifoliae* Fitch.)

BY HENRY SHIMER, M. D.

It is more than three years since my wife first called my attention to a few galls on her grapevines, in the grounds of Mt. Carroll Seminary. Since then I have been a close observer of the Coccus, that inhabits the gall and its enemies. Now, as the insect is making its appearance in other parts of the West, in vineyards, and attracting a good deal of attention, it occurs to me as not improbable that some extracts from my notes might be of value to the public.

The galls when first observed here were few, but have constantly increased up to the present time. Generally early in June a few scattering galls can be seen; but by the last of June and early in July they become very numerous. In August they appear in unnumbered millions, so that the young leaves turn black, die and fall off, from exhaustion of sap, even before the gall is fully formed.

This is the fourth year of their presence here, and the leaves are covered with galls—often 500 to 1000 galls on a single large leaf. They breed with alarming rapidity. Mr. Waish, in his answer to correspondents in the 11th number of the PRACTICAL ENTOMOLOGIST, makes quite a generous estimate of the breeding capacity of this insect—"50 eggs on a rough calculation." I have many times made a very close estimate by counting; and although sometimes I find as few as he does, yet more frequently I find many more—as for instance July 27, 1865, 500 eggs in a single gall, the parent so full as not to be able to move, and laying continually, the act of ovipositing actually observed. August 15, 1865, upon examining some of the best developed galls, not visited by enemies, I find by counting and close estimation, over 5000 eggs and young ones just hatched, in a single gall with but one parent insect; and as the young are constantly leaving, to say that each parent becomes the mother of 10,000, and in another month grand-mother to 100,000,000, is, if at all incorrect, below the true estimate; and as they produce about five perfect generations in one season, it needs little mathematical knowledge to see that one parent, not affected by enemies and other misfortunes, will, in a single season, become the progenitor of 10,000,000,000 000,000—a number sufficient to encompass the earth 1,250,126,277 (over one and a quarter billion) times; and allowing that we crowd 50 into a square inch, enough to carpet all the land portion of the earth from pole to pole. And all these, un-

der the most favorable circumstances, might be produced from one of these insignificant, lice-like, almost microscopic creatures. From such reflections that figures force upon our consideration, (and "figures don't lie,") we can easily learn to appreciate the importance of destroying, if it be but one noxious insect; and much more of preserving and fostering as our own life its insect enemies.

This year, by the middle of July, I saw the second young brood of coccus, by the aid of a glass, so numerous as to literally cover the upper side of the young expanding leaf, while its sides were yet folded together. In these cases they formed no large galls, but the exhausted leaves soon died; and now, many limbs are entirely devoid of leaves for a foot or two near the end, a few young leaves still struggling into existence from the buds near the tip. The young coccus is quite an active traveller for this variety of insect. I saw the young leaves densely populated, on side branches of the vines, when no parent galls were within ten or twelve feet of them. When two or more young coccus happen to locate close together, the two original galls blend into one oblong perfect one. But this can only occur, as I have observed a thousand times, when the coccus are not so numerous as to be closely clustered together on all sides. A single leaf is not often able to form more than about 500 galls. When it much exceeds this, nature yields as before observed, and the insect by its excessive multiplication proves its own destruction in the destruction of the plant.

The tendrils, leaf stalks and tender branches, are not exempt from the attacks of these insects. I have now before me a number of limbs, embracing two or three feet of the end of the vine, all covered with fleshy wart-like galls, usually elongated lengthwise of the limb, others quite similar to those on the leaves, with such differences as situation establishes. On the leaf the gall is formed by the irritated surface receding away from the insect, and an abnormal cell-growth on the opposite side of the leaf; while in the limb the very necessity of the case prompts a modification of this same effort on the part of the vine; the bark thickens around the coccus, and forms a juicy, irregular wart, with the gall usually open on the top, the sides being much thicker than the leaf gall. From a close microscopic examination, I am not able to detect any essential difference in the insects themselves, as found on the leaf, stem, tendrils or limb. The tendril is more pliable than the limb, and here we see, as in the leaf, the same abnormal growth and thickening on the opposite side, whence it curves partly around the insect. The cavities in these galls are not so roomy as in those on the leaf, and we find fewer eggs and young; but the eggs and young, as well as the parents, are in all respects similar to those on the leaf.

Furthermore, from my observations, I am of the opinion, that the few that escape from their enemies on the tendrils and limbs late in the fall pass the winter in the gall, and are ready for operations on the tender leaves in the spring. The limbs, espe-

cially where the leaves have died and fallen off, are almost covered with black, rough scars. This is produced by the insect from some cause failing to develop, the succulent, warty limb-gall either falling off accidentally or being destroyed by its natural enemies. For on the limb, it will be observed, as well as on the leaf, that the presence of the insect is necessary to the continuance of the gall; and as soon as the insect is outside, the gall ceases to grow; and if already fully developed, partly opens as the vine attempts to restore the injured part, and, as a natural consequence, leaves a blackened scar.

Mr. Walsh, in the PRACTICAL ENTOMOLOGIST (Vol. I, p. 112), gives it as his opinion, that the galls on the tendrils are made by a different species of bark-lice.² Those that I have always observed on the tendrils and tender limbs, for two or three years past, appear to agree with his account of his supposed new species. If they do, I am inclined to think that, after studying them three or four years, he will refer them to the same species; for if he constructs a species for those on the tendrils, he must also construct another for those on the limbs. He gives it as his opinion that they will not prove injurious, and may perhaps be beneficial. I sincerely hope he may be correct, but fear that they will prove to be to the grape what the apple bark-louse is to the apple tree—its most deleterious enemy; and if I were buying I would no more think of purchasing grape vines from a nursery with the grape-leaf coccus, than I would apple trees from one having the apple bark-louse. My reasons for this are not without foundation. Since I first knew them, they have held right on through every adversity with a steady increase, and to-day are much worse than I ever saw them before. They endure the most severe winter weather without protection.

The most important question practically is, what are the agents that may be brought to bear against them, to hold them in check?

They resolve themselves into two:

First. Man—he can do something, though the smallest part of the work, by gathering up and burning all his trimmings, in the fall, winter or spring, when this work is done, and by raking up the leaves and burning them. For it is not impossible that some eggs may be in the leaf galls, late in the fall, after the weather becomes too cold for hatching them; (though last fall I made close search on the 1st of October, and found all empty that I examined;³) any thus passing the winter in the dead leaf on the ground would hatch in the spring, and the young insect, in its wanderings in quest of food, might reach the vine stalk and then the young leaf.

Second. Insect Enemies. These are far the most efficient agents; and it is one of the most interesting themes to witness the strife for life upon a grape leaf. I have observed some half dozen or more enemies, some of them very efficient. Mr. Walsh speaks of an orange colored larva from which he bred a small fly. He gives no account of the fly except its size.

I found last summer a whitish larva with a faint yellowish tinge in great abundance; the pupa is brown, with an oblique flattish point at one end.⁴ From this I bred a small gray silver-colored fly, kindly determined by Baron Osten Sacken to belong to the genus *Leucopis*. This is a valuable enemy, and would prove very efficient were it not for a minute species of chalcis fly, that preys upon it while it is eating the eggs of the coccus; thus doubly verifying the law of "eat and be eaten." Last year I bred twenty of them to one fly; this summer the larva of the fly is not so abundant. I also saw a deep yellow, orange-colored larva, from which I bred quite a different and unknown insect. It is comparatively rare here.

A very minute almost microscopic black ichneumon feeds upon the coccus. Rare; I have only one specimen.

A small heteropterous insect, probably undescribed, also preys upon the coccus, and is moderately abundant.⁵ I have seen its small light purple larva in the gall, both last summer and this, as well as on the outside of the leaf, sometimes in colonies. One of them I bred to the perfect state by feeding it one month with the coccus.

By far the most important enemy is a very small species of the *Coccinellidæ* or lady-birds. They are very plenty in both larval and perfect state. I have frequently found the larva in the galls, as well as crawling about over the leaf, visiting the different coccus families, as its necessities demanded. Its abundance and comparative freedom from parasites make it the most important of all the enemies that I have found among the coccus. The bodies of the larva are covered with a cottony secretion looking like white fuzzy bands encircling each segment. They evidently belong to the genus *Scymnus* and correspond with *Scymnus terminatus* (Say), an insect described as inhabiting Louisiana.

The larvæ of "the golden-eyed lace-winged fly" (*Chrysopa*) can usually be found feeding upon them, from which I have bred *C. plorabunda* Fitch, and an undescribed species remarkable for the great length of its antennæ and general paleness. These *Chrysopa* generally are doing a good work, but are considerably restrained by an ichneumon parasite.

NOTES BY BENJ. D. WALSH.

1. Dr. Shimer estimates that he found "over 5000 eggs and young ones just hatched, in a single gall with but one parent insect." Either his galls are larger than mine, or his eggs are smaller than mine, or, which I rather infer, there is some error in his calculation. On carefully measuring the eggs and the largest galls I have been able to find, I calculate that it is impossible to pack more than 700 eggs in any gall, besides the mother-louse. Moreover, I have almost always found more than one mother-louse in the large-sized galls. Probably 200 eggs on an average to every female louse would be not far from the mark.

2. I have observed tendril-galls on the Clinton grape-vine, that I believe to be produced by the same insect as the leaf-galls. The tendril-galls, which I spoke of in the passage referred to by Dr. Shimer, were said by my correspondent to occur on a foreign grape-vine which bore no leaf-galls at all. Whether these are produced by a distinct species of *Coccus* is another and a very different question. I think it not improbable, however, from the

very great similarity of these tendril-galls to those on the Clinton grape-vine, that they are not.

3. On October 1st, I found as many as five of these leaf-galls to contain a mother-louse along with eggs and young larvæ; but this was exclusively on the small terminal leaves. As the larvæ hatch out through the summer, they keep perpetually passing on to younger and younger leaves to establish new galls, so that the old leaves, by the end of the summer, become entirely free from bark-lice, and the old galls gape widely open and partially dry up.

4. The pupa of *Leucopis*, according to European authors and my own observation, has two oblique processes, (not one, as stated by Dr. Shimer,) growing from its tail, as in many Syrphidous pupæ. Dr. Shimer says that "I gave no account of this fly, except its size." I distinctly stated that it was a two-winged fly belonging to the great *Musca* family. (PRACTICAL ENTOMOLOGIST I, p. 112.) See further on this subject in the Answer to E. Daggy, in the PRACTICAL ENTOMOLOGIST II, p. 8, and to W. H. S. on page 9 of the same volume.

5. The "small heteropterous insect," spoken of as preying upon the *Coccus*, is probably a *Thrips* which genus has never been referred by any author to Heteroptera, though Latreille places it among the Homoptera. By Westwood and others the *Thrips* family are considered as forming by themselves a separate Order. I have noticed many of them in and about these galls both in the larva and in the perfect state, and I am now fully satisfied, from repeated observations in regard to a great variety of galls, that *Thrips* is a cannibal insect, and not a vegetable-feeder as all authors had previously supposed. (See *Proceedings*, &c. III, pp. 611-2.) There is no "small heteropterous insect" known to me that is a cannibal, all those belonging to this Order that are really cannibals being of some considerable size.

Since the above paper of Dr. Shimer's was forwarded to the PRACTICAL ENTOMOLOGIST, that gentleman has published in the *Prairie Farmer* (Nov. 3, 1866) an account of the winged male obtained from these *vitifolia* galls. I have been refused permission to inspect one of his specimens, but from the paper itself and from an examination of a specimen made at my request by Mr. Cresson it results that this insect must form a new and somewhat anomalous genus belonging to the *Coccus* family. The tarsus is one-jointed, but it is stated that there are two distinct tarsal claws; and there are four wings, the front pair much the smallest and devoid of veins, the hind pair with a "costal" or rib-vein only, which Dr. Shimer erroneously calls the "discoidal nerve," and which emits, according to that gentleman, "a long longitudinal branch" very obscurely developed. Misled by the unusually full development of the hind wings, and by the presence of two tarsal claws—though by the way, I can myself discover but a single tarsal claw in the wingless female, under an excellent Coddington lens—Dr. Shimer proposes to establish a new Family, intermediate between the *Coccus* and *Aphis* families, to contain his new genus, to which, however, he has as yet assigned no name. But in all known males belonging to the *Coccus* family, the hind wings, as in Diptera, are represented by balancers (halteres), and the more complete development of these balancers into a small pair of hind wings is not sufficient ground for the establishment of a new Family. As well, because in the generally four-winged *Ephemeræ* family, some *Cloe* and all *Cenis* have not even the slightest vestiges of any hind wings, make on that account a new Family out of them. Again, the presence of two tarsal claws, instead of a single tarsal claw, is not sufficient ground for the establishment of a new Family. For in many Families of insects, which no one ever yet dreamed of cutting up on that account into two families, for example, in the *Pselaphus* family among the Beetles, some genera have two equal tarsal claws and some but a single tarsal claw. On the other hand the one-jointed tarsus is a character of much higher value, and coupled with the neurulation of the front wing, which, so far as can be ascertained from a very loose and indefinite and inaccurate description, unaccompanied by any figures, is nearly identical with that of *Coccus*, forms good and sufficient grounds for referring this insect to the *Coccus*, and not to the *Aphis* family.

In his paper in the *Prairie Farmer*, Dr. Shimer errone-

ously quotes me as referring this grape-gall insect to the genus *Coccus*. What I said was merely that it was "a true bark-louse belonging to the *Coccus* family," which is a very different thing from the assertion which he puts into my mouth. He is also altogether wrong in assuming that all bark-lice inhabit the bark; for the *Coccus Hesperidum*? so often found on the Oleander, inhabits the leaves, and yet no entomological purist has yet been found absurd enough to call it, on that account, a "leaf-louse." One might as well insist on it that the common Bed-bug ceases to be a Bed-bug when, as I have known it to do, it quits the beds of christian folks, and infests Hen-houses in enormous numbers.

I had previously been under the impression that no species belonging to the *Coccus* family were known to produce galls upon plants; but Baron Osten Sacken has kindly informed me, that in the Transactions of the Vienna Zoological and Botanical Society there is an account of various galls produced by true Barklice in Australia, "some of which Barklice are an inch long, the males producing galls of different shape from those of the females, and other odd things." Westwood also refers to the enormous size of certain Australian Barklice. (*Introd.* II, p. 450.) We may be thankful that our species are of more moderate dimensions. Fancy all the barklice on a badly-infested Apple-tree suddenly becoming an inch long!

The Striped Bug.

By A. of Quincy, Mass.

In the last [Aug. 1866,] number of the PRACTICAL ENTOMOLOGIST, I saw an article on the striped cucumber-bug, in which the writer recommended as a protection to the vines, a frame of "four short pieces of board, nailed together in the form of a bottomless box and roofed over at the top with musketo-bar." I can tell you something better than that. As soon as the bugs begin to attack the vines, sift or sprinkle plaster of paris over the vines. This will keep the bugs off, as they cannot alight on the plaster. If they do, they cannot rise again, for it sticks them to the spot like glue. I have tried this remedy for 12 years and have never known it to fail. If it rains and washes off the plaster, sift it on again as soon as it is done raining, and keep it on until the vines get so large that the bugs cannot hurt them.

Remarks by B. D. W.—As one of our largest market gardeners at Rock Island uses the above plan, I presume that it does some good. But that it is not so effectual as A. represents it to be, I have seen with my own eyes. For although every hill of vines was dusted with plaster in this gardener's field, I found him in the spring of 1865 commencing on the windward side of the field and driving the Cucumber bugs before him like so many Quails. Of course, if the plaster had been an effectual remedy, he would not have taken all this trouble.

Doctoring Fruit-trees.

The following is from the proceedings of the N. Y. Farmers' Club, as published in the *N. Y. Sem. Tribune*, Oct. 23, 1866:—

Apple Tree Borers.—John Thompson, jr., Rochester, N. Y., proposes to extirpate borers by boring three or four holes with a large gimlet into the sap-wood of the tree, then put into each hole a grain of blue mass, fill up with sulphur, and cork, and finally seal over with wax. The idea is to medicate the sap, so as to make it disagreeable to the insects. He says: "By the use of sulphur I have found a way to check them."

Blight in Pear Trees.—Besides inserting the sulphur, I drove about a dozen cut nails into the body of each tree. I intend to try calomel upon my peach trees."

And why not try jalap too? And rhubarb? And ipecac? But be careful not to give too large a dose of Blue Mass or of Calomel, or you may salivate your trees. Clearly, Mr. Thompson, jr. does not read the *Practical Entomologist*.

Beetles destroying Corn.

[From the *Rural American*, July 15, 1866.]

Mr. MINER.—Knowing that you are interested in anything connected with agricultural pursuits, I take the liberty of sending, for your inspection, a few specimens of small beetles, taken out of three hills of corn. They burrow down in the hill, and attach themselves (head downwards) to the young corn, about two inches below the surface of the ground, and insert their proboscis into the corn plant, and suck the juice until the blade turns blue and dies. I find from one to five of them in each hill. One of my neighbors has lost eight acres of corn (old sheep pasture) by them. If you can suggest anything to stop their ravages, you will confer a favor on several subscribers to the *RURAL AMERICAN*.

Hannibal, N. Y. JAS. M. MANKS.

REMARKS.—The small beetles sent to us are an insect with which we are not acquainted; but perhaps some of our subscribers can throw some light on their depredations and a remedy.—Ed.

If Editors in the above predicament would send us the insects with which they are "not acquainted," we would cheerfully give their names and any other information about them that we could furnish. How can "Subscribers" tell what beetles are spoken of, when all that is said about their size, shape, sculpture or color is that they are "small"? But are they really beetles? If they have a "proboscis" and "suck sap," they must be "Bugs" and not "Beetles." By some unaccountable perversity, people will persist in calling "Beetles" "Bugs," and now it would seem that "Bugs" are dubbed "Beetles." Just so amongst the peasantry of the County of Dorset, in England, toads are called "frogs" and frogs are called "hop-frogs." B. D. W.

ANSWERS TO CORRESPONDENTS.

Isaac Hicks, N. Y.—You say that, according to the description of the larva of the Native American Gooseberry Sawfly, (*Pristiphora grossularia*), given in the PRACTICAL ENTOMOLOGIST, No. 12, you had it on your currant bushes in the nursery last year, but not this year. This is an important fact, as showing the presence of this insect in the East as well as in the West. You remark further that persons living in Otsego and Onondaga Counties, N. Y., told you that their currant-worm was a measurer. Of course, therefore, it must have been the *Abraxas ribearia* of Fitch, spoken of in the PRACTICAL ENTOMOLOGIST, Vol. I, p. 122, and which is now called *Ellopiia ribearia*. It was by an error of the printers that you were stated to have tried the "sulphur cure" on your peach-trees in 1860, instead of 1840. (PRACTICAL ENTOMOLOGIST, I, p. 125). The insects with long antennae, and a few of them having wings "banded with light and black or slate-colored bands," which you saw huddling together in clusters of 50 or 100 on the trunks of large trees, were probably the *Pococenus venosus* of Burmeister, which has that remarkable habit, and sometimes marches in large dense groups up and down the trunks of trees like a regiment of soldiers. This species belongs to the *Pococenus* family in the Order Neuroptera—the same family to which the minute booklice belong, which are often found in books, collections of insects, &c., and feed on dead animal and vegetable substances. It is, however, only about $\frac{1}{2}$ inch long, including in the measurement the closed wings, and you describe your insect as $\frac{1}{2}$ inch long or more. But perhaps on this point you trusted to your general recollection of the insect.

Calvin Ward, Vermont.—You complain of a "small worm, almost $\frac{1}{2}$ inch long, of the size of a common pin in diameter, with no appearance of any legs, the color of the pulp of the apple and with a little black on the top of the head," that bores your apples in all directions. When taken out of the apple and placed upon the window-stool "it moved," you say, "very slowly, either end

first." You further remark that "this insect does more injury to you than all other insects combined," and that "in 1865 it injured your apples to the extent of one-half their value, though it is not the only one that preys on them, but that it has not been so bad in 1866."

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The pretty little moth bred from golden-rod galls is probably *Euryptychia salignana* (Clemens), respecting which see the PRACTICAL ENTOMOLOGIST I, No 3, p. 11 and note; the round golden-rod galls are probably, as you suppose, those of *Trypeta solidaginis* Fitch, and are quite common in Illinois.

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So far as I can tell, without breeding the moth from it, it seems to be the same insect that almost entirely ruined the corn crop in Kansas in 1860; and of which very fair figures in all its states will be found in the *Prairie Farmer* of Jan. 31, 1861. The earlier specimens are said

ously quotes me as referring this grape-gall insect to the genus *Coccus*. What I said was merely that it was "a true bark-louse belonging to the *Coccus* family," which is a very different thing from the assertion which he puts into my mouth. He is also altogether wrong in assuming that all bark-lice inhabit the bark; for the *Coccus Hesperidum*? so often found on the Oleander, inhabits the leaves, and yet no entomological purist has yet been found absurd enough to call it, on that account, a "leaf-louse." One might as well insist on it that the common Bed-bug ceases to be a Bed-bug when, as I have known it to do, it quits the beds of christian folks, and infests Hen-houses in enormous numbers.

I had previously been under the impression that no species belonging to the *Coccus* family were known to produce galls upon plants; but Baron Osten Sacken has kindly informed me, that in the Transactions of the Vienna Zoological and Botanical Society there is an account of various galls produced by true Barklice in Australia, "some of which Barklice are an inch long, the males producing galls of different shape from those of the females, and other odd things." Westwood also refers to the enormous size of certain Australian Barklice. (*Introd.* II, p. 450.) We may be thankful that our species are of more moderate dimensions. Fancy all the barklice on a badly-infested Apple-tree suddenly becoming an inch long!

The Striped Bug.

By A. of Quincy, Mass.

In the last [Aug. 1866,] number of the PRACTICAL ENTOMOLOGIST, I saw an article on the striped cucumber-bug, in which the writer recommended as a protection to the vines, a frame of "four short pieces of board, nailed together in the form of a bottomless box and roofed over at the top with musketo-bar." I can tell you something better than that. As soon as the bugs begin to attack the vines, sift or sprinkle plaster of paris over the vines. This will keep the bugs off, as they cannot alight on the plaster. If they do, they cannot rise again, for it sticks them to the spot like glue. I have tried this remedy for 12 years and have never known it to fail. If it rains and washes off the plaster, sift it on again as soon as it is done raining, and keep it on until the vines get so large that the bugs cannot hurt them.

Remarks by B. D. W.—As one of our largest market gardeners at Rock Island uses the above plan, I presume that it does some good. But that it is not so effectual as A. represents it to be, I have seen with my own eyes. For although every hill of vines was dusted with plaster in this gardener's field, I found him in the spring of 1865 commencing on the windward side of the field and driving the Cucumber bugs before him like so many Quails. Of course, if the plaster had been an effectual remedy, he would not have taken all this trouble.

Doctoring Fruit-trees.

The following is from the proceedings of the N. Y. Farmers' Club, as published in the *N. Y. Sem. Tribune*, Oct. 23, 1866:—

Apple Tree Borers.—JONAS THOMPSON, jr., Rochester, N. Y., proposes to extirpate borers by boring three or four holes with a large gimlet into the sap-wood of the tree, then put into each hole a grain of blue mass, fill up with sulphur, and cork, and finally seal over with wax. The idea is to medicate the sap, so as to make it disagreeable to the insects. He says: "By the use of sulphur I have found a way to check them."

"*Blight in Pear Trees.*—Besides inserting the sulphur, I drove about a dozen cut nails into the body of each tree. I intend to try calomel upon my peach trees."

And why not try jalap too? And rhubarb? And ipecac? But be careful not to give too large a dose of Blue Mass or of Calomel, or you may salivate your trees. Clearly, Mr. Thompson, jr. does not read the *Practical Entomologist*.

Beetles destroying Corn.

[From the *Rural American*, July 15, 1866.]

MR. MINER:—Knowing that you are interested in anything connected with agricultural pursuits, I take the liberty of sending, for your inspection, a few specimens of small beetles, taken out of three hills of corn. They burrow down in the hill, and attach themselves (head downwards) to the young corn, about two inches below the surface of the ground, and insert their proboscis into the corn plant, and suck the juice until the blade turns blue and dies. I find from one to five of them in each hill. One of my neighbors has lost eight acres of corn (old sheep pasture) by them. If you can suggest anything to stop their ravages, you will confer a favor on several subscribers to the *RURAL AMERICAN*.
Hannibal, N. Y. JAS. M. MANKS.

REMARKS.—The small beetles sent to us are an insect with which we are not acquainted; but perhaps some of our subscribers can throw some light on their depredations and a remedy.—Ed.

If Editors in the above predicament would send us the insects with which they are "not acquainted," we would cheerfully give their names and any other information about them that we could furnish. How can "Subscribers" tell what beetles are spoken of, when all that is said about their size, shape, sculpture or color is that they are "small?" But are they really beetles? If they have a "proboscis" and "suck sap," they must be "Bugs" and not "Beetles." By some unaccountable perversity, people will persist in calling "Beetles" "Bugs," and now it would seem that "Bugs" are dubbed "Beetles." Just so amongst the peasantry of the County of Dorset, in England, toads are called "frogs" and frogs are called "hop-frogs." B. D. W.

ANSWERS TO CORRESPONDENTS.

Isaac Hicks, N. Y.—You say that, according to the description of the larva of the Native American Gooseberry Sawfly, (*Pristiphora grossularia*), given in the PRACTICAL ENTOMOLOGIST, No. 12, you had it on your currant bushes in the nursery last year, but not this year. This is an important fact, as showing the presence of this insect in the East as well as in the West. You remark further that persons living in Otsego and Onondaga Counties, N. Y., told you that their currant-worm was a measurer. Of course, therefore, it must have been the *Abraxas? ribesaria* of Fitch, spoken of in the PRACTICAL ENTOMOLOGIST, Vol. I, p. 122, and which is now called *Ellopiia ribesaria*. It was by an error of the printers that you were stated to have tried the "sulphur cure" on your peach-trees in 1860, instead of 1840. (PRACTICAL ENTOMOLOGIST, I, p. 125). The insects with long antennae, and a few of them having wings "banded with light and black or slate-colored bands," which you saw huddling together in clusters of 50 or 100 on the trunks of large trees, were probably the *Pococis venosus* of Burmeister, which has that remarkable habit, and sometimes marches in large dense groups up and down the trunks of trees like a regiment of soldiers. This species belongs to the *Pococis* family in the Order Neuroptera—the same family to which the minute booklice belong, which are often found in books, collections of insects, &c., and feed on dead animal and vegetable substances. It is, however, only about $\frac{1}{2}$ inch long, including in the measurement the closed wings, and you describe your insect as $\frac{1}{2}$ inch long or more. But perhaps on this point you trusted to your general recollection of the insect.

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to leave the ear, go underground to pass into the pupa, and emerge thence in the winged moth-form the same season, in time to lay eggs for the second brood of worms, which, being of course greatly more numerous than the first, is the one that does the principal mischief. The last brood goes underground in the same way and stays there all the winter, ready to propagate the breed next summer. The scientific name of the insect is not given in the *Prairie Farmer*, but it evidently belongs to the *Noctua* family, (Owl-moths,) and the Order Lepidoptera. I extract the following description of the larva, which, being based upon numerous specimens, is more reliable than any I could draw up from a single specimen.

"The worms, when fully grown, are about an inch in length, [the figures give them as 1 1/4 inch long, and that is the length of your specimen,] and vary much in color and markings—some being brown, others green, striped with brown, and of all the intermediate shades. The body is sparingly clothed with short hairs, which rise from numerous black spots or warts, on each segment; and on each side is a yellow or lighter-colored longitudinal stripe. The younger caterpillars are of a reddish color, and similarly striped, and marked with numerous black spots."

The only remedy suggested is to destroy the first crop of worms, so as to put a stop to the propagation of the second brood. The damage done by this insect is not confined to the mere loss of the kernels which it devours, but it is said that "the ends of the ears, when partially devoured and left by this worm, afford a secure retreat for hundreds of small insects, which finish the work of destruction." From your account, the insect seems to have been very numerous with you; for you say that "almost every ear in the field shows a hole through the husk, from which, as you suppose, the vermin has come forth." Yes, you supposed right; these were the holes bored by the larva to make its escape into the earth. I notice that you say that "some of these worms are of a green color and others nearly black." This agrees with the description of them quoted above. It is stated that horses fed upon "wormy" corn in Kansas died very generally of "blind staggers"; hence you had better be careful how you feed it to your horses.

C. F. Wickorham, Penna.—The larva walking about in a moveable cocoon-like case, which you found on the Norway Fir the first week in August, and which in the beginning of October changed to a brown moth about 1/2 inch long, with transparent glassy wings and feathered antennae, are the true *Thyridopteryx ephemeraformis* of Haworth. I referred them myself doubtfully to this species, but for greater certainty forwarded a specimen to Dr. B. Clemens, our best N. A. authority on the Lepidoptera. He kindly informs me that I had named the insect correctly, but that long after Howarth's time it was named by Dr. Packard as *Aceticus coniferarum*, the name of *Thyridopteryx ephemeraformis* being erroneously applied by that writer to a very different species; and further that, after Dr. Packard's paper was published, Mr. Grote gave a third name to this same species—*Hymenopyche thoracicum* [-ica?]. Thus we have three different names for the same insect, but according to the law of priority the first must take precedence of the two subsequent ones.

The species wrongly named *Thyridopteryx ephemeraformis* by Dr. Packard, is distinguishable at once from your insect by the wings not being glassy-transparent. Your insect is said by Mr. Cresson "to be very abundant on the shade-trees in the streets of Philadelphia, being commonly called the bag-worm, and to have been peculiarly destructive to the arbor-vitae in 1866, stripping it completely of its foliage." I have not met with it out West, and was glad to receive your specimens, though not in as good order as is desirable.

It were much to be wished that some of our younger entomologists would be a little more careful in establishing new species, new genera, and even new families upon very insufficient foundations. At the rate at which they are now progressing, we shall soon have as many species as varieties, as many genera as species, and in the end as many families as genera.

C. H. Cushing, Kansas.—I do not believe that any of your "grasshopper" eggs will hatch out this fall. Respecting your other questions, see my Article on Grasshoppers and Locusts, in the *PRACTICAL ENTOMOLOGIST*, Vol. II, No. 1.

S. A. M., Mass.—The symmetrical masses of cocoons found on pear-trees, which you send, are those of some Ichneumon-fly—probably a *Microgaster*. They appear identical with those sent me last spring by Mr. Cook of your State, respecting which see *PRACTICAL ENTOMOLOGIST* I, p. 78. Mr. Cook's specimens were accidentally attached to the mass of eggs laid by the Moth of the common "Caterpillar" of the Apple-tree, (*Clisiocampa americana*.)

NOTE

The following should have been appended as a foot-note to *PRACTICAL ENTOMOLOGIST*, Vol. II, No. 1, p. 2, column 1, line 18, after the word "species," but was accidentally omitted:—

I have a single unusually long-winged ♂ of *Caloptenus femur-rubrum*, in which the front wings are proportioned to the body exactly as in a rather short-winged ♂ *spretus*, namely, as .88 to .80; but I have met with no such case in the other sex. From the greater proportional length of wing, *spretus* seems at first sight to be a larger insect than *femur-rubrum*; but on measuring the length of the bodies of 6 ♀ *spretus* and 7 ♀ *femur-rubrum*, the average of the former was .97 inch and that of the latter .98 inch, the extremes of each being respectively .91—1.08 inch and .92—1.05 inch. Although all the intermediate grades occur, yet on an average of a great number of specimens, *femur-rubrum* has nearly a joint and a half more to its antennae than *spretus*. In *spretus* 9 ♂ antennae averaged 23.66 joints, and 8 ♀ antennae 23.87 joints, the extremes of each being respectively 23—24 and 23—25 joints. In *femur-rubrum* 11 ♂ antennae averaged 24.82 joints, and 11 ♀ antennae 25.54 joints, the extremes of each being respectively 23—27 and 24—27 joints. Consequently in *spretus* 17 ♂ antennae averaged 23.76 joints, and in *femur-rubrum* 22 ♂ antennae averaged 25.18 joints; the differences between the two ♂ averages being 1.42 joints, or nearly a joint and a half, as stated above. A single ♂ *femur-rubrum*, with one antenna 22-jointed and the other 19-jointed, had evidently had them mutilated in the larval or pupal states, and was consequently not included in the above calculation. It is proper to add, that in both species there is some difficulty in counting the antennal joints with even-handed precision, homologous pairs of joints near the base of the flagellum and at its extreme tip being in different specimens sometimes perfectly free, sometimes connate, and sometimes so completely confluent as to form one long joint without the least trace of any suture; but in every specimen of either species that I have examined, the second joint of the flagellum is perfectly free and much shorter than any of the others. Hence closet-naturalists, who examined only a few specimens of each species, might easily be led to suppose, that the proportions of the antennal joints differed in each; which does not appear to be the case, the proportions being in reality variable in either species within certain limits. B. F. W.

THE POSTAGE

on the *PRACTICAL ENTOMOLOGIST* is 12 cents per year, or 3 cents per quarter, payable in advance, at the Post Office of the Subscriber.

INDEX TO VOLUME I.—At the time No. 12, of Vol. I of the *PRACTICAL ENTOMOLOGIST* was printed, it had not been decided whether to close the Volume with that number, or to continue it to the end of the second year; under those circumstances our *Index and Title* were not issued. But having since concluded to commence a new volume with the second year's issue, an *Index and Title* page to Volume I have been printed, and will be furnished to those wishing a copy.

ERRATA in Vol. II, No. 1

Page 9, column 1, line 1, for "chrysalises" read "four chrysalises."
Page 9, column 1, line 12, for "1—5 inch" read "1—5th inch."

ADVERTISING DEPARTMENT.

SPECIAL NOTICES.

Pomona's Home Nurseries.

We call the attention of our readers to the advertisement of J. H. FOSTER, JR., POMONA'S HOME NURSERIES, WEST NEWTON, PA., in this number. Mr. F. offers for sale a splendid stock of Strawberry Plants and Grape Vines, and has always on hand a fine assortment of Small Fruit Plants and General Nursery Stock. Examine his advertisement, and send for a copy of his "Abridged Manual of Grape Culture," which is handsomely illustrated and well worth reading. SENT FREE to all applicants.

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THE
Practical Entomologist.

A MONTHLY BULLETIN,

Published by the Entomological Society of Philadelphia, for the dissemination of valuable knowledge among Agriculturists and Horticulturists.

VOL. II, No. 3.

DECEMBER, 1866.

WHOLE No. 15.

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Edited by BENJ. D. WALSH, Rock Island, Illinois.

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The annexed figure represents the **THREE-LINED LEAF-BEETLE** (*Lema trilineata*) considerably magnified, the hair-line showing its natural length. One character by which this insect may be easily distinguished from the common Cucumber-beetle (*Diabrotica vittata*),* which it otherwise strongly resembles at first sight, is the remarkable pinching in of the sides of the thorax, so as to make quite a lady-like Colors, cream-waist there, or what naturalists call a "constriction." It is also, on the average, a somewhat larger insect, and differs in other less obvious respects.

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*Figured in the PRACTICAL ENTOMOLOGIST, 1, p. 110. fig. 2.

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The annexed figure represents the THREE-LINED LEAF-BEETLE (*Lema trilineata*) considerably magnified, the hair-line showing its natural length. One character by which this insect may be easily distinguished from the common Cucumber-beetle (*Diabrotica vittata*),* which it otherwise strongly resembles at first sight, is the remarkable pinching in of the sides of the thorax, so as to make quite a lady-like Colors, cream-waist there, or what naturalists call a "constriction." It is also, on the average, a somewhat larger insect, and differs in other less obvious respects.

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*Figured in the PRACTICAL ENTOMOLOGIST, I, p. 110. fig. 2.

other very common larva which has the same eccentric habits, and which may be found in great numbers on the Sumac (*Rhus glabra*) in Illinois, and probably in other States also south of New England. This last changes to an oval jumping Leaf-beetle, (*Blepharida rhois*), about $\frac{1}{4}$ inch long and of a yellow color speckled with brick-red, so as strongly to resemble a variety of field-bean commonly grown among corn in the Western States.

There are two broods of this insect every year. The first brood of larvæ may be found on the Potato vines towards the latter end of June, and the second brood in August. They always retire under ground to assume the pupa state, the first brood staying there about a fortnight before they emerge in the perfect beetle state, and the second brood staying there all winter, and only emerging at the beginning of the following June. They then of course, as usual, pair and lay their eggs on the leaves of the potato, which eggs are said to be oblong-oval, of a golden yellow color, and to be glued to the leaves in parcels of six or eight together. The same process is repeated when the second brood of beetles emerges from the ground. Throughout the Eastern States, as may be readily seen from various answers to correspondents in the PRACTICAL ENTOMOLOGIST, this insect is quite common, and sometimes rather troublesome; but nowhere has it ever devastated the potato-vines, as ruinously as the Colorado beetle does, wherever it is once fairly established. Miss Plucke, however, of New York, says that "it destroyed her potato-vines for two years back, and threatened to do the same in 1866." (PRACTICAL ENTOMOLOGIST I, p. 113.) Throughout the Western States, so far as my experience goes, it is quite a rare insect, though at one point in Ohio it appears to be somewhat commoner, according to Mr. Benner. (See PRACTICAL ENTOMOLOGIST I, p. 114.)

The above insect, as will have been noticed, agrees with the Colorado Potato Bug in the larva, as well as the perfect insect, feeding on the leaves of the plant which it inhabits, and also in there being more than one brood of them every year. The three following differ from both the above insects in these two respects; for in these three it is only the perfect beetle that eats the leaves, the larva feeding underground upon roots of different kinds; and moreover there is but one brood of them every year. All three of these are true Blister-beetles, belonging to the same genus as the common Spanish Fly of the shops, and will raise just as good a blister as that does. Hence, wherever they occur in excessive numbers, they might be made to pay for the damage that they do by killing them in hot water, spreading them out to dry for a week or so, and then selling them to the apothecaries, with whom they would command now from \$1.85 to \$1.90 a pound. In this case, however, care should be taken not to inhale the fumes arising from their bodies, which fumes are of a very strong and almost poisonous nature.

The STRIPED BLISTER-BEETLE (*Lytta vittata*), of which a slightly magnified figure is annexed, oc-

curs more abundantly in southern latitudes, but is occasionally seen in North Illinois and in New England. In South Illinois I found it quite abundant in a Potato field, but not so as to completely strip the leaves and even to devour all the smaller stems, as the Colorado beetle usually does, if not interfered with. In some specimens, the broad outer black stripe on the wing-cases is divided lengthways by a slender yellow line, so that instead of two there are three black stripes on each wing-case; and in the same field all the intermediate grades between the two varieties may be met with, thus proving that the four-striped individuals are not distinct species, as was supposed by Fabricius, but only varieties.

The ASH-GRAY BLISTER-BEETLE (*Lytta cinerea*) is the common species met with in the Northern States, and scarcely differs at first sight from the above, except in being rather smaller and of a uniform ash-gray color. It attacks not only potato-vines, but also honey-locusts, and especially the English or Windsor bean. This bean I tried in vain for several successive years to raise in my garden, but was regularly foiled and beaten out by the ash-gray gentlemen, though I kept a girl at work picking them off the vines, till her fingers were completely sore and blistered up with crushing them. In one particular year, in conjunction with about equal numbers of the common rose-bug, (*Macrodactylus subspinosus*), they invaded my apple-trees in great swarms, not only eating the foliage but gnawing into the young apples. But I have never known them do this before or since.

The BLACK BLISTER-BEETLE (*Lytta atrata*) is about the same size and shape as the above, but appears later in the season, (late in August instead of late in June), and is by no means so generally noxious. Harris reports having found it himself on potato-vines; and I have heard of it in Iowa from a correspondent, as very abundant on that plant; and Mr. Hill found it in 1866 "in countless numbers" on the potato in the State of Ohio, in company with the Striped Blister-beetle; (see P. E. I, p. 107;) but about the only plant on which I have myself noticed it is the Golden-rod (*Solidago*), on the flowers of which it appears in considerable numbers regularly every September.

The MARGINED BLISTER-BEETLE (*Lytta marginata*) only differs from the Black species in the wing-cases having an elegant, narrow, ash-gray edging all around. Mr. Barber, of Wisconsin, found this species on his potato-vines, but not in very large numbers; (See PRACTICAL ENTOMOLOGIST I, p. 113;) but it more usually feeds on certain wild plants.

Almost the only known remedy for all the above insects, when they occur in injurious numbers on potatoes, is hand-picking or brushing them off the vines into shallow pans. As I have already once suggested, a pan with a lid to it like that of a common spittoon, would, I think, be found very convenient for this purpose: as the insects might then



Colors—yellow and black.

be shaken through the central hole into the hollow space below, whence it would be very difficult or almost impossible for them to make their way up again. According to Mr. M. S. Hill of Ohio, the farmers in that State got rid of the Blister-beetle in their potato fields in 1866, by burning small quantities of straw between the rows. (See PRACTICAL ENTOMOLOGIST, Vol. I, p. 107.) As the newspapers often say, "this requires confirmation," before we finally accept it as an available remedy.

B. D. W.

KLIPPART'S WHEAT PLANT.

This is a book of 700 pages, on a subject of great practical importance, published in 1860, at Cincinnati, Ohio. Its author has, for many years, filled the responsible position of Corresponding Secretary of the Ohio State Board of Agriculture, is a member of several Learned Societies in the West, and is popularly believed, in the Valley of the Mississippi, to be one of the most distinguished men of science in that region.

On the merits of the great bulk of the book, I shall say nothing, because having read but a small part of it, I know nothing whatever about the remainder. But as to the Chapter on "Animal parasites affecting the wheat," which occupies 45 pages printed in much smaller type than the rest of the work, (pp. 592—638,) I am enabled to pronounce a very decided opinion, because I have read that much of the book very carefully. If, after hearing the evidence, the reader, in common with myself, should be inclined to pronounce an unfavorable verdict upon the merits of this Chapter, Mr. Klippart has no one to blame but himself. I fully acquit him of intentional misrepresentation. His sins are those of careless hastiness and gross ignorance, not of wilful misstatement or intentional suppression of the truth. But surely this is not a sufficient excuse for a writer. If a thing is worth doing at all, it is worth doing well. Before a man undertakes to teach arithmetic, he should at least know the multiplication table. Before he professes to lecture on geometry, he should find out the difference between a circle and a square. And in the same way, before a writer publishes a treatise on noxious insects, he is bound in scientific honor to make himself acquainted with at least the rudimentary elements of the science of Entomology.

If we accept Mr. Klippart at his own valuation, he claims to be an entomologist of very distinguished attainments. One of the most difficult problems in entomology is, to decide to what perfect insect a particular larva belongs, when the perfect insect has never yet been actually bred from that larva. Yet on p. 593 he says of such a larva, with all the self-sufficient authority of a master of the science, "We consider it to be the offspring of *Agriotes sputator* and *Agriotes lineatus*." How the same larva happens to be produced by two entirely distinct beetles, he does not explain. Not to weary the reader with cases of this kind, in a note to page 603 he disputes, on the most frivolous grounds, the opinion of Dr. Fitch, in a matter where, as we might natural-

ly expect, Dr. Fitch is in the right, and the Ohio gentleman is in the wrong. Indeed, I have no hesitation in saying, that the little finger of Dr. Fitch would cut up into a hundred such so-called entomologists as this Mr. Klippart, and as in the miracle of the loaves and fishes, leave full as much stuff behind, to be gathered up in baskets at the end of the operation, as was found to be present at the outset.

"But," it will be said, "these are mere unmeaning generalities." Very well, then. Let us, at the risk of being tedious, look carefully into the hard dry facts of the case.

Mr. Klippart professes to give a history of the various Noxious Insects that infest the Wheat-plant in this country, and of the different parasitic and cannibal insects that prey upon them. I have carefully catalogued the species named by him as coming under these categories, and they are 54 in number; and of most of these he gives brief descriptions and figures. Will it be believed now, that out of this total of 54 professedly American insects, there are only 12 that are really found in America, the remaining 42 being exclusively European? Yet such is the fact. Nay, further. Out of the 12 insects really found in America, there are only 3 that are exclusively American, the other 9 species being imported insects, which have been introduced into America from Europe or the reverse, and the history of which he has copied almost verbatim from European Authors.

When I was a school-boy, my school-master, being a very severe disciplinarian, was in the habit of frequently inflicting punishment upon a very large number of us at once. Out of a class of perhaps 25 boys he would often punish, at one fell swoop, 22 or 23. To save time and trouble, therefore, he used to enumerate only those few that escaped castigation, and say nothing at all of those whom he intended to receive it. For example, he would say "All the boys except Brown and Smith will learn by heart the first Chapter of Matthew, and recite it without missing a word tomorrow morning." Upon the same principle, and in order to save printing a tedious list of names which would soon exhaust the reader's patience, instead of cataloguing the 42 European insects that Mr. Klippart wrongly assumes to be found in the United States, I shall content myself with enumerating only the 12 which he correctly states to be found there; and thus the 12 innocent ones being named, it will be easy to see who are the 42 guilty culprits. The 12 veritable U. S. species are the following:—1st., *Aphis granaria*, the Grain Plantlouse, usually now called *Aphis aeneæ*. 2nd., *Cecidomyia (diplosis) tritici*, the Wheat midge. 3rd., *Cecidomyia destructor*, the Hessian Fly. 4th., *Calandra (sitophilus) oryzae*, the Rice Weevil. 5th., *Trogosita mauritanica*, the Cadelle, common in granaries in Europe, and quoted in the Melsheimer Catalogue as occurring in this country also. 6th., *Tenebrio molitor*, the European Meal-worm beetle. 7th., *Tenebrio obscurus*, the N. A. Meal-worm beetle, introduced into England from the United States. 8th., *Tinea granella*, the Grain-

moth. (The above are all found on both sides the Atlantic. The remaining three are exclusively confined to America.) 10th. *Glyphe [ceraphron] destructor*, one of the parasites of the Hessian Fly. 11th. *Micropus leucopterus*, the Chinch-bug. 12th. *Gortyna zœæ*, the Spindle-worm of Indian corn.

The real truth of the matter is, that Mr. Klippart wrote this long chapter of his upon the N. A. Insects of the Wheat-plant, not with his pen, but with his scissors. Jumping erroneously to the conclusion, that, whatever insects infested small grain in Europe, must necessarily also infest it in this country, he took several European treatises upon Noxious Insects, written by Curtis and others, clipped out a piece here and a piece there and another piece in a third place, and pasted the hodge-podge into a blank-book, which he is facetiously pleased to print as his own original work, for the edification of the farmers of the United States, with scarcely a word of acknowledgement to the distinguished authors whom he has thus plundered. But he has not even the merit of being an adept in his own miserable trade of scientific piracy. His materials are put together in so bungling a way, that the cloven-foot sticks out everywhere. For instance, in America by the word "corn" we always understand Indian corn or Maize; and wheat, rye, barley and oats are called "small grain" or simply "grain." In England these last are always called "corn," maize being scarcely grown there at all, except as a curiosity. Now, in no less than four distinct passages, (pp. 595, 598, 599 and 616,) Mr. Klippart, clipping with his scissors from European writers, forgot to change their European phrase "corn" into our American phrase "grain," and speaks of wheat, barley and oats as "corn"!! Again, although there are no birds in the United States popularly known as "lapwings," this great Ohio naturalist, copying from Authors writing in England, where such birds are very common, makes "lapwings" eat wire-worms in this country twice over, namely, on pages 599 and 630!! Thirdly, speaking of a strictly European Beetle (*Anisoplia horticola*), which he says is "very abundant in this country," (!) he asserts that "it often covers the White-thorn hedges." Now "white-thorn hedges" are the commonest of all live fences in England, where the original author of the above remark resided; but there are probably not fifty such hedges in the whole United States, where the Great Ohio Clipper himself resides. Finally, instead of adopting some kind of system or classification in his compilations, as every author with any real claims to scientific distinction would be sure to do, items on one and the same subject are scattered about everywhere at haphazard, in this precious chapter; just as a newspaper editor, when he is hurried for time, clips items with his scissors from a hundred different exchanges, and slaps them into his paper anyhow and everyhow, higgledy-piggledy; hit or miss. For example, we find no less than eight different species of Click-beetles, (*Elatér* family)—all of them, by the way, exclusively European species—named, described, and some of

them figured as North American species.* Four of the eight are treated of on pages 592 and 593, three on pages 596 and 597, and the remaining one on page 622, the intervening pages being occupied with disquisitions on all kinds of other insects. As if this was not already sufficiently distressing, we find 17 lines of Mr. Klippart's clippings, on the subject of Click-beetles and their larvæ the Wire-worms, interpolated without rhyme or reason on pages 598—9, between his description of a Saw-fly (*Cephus pygmaeus*), which infests wheat in Europe exclusively, and his speculations on the Wheat-midge, which has really been imported among us from Europe. So far, what we get upon this subject is simply stolen from European authors and marred in the stealing. But we have not yet done with the Click-beetles. On page 629, or seven pages later in the chapter, we are favored with two more figures of Click-beetles, which, however, Mr. Klippart cautiously abstains from naming, seeing that they are his own discovery in Ohio and not filched from his European friends. Let any good Entomologist look at these two figures, and he will say at once that they not only belong to two distinct species, but probably to two distinct genera. And yet, in the face of the notorious general rule that in this Family of Click-beetles the males and females are externally undistinguishable, this great Western Savant boldly pronounces that these two very distinct beetles are the sexes of one and the same species!! Again, the European Ichneumon-fly, *Pachymerus calcitrator* (misspelt twice over *Pachymesus calistrator*!) is treated of, both on page 598 and page 624. The imported Cadelle, *Trogosita mauritanica*, both on page 619 and page 628. The European parasitic fly, *Proctotrupes viator*, both on page 624 and page 631. The European parasitic fly, *Pteromalus micans*, both on page 618 and page 625. And, to crown the whole, not only is the European Ichneumon-fly, *Aphidius avenæ*, treated of both on page 595 and page 636, but the wood-cut representing it is repeated in both places!! If this is not mean business meanly done, I do not know what is. If a man must plagiarize, let him do it with some artistic skill. It degrades the miserable dignity of thieftom, to steal in this clumsy, awkward, unprofessional manner.

If any man requires further proof that Mr. Klippart knows no more of entomology, than a newly-born baby does of the multiplication table, I will give one or two more instances of his scientific proficiency, and then retire from this disagreeable subject. On page 596 he speaks of the Plant-louse of the hop, (*Aphis humuli*), as the Hop-beetle (!), although he has his own figure staring him in the face to show that it is a true Plant-louse. Again, on page 595 he figures a female Grain Plant-louse, (*Aphis avenæ*), which his own figure represents with

* *Agrypnus murinus*, *Agriotes lineatus*, *Agriotes obscurus*, *Agriotes sputator*, *Athous longicollis*, *Athous ruficaudis*, *Ath. niger*, and *Elatér (lepidotus) holosericeus*. The only two species of the *Elatér* family, that are known to occur on both sides of the Atlantic, so far as I am aware, are *Elatér nigrinus* and *Corymbites confuens*, which, according to L. Conte, are found both in Europe and Russian America.

a distinct ovipositor or egg-laying instrument, and names and describes it as a male, (!) although no other author has yet succeeded in discovering the male of this particular species. Thirdly, after correctly naming the common Chinch-bug on page 619 as *Micropus leucopterus*, he gravely informs us on page 621, that it belongs to the genus *Rhyparochromus*, which it most certainly does not. At any rate it ought not, for the sake of consistency, to belong to two very distinct genera in three consecutive pages. Lastly—and this is the only original matter of any value in the whole chapter of 45 pages—on pages 636 and 637 he figures and describes some remarkable eggs found attached to an ear of wheat, in which eggs he discovered, as he says, the body of a parasitic Fly, and what he supposed to be the antennæ of a Wheat-midge; whence he arrives at the astounding conclusion, that the egg had contained "the larva of a Wheat-midge, partially transformed into a parasitic Fly."!! Whereas the very figure of the antenna which he himself gives, is as different from that of a Wheat-midge as a cow's horn is from a buck's horn, and is manifestly the true antenna of his parasitic fly; and Dr. Fitch subsequently proved that the eggs themselves had nothing whatever to do with the Wheat-midge, but were those of a common Cannibal Bug—*Nabis fera*—which preys upon Grain Plant-lice and doubtless on other insects also, and the eggs of which, as with so many other insects, are infested by a Parasitic Fly.* (*N. Y. Rep.* III, pp. 78, 112.)

But for the fact that this book about the Wheat-plant has had a very extensive circulation among Western Farmers, and has been commonly given as a prize at State Fairs by various State Agricultural Societies in the West, thereby to a certain extent endorsing it as scientifically and practically reliable; and but for the further fact that many young entomologists have, to my personal knowledge, been greatly puzzled and bewildered by its absurd misstatements, and that every plain farmer must, of course, be ten times worse puzzled, by having no less than forty-two European insects palmed off upon him, as natives of the United States, by this most mendacious work, I should not have thought it deserving of any notice in the PRACTICAL ENTOMOLOGIST. As it is, I expect that I have expended more time in refuting the book, than Mr. Klippart expended in compiling it. But the scissors can always beat the pen; and any child can utter more falsehoods in five minutes than a grown man can disprove in a whole day.

I am well aware that what I have said above will not be personally agreeable to Mr. Klippart and to Mr. Klippart's friends. But I long ago declared open war against all scientific charlatanism, and with me it is now "War to the knife and the knife to the hilt." It is about time that men, who know nothing whatever themselves about Entomology, should quit teaching Entomology to the million.

* The accuracy of the author of the "Wheat Plant" may be judged of from the fact, that the highly-magnified tarsus of this Parasitic Fly is figured by him as seven-jointed; although no known insect has more than five joints to its "tarsus" or foot. (Page 636, fig. 8.)

Something more I had to say of this sorry pretender to entomological knowledge; but let him go. I have already pilloried him on a bad eminence, from which he will not easily slink down again into his merited obscurity. So may it ever be with those, who defile the holy shrine of Science by offering impure gifts upon her altars! B. D. W.

Trimble's Insect Enemies of Fruit and Fruit-trees.
(New York, 1865.—One thin quarto, pp. 139.)

The author of this work, is Entomologist of the State Agricultural Society of New Jersey. The work itself treats exclusively of the two worst enemies of the Fruit-grower—the Curculio (*Conotrachelus nenuphar*), a Native American insect, and the Apple-worm Moth or Codling Moth (*Carpocapsa pomonella*), an imported insect. But, if encouraged as it ought to be, it is intended to be followed in succeeding volumes by similar treatises on other insects that infest Fruit and Fruit-trees.

With singular modesty Dr. Trimble speaks of himself as follows, (p. 88:)

I am not an entomologist and never expect to be. If I knew all about the insects, I would be willing to accept the title. The fact is, I do not believe I know all about any one insect.

There is not an entomologist living, but, if he were honest, would make the same avowal. What little any one man knows in Entomology, or in any other department of Natural History, is but a drop in the bucket when compared with the vast illimitable unknown; and even the best of us—in the words of Sir Isaac Newton—are but as boys picking up a few shells on the shore of the great Ocean of Truth. But if Dr. Trimble is not a professed Entomologist in the ordinary sense of the term—i. e. a man who can give the scientific names of thousands of different insects, and troubles himself but little about their preparatory states, their mode of life, their food, their migrations, their loves and wars and sports, their habitations, and so forth—he is what practical fruit-growers will, I am sure, consider as something far more valuable. For he has devoted himself, heart and soul, for a long series of years, to studying the Natural History of the particular Insects which he has chosen for his subject, and the best and most efficient and most practical means of counterworking them.

Dr. Johnson used always to maintain, that the real Discoverer of a new Fact was, not the man that first hit upon it, but he who, having hit upon it, proclaimed it so long and so loudly to the world as to compel the world to listen to him. There is nothing absolutely original in Dr. Trimble's modes of fighting the Curculio and the Apple-worm, but, upon Dr. Johnson's principles, he is certainly entitled to the merit of having discovered these particular modes. For he not only shows at great length, by a long series of experiments, that these modes are practically reliable and infallible, but he exposes by incontrovertible facts the utter absurdity of a great number of quick nostrums, which have been recommended for the same purpose.

For full and complete details on this subject, every extensive Fruit-grower is earnestly advised

to go to the work itself. In the meantime it may be briefly stated here, that in the case both of the Curculio and the Apple-moth, it is recommended to destroy as quickly as possible all the infested fruit that falls from the tree; that, in the case of the Curculio, jarring (not shaking) the infested tree upon white sheets, and killing all the "little Turks" that fall thereon, is the approved remedy, and in the case of the Apple-worm, wrapping hay-bands round the trunk of the infested tree, and destroying from time to time the insects contained in the cocoons formed on and in the bark beneath those hay-bands.

On the subject of these same hay-bands, I cannot resist the temptation of quoting a short passage, illustrative of the vein of quaint, dry humor which crops out every now and then in the course of the work.

But some people will say: "It will take a great deal of hay to go over a large orchard in this way, and hay is very dear now."—I have had a long fight with the insect enemies. There has been a good deal of wear and tear of patience. Job was a patient man—he bore all those boils with commendable resignation. Abraham Lincoln has been a patient man. To have borne all he has from the rebels on one side, and all their friends on the other, without once saying "by the Eternal," is a manifestation of gentleness almost superhuman. I am patient myself. A man who has fought the Curculio for so many years, must be patient. But when I meet a man who counts the cost of a yard of hay-ropes, when he sees the ground covered with worthless fruit under each of those trees which he has worked at so long and so faithfully, and with no apples, no pears, and no fruit of any kind—why, then I lose my patience, and say—no, I won't say what I would say. (p. 127.)

There is but one drawback to this work. In one particular department the Artist has not done justice to the Author. Nothing can exceed the life-like beauty of Mr. Hochstein's plums and nectarines and apricots—they almost seem to melt in our mouths. In delineating the evil works of insects upon our choicest fruits, he is also great. But when he attempts to picture the insects themselves, he is nowhere. For example, the Apple-worm Moth (Plate IX, figs. 7 and 8) is quite unlike the genuine insect, both in coloring, and in the pattern drawn so deftly on its wings by nature. And as to the highly magnified colored drawings of the Curculio, (Plate VI, figs. 6 and 7,) they are like nothing in the heavens above, or in the earth beneath, or in the waters under the earth. B. D. W.

INSECTS IN THE ORCHARD.

BY DR. J. S. HOUGHTON, PHILADELPHIA.

My observations upon Insects have been chiefly directed towards the destruction of them. I have studied them, scientifically, only so far as to learn how to prevent their ravages in the orchard and garden. I have a few facts and suggestions which I should like to see discussed in the PRACTICAL ENTOMOLOGIST:—

1st. *The Curculio*.—It has been asserted by one of our leading fruit-growers, that the Curculio breeds in the Cherry. Is this so? We know very well that the Curculio stings the cherry, and probably deposits its eggs in that fruit; but does the

cherry exist long enough to perfect the larvæ of the Curculio? If the cherry does breed the Curculio, the sooner we get rid of our Cherry-trees the better; for no other fruit can produce so many of these destructive insects.

2nd. *The Bark-louse on Pear-trees*.—My orchard has been severely afflicted with the Bark-louse, *Coccus*, or *Scale* insect. I am too thorough and careful in my cultivation, to give up to this enemy, but it has cost me much labor to keep these insects within reasonable bounds.

Last fall (1865), I had all the trees carefully painted with strong Soda wash. In the spring, and during the summer, not a living louse or scale could be found on thousands of trees. Even on the parts not painted, the Scale seemed to be all dead. Up to September 15th, I flattered myself that there was not a living insect of this description in my orchard, which covers a number of acres. I thought the winter of 1865—6 had been so cold it had killed them all. I had not before noticed any period in the year, when the Bark-louse, if on the trees, could not be found alive. But, lo! on the 20th of September, there were millions upon millions of bark-lice on my Pear-trees!

How and why was this? We had been at work upon and among the trees, all summer, and had constantly watched for bark-lice—four persons had thus watched. But there was no sign of a living insect, up to the 15th of September, and within five days afterwards, the trunks of thousands of Pear-trees were literally covered with "a multitude that no man could number."

The questions I would like to ask are as follows:

Does the female *Coccus* pass any portion of her life in or upon the soil?

Why does the Scale first appear upon the trunks of the trees, instead of the branches?

Is it probable, in the instance of the orchard above described, that the *Coccus* or *Scale*-eggs were deposited at the usual time, in June or July, and did not attract attention, until the insect had reached a certain size?

3rd. *The Cantharides*.—I have found, within a year or two, a great increase in ravenous *Cantharis* insects in my orchard. One large species, which I sent to Mr. Stauffer, of Lancaster, he thinks is not generally known to Entomologists. These *Cantharides* gnaw the young pears with great avidity, eating large holes in their sides, so as entirely to destroy the fruit. I have caught them in the act of eating the young pears. They are not easily alarmed, and may be readily caught, as they are quite large, and make no attempt to escape. I think they also eat the young fruit-buds, and the interior of the flowers. I shall watch them more closely next season. Should this insect increase very rapidly, it would totally destroy all hopes of a crop of fruit.

4th. *Destruction of Insects in the Soil*.—I have thought that the larvæ of many insects injurious to fruit-trees, might be destroyed in the soil, by very late plowing or digging, turning up the soil during cold, wet, frosty weather, and thus exposing the

larvæ to conditions unfavorable to their existence. How much could be accomplished in this way?

Then the free application of salt, lime and ashes, in the fall, I have thought, might have much effect to destroy insect larvæ in the soil. Do you think so?

5th. *Evergreens as a Harbor for Insects*.—The question has lately presented itself to my mind, how far Evergreens, and especially Evergreen Hedges, in and about orchards, may prove injurious, by forming a safe harbor for insects in winter. I have several thousand evergreens in and near my orchard, and several thousand feet of very dense Norway Spruce and Arbor Vitæ hedges. These plants are, of course, infested with insects peculiar to themselves. They are subject to Aphides and Borers and Basket Worms. Do they also shelter the Curculio, the Codling Moth, and other insects destructive to fruit-trees? I should be glad to have some precise information on this point. Evergreens and hedges furnish protection to small birds, which often build their nests in them; but I fear the insects are more numerous than the birds.

6th. *Spiders and Wasps in the Orchard*.—These insects are very numerous in my orchard, and on the fruit-trees and evergreens. I have been told that the spiders attack the tender fruit-buds, and opening fruit-blossoms, and devour the pistils and the pollen. I have never seen anything of this. Is it probable? And what is the general influence of the spider in the orchard? Wasps and Bees are very injurious to ripening fruit. The *Cantharides* and the *Click*-beetles make holes in every fruit in the slightest degree decayed, and then the Wasps, Hornets and Bees finish the work of destruction. Do Spiders, Wasps, Bees or Hornets, destroy any other insects injurious to fruit-trees?

PHILADELPHIA, Oct. 1866.

ANSWERS TO THE ABOVE, BY B. D. W.

1st. I have no personal knowledge that the Curculio breeds in the cherry, but I see no reason to doubt the fact. Dr. Trimble, who is better authority on this subject than any other man in this country, because he has made *Fruit Insects* his special study for years, evidently believes that it does; for he recommends outlying cherry-trees, which cannot be properly attended to, to be cut down, to prevent the propagation of the Curculio. (See his *Fruit Insects*, pp. 26 and 39.) And Dr. Fitch has remarked upon the singular anomaly, that the cherry and the thorn-apple, which are small fruits, hang upon the tree and ripen when stung by the Curculio, "though so wounded, knotty and deformed, that the fruit is worthless;" while on the other hand, the plum, the apple, the pear and the peach, which are large fruits, wither under the same circumstances, and fall to the ground. (*Address on Curculio*, &c., 1860, p. 18.) It is undoubtedly true, that in very many apples and pears, the young larva of the Curculio perishes prematurely; but that is evidently because its natural food is stone-fruit, and it is only when she cannot do any better, that the mother-insect has recourse to pip-fruit. Indeed, it is only of late years, since the Curculio has become so greatly multiplied, that it has been observed to attack pip-fruit. Consequently, as the Cherry is so closely allied to the Plum, that many botanists class them under the same genus, and as the Plum is the favorite food of this insect, we might reasonably infer *a priori*, even if we had no reliable evidence on the subject, that the great bulk of the eggs deposited in the Cherry will come to maturity, unless artificially destroyed.

But, if we allow this to be so, I do not see the force of your reasoning, that we ought, on that account, to get rid

of our Cherry-trees as soon as possible. It is a mistake to suppose that one plum can only feed one Curculio. I have repeatedly found several larvæ in the same plum, and Dr. Trimble has done the same. Hence, if one plum is equal in bulk of flesh to four cherries, a plum-tree with 500 plums is capable of producing as many Curculios as a cherry-tree with 2,000 cherries, supposing every fruit to be stocked with Curculio eggs to its utmost capacity; and your assumption that the Cherry can beat all other trees at raising Curculios is probably incorrect.

I may state here, that my belief is, that the Curculio passes the winter in the perfect state, hibernating, as I know many other snout-beetles to do, in moss, under dead bark, in tufts of old grass, &c., and that those which make their appearance in the spring to sting our early fruit, are the individuals bred in the fruit, and sometimes in the Black-knot, of the preceding year. Indeed Dr. Trimble has actually found specimens hibernating under the shingles of a roof, in the chinks of stone-walls, and under the bark of an apple-tree. (*Fruit Insects*, p. 49.) The duration of life among insects in the perfect state, has been very generally under-estimated by entomologists. (See some remarks on this subject in my Essay, *Trans. Ill. State Agr. Soc.* V, p. 475.) As to Dr. Fitch's notion, that there is a second brood of them, which is generated from eggs laid towards the end of the summer in certain slits in pear-trees, I have little doubt that the egg-slits doubtfully referred to the Curculio by this author, were those of my *Chloroneura malefica* or some other small Homopterous insect. (See Fitch, *N. Y. Rep.* II, § 52, p. 33.) Dr. Trimble, upon dissecting several Curculios which he had bred the same season from fruit, found all their bodies to be empty of eggs; whereas, females captured in the spring contained many eggs, one of them in particular twenty-five in number. (*Fruit Insects*, pp. 43 and 73.)

2nd. What we call the "Bark-louse" or "Scale-insect" of the Apple-tree and Pear-tree, is nothing but a scale covering the eggs which are to hatch out next summer, and is not seen until the middle of the autumn, because previously to that time it had no existence, with the exception of the old ones of over a year's growth. There are two perfectly distinct Bark-lice which infest the Apple-tree, and I will now point out the distinctions between them.

The OYSTER-SHELL BARK-LOUSE, (*Aspidiotus conchiformis*), which is represented of its natural size on the annexed twig, a single individual being magnified to show its



shape more clearly, is an imported insect. It is an awful pest in the orchard—and has now reached my immediate neighborhood. The scale here, according to all authors, is composed of the body of the mother-louse dying and drying up in the autumn—is almost exactly the color of the bark—and, when raised up with the point of a pen-knife any time in the dead of the year, shows underneath it many dozen minute, oval, milk-white eggs. In the following summer these eggs will hatch out into minute lice, which can scarcely be seen with the unassisted eye, or if seen, would be mistaken for natural specks in the bark, as they hardly move at all.

HARRIS'S BARK-LOUSE, (*Coccus Harrisii*, Walsh), which is exhibited in the annexed cut, in the same manner as



the preceding, is a Native American insect. I have noticed it for many years on Crab-trees, and in small numbers on apple-trees, but never, until 1866, found it to swarm on any Apple-tree so as to be dangerous, and then only in the case of a single tree in my own garden. The scale here is supposed by Harris to be constructed as

the autumn by the insect, like a cocoon, of some white material, its dried up and pale-brown body being attached to one end of it—is milk-white, so as to be in strong contrast with the bark—much more flattened than the Oyster-shell species—and the eggs under the scale, instead of being milk-white, are pink or lake-red all through the winter. These eggs hatch out about as the preceding. The species was described, but not named, by Harris; and, just as he states, there are scales of two distinct shapes promiscuously intermixed, one short-oval and the other very similar to that of the Oyster-shell species, as shown in the above figure at A and B. He is mistaken, however, in supposing that the oval scales are mistakes of the male insect; for these, as well as the elongate or oyster-shaped ones, have a parcel of eggs under each of them; neither is it true, as he asserts, that the oval scales are only about half as long as the oyster-shaped ones; for on the average they are a trifle longer, though the range of variation is very considerable. Singularly enough, he says nothing of the remarkable red color of the eggs. As to the difference in the shape of the scales, as both kinds from their containing eggs under them must be those of females, I suppose we have here another case of what is called "Dimorphism" by modern Naturalists, as with the two kinds of females found among the Plant-lice. In any case the paragraph in Harris, (pp. 255-6), which has been copied from Dalman's account of a Swedish kind of Bark-lice found on the aspen, (*Coccus cryptoganus*), can have no application whatever to this species.

I doubt very much Harris's theory—which appears to be founded merely upon the analogy, now shown to be altogether erroneous, with Dalman's Swedish species of Bark-lice—that the scales of this American species are not composed of the dried body of the female, but "in the same way as the down which exudes from the bodies of other bark-lice." In the middle of November there may often be seen on such twigs as are infested by these scales, very numerous cast skins of the immature insects, not tightly affixed to the bark like the true egg-bearing scales, but loose like the cast skins of plant-lice. These cast skins are milk-white, oblong-oval, about 2½ or 3 times as long as wide, and show at one end of each precisely the same oval, pale-brown scale that appears at one end of the true egg-bearing scale of either shape. This pale-brown scale is divided, by faint cross-lines, into segments like the bodies of almost all insects. I infer that it is the cast skin of the back of the insect, and that the rest of the cast skin, which is white and devoid of cross-lines, is that of the inflated and elongated venter. What confirms me in this opinion is, that frequently the pale-brown scales may be met with without any white appendage behind them. Hence, I conclude, from analogy, that the true egg-bearing scale, also, whether the short-oval kind (A) or the oyster-shaped kind (B), is composed of the body of the female bark-lice, as in the imported species, and not, as Harris believed, spun or otherwise constructed by the insect. I have forwarded specimens of all these matters to the Entomological Society for the satisfaction of the incredulous. The whole case affords an instructive example of how the best of us are sometimes deceived by false analogies, and jump too hastily to erroneous conclusions. But after all, this is a matter of no practical importance, though it is of considerable scientific interest.

It only remains to add that when, as sometimes happens, these two kinds of Bark-lice are intermixed on the same tree, the oyster-shaped scales (B) of Harris's Bark-lice may be readily distinguished from those of the Imported species by their being milk-white, instead of the color of the bark, and by the eggs under them being pink instead of milk-white. We have here another instructive example of the difference between the destructive powers of Imported and Native American Insects. Myriads of trees in the United States have been killed by the Imported Bark-lice of the Apple-tree; and yet our Native Species, which infests the same apple-tree, has never yet been known to kill a single tree.

Soda-wash and other alkaline watery infusions, to be of any service, must be applied after the young bark-lice have hatched, or some time in June. The eggs are so effectually protected by the scale, that no watery infusion

* Harris says, "of a very long oval shape or almost four-sided;" but "long" is evidently a clerical error for "short." (See *Inj. Ins.* p. 255.)

can reach them, though, as I have demonstrated by careful experiments, a thin coat of kerosene put on with a brush, any time in the dead of the year, will kill them every one. The reason is obvious. Nature has made the scales rain-tight, but, as we have no showers of oil, she has not thought it necessary to make them oil-tight. Probably benzine, as it evaporates much more quickly, would be preferable to kerosene, or perhaps either might be diluted with water. I observed that about one-sixth of the limbs that I painted with pure kerosene died, and that in every case these were such limbs as were most badly infested by the Bark-lice. Possibly these would have died in any event, or, as I rather infer, being greatly weakened by the insect they might have had the finishing stroke given them by the kerosene.

I do not believe that either Soda-wash or Kerosene oil will kill egg or larva, except such as it actually touches. People are perpetually reasoning upon the assumption, that such substances are immediately taken into the circulation of the washed or oiled plant; as if plants, like the higher animals, had a complete circulatory system of veins and arteries, whereas every Botanist knows that it is no such thing. Hence, if Bark-lice had the habit of spreading themselves evenly over a whole tree, after the manner of the winged Plant-lice, it would be very difficult to fight them; for in that case we should have to apply the necessary wash or oil to every limb and twig. Fortunately, however, for us the female bark-lice is wingless, and the only way in which she can, as a general rule, pass from one tree to another, is by adhering to the feet of some bird as it flies from one tree to another. I have long observed that when a tree first begins to be attacked by bark-lice, it is only particular limbs and branches that are at first infested, and that these will be swarming while the rest of the tree will be free from lice. And I have further observed that it is the lower horizontal limbs and branches, or such as birds would most naturally perch on, that are first attacked. If neglected, however, the insect will gradually spread over the whole tree in the course of a few years, when, in the case of the Imported Bark-lice, the result is sure and speedy death. Hence, it will be seen that, to check the operations of the Bark-lice in its earlier stages, it is not necessary to operate on the whole tree, but only on such limbs as are actually infested.

I have found that Bark-lice may be greatly checked, by placing upon the infested tree, a dozen or two of the Ladybirds figured in the margin. The one to the left—the Twice-stabbed Ladybird (*Chilocorus bivitatus*)—may be taken on forest-trees in considerable numbers by beating the boughs into an inverted umbrella. The one to the right—the spotted Ladybird (*Hippodamia maculata*)—may be taken abundantly on herbage with a common "sweeping-net," which is simply a bag of strong cloth sewn upon a hoop of strong iron wire and attached to a stout staff.

As to your queries under this head, I assume that your painting your trees with soda-wash did no good whatever, because it was done, as you yourself say, in the fall, when the insect was in the egg-state, and sheltered under the protecting scale. You saw no living insects the following summer, because they are then very minute, almost motionless, and hard to perceive with the naked eye. But when the new scale was formed on Sept. 20th, then you saw them. Most certainly the female Bark-lice never descends to the earth. On my own trees I never find any Bark-lice on the trunks, but then the trunks of my trees are scaly and rough, and yours having been treated with soda-wash would probably be smooth. I doubt the fact of the Scale appearing on your trunks any considerable time before it appeared on the branches. Your supposition that the eggs of Apple-tree Bark-lice could be deposited "in June or July" is of course incorrect, as has been shown above.

3rd. The large Blister-beetle, that eats your pears, is in all probability the *Lytta Sayi* of LeConte. Say first described it, supposing it to be a mere variety of his *Lytta aenea*, whereas it is in reality a distinct species. After LeConte had established it as a distinct species, and named it after Say, "*Sayi*," Fitch, supposing he had got hold of an undescribed species, named and described it over



Colors—black and red. Colors, pink and black.

again as "*pyriora*, or the Pear blistering-fly," stating that "it eats the young pears voraciously in June, and in a short time destroys all or nearly all upon the tree." (*N. Y. Rep.* II, § 58). Last of all, after the insect had been described by three preceding authors, and named by two of them, comes Mr. Stauffer, and supposes that "it is not generally known to Entomologists." I have myself taken it on wild flowers near Rock Island, Ill., but it is very rare there. The species is dark metallic-green, with red legs and black knees and tarsi, and is the size and shape of the Striped Blister-beetle, figured on page 26 of this number.

4th. All root-feeding insects may be starved out and destroyed by perpetually plowing the land, so as to suffer no plant whatever to grow therein. But in an Orchard you cannot do this, because the roots of the trees must not be destroyed, and consequently there will always be food there for root-feeders. I do not believe that plowing or digging would at all bother underground larvae, except by subjecting them for a short time to be preyed on by crows, robins, &c. Shortly after being exposed to the light of day, they will just gather themselves up," as we say in the West, and burrow underground again. But with such Beetles, Moths and Flies, as are already in the pupa state and consequently inactive, it would no doubt have a beneficial tendency, because it would be apt to place them in unnatural conditions, too hot or too dry, &c., and thereby eventually cause their death. I have no faith whatever in the application to the soil of salt, lime, ashes, &c. in order to destroy insects. A dose heavy enough to kill insects will kill plants at the same time; and smaller doses will kill neither.

5th. I do not believe that evergreen hedges are likely to shelter such insects as peculiarly afflict the Orchard. Evergreens have, as you justly remark, their own peculiar insects, but these are none of them such as likewise make war upon fruit-trees. For example, the "Basket-worms" that you speak of, which I suppose are the larvae of *Thyridopteryx ephemeriformis*, otherwise known as "bag-worms," (See Answer to C. P. Wickersham, Pa., in *PRACTICAL ENTOMOLOGIST* II, p. 22) never have been known, I believe, to attack any of the trees grown in our orchards for fruit.

6th. All known spiders are cannibals, chiefly feeding upon insects, though they are by no means particular as to the good or bad character of the species they prey on, whether it be a plant-feeder, or a cannibal like themselves, or a parasite. Sometimes they mete out retributive justice in rather an amusing way. The common black and yellow Mud-wasp, (*Pelopaeus lunatus*), as is well known, provisions its nest with a small greenish-yellow spider, which spins no web, but haunts flowers, and lives by catching such insects as visit those flowers for the sake of their honey and pollen. Last summer I saw a large web-spinning spider envelop one of these Mud-wasps in his net in an out-building of mine, after a long and severe contest; and the next day I found the Mud-wasp dead and sucked as dry as a bone. Thus the ravenous spider-killer succumbed to a spider. The so-called "Red Spider" that infests greenhouses (*Erythraeus telarius*) is not a true Spider, but a mite. On the whole, the influence of Spiders upon the insect-world is generally beneficial to us, and they ought by no manner of means to be disturbed in their operations.

Your statement that "Click-beetles" [*Elater* family] as well as Blister-beetles make holes in fruit is quite a new fact. Are you sure that you have not mistaken some other insect for a "Click-beetle"? Please send me specimens next summer, that I may identify the species. None of the Bees destroy other insects, except a few Cuckoo-bees, which, like our Cow-bird and the European Cuckoo, lay their eggs in the nests of other Bees, the larvae proceeding from which eggs starve out or, as I believe, destroy the rightful tenant and appropriate the food laid up for him. As to Wasps, there are hosts of them, and it requires very considerable knowledge of Entomology to distinguish one kind from another, each kind having its peculiar habits. As a general rule most Wasps catch insects for their young, each species affecting a certain group of insects as its prey; but they themselves feed upon honey, pollen, &c. The Social Wasps (Hornets and Yellow-jackets) are more exclusively vegetable-feeders in the larva state, but by no means entirely so. Some of the Cuckoo-bees referred to before, (genus *Nomada*), re-

semble wasps very much, and would be taken for wasps by anybody but a professed entomologist. As a general rule, the influence of wasps is beneficial to man, and they should not be disturbed, except when they trouble ripe fruit. In England, under such circumstances, they are commonly caught in large numbers by hanging up narrow-mouthed phials, half full of sweetened water or sweetened beer, on the infested fruit-trees.

ANSWERS TO CORRESPONDENTS.

M. S. Hill, Ohio.—The two Cicada (popularly called "Locusts," that you send, are the two sexes of the common 17-year Cicada, (*Cicada septendecim*.) You observe that they are "scarcely half the size of the common 17-year Locust and much darker underneath, that their song is entirely different, and that they are much less abundant." You must have mistaken some of the larger species of Cicada for the true 17-year species. One of these, which I believe is undescribed, has the same yellow wing-veins as the 17-year species, but is distinguishable by being proportionally much stouter, by the thorax being conspicuously marked with yellow, and by the size being almost twice as great. If this large species swarmed with you in 1866, it is a new fact. I have but a single specimen in my cabinet, and should be obliged if you could furnish me with more.

You say that "in 1864 all the gooseberry bushes in your vicinity were entirely stripped of their leaves by a small green worm, about ½ inch in length. In 1865 it again made its appearance, but not in such great numbers, while in 1866 you have not seen a single worm." You further remark that "you cannot state positively whether they were marked with rows of black spots or not." The spots on the larva of the Imported Gooseberry Sawfly (*Neomatus ventricosus*) are so conspicuous, that you could scarcely fail to observe them; and besides, if it had been this species that troubled you, it would not have gradually disappeared in 1865 and 1866. Hence I infer that your species was my *Pristiphora grossularia*, or the Native Gooseberry Sawfly, which as you will see from the answer to Isaac Hicks of New York. (*PRACTICAL ENTOMOLOGIST* II, p. 20) seems to have appeared in other States besides Ohio, from time to time. It is perpetually the case that after a new insect has been once described and brought into general notice, it turns out to be quite common in a variety of different localities.

Miss Marion Hobart, Ill.—The small roughish tubercles so thickly set on a piece of dry twig, are probably caused by the puncture of some insect; but they do not now contain, and have not previously contained any eggs. The bald-faced hornet, (*Vespa maculata*), which suspends its large paper nest to the boughs of trees, like all other species of that genus, including the common "Yellow-jackets," of which in Illinois we have several species, breaks up housekeeping when the weather begins to turn cold in the autumn. The workers then all perish, as well as the drones or males; but the large females retire under very rotten logs half buried in the ground, in which situation I have repeatedly found them early in the following spring, and pass the winter there in a torpid state. As soon as the spring opens, each female hornet comes forth into the open air again and becomes the founder of a new colony. It was formerly supposed that the workers in this genus were barren and laid no eggs, or at all events nothing but eggs that produced male wasps. But according to the distinguished English Hymenopterist, Mr. Fred. Smith, it has been demonstrated by Dr. Ormrod, Mr. Stone and others, that worker wasps can and do lay eggs that produce other worker wasps. The proof of this very remarkable fact is simple. A nest containing a single female and several workers is in early spring deprived of the female; and it is found that the building of fresh cells and the production of fresh workers therein, goes on as successfully as if the mother-female had remained in the nest. (Stanton's *Entomological Annual*, 1861, p. 39.) Whether these worker wasps are capable of generating, in the autumn, females of the usual large size, to continue the breed for another year, does not appear to have been as yet ascertained. The whole subject is a very curious one, and is recommended to the attention of entomological observers, as it involves many very cu-

rious physiological questions. The experience of many years, confirmed by the observations of the best European entomologists, has satisfied me that in the genus *Vespa* the males make their appearance only towards the autumn, say the last of August and early in September. In the allied genus *Polistes*, of which we have two species in North Illinois and a great many in South Illinois, and which makes a nest composed of a mass of hexagonal cells like the Hornet, but does not cover these cells over with a large paper envelop, I have often observed that the females pass the winter under the loose bark of standing trees, generally such as are dead.

M. C. D. N. Y.—The whitish worm about an inch long, found in flour, is probably the larva of the Meal-worm Beetle (*Tenebrio molitor*), a species which was imported long ago from Europe, and which commonly infests all kinds of bread-stuffs, bran, &c. There is also a Native American species (*Tenebrio obscurus*), which peculiarly infests flour, but is not near so common or so abundant or so destructive as the other. Both of them, in the perfect state, are oblong-oval black beetles, about $\frac{1}{2}$ inch long, the former a little polished, the latter of a very dead opaque black without the slightest gloss. There is no way to keep them out of flour, but to make the vessel or bin containing it perfectly beetle-tight; and if it is already full of their eggs and young larvae, to destroy those eggs and young larvae either by hot water or by fumigation with sulphur. The evil may be palliated by cleansing the bin thoroughly before filling it a second time, and keeping the lid always tightly closed.

There are a good many beetles which "bore holes about the size of pins in timber under the floors of buildings." Most of them belong to the *Anobium* family, and the larvae of some of them make a ticking noise as they bore, commonly known as the "death-watch." A century and a half ago, Dean Swift ridiculed this superstition about a worm being possessed of prophetic powers by the well-known lines:

"A kettle of scalding-hot water injected

Infallibly cures the timber infected,

The worm it will die but the man will recover."

The species that chiefly infests pine timber in Illinois, is the *Pinus brunneus* of Duftschmidt, a chestnut-brown species about $\frac{1}{4}$ inch long, with antennae as long as its body. But different kinds of timber are affected by different species. The time of the year at which the timber is cut has nothing to do with the presence of these minute borers. "Kyanized" timber—i. e. timber saturated with a solution of corrosive sublimate—they will not attack. The pinholes seen in timber growing in the woods are mostly produced by other beetles belonging to the genus *Tomicus*, and the *Scolytus* family.

J. B. Ellis, N. J.—The scientific name of the Moth that produces your corn-worm is *Heliothis armigera*, and it is identical with the larva that burrows into the bolls of the Cotton in the South, and is known there as "the boll-worm." The chief difference seems to be, that in the Southern States there are three broods of larvae every year, and in the Northern States only two. Mr. Glover gives the following, as proof of the identity of the cotton-feeding larva: "I have frequently taken the worms from unripened ears of corn and fed them entirely on cotton-bolls, as also the worms from cotton and fed them on corn, and in no case did the change of diet appear to affect the health of the caterpillars in the least, as they went through all their transformations in exactly the same manner, and when the perfect moths made their appearance they could not be distinguished from each other." (*Agr. Bureau, Monthly Rep.*, July, 1866, p. 284.)

Geo. W. Robinson, N. Y.—The worm you send, is not a true insect, but belongs to the genus *Iulus* in the Class Myriapoda or thousand-legged worms. As with the wire-worms, which are the larvae of certain Click-beetles (*Elater* family), the body is elongate-cylindrical, hard and horny, but it is readily distinguishable from these by having a very large number of legs strung all along its body, instead of only six legs placed at the front end of its body. The account you give of its operations is something quite new, no species of *Iulus* having been hitherto observed to attack living vegetable matter, though in Europe certain species of allied genera, (*Geophilus electricus* and *Polydesmus complanatus*), have been long known to bore into carrots, parsneps and potatoes, and thereby greatly injure them. So far as is recorded in such authors as are

accessible to me, and so far as my own experience extends, all other species of *Iulus* live on decaying vegetable matters, such as rotten wood; and this is certainly the habit of the giant of the genus, *Iulus marginatus*, which I recently received from Ohio. (See *PRACTICAL ENTOMOLOGIST* II, p. 10. I print in full, your account of the habits of this creature, as they are not only interesting but important.

"This destructive worm has possession of the length and breadth of my garden, and of many others in the vicinity. In the day time it is out of sight, inhabiting the ground, but is often found on turning up a stone or a piece of board. During the night it travels about on the surface of the ground. Often in digging I have found a nest of them, from the patriarchs of a mahogany color, down to such as were no bigger than small pieces of white thread. The indictment against them is this: They feed on the fine fibrous roots of most plants, but are especially destructive to strawberries. These they slowly work at, gradually dwarfing them to mere weeds, blossoms and fruit having vanished forever. The same dwarfing is seen in many other plants, young trees and vines, which must be referred to the same agency. Their scattered position in the ground effectually shields them from any warfare that I am able to wage against them. The currant worm and all others that live above board I can overcome; but in respect to these pests I am only second best."

It is a general law in the Animal Kingdom that where the habits differ materially the structure differs also; and your worm forms no exception to the above law. In the true genus *Iulus*, as limited by Latreille, the antennae are seven-jointed, the second joint long and the last joint small. In your worm the antennae are six-jointed, the second joint long and the last joint small. Hence we may either regard it as forming by itself a distinct genus, or, which I rather prefer, a distinct Subgenus or section of the genus *Iulus*. In *Iulus marginatus* Say, (known to feed on decaying vegetable matter), the joints of the antennae are proportioned as 1, 3, 2, 2, 2, 1; in your worm (known to feed on living vegetable matter) as 1, 3, 2, 2, 2, 1. As your worm, so far as I can find out, belongs to a hitherto unnamed and undescribed species, I annex a name and description, as well as a figure, the hair-line showing the true length.



IULUS MULTISTRATUS, n. sp. (*The many-grooved Iulus*.) Body brown. Face towards the mouth, mouth, the tips of all the joints of the body, and the venter and legs, all whitish. Head glabrous and polished. Eyes black, pear-shaped, the large end upwards, with about 5 granulations counting from one side of the pear to the other. First joint of the body glabrous and polished, and nearly as long as the three succeeding joints, which are shorter than the rest. All the joints, except the first and the two last, with a fine, acute, transverse, submarginal stria in front, from which proceed in a backward direction, nearly to the tip of the joint, about 40 or 50 fine, acute, longitudinal striae, with their interstices flat. Penultimate and last joints with fine and shallow punctures. Last joint obtusely rounded at tip, paler than the rest, and broadly margined all round with whitish.

Length of the largest individual, 1.15 inch; diameter .08 inch. Described from 7 specimens. Comes near *Iulus lactarius* Say, but differs in having no dorsal rufous vitta nor subobsolete lateral one, in the joints of the body being longitudinally striate with flat interstices, not longitudinally carinate, and in the eye being pyriform, not triangular. Neither is the line of the stigmata geminate, as is said to be the case in *lactarius*. From *I. pusillus* Say, it is distinguished at once by the striae being dorsal as well as lateral; and from *I. annulatus* Say, by the joints bearing each about 40 or 50 striae, instead of about 15 carinae. Say's other three species are quite different.

As to counterworking this worm, as it has been hitherto unknown, experience can of course teach us nothing, and we can only be successful by patiently experimenting. I should recommend you to begin by putting small pieces of potato, carrot or parsnep, or such other vegetable substances as you may from analogy infer to be agreeable to

it, under pieces of board laid flat on the ground by way of traps; and then visiting the traps with a lantern at bed-time and the first thing after it is light in the morning. A great deal may also be effected by pertinaciously killing every individual that you come across, when you are spading and hoeing your ground. *Iulus*, so far as I am aware, is like almost all other articulate animals in laying eggs and not bringing forth its young alive.

Since the above was in type, I have ascertained that Dr. Fitch has found the very European centipede referred to above (*Polydesmus complanatus*) to destroy the roots of young cabbages, onions, &c., in New York, and that he has also noticed some species or other of *Iulus*—he does not specify which—intermixed among them. (*Ann. Reg. Rural Affairs*, 1861, pp. 96 and 100.)

Willie C. Fish, Mass.—The very minute gnats that you send, the larva of which inhabits a fold on the edge of one of the terminal leaves of the cranberry-plant, is, as you suppose a *Cecidomyia*, or gall-gnat. There are whole hosts of these gall-gnats inhabiting similar folds and other deformations on various plants, which, like your insect, are undescribed. As you say that there are not usually more than two of these gnats to one shoot of the vine, and sometimes only one, I should scarcely have supposed that they could do material injury to the vine, judging from the analogy of similar gnats on other plants. Yet you say, that the owner of a cranberry bog of seven acres, estimated the damage done by this insect in 1866, at several hundred dollars, and that "the mischief done is in killing the extreme tip of the vine, which prevents the formation of a fruit-bud for the next year's growth, unless the vine by an extra effort puts them out at the side, as is frequently the case." Of the five specimens sent by you, which you bred from these cranberry-galls, one was a minute *Chalcid* fly, which had of course preyed upon the larva of one of the gall-makers. Thus, as you may now see, you have a good friend at hand to check the unlimited increase of this insect. Your specimens were in very poor order, and next year I should be glad if you could send me a number of the galls containing the living larvae and pupae, packed in any little tin box, the tighter the better. Baron Osten Sacken describes another and very different gall made by a gall-gnat on *Vaccinium* (Cranberry) or *Gaylussacia* (?). This is in accordance with what I believe to be a general law, namely, that where one species of a given genus of gall-makers infests a given genus of plants, many more species of the same genus may almost invariably be found thereupon.

The two flies sent are *Eristalis cuprovitata*, (Weid.), a very common species. The green carrion-beetle is a *Suprinus*, and identical with two specimens received by me from Colorado, which I have not been able to name, and which may probably be undescribed, though there are already 55 described species belonging to this genus. What you take for an ant is a female *Mutilla*—the females in which genus are always wingless, but may be distinguished from ants at once by their antennae not being flail-shaped. It is undoubtedly the *M. montivaga*, so accurately and fully described by Mr. Cresson in the *Proceedings*, and like that writer I have received it myself from Colorado. I presume that you yourself received both these last two insects from the Rocky Mountain region, though you say nothing to that effect.

Answers to Miss Marion Hobart, Thomas T. Smith and Geo. Scarborough, will be given in our next number

Another Humbug.

The following Advertisement has been extensively inserted in the Agricultural Press, and we republish it in our columns without charging Mr. Sheldon anything:—

TWO FRUIT-GROWERS.

P. B. SHELDON'S COMPOSITION FOR DESTROYING BORERS and other Insects, that infest Fruit and Ornamental Trees. The Composition, together with the method of applying, patented. Individual, Town, County and State Rights for sale. Send for Circular. P. B. SHELDON, Clinton House, Rochester, N. Y.

So far so good. But "the proof of the pudding is in the eating," and here is what Mr. J. D. Wis-

ner, of West Dresden, N. Y., says about this "Patent Composition," in the *Cultivator and Country Gentleman*, of November 22, 1866:—

"P. B. Sheldon's Patent Composition for Fruit-trees has been tested in this vicinity, this season, on hundreds of trees. The result has been worse than a failure, as it has killed quite a number of thrifty trees, and others as good as dead. It was removed in a few weeks after it was applied, or it would have been far worse for the rest. Wherever it washes down the tree, the bark dies and cracks open to the wood. There are also borers in the trees now."

This is really the unkindest cut of all. It not only, as it appears, does not kill the borers, but it kills the trees!! Poor Mr. Sheldon!!

NOTICES.

The *American Agriculturist*, published monthly in New York, at only \$1.50 a year, is one of the largest, the cheapest and the best of the very valuable class of periodicals to which it belongs. There are single illustrations in single numbers, which, as works of art, are almost worth the subscription money for a whole year. We would instance the Wood engraving of a Merino Ram in the number for November, 1866, drawn by Edwin Forbes of New York, and that of Highland Cattle, designed by the French Artist, Rosa Bonheur, which appeared a month or two ago. What can be more charming, again, and more life-like and natural, than the Guinea-pig, in the November number, poking his curious nose among a happy family, composed of a Pussy-cat and her five kittens? We can almost hear the intruder sniff audibly, as he pauses with uplifted head to ascertain what kind of a reception he is likely to meet with. In scientific matters, it is only necessary to point to the admirable series of Botanical articles contributed by Dr. Asa Gray. But what preeminently distinguishes this paper, is the honest and fearless war which it has long waged against the thousand and one Swindling Humbugs, for cheating the Farmer out of his money. The genus "Humbug" is a most extensive one, and the number of species comprised in it is quite numerous. Yet multitudinous as is this great army, and powerful as it is in the sinews of war, the *Agriculturist* has not hesitated to attack it. We must confess that we are astonished at such unparalleled boldness. We have occasionally ventured ourselves to skirmish a little with one single species—classified by the best authors as *Humbuggus entomologicus*; but this fighting hand to hand against such fearful odds, is more than we should have ever dared to attempt.

The *Country Gentleman* is issued weekly, at Albany, New York, forming yearly two quarto volumes of 400 pages each, at the low price of \$2.50 a year, if paid in advance. It is very fully illustrated, and has been long adopted by Dr. Fitch, the State Entomologist of N. Y., as a medium for the publication of some of his very reliable and able Papers on Economic Entomology.

The *Prairie Farmer* is printed and published at Chicago, Ill., in the same form as the preceding, at \$2 per annum, and is one of the ablest and best and most widely circulated papers of its class. Its chief entomological contributor is Mr. C. V. Riley, of Chicago, a promising young entomologist, who has already made several valuable additions to our knowledge of the habits of Noxious Insects. Dr. Fitch long ago characterized the *Prairie Farmer* as "that excellent periodical, which has contributed so much to render the agriculturists of the West enlightened and intelligent in their vocation." (*N. Y. Rep.*, I, p. 282.)

Coiman's Rural World is published bi-monthly, at St. Louis, Mo., in the same form as the two preceding, making one yearly volume of about 400 pages, at \$2 per annum. As we might anticipate, from the place of its publication, it circulates more especially in Southern latitudes, and often contains valuable papers on the management of what are peculiarly Southern crops. In the list of special contributors for 1866, we notice, among others, the names of Dr. Hull, the distinguished pomologist of Alton, Ill., and of Mr. Carew Sanders, the well-known scientific Horticulturist.

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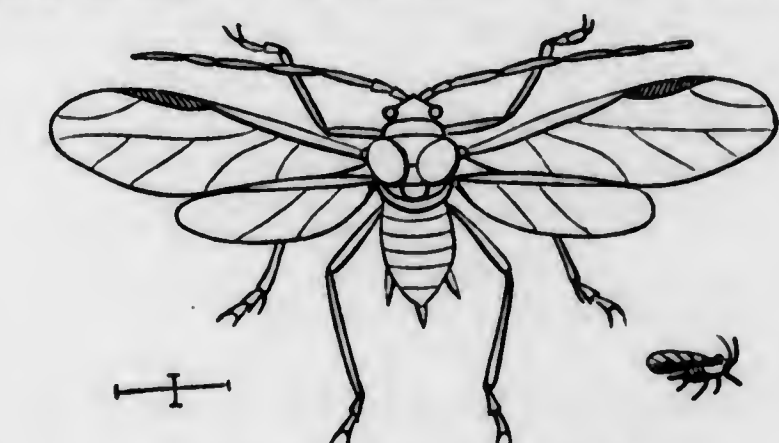
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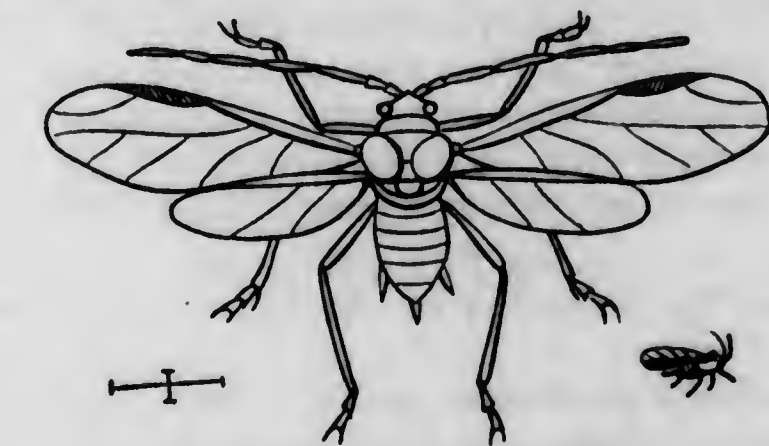
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full of lice, some winged and some wingless, and only differing from the Apple-tree Plant-lice in certain details of color, &c. The insect itself is called the Currant Plant-louse (*Aphis ribis*;) and, like the preceding, has in all probability been imported into this country from Europe.

If we examine a cabbage-plant towards the autumn, we shall sometimes see all the outer leaves covered by similar lice, except that they are dusted over with a white powder, and differ from either of the preceding in certain peculiarities of color, &c. But never, under any circumstances, shall we see the cabbage leaves curl up or bulge into blister-like projections under the punctures of these insects, as was found to be the case with the Plant-lice of the Apple and the Currant. The cause of this difference can only be attributed to certain unknown peculiarities of the plant which we call a cabbage. It cannot be owing exclusively to the greater thickness of the leaf of the cabbage, as compared with the leaves of the apple or the currant, because there are numerous plants with quite thin leaves which are infested by Plant-lice, but which do not in consequence thereof have their leaves curl up or bulge out. The Cabbage Plant-louse is scientifically known as *Aphis brassicæ*, and has likewise been introduced among us from Europe.

In the same way many other plants—for example, the Plum, the Cherry, the Peach, the Grape-vine, the Rose, the Willow, the Maize or Indian corn, and the group of cereal plants known as Wheat, Rye, Oats and Barley—are infested each by a peculiar species of *Aphis*, and sometimes by several distinct species; and, as a general rule, a species that inhabits one plant cannot live upon another, but perishes if transferred to it by artificial means. In the case of Wheat, Rye, Oats and Barley, however, the same insect can live indifferently upon either, as in the year 1861 the Farmers of New York and New England and Pennsylvania ascertained to their cost; the Grain Plant-louse (*Aphis avenæ*) having in that year multiplied so prodigiously in that section of country, as greatly to damage the grain crop, and more especially the later-maturing grain, such as Spring Wheat and Oats.

Besides the genus *Aphis*, there are other genera of Plant-lice belonging to the same *Aphis* family, but differing in the veining of their wings and in other minute particulars, and differing also more or less in their habits. For example, the Woolly-Plant-louse of the Apple-tree, (*Eriosoma lanigera*), belongs to the genus *Eriosoma*, which has only one instead of two branches springing from the third vein in its front wing, (see the above figure,) and inhabits the limbs and trunk of the infested tree rather than the leaves and small twigs. Again, the root Plant-louse of the Apple-tree, (*Pemphigus pyri*), belongs to the genus *Pemphigus*, which has the third vein in its front wing perfectly simple, and not at all forked or sprangled, and inhabits the roots of the infested tree exclusively. Trifling and unimportant as such distinctions may appear to the general reader, they are yet almost perfectly constant and invariable. Take a hundred winged Plant-lice from

the leaves of an Apple-tree, and every one of them will have the third vein of the front wing twice forked. Take a hundred winged Woolly-Plantlice from the limbs of the same tree, and every one of them will have the third vein once forked. Take a hundred winged Root-Plantlice from the roots of the same tree, and every one of them will have the third vein devoid of any forks at all. Where nature is the workwoman, there are seldom any botches.

Besides the genera of Plant-lice referred to above, there are others which originate and inhabit curious excrescences or "galls" upon different plants. But in what I am now about to say, I shall, for the sake of brevity, confine myself exclusively to the Plant-lice belonging to the genus *Aphis*, none of which inhabit galls, and but a single North American species of which—the Maize Plant-louse (*Aphis maidis*)—ever lives underground upon the roots of the infested plant; and even that one occasionally emerges into the light of day, and attacks the stems of the roasting-ears.

People are often puzzled at finding an Apple-tree or other plant swarming with Plant-lice, when, a week or ten days before, there was scarcely one to be seen on it. The reason is the prodigious fecundity and the very early maturity of these insects. As a general rule, an *Aphis* in the summer season attains complete maturity in ten or twelve days, after which time it produces every day about two young ones, which, contrary to the general rule with insects, are born alive and not in the egg-state. Hence, the English Entomologist, Mr. Curtis, has calculated that from a single female, in seven generations, 720 millions of lice may be produced. But in the case of the Grain Plant-louse, the possible rate of increase is more astonishing still; for Dr. Fitch ascertained, by actual experiment, that one of the wingless females of this species becomes a mother at three days old, and thereafter produces four little babies every day; so that even in the short space of twenty days her descendants, if not destroyed from extraneous sources, would number upwards of two millions. If the human species increased at the same prodigious rate, how rapidly the land-speculators would make their fortunes!

The arithmetical reader may perhaps object, that in the above calculations no allowance has been made for a certain per centage being males, and consequently barren. But—strange to say—all through the summer there are no males at all born, all that are born, whether you choose to call them females or not, being fertile individuals and giving birth to others, and these to others still, and so on indefinitely, without any intercourse with the opposite sex. How, under these circumstances, the process of generation is accomplished, is a curious and at present an unsettled problem. Some distinguished German entomologists maintain that these so-called females are neuters (Ammen), without any regular ovaries developed, and that it is by a budding process, analogous to that of the Polyps, that the young plant-lice are developed within the body of the parent stock. I have just heard from Mr. Darwin that it has been demonstrated by Bal-

biani, in a paper recently published, that these individuals at first are neither females, nor neuters, but hermaphrodites. If this be so, it is the only known instance of an animal, so high in the scale of the creation as an insect, being of the hermaphrodite sex; though several inferior Mollusks, our common Snails for example, are so. As a general rule, most species of *Aphis* produce males late in the season, when copulation takes place in the usual manner, and eggs are laid by the impregnated females to continue the species next year. In the case of the Apple-tree Plant-louse the eggs, which are minute, shining, elongate-oval, black bodies, may be found in the winter in large numbers glued to the twigs. But in the case of the Grain Plant-louse Dr. Fitch says, that "he has watched it the year round, so closely, that he is perfectly assured no eggs were laid and no males were produced;" and he further states that in the autumn "the mature lice continued to produce young ones, until they and their young became congealed upon the leaves of the young grain by the advancing cold of the season. And in this state they were buried beneath the snows of winter, and with the warmth of the ensuing spring they were thawed and returned to life again." (*Prairie Farmer*, Nov. 8, 1862, p. 292.) Mr. Cyrus Thomas also found living lice upon young green fall-wheat, in South Illinois, in the middle of the winter, and after much sleet and snow had fallen. (*Prairie Farmer*, Jan. 18, 1862, p. 35.) Nay, even so far north as Connecticut, Mr. Verrill found very numerous Woolly Plant-lice of all sizes on the branches of an Apple-tree so late in the year as December 11, and after "two snow-storms and many cold rains and freezing nights." (*PRACTICAL ENTOMOLOGIST* I, p. 21.) Except on the hypothesis that in certain species of Plant-lice males do not appear at all, or only appear in certain exceptional seasons, it seems difficult to explain all the above facts. Similar cases occur in certain other families of Insects, for instance the Gall-flies.

After all, such calculations as those which have been quoted above, of the astonishing fecundity of Plant-lice, are rather matters of theoretical curiosity than of practical utility. In point of fact, Plant-lice never do increase at anything approaching to the rate established by the theory, because they are always more or less checked and controlled by certain causes to be hereafter explained. Thus the theory is like one of those problems in Mechanics, where it is assumed that a lever is perfectly inflexible, that a rope is perfectly flexible, and that there is no such thing as friction, none of which three things can ever take place in actual practice; or like the problem with which the schoolmen in the middle ages amused themselves, namely, how many thousand angels could dance on the point of a needle without jostling one another?

FRIENDS OF THE PLANT-LICE.

If the reader will refer once more to the figure given above, he will find—besides the little projection at the extreme tip of the abdomen, which is the ovipositor or egg-laying instrument—another

little horn-like projection on each side of the abdomen not very far from its tip. This is called the honey-tube, and through it the insect has the power of secreting at will a drop of sugary fluid. If the plant-lice are left to themselves, this fluid is from time to time discharged upon the leaves of the infested plant, when after drying up it forms a sweet glutinous substance, well known to school-boys by the name of honey-dew. Thanks to the poor despised "bug-hunters," we now fully understand the nature and origin of this "honey-dew." But in olden times it puzzled philosophers dreadfully, because in those times it was considered to be beneath the dignity of a philosopher, to open his eyes and read for himself in the Great Book of Nature. For instance, the Roman naturalist, Pliny, gravely hesitates whether to call this honey-dew "the sweat of the heavens, the saliva of the stars, or a liquid produced by the purgation of the air."

But in 99 cases out of a 100, the *Aphis* is not allowed "to waste her sweetness on the desert air." Ants, as most housewives know to their cost, are very fond of sweet things, and wherever you find a tree or other plant infested by *Aphis*, there you find almost invariably swarms of ants passing and repassing up and down the trunk of the tree or the stem of the plant. Examine closely one of the groups of Plant-lice, and you will generally see one or more ants walking about among them. Examine the group still more closely with the assistance of a pocket lens, and you will from time to time perceive an ant drumming gently on the back of a Plant-louse with its flail-shaped antennæ, till it has coaxed the Plant-louse into emitting from its honey-tubes a drop of sugary fluid. This the ant greedily absorbs, and then passes on to another and another, until having filled itself to repletion, it descends to the earth and regains its nest. Here the sweet fluid is disgorged into the mouths of the helpless and legless white maggots, which are the larvæ of the future ants, and which are entirely dependent for their food upon the fostering care of these working or wingless ants, the male ants, like the drone of the honey-bee, being idle gentlemen, and the female ants, like the queen-bee, seldom leaving the nest. In the words of Linnæus, which were uttered a century ago, though very few, except professed naturalists, have heeded them up to the present day, "The ant ascends the tree, that it may milk its cows the Plant-lice."

In Natural History there is scarcely a single rule without its exception. The facts recounted above will apply to hundreds of different species of *Aphis*; but in the case of the Grain Plant-louse (*Aphis avenæ*), though the honey-tubes are well developed, yet they emit no honey; and in consequence of this remarkable anomaly the species, as has been remarked by Dr. Fitch, is not attended by any ants. In other words, as this peculiar breed of cows gives no milk at all, the milk-maids do not think it worth while to visit them. In the human species, little boys and girls sometimes deceive one another into mistaking an empty egg-shell for an egg full of meat; and it is said that professed cock-fighters

have been more than once deceived, by having a clipped and disguised eagle pitted against a genuine game-cock; but you cannot deceive an ant into mistaking a Grain Plant-louse for an individual of the ordinary honey-producing species. Call it instinct, or inherited experience, or acquired experience, or acute powers of sensation, or reason, or what you will, the fact is indisputable, that my friends, the poor despised insects, often know more than such an exalted and highly-educated being as Man. Of the thirty millions of men that inhabit the United States, probably not a thousand persons could distinguish a Grain Plant-louse from an Apple-tree Plant-louse, when the two were placed side by side. Of the billions upon billions of ants that inhabit the same country, probably not a single individual would be puzzled to tell the difference between the two. Take any philosopher in Christendom, blind-fold him, and set him down in a large and dense forest five miles away from his own house, and he will likely enough starve before he finds his way home without assistance. Put a common honey-bee in a close box, and carry it to the same forest five miles from its hive, and after it has gorged itself with honey it will fly so straight home, that its path has passed into a proverb and is known as a "bee-line." And yet the ant and the bee are commonly thought, by the high and the low vulgar, to be beneath the notice of any grown man!

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it is figured here because it is remarkable for being the only known North American species which feeds upon vegetable substances, being a bitter enemy to the squash-vine. (See PRACTICAL ENTOMOLOGIST I, p. 111.) The larva between the two figures, with some slight variation, might be taken for the larva of either of the above two species, having numerous sprangling prickles growing out of its back, which, however, may be handled with perfect impunity.

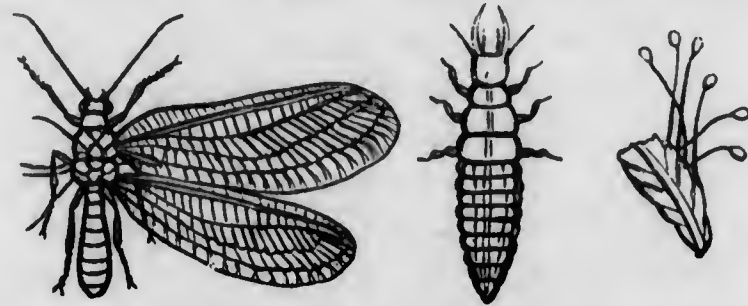
There is still another genus of Ladybirds, (*Scymnus*), which comprises insects that are much smaller and of obscure brown colors, in some species with the tail brick-red or yellowish. The larvæ of these have numerous white evenly-shorn filaments growing from their backs, and I recently received some from a Wisconsin Cranberry-grower, along with the Cranberry Plant-louse, he supposing that both insects were equally destructive to his vines. Whereas, instead of being an enemy, the *Scymnus* larva was experimentally proved by me to prey on the plant-lice, and to be in all probability the only efficient friend that he had toward keeping within bounds his plant-feeding foe. (See the PRACTICAL ENTOMOLOGIST, Vol. II, p. 8.)

Dr. Fitch tells an amusing story of a very similar mistake, which was made by one of his neighbors, whose rose-bushes were grievously infested by Plant-lice. He complained, we are informed, to the Doctor that, although he took the greatest pains to go over the infested bushes every morning, and destroy all the "old ones," yet that his bushes were ten times as badly injured by plant-lice, as those of his neighbors, who took no pains at all to war upon the enemy. On examination it turned out, that the worthy gentleman had occupied himself every morning, in killing off all the Ladybird larvæ that he could find, supposing that these were the mothers of the plant-lice, and that he should thus nip the evil in the bud. In other words he had fired into the ranks of his best friends, and allowed his enemies to march where they would, and increase and multiply at discretion.

It is only necessary to add, that the eggs of most Ladybirds are small, yellow, elongate-oval bodies, and that they are usually attached endways, in clusters of a dozen or so, on the under side of the leaf of the infested plant. The pupa of these insects, as with all other Beetles, is stationary and eats nothing, being generally suspended by the tail to some plant. But in the genus *Chilocorus* the full-grown larva fixes itself firmly, at full length, to a branch, and the pupa state is assumed inside the prickly skin of the larva. The same thing takes place in certain

other Ladybirds, but in their case the larval skin splits open along the back so as to show the pupa inside.

The next group of Insects which make war upon the Plant-lice is the Golden-eyed Flies, (*Chrysopa* genus, *Hemerobius* family, Order Neuroptera,) of which we have several dozen North American species, differing by very minute characters, but all of them slow-flying, green-bodied insects, with eyes of burnished gold, and transparent wings veined with grass-green. The left hand figure in the annexed cut shows one of these insects, the two left wings



being omitted from the drawing to save space. They have the remarkable habit of attaching their eggs to the tip of long filaments spun by the body of the females, so that a bunch of these eggs strongly resembles certain mosses when they are gone to seed. The right hand figure exhibits a few of their eggs attached to a leaf, but I have sometimes noticed as many as twenty in one group. The larva of the Golden-eyed Flies (see the middle figure, which is magnified fully two diameters) is shaped a good deal like that of the Ladybirds, but is usually of a sober brownish color, and may be readily distinguished from the other one by its very elongate protruding jaws. Its habits are nearly the same as those of the Ladybird larvæ, and like them it is fond of preying on the eggs of various insects. But the pupa, instead of being suspended naked by the tail or enclosed in the skin of the larva, is protected by a tough globular or short-oval silken cocoon, with so smooth a surface that it might almost be mistaken for the seed of some plant. The cocoon, in all the species known to me, is remarkable for being unusually small in comparison with the large fly that comes out of it; so that, in Dr. Fitch's graphic language, "it seems like a full-grown hen hatching from an ordinary-sized egg."

Authors, copying from one another, have attributed to all or almost all these Golden-eyed Flies the peculiarity of giving out a very offensive smell, when handled. I do not doubt that this may be so in the case of particular European species, for there is strong testimony to that effect. But it is certainly not generally true of our North American species. I have handled, myself, thousands of specimens belonging to dozens of different species, and could never yet perceive that they gave out any smell whatever, whether pleasant or unpleasant.

A third group of insects that prey most savagely upon the Plant-lice, but only while it is itself in the larva state, is composed of various species belonging to the *Syrphus* family in the Order Diptera. In the perfect state these are all of them two-winged flies, some of them of an obscure brown color, and some beautifully banded like a "yellow-

jacket" with black and yellow. The upper figure in the annexed cut shows one of these last—the *Syrphus politus* of Say—the hair-line exhibiting its natural length. The



Colors, black and yellow.



Color, whitish.

lower figure shows the larva of a species of *Syrphus* transfixing an *Aphis* with its pointed mouth, and sucking out its juices as it holds it helplessly suspended in the air. Unlike the two groups of larvæ, which we have just been considering, these *Syrphus* larvæ are slow-going, fleshy, footless, whitish maggots, and the egg from which they take their origin is always deposited by the parent-fly right in the midst of a colony of the Plant-lice, whereas the eggs of the others are sometimes laid a considerable distance off. The reason is obvious. The former are active six-legged insects, and having good eyes of their own can readily seek out their prey. The latter are sluggish legless fellows, and, strange to say, they are perfectly blind.

Few things are more amusing than to watch the proceedings of one of these *Syrphus* larvæ among a lot of Plant-lice; which may be readily done even with the naked eye, though a pocket-lens is a great assistance. You see a leech-like maggot slowly crawling along, and swaying his pointed head first to one side and then to the other, as an elephant moves his trunk. The head comes within a hair's breadth of a plant-louse, and you fancy that the poor plant-louse is doomed. No such thing; the *Syrphus* has not actually touched his prey, and like a blind Cyclops he goes groping along till accidentally he touches one. Then, like a flash of lightning, he impales his victim, hoists him in the air, in spite of all his kickings and strugglings, and in a few seconds has sucked him as dry as a bone, exhibiting, under the lens, as much greedy gusto, as an Alderman would do in swallowing a plate of turtle-soup. Jerking away the empty skin, he then proceeds with grave and earnest solemnity, as if he were well aware that he is performing a sacred duty towards society, to search out another and another victim; till having satisfied both his appetite and his conscience, he reposes for awhile from his labors, with the pleasing conviction, that he has tickled his own palate, and at the very same time discharged his obligations towards that sublunary world, of which he forms so important a member.

It is almost impossible to find a group of plant-lice of any magnitude, without one or more of these *Syrphus* larvæ among them; and yet Farmers and Gardeners and Orchardists, with hundreds of such scenes as the above constantly under their very noses, go through life with their eyes shut and fail to see them. As the old proverb has it, "None are so blind as those that won't see." It may be added here, that most of the *Syrphus* flies are distinguishable, by the habit that they have of occa-

sionally hovering motionless for a few seconds in the air, like our Sparrow-hawk. In both cases the object probably is to discover the more readily that prey, which a wise Providence has appointed them to attack; the Sparrow-hawk carrying off its quarry to its nest, and the *Syrphus* fly building no nest at all, but laying its egg where it instinctively knows that its future family will find abundance of food.

Besides the above three principal groups of enemies, Plant-lice, in common with most other groups of Insects, are attacked by *Ichneumon* flies, which inject a single egg into their bodies with their ovipositor. As in similar cases, this egg becomes a larva, and gradually devours the body of the living victim which it inhabits, finally emerging as a minute four-winged Fly, belonging to the sub-group *Aphidius* of the group *Bracon* of the great *Ichneumon* family. In a small parcel of Plant-lice sent me from Kentucky, I counted no less than two or three dozen of these minute *Ichneumon* flies, which had hatched out on the journey. (See PRACTICAL ENTOMOLOGIST, Vol. I, p. 100.) Plant-lice attacked in this manner, like other ichneumonized insects, affix themselves firmly to the surface on which they stand, and may be otherwise distinguished from such as are in good robust health, by their swollen and bloated bodies. If they are carefully opened, the maggot-like larva of the *Ichneumon* fly may often be found coiled up inside them.

Besides all the above, there are many other insects which occasionally or habitually prey upon plant-lice. I have noticed a "Devil's darning-needle" (*Agrion*) flying among my currant-bushes with one of the Currant-bush Plant-lice in its mouth. Certain wood-wasps also, (*Crabro* family,) provision their nests with the bodies of these insects, in Europe and probably in this country as well; for in the heart of one of the Pine-cone like galls, which are so common everywhere on the tips of the twigs of a Willow, (*Salix cordata*), and which have been named *strobiloides* by Baron Osten Sacken, I once found a little heap of plant-lice, which had evidently been placed there as provision for the young larva of some kind of Wasp or other. A species of the true bugs (Heteroptera) known as *Nabis fera*—an elongate, long-legged, grayish-brown insect, about $\frac{1}{2}$ inch long, belonging to the *Reduvius* family—is likewise said by Dr. Fitch to attack the Grain Plant-louse; but this Bug, as I have noticed, is confined to low-growing plants, and its place upon trees and shrubs seems to be supplied by other members of the same family, the *Reduvius raptatorius* of Say and the *R. multispinosus* of DeGeer. Finally, the all-devouring spiders, which are spread everywhere, and which all of them feed exclusively upon animal food, must, in all probability, occasionally make a meal off the plant-lice.

As a general rule, I do not believe that plant-lice are injurious to fruit-trees, because in limited numbers they operate as a summer-pruning, and tend to throw the tree to fruit; and their numerous enemies usually prevent them from increasing to any alarming extent for any great length of time.

When, however, they become unduly numerous, the best and most effectual remedy, and one which has been practised for many years back by European horticulturists, is to place upon the infested plants a number of their natural enemies, collected in the woods and fields. For this purpose the means for collecting insects, ordinarily employed by Entomologists, are readily available; but as I propose to elucidate this subject in a future paper, I will not enter upon it here. On greenhouse plants fumigation with tobacco is an effectual remedy, but it is too troublesome and expensive to be employed in the Garden or the Orchard. As to the various washes recommended for this purpose, I have not much faith in them; but from analogy I should infer that a thorough drenching with hot water would kill the plant-lice, and at the same time not injure the plant. Experiments, however, are required to establish the fact, and also to determine what degree of heat may be safely employed. In this, as in so many other cases, we need a series of experiments carefully tried by competent scientific authority. We know, however, from good French authority, that Bark-lice may be killed by hot water, without at all injuring the tree on which they occur.

Now let us suppose, for an instant, that all the multitudinous enemies of the Plant-lice, which have been enumerated above, were swept away from off the face of the earth by the besom of destruction. Then consider the enormous and almost inconceivable rate at which, as has been already shown, plant-lice naturally increase when unchecked and uncontrolled from any extraneous source. Think of all this, and then tremble when the inevitable inference is drawn, that but for these destroyers of the Plant-lice, the whole vegetable world would in six months be as brown and dry and desolate as the deserts of Sahara. All animal life depends either mediately or immediately upon vegetable life. Hence, the Vegetable Kingdom being destroyed, the Animal Kingdom would be involved in the same universal ruin; and man and all his proud works would perish from off the face of the globe. It may be to some a humiliating fact, but it is nevertheless demonstrably true, that upon the permanent well-being of a few small flies and beetles, which we every day crush ruthlessly under our feet, and which most of us consider as unworthy the notice of any but women and children, depends the very existence of that noble race of beings, that gave birth to Pericles and Thucydides—to Cromwell and Newton—to Gustavus and Linnæus—to Napoleon and LaPlace—and last but not least, to Washington and Franklin. B. D. W.

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It has been the fashion for some years to maintain that all birds, or at all events all the smaller birds, are beneficial to the Agriculturist, because they prey more or less upon insects, and that all insects without exception are noxious vermin. Nothing can be further from the truth than these two propositions. There are many small birds that upon the whole do more harm than good, and some few whose works are evil always and continually. And on the other hand, out of a hundred distinct kinds or species of insects taken indiscriminately, at least twenty-five or one-fourth part will be found to be generally beneficial, by preying exclusively upon other insects, many of which are really noxious.

I know from personal experience, that the common American Crow will dig up young corn out of the hill, no matter how deeply it may be covered, for the sake of the kernel attached to the root. And I know likewise that the Swamp Blackbird (*Agelaius phœniceus*) will pull it up out of the hill for the same purpose, unless it be covered so deeply that the young blade breaks off instead of fetching up the root along with it. For three long weeks, when I first opened a farm in the midst of wild land in Henry Co., Ill., more than a quarter of a century ago, I had to be in my corn-fields at the first peep of day with my gun, to save the crop from the crows; and a hard battle I had to fight with them, though by patience and perseverance I came out victorious in the end. And yet, in the face of the strongest evidence, there are writers to be found, who deny that crows and blackbirds pull up young corn for the sake of the seed-kernel, and assert that it is only "a worm at the root" that they are in search of!! (*Md. Farmer*, April 1866 p. 106.) But surely in that case the bird would only attack a hill here and there, whereas both crows and blackbirds will follow along a row of corn, and gut every hill as they go. Again, crows will dig into the tips of young ears of corn when they are in the milk, so as to destroy at least a fourth part of each ear, by the consequent exposure to the weather; and when the ear is ripe they join the prairie-hens in stripping it of its kernels by wholesale. Yet, on the other hand, it is probable that all these birds devour at particular seasons of the year many noxious insects; so that to find out whether each is to be considered, upon the whole, as a friend or as an enemy to the Farmer, we must draw up a careful Debtor and Creditor account, and ascertain on which side the balance lies.

Take another well-known bird—the Orchard Oriole (*Icterus spurius*). Dr. Trimble says that it knows how to find the leaf-rolling caterpillars in their places of concealment, and other authors report it as a very general insect-feeder. We should suppose therefore that it would be a welcome guest in every orchard. Yet this is what one of the most intelligent and successful fruit-growers in Illinois, Dr. Hull of Alton, says of this bird:—

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Many years ago I saw a Paper by a New England Naturalist, stating that he had examined the craws of a great number of Robins (*Turdus migratorius*), and that they contained vast numbers of a certain larva which he had forwarded to Dr. Fitch, and which was pronounced by that gentleman to be that of the *Bibio albipennis* of Say. Hence he drew the inevitable inference which almost all these Bird Protectors jump to, namely that the Robin must be a very useful bird; for he proved, by arithmetical calculations, that it destroyed in the course of the whole season I don't know how many millions of "*Bibio albipennis*." As, however, he stated nothing whatever respecting the habits and history of this insect, I will now supply the deficiency. *Bibio albipennis*, or the White-winged Bibio, is a sluggish, slow-flying, blackish, two-winged fly, about the size of a common House-fly, but much slenderer, which swarms in gardens among fruit-trees and fruit-bearing bushes in the spring. Its larva—I have bred hundreds of them to the perfect Fly—lives upon damp dead leaves, and is therefore perfectly harmless, and so is the Fly bred from it. Consequently, even if the Robin annihilated this insect entirely, it would not benefit mankind. On the other hand, the Robin is confessedly death upon cherries and certain other fruits. Whether, on

the whole, this bird be beneficial to the Agriculturist, cannot be decided without further and better evidence. In any case we want some more cogent proof than the *Bibio albipennis* argument, before we acquit this culprit.

As to the N. A. Woodpeckers—another bird which the laws of Illinois forbid us to kill—they appear to be divisible into three categories. The great bulk of them feed almost exclusively upon insects, and chiefly upon such species as bore into timber, though a few of these will sometimes eat corn. There are other species which superadd to these habits a propensity for devouring fruits of different kinds—the golden-winged Woodpecker, Yellow-Hammer or Flicker (*Picus auratus*), the Red-headed Woodpecker (*Picus erythrocephalus*), and the Pileated Woodpecker (*Picus pileatus*). And there is a single species, the Yellow-bellied Woodpecker (*Sphyrapicus varius*)—generally known as the "Sapsucker," though many writers incorrectly give this name to the innocent Downy Woodpecker, *Picus pubescens*—which bores horizontal rows of holes in the bark of various trees, for the sake of the sappy inside bark which he extracts from the bottom thereof.* The first group are universal friends; the second are obnoxious to the fruit-grower, but otherwise useful; the last is to be exterminated without mercy wherever he is found, even in the judgment of Dr. Hoy of Wisconsin, who was the first to demonstrate scientifically the very peculiar habits of the species.

But it does not follow, because a particular species of bird feeds exclusively upon insects, never molesting the Farmer's grain or the Orchardist's fruit, that therefore it must necessarily be beneficial to mankind. We must prove in addition that it destroys a great many more plant-feeding insects, than it does Cannibal and Parasitic insects, before its good character can be considered as firmly established. And this is where the evidence almost universally breaks down, and where a long series of careful experiments is required, before we can arrive at any definite conclusion on the subject. Many years ago I saw a French work, giving an account of the contents of the craws of a great variety of European small birds, of each of which numerous specimens had been killed and dissected for that express purpose. The author was a zealous advocate for the preservation of birds, but though doubtless a good ornithologist he appears to have known but little about Entomology. For among the noxious insects which he enumerated with great gusto, as found in the craws of his little friends, he mentioned many species, for example the *Agrion* or Devil's Darning Needles, which are decidedly beneficial by preying upon noxious insects. Again, no group of birds is more exclusively insectivorous than the Swallows; for they none of them ever touch either fruit or grain or any other crop. At first sight, therefore,

* As this fact is still disbelieved by some, and was formerly disbelieved by myself, it may be as well to add, that Dr. Hull says that he has several times actually found cambium in the bill and in the crop of this bird. (*Agric. Rep. Mo. Append. p. 345.*)

When, however, they become unduly numerous, the best and most effectual remedy, and one which has been practised for many years back by European horticulturists, is to place upon the infested plants a number of their natural enemies, collected in the woods and fields. For this purpose the means for collecting insects, ordinarily employed by Entomologists, are readily available; but as I propose to elucidate this subject in a future paper, I will not enter upon it here. On greenhouse plants fumigation with tobacco is an effectual remedy, but it is too troublesome and expensive to be employed in the Garden or the Orchard. As to the various washes recommended for this purpose, I have not much faith in them; but from analogy I should infer that a thorough drenching with hot water would kill the plant-lice, and at the same time not injure the plant. Experiments, however, are required to establish the fact, and also to determine what degree of heat may be safely employed. In this, as in so many other cases, we need a series of experiments carefully tried by competent scientific authority. We know, however, from good French authority, that Bark-lice may be killed by hot water, without at all injuring the tree on which they occur.

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Many years ago I saw a Paper by a New England Naturalist, stating that he had examined the craws of a great number of Robins (*Turdus migratorius*), and that they contained vast numbers of a certain larva which he had forwarded to Dr. Fitch, and which was pronounced by that gentleman to be that of the *Bibio albipennis* of Say. Hence he drew the inevitable inference which almost all these Bird Protectors jump to, namely that the Robin must be a very useful bird; for he proved, by arithmetical calculations, that it destroyed in the course of the whole season I don't know how many millions of "*Bibio albipennis*." As, however, he stated nothing whatever respecting the habits and history of this insect, I will now supply the deficiency. *Bibio albipennis*, or the White-winged Bibio, is a sluggish, slow-flying, blackish, two-winged fly, about the size of a common House-fly, but much slenderer, which swarms in gardens among fruit-trees and fruit-bearing bushes in the spring. Its larva—I have bred hundreds of them to the perfect Fly—lives upon damp dead leaves, and is therefore perfectly harmless, and so is the Fly bred from it. Consequently, even if the Robin annihilated this insect entirely, it would not benefit mankind. On the other hand, the Robin is confessedly death upon cherries and certain other fruits. Whether, on

the whole, this bird be beneficial to the Agriculturist, cannot be decided without further and better evidence. In any case we want some more cogent proof than the *Bibio albipennis* argument, before we acquit this culprit.

As to the N. A. Woodpeckers—another bird which the laws of Illinois forbid us to kill—they appear to be divisible into three categories. The great bulk of them feed almost exclusively upon insects, and chiefly upon such species as bore into timber, though a few of these will sometimes eat corn. There are other species which superadd to these habits a propensity for devouring fruits of different kinds—the golden-winged Woodpecker, Yellow-Hammer or Flicker (*Picus auratus*), the Red-headed Woodpecker (*Picus erythrocephalus*), and the Pileated Woodpecker (*Picus pileatus*). And there is a single species, the Yellow-bellied Woodpecker (*Sphyrapicus varius*)—generally known as the "Sapsucker," though many writers incorrectly give this name to the innocent Downy Woodpecker, *Picus pubescens*—which bores horizontal rows of holes in the bark of various trees, for the sake of the sappy inside bark which he extracts from the bottom thereof.* The first group are universal friends; the second are obnoxious to the fruit-grower, but otherwise useful; the last is to be exterminated without mercy wherever he is found, even in the judgment of Dr. Hoy of Wisconsin, who was the first to demonstrate scientifically the very peculiar habits of the species.

But it does not follow, because a particular species of bird feeds exclusively upon insects, never molesting the Farmer's grain or the Orchardist's fruit, that therefore it must necessarily be beneficial to mankind. We must prove in addition that it destroys a great many more plant-feeding insects, than it does Cannibal and Parasitic insects, before its good character can be considered as firmly established. And this is where the evidence almost universally breaks down, and where a long series of careful experiments is required, before we can arrive at any definite conclusion on the subject. Many years ago I saw a French work, giving an account of the contents of the craws of a great variety of European small birds, of each of which numerous specimens had been killed and dissected for that express purpose. The author was a zealous advocate for the preservation of birds, but though doubtless a good ornithologist he appears to have known but little about Entomology. For among the noxious insects which he enumerated with great gusto, as found in the craws of his little friends, he mentioned many species, for example the *Agrion* or Devil's Darning Needles, which are decidedly beneficial by preying upon noxious insects. Again, no group of birds is more exclusively insectivorous than the Swallows; for they none of them ever touch either fruit or grain or any other crop. At first sight, therefore,

* As this fact is still disbelieved by some, and was formerly disbelieved by myself, it may be as well to add, that Dr. Hull says that he has several times actually found cambium in the bill and in the crop of this bird. (*Agric. Rep. Mo. Append. p. 345.*)

we should be inclined to characterize them as universally beneficial to mankind. Yet on one occasion, as I was advancing, net in hand, to capture a large Dragon-fly (*Anax junius*), a Bank Swallow (*Hirundo riparia*), just as I was only a yard or two from my game, swooped in like a flash of lightning under my very nose and robbed me of my prey. Now I incline to believe that this large insect devours as many Flies, Gnats and Musketoes in the course of a day as the Swallow could have done; and if so, there was certainly a heavy item to be posted up against the bird on the Debtor side of the account.*

On the whole—putting any damage done to the Farmer's grain and corn, or to the Orchardist's fruit, out of the question for the present—I do not think that we are entitled to assume that any particular species of bird is a Public Benefactor, until we know by the results of numerous experiments, not only that it feeds upon insects, but that it destroys at the very least thirty times as many Noxious Insects as it does Beneficial Insects. For assuming, what I believe to be very near the truth, that the number of Noxious Species of Insects is to that of Beneficial Species as three to one, we must also take into account the further fact that, on the average, Noxious or Plant-feeding species are very much more numerous in individuals than those species which prey on them, just as in most places the Rats and Mice greatly outnumber the Cats. Suppose that, on the average, they are ten times as numerous, which is certainly, I think, much within bounds. Then it will follow that, out of a large lot of individual insects indiscriminately captured, the plant-feeding or injurious individuals will be on the average thirty times as numerous as the individuals that prey on them, the plant-feeding species by the supposition being thrice as numerous, and the individuals of each plant-feeding species on the average ten times as numerous. Hence it results that, unless an insect-devouring bird is found to destroy considerably more than thirty times as many Noxious Insects as it does Beneficial Insects, it is not on the whole useful to man; and if it destroys considerably less than the above proportion, it is decidedly injurious to man. For in the latter case, instead of inclining Nature's scales in favor of the Agriculturist, it inclines them the other way; and if the same process were repeated by other birds to an indefinite extent upon all sides, the final result would be that every Beneficial Insect would be swept away from off the face of the earth, while there would be a large residuum of Noxious Insects to increase and multiply in

* Mr. Glover, the Entomologist of the Agricultural Bureau, found the stomachs both of humming birds and of robins to contain spiders. Now spiders are universally carnivorous, and, so far as they prey upon noxious species of insects, beneficial to the Agriculturist. Again, in the stomach of a Red-bellied Woodpecker killed in December he found a species of wasp belonging to the genus *Polistes*. Now I have myself seen in South Illinois *Polistes rubiginosus* (St. Fargeau) devouring a green caterpillar $\frac{1}{2}$ inch long, and probably other species of the genus have similar habits. (See *Agric. Rep.* 1865, pp. 33, 39.)

future seasons, without any check whatever from their Insect foes.

Mr. J. A. Allen, of Massachusetts, has obligingly furnished me with the following list of birds, which he has observed to prey on the Apple-tree Plant-louse during the autumn months and especially in October: The Pine Finch (*Chrysomitris pinus*), the Yellow-Bird (*Chrysomitris tristis*), the Purple Finch (*Carpodacus purpureus*), the Snow-Bird (*Junco hyemalis*), the Field Sparrow (*Spizella pusilla*), the Chipping Sparrow (*Sp. socialis*), the Tree Sparrow (*Sp. monticola*), the Song Sparrow (*Melospiza melodia*), and the White-throated Sparrow (*Gonotrichia albicollis*). As Mr. Allen expressly states, that he found plant-lice in the stomachs of many of these birds on dissection, there can be no doubt of the fact that they eat Plant-lice. But do they not also eat those bitter enemies of the Plant-lice, the larvæ of the Ladybirds and of the Lace-wing Flies and of the *Syrphus* flies? To refuse a good fat fleshy white *Syrphus* maggot, when it lies just under his bill, would, I suspect, require more philanthropic self-control, than mortal Sparrow was ever yet possessed of. And perhaps—if I may be pardoned for such a malignant and slanderous supposition—some of Mr. Allen's birds took the *Syrphus* maggots exclusively, and refused the Plant-lice, as "too small business" to bother their beaks with.

A great deal has been said of late, about importing into this country the European House Sparrow to destroy our insect enemies, and according to my venerable friend, Dr. Kirtland, of Ohio, "it is now breeding successfully on Staten Island, N. Y." (*N. Y. Trib.* Feb. 2, 1866.) But I agree with a writer in the *Horticulturist*, (Nov. 1866,) that we ought to think twice before we import a bird of so doubtful a character. So far as a recollection of thirty years standing goes, the House Sparrow is an unmitigated pest in England in Farmers' Stack-yards, pertinaciously pulling out the straws one by one from a grain-stack, and feeding at his leisure upon the grain which he thus secures for his own liquorish chops. It is not, however, the European House Sparrow, as the writer in the *Horticulturist* suggests, but the European Bullfinch that feeds upon tender fruit-buds in early spring, before they expand into blossom. Many a time, when I was a schoolboy of eight years old in a Village School in England, have I seen my worthy schoolmaster rise in hot haste from his elevated chair in April and May, to scare away the Bullfinches out of his Gooseberry bushes.*

There is one fact which has always struck me as adverse to the fashionable theory, that, without the presence of numerous small birds, noxious insects cannot effectually be checked. Throughout a

* According to Mr. Glover, we have birds in North America with the same habits as the European Bullfinch. For the Purple Finch or American Linnæ is said by him to feed very largely on the fruit-buds of the peach; and according to the same writer, "the Ruffed Grouse, or Pheasant of the middle and western States, and Partridge of the north, sometimes does much damage to orchards by devouring the buds of apple-trees." (*Agr. Rep.* 1865, pp. 41, 44.)

space of three or four miles round Rock Island, Ill., there is scarcely a small bird of any kind to be met with at any time of the year, except Swallows and Martins and birds of passage on their travels, in consequence of the hosts of idle gunners from the city who are all the time making war upon them. Yet I could never perceive that Noxious Insects are more numerous or more destructive in this vicinity, than in localities where small birds abound. Possibly, however, this may be due to the insect-devouring propensities of the very large number of Dragonflies, or Snake-feeders as they are absurdly called, (*Libellula* family), and Devils Darning Needles, (*Agrion* family), which breed in the rivers that surround us on both sides, and in our numerous Bayous and Swamps.

B. D. W.

ANSWERS TO CORRESPONDENTS.

J. Pettit, C. W.—Your insects are named as follows: 1st. *Elaphrus cicatricosus* Lec. 2nd. *Lebia scapularis* Dej. 3rd. *Helophorus scaber* Leconte, kindly determined by the describer. 4th. A variety of *Clerus nigripes* Say, according to Leconte, to whom I forwarded a specimen. It differs from the normal form in the anterior $\frac{1}{2}$ of the abdomen and elytra and the entire head and thorax being black instead of red both above and below. Several years ago I took hundreds of specimens of the true *nigripes* off an ash-tree in April, where the larva had evidently been preying upon the larva of *Hylesinus aculeatus* Say, which occurred on the same tree in similar profusion, issuing out of numerous holes in the solid wood. Every one of these specimens was of the normal color, with no perceptible variation. Hence, I am disposed to regard the so-called variety as a distinct form. Whether or not you choose to call it a distinct species, depends upon the meaning you choose to attach to the word "species," and, after all, is merely a question of words and not a question of facts. For myself, I fully believe that these two forms, as well as all the species of the genus *Clerus*, are aboriginally descended from common parents. But still, as they do not appear to graduate into one another, or to occur in company with each other, I should call them distinct species, though the differences are merely colorational; just as I believe, with all the best authors, that *Colias philodice* is specifically distinct from *C. eurytheme*, though these two butterflies merely differ in the one being sulphur-yellow and the other a deep rich orange-color. 5th. *Hydrocera pallipennis* Say. 6th. *Photinus neglectus* Lec. 7th. *Anobium notatum* Say. I thought Say's description rather inapplicable, but Dr. LeConte tells me that he has typical specimens from Melsheimer and that it is rightly named. 8th. *Cryptarcha ampla* Erichs. 9th. *Platydemia flavipes* Fabr. 10th. *Gaurates cyampennis* Say. 11th. *Lepidura capitata* Newman, determined by LeConte. Very like *L. americana* Hald., of which I took last year many specimens issuing out of a decayed white Elm, but differs in being much smaller, in the elytra being much more coarsely punctured, and especially in the space behind the eyes being much less inflated. 12th. *Admonia externa* Say. 13th. *Tingis ciliata* Say. You say that you found this little Bug "in great numbers under the bark of Buttonwood [or Sycamore] trees, in the winter, but that you never met with it in the summer." You will find it in the latter part of the summer, in profusion, on the under surface of the leaves of the same tree, in company with its larva, lazily sucking the sap therefrom just like an *Aphis*. I was not previously aware that this insect hibernated in the imago state, and the fact is an interesting one. Many *Aphis*, and probably all that feed upon annual plants which perish in the autumn, hibernated in the imago state. Otherwise it would be difficult for such species to survive from year to year.

Of the above 13 insects, Nos. 2, 5, 6, 8 and 13 are common with me. Nos. 1 and 12 are very rare with me. Nos. 9 and 10 do not occur in Illinois, so far as I know. And Nos. 3, 4, 7 and 11 are new to my collection. I shall be pleased to hear again from you, as often as you wish.

Miss Marion Hobart, Ill.—The apple-tree Barklouse which you send is the terrible Imported Barklouse, (*Aspidiotus conchiformis*), which is just reaching the western extremity of Northern Illinois in the course of its travels westward. When first introduced into any neighborhood, it is certain death to any tree that it attacks, unless artificially destroyed; but in the course of seven or eight years, the Ladybirds that prey on it increase so much as to measurably check it. In a paper which appeared, with illustrations, in the last number of the *PRACTICAL ENTOMOLOGIST*, p. 32, I have given the best directions in my power for destroying this abominable pest; but to make the thing complete, there is required a series of experiments which would absorb much time and trouble, and which at present it is "nobody's business" nearly twice as long as wide, and when immature of a grass-green color, are, as you rightly suppose, the eggs of the common Plantlouse of the Apple-tree, (*Aphis mali*). On the general subject of these Plantlice, I have prepared a long illustrated Paper, which appears in this number of the *PRACTICAL ENTOMOLOGIST*. Ladybirds are said to feed upon plantlice, eggs of insects, &c., in the perfect or beetle state, but not to nearly so great an extent as their larvæ do.

Geo. Scarborough, Kansas.—If you wish to go deeper into Entomology than the works you already have enabled you to do, you had best take up some particular Order of Insects to begin with. Otherwise the field is so enormously wide, that it would require a whole Number of the *PRACTICAL ENTOMOLOGIST* to catalogue the requisite books. Many of these books, too, are in Latin, French and German, and I do not know whether you read these languages. Coleoptera is the only Order of Insects that has as yet been tolerably well worked out in this Country; and even in that Order there are some groups, for example the Snout-beetles (*Curculio* family), about which comparatively little is known by any N. A. Entomologist. Say's works treat pretty fully of all the Orders except Lepidoptera, and contain many colored plates; but you cannot use Say to any good advantage without a previous knowledge of other authors. The price of Bailliere Brothers, Works is \$20, and they may be had of Bailliere Brothers, New York. Even in England, where Entomology has been extensively studied for more than half a century, they have no reliable work which treats exhaustively of all known English Insects, as Gray's Botany does of all Phanerogamic Plants found within a certain district in the United States. And even in England there are only a few Orders of Insects—Coleoptera and Lepidoptera and to a certain extent, Hymenoptera—that have been pretty well worked out. You must not be surprised therefore, that the Entomological Student is surrounded on all sides by difficulties in this country, where ten years ago an Entomologist was almost as rare a bird as a Black Swan.

Answers to Thomas T. Smith, W. C. Fish, George Haines, C. Moran and L. D. Morse will be given in the next number.

Fruit-growers' Associations.

One of the most practically useful movements of the day, is the formation of Local Associations among men devoted to Fruit-growing in various parts of the country. By this means, not only is the experience of each individual member thrown into the common stock, but by the adoption of proper rules and regulations, they are enabled to concentrate their energies against any particular Noxious Insect. For example, if only a single Orchardist destroys all the Caterpillar nests on his apple-trees, it does comparatively but little good; but if a whole neighborhood unite in so doing, the caterpillar will soon become quite scarce. The Fruit-growers' Association, of South Illinois, held a very interesting meeting in December, 1866; and we notice that the Lake Shore Grape-growers' Association will meet at Cleveland, Ohio, on the 3rd Wednesday of February, 1867. Success to them both.

Errata.

Vol. II, Page 27, column 2, line 7 from bottom, before "6th, *Trogosita*" insert "5th, *Calandra* (*Sitophilus*) *granaria*, the Grain Weevil." Page 35, column 1, line 15, for "1861" read "1867."

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VOL. II, No. 5.

FEBRUARY, 1867.

WHOLE No. 17.

The Practical Entomologist.

PHILADELPHIA, FEBRUARY, 1867.

The TRUE THRIPS and the BOGUS THRIPS.

Published by the ENTOMOLOGICAL SOCIETY OF PHILADELPHIA, at their Hall, No. 518 South Thirteenth Street, Philadelphia.

Edited by BENJ. D. WALSH, Rock Island, Illinois.

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To Subscribers in Canada.—REV. CHARLES J. S. BETHUNE, (Secretary of the Entomological Society of Canada,) CREDIT, C. W., has very kindly undertaken to forward to their respective destinations all such copies of the PRACTICAL ENTOMOLOGIST as may be subscribed for through him by gentlemen residing in Canada. Those desirous of subscribing in this manner will please send him their name and address, together with sixty-two cents for each copy they desire to take, namely, fifty cents for the regular subscription money and twelve cents for the amount of the Canadian postage that has to be prepaid. By this arrangement they will save the ten cents postage required to write directly to the Society at Philadelphia, U. S., less the two cents postage to Cobourg, C. W., and they will also save the difference between the Canadian and the International postage, which is twelve cents; making a total saving for each year of twenty cents.

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INDEX TO VOLUME I.—At the time No. 12, of Vol. I of the PRACTICAL ENTOMOLOGIST was printed, it had not been decided whether to close the Volume with that number, or to continue it to the end of the second year; under those circumstances our Index and Title were not issued. But having since concluded to commence a new volume with the second year's issue, an Index and Title page to Volume I have been printed, and will be furnished to those wishing a copy.

NOTICE.

We are compelled to discontinue the PRACTICAL ENTOMOLOGIST to several subscribers who have failed up to this day to remit their subscription money. This is probably a mere oversight on their part; but labor and materials are too high, and our terms are too low, for us send the PRACTICAL ENTOMOLOGIST to any one on credit.

Throughout the Valley of the Mississippi, vine-growers and others in their Horticultural Meetings are perpetually speaking of the "Thrips," as an insect very destructive to the grape-vine. Some of them, indeed, occasionally call it a "Thrip," erroneously supposing that "Thrip" is the singular form and "Thrips" the plural form of one and the same noun; just as young beginners will sometimes talk of a "specie" of insects, supposing "specie" to be the singular and "species" the plural; and just as I once heard an indignant Irishman exclaim—"Faith, now, Judy, and you are a disgrace to your 'seck' entirely"—Paddy supposing that "seck" was the singular form and "sex" the plural. What particular species of insect is thus designated by Western Horticulturists, and even to what Order of Insects it belongs, is still a profound mystery to the Entomological world. I have, time and again, in the columns of the PRACTICAL ENTOMOLOGIST, requested vine-growers to send me specimens, in order that the enigma might be solved. But no one has yet taken the trouble to comply with my request. Since, therefore, the mountain will not come to Mahomet, Mahomet must go to the mountain. Since the vine-growers will not explain to me what they mean by a "Thrips," I will show them pictures of two very distinct species of insects, one or other of which has probably been mistaken by them for a true "Thrips," and I will also show them a picture of a true "Thrips," that they may see how very different it is from any insect that really infests the Grape-vine.

Centuries ago, when Catholic Bishops sometimes went into the army, like the notorious Bishop Polk of confederate memory, a certain holy Bishop had been taken prisoner on the field of battle by a King of England. Forthwith the Pope of Rome demanded, that his dear son in God should be released without price and without ransom. By way of practical answer, the King sent to the Pope the blood-stained cuirass of the Prelate, with the puzzling question—"Judge thou, if this be thy son's"

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Practical Entomologist.

A MONTHLY BULLETIN,

Published by the Entomological Society of Philadelphia, for the dissemination of valuable knowledge among Agriculturists and Horticulturists.

VOL. II, No. 5.

FEBRUARY, 1867.

WHOLE No. 17.

The Practical Entomologist.

PHILADELPHIA, FEBRUARY, 1867.

The TRUE THRIPS and the BOGUS THRIPS.

Published by the ENTOMOLOGICAL SOCIETY OF PHILADELPHIA, at their Hall, No. 518 South Thirteenth Street, Philadelphia.

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INDEX TO VOLUME I.—At the time No. 12, of Vol. I of the PRACTICAL ENTOMOLOGIST was printed, it had not been decided whether to close the Volume with that number, or to continue it to the end of the second year; under those circumstances our Index and Title were not issued. But having since concluded to commence a new volume with the second year's issue, an Index and Title page to Volume I have been printed, and will be furnished to those wishing a copy.

NOTICE.

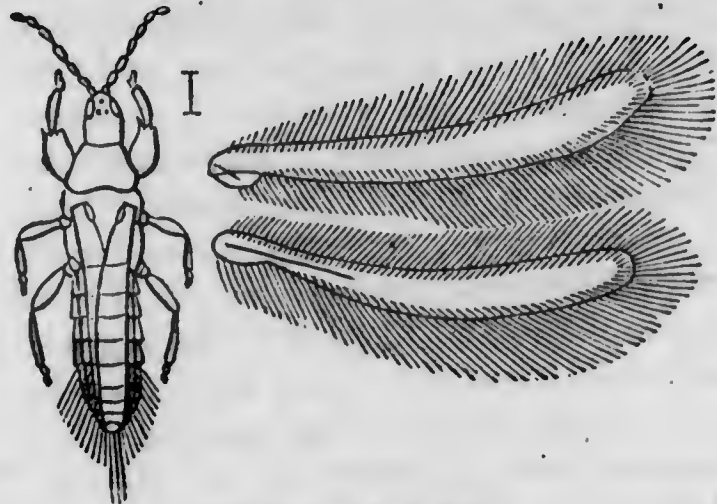
We are compelled to discontinue the PRACTICAL ENTOMOLOGIST to several subscribers who have failed up to this day to remit their subscription money. This is probably a mere oversight on their part; but labor and materials are too high, and our terms are too low, for us send the PRACTICAL ENTOMOLOGIST to any one on credit.

Throughout the Valley of the Mississippi, vine-growers and others in their Horticultural Meetings are perpetually speaking of the "Thrips," as an insect very destructive to the grape-vine. Some of them, indeed, occasionally call it a "Thrip," erroneously supposing that "Thrip" is the singular form and "Thrips" the plural form of one and the same noun; just as young beginners will sometimes talk of a "specie" of insects, supposing "specie" to be the singular and "species" the plural; and just as I once heard an indignant Irishman exclaim—"Faith, now, Judy, and you are a disgrace to your 'seek' entirely"—Paddy supposing that "seek" was the singular form and "sex" the plural. What particular species of insect is thus designated by Western Horticulturists, and even to what Order of Insects it belongs, is still a profound mystery to the Entomological world. I have, time and again, requested vine-growers to send me specimens, in order that the enigma might be solved. But no one has yet taken the trouble to comply with my request. Since, therefore, the mountain will not come to Mahomet, Mahomet must go to the mountain. Since the vine-growers will not explain to me what they mean by a "Thrips," I will show them pictures of two very distinct species of insects, one or other of which has probably been mistaken by them for a true "Thrips;" and I will also show them a picture of a true "Thrips," that they may see how very different it is from any insect that really infests the Grape-vine.

Centuries ago, when Catholic Bishops sometimes went into the army, like the notorious Bishop Polk of confederate memory, a certain holy Bishop had been taken prisoner on the field of battle by a King of England. Forthwith the Pope of Rome demanded, that his dear son in God should be released without price and without ransom. By way of practical answer, the King sent to the Pope the blood-stained cuirass of the Prelate, with the puzzling question—"Judge thou, if this be thy son's

coat or not." So now do I send the picture of the true "Thrips" to the vine-growers, and enquire of them—"Judge ye, if this be the image of your foe, or whether you have not confounded one of your best friends with one of your bitterest enemies."

The true *Thrips* of Entomologists, of which the annexed highly-magnified figure will give a very good idea—the hair-line showing its real length, and the two wings on the right side being still more



Color—blackish.

highly magnified, and detached from the body to show their hairy fringes—is an exceedingly minute, four-winged, active, blackish insect. In the larva or imperfect state it differs chiefly in having no wings, and in being then of a reddish or purplish color, like the larva of a Chinch-bug, (*Micropus leucopterus* Say.) There are a great many species of them, belonging to different genera of the *Thrips* family; but as no one hitherto has investigated and named our common North American species, we may for the present call them all *Thrips*.

Naturalists hitherto had always supposed, that these *Thrips* were vegetable-feeders and injurious to plants. In the *Proceedings* (III, pp. 611—612) I suggested "that they are generally, if not universally, insectivorous, and that those that occur on the ears of the wheat, both in the United States and in Europe, are preying there upon the eggs or larvæ of the Wheat Midge (*Diplosis tritici*), and are consequently not the foes, as has been generally imagined, but the friends of the farmer." At the conclusion of this passage I gave several reasons for my belief; and I have since found *Thrips* preying upon the gall-making larvæ of more than twenty different galls, growing on different trees and other plants; so that there is now no manner of doubt in my mind, that *Thrips* is a true Cannibal insect. The importance of this discovery may be seen at once. The larva of a minute flea-beetle (*Haltica*) often grievously infests clover-blossoms, feeding upon and destroying a large portion of the seed. A *Thrips* occurs also sometimes in large numbers on these same blossoms. Hitherto, farmers, when they detected *Thrips* on their clover, had supposed that a new enemy was invading it. Now, when they see the *Thrips* there, they may go to bed and sleep comfortably, satisfied that the depredations of the real enemy are about to be checked. And in the same way, whenever in wheat fields infested by the larva of the Wheat Midge, (popularly known in the East as the "Milk Weevil" and in the West as the "Red Weevil,") *Thrips* are discovered in the ears of the infested grain, the farmer

may know that a friend has come to his rescue, and that the Great Author of Nature is saying to the little pest, through the mouth of the minute and almost microscopic insect which He has appointed to do His work—"Thus far shalt thou go, but no farther, and here shall this grievous Plague of Flies be stayed."

I may remark here, that I have found a few *Thrips* haunting the leaf-galls, which have so abounded everywhere in 1866 on the Clinton grape-vine, and which have been named *vitifoliae* by Dr. Fitch.* There can be little doubt that they were preying here upon the minute Barklouse, which produces this leaf-gall. I have also noticed them to be very abundant in the flowers of the Bracted Bindweed, (*Calystegia sepium*.) As a small plant feeding beetle (the *Conotelus obscurus* of Erichson) also occurs in great numbers in the same flowers, it is not improbable that the *Thrips* may feed upon its larva.

So much for the true *Thrips*. Now for a notice of the two very distinct insects, which I guess to have been mistaken for *Thrips* by the vine-growers. I am sorry that I can only guess in this matter. But it is not I, but Congress that is to blame here. Congress ought to have long ago invested the PRACTICAL ENTOMOLOGIST with plenary power to send for persons and papers, and to commit any body to jail, for contempt of court, that refuses to answer such questions as may be propounded to him. In the present inefficient state of the law, I ask the vine-growers what on earth they mean by a "Thrips?" They defy the Great High Court of Science, and contemptuously refuse to answer the question. And yet—will it be believed in future ages?—the Court has not even power to fine the recusant witnesses a few thousand dollars, much less imprison them till they come to their senses, and humbly answer the important questions which have been propounded to them.

The annexed figure represents the Grape-vine Flea-beetle, (*Haltica chalybea*), in its perfect or winged state. As will be noticed, the hind thighs are enlarged, so that the insect can jump quite vigorously; and of course it is to this jumping propensity that the name of "Flea-beetle" refers. The figure is considerably magnified, to exhibit the true shape and structure of the insect, but the annexed hair-line shows its natural length. The larva, (which is not shown in the figure,) is light-brown, with numerous rows of black spots, and has six legs in front and a pro-leg or sham leg at its tail. Except that it is of course much smaller, it is not very unlike the larva of the New or Colorado Potato Bug, as figured in the PRACTICAL ENTOMOLOGIST (Vol II, p. 13.) In April this larva



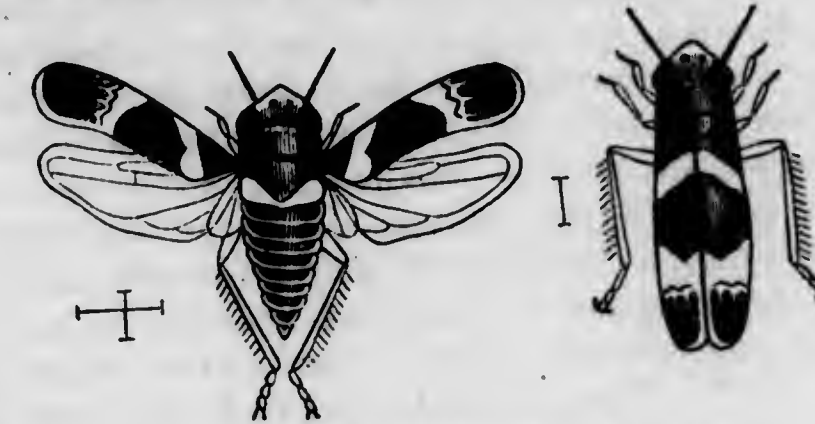
Color—steel-blue.

* According to the great Missouri Vine-grower, Mr. Geo. Humann, this same gall is also found on the Taylor grape-vine. As I have already stated, I also found it in limited numbers on the Delaware grape-vine. It does not appear to occur on any other cultivated variety; so that Dr. Shimer's apprehensions that it will eventually prove as destructive to the grape-vine, as the Barklouse is to the Apple-tree, are measurably unfounded. (See P. E. II, p. 18.)

is very hard on the buds of the grape-vine, and afterwards on the leaves. Those who wish to know more about it, are referred to an excellent article on this insect by Mr. J. Kirkpatrick, which has been reprinted in the PRACTICAL ENTOMOLOGIST (I, p. 40.)

Well, Messieurs vine-growers, is this your *Thrips*? I should say it must be Mr. Meeker's *Thrips*, because he expressly says that his "Thrips" "eats the leaves till they appear like shreds," (see PRACTICAL ENTOMOLOGIST, Vol. I, pp. 21—2,) and the insect to be next noticed has no jaws at all to eat with, only a beak to suck sap with. Likely enough, however, different vine-growers call different insects by one and the same name—"Thrips." So we will 'bout ship and try another tack.

The annexed figure represents the Leaf-hopper of the Grape-vine, the *Tettigonia (erythronera) vitis* of Harris. That to the left shows the perfect insect with expanded wings; that to the right the same insect with its wings closed. The hair-lines show the natural length of the insect, the figures themselves being considerably magnified. In



Colors, pale-yellow and blood-brown.

Harris's *Injurious Insects* (Plate III, fig. 5,) may be found a very poor colored figure of this same species, but the wings, as represented there, are out of all drawing, and the coloring is exaggerated. This Leaf-hopper is one out of five quite distinct species—all belonging to the same genus, and all of the same shape and size, but differing in their coloring—which often swarm in varied proportions on the leaves of the grape-vine in the U. S. Two of the five have been described by Dr. Fitch as *Erythronera vulnerata* and *E. tricolorata*, and two by myself as *E. ziczac* and *E. 8-notata*; and I have recently received from Canada two other species, also distinguished by their coloring alone, which are as yet undescribed and unnamed, and which swarm there on the grape-vine in company with some of our U. S. species. In all the above species the larva differs from the perfect winged insect chiefly in having no wings, and is equally destructive to the vine, pumping away in great crowds at the sap upon the lower surface of the leaf, and causing there numerous brown dead spots, so as to often kill the leaf entirely, and sometimes, when the insects are exceedingly abundant, to kill the whole vine. Both larva and perfect insects jump like any flea, but of course it is only the perfect winged insect that has the power of flying. Unlike the Flea-beetle that we were looking at just now, the hind thighs are not thickened, but the entire hind leg is greatly elongated and armed with rows of little thorns, as in the

Grasshoppers, which enables it to jump with great vigor. Like almost all other species belonging to the Order Homoptera, they have a peculiar habit of running sideways like a Crab; and when they see you looking at them upon one side of a leaf, they will often dodge round quickly to the other side, as a squirrel dodges round to the opposite side of the trunk of a tree when he sees that he is noticed. Insects are more wide-awake than people generally suppose. The high and low vulgar despise them because they are comparatively small. But their habits are as interesting, and their structure as complicated and wonderful, as those of the higher and larger animals. In some cases their structure is even more complicated than in the higher animals; for Lyonnnet demonstrated that there were 4000 distinct muscles in the body of a single caterpillar, and in Man—the highest of created animals—there are only 529 muscles. God took just as much pains in making one of these poor despised little creatures, as in making a Whale or an Elephant. Yet he that dissects an Elephant is, in the popular eye, a distinguished and a learned man, and he that dissects a Fly is a fool and a "bug-hunter!"

I said just now, that there were no less than seven distinct species of Leaf-hoppers, all of the same shape and size, but differing in coloration, which commonly infested the Grape-vine in North America. "But," some one will reply, "may not some of these seven be mere varieties, and not true species?" The answer is, that I have carefully compared together scores, and in some cases hundreds of each supposed species, taken on the same day, off the same grape-vine, and clearly ascertained that there are no intermediate grades, and that one supposed species does not fade away gradually into another. Neither can it be the case, that any two supposed species are merely the opposite sexes of one and the same species; for in this whole Order of Insects the sexes are distinguished with the greatest ease, and both males and females are found belonging to each of the seven species referred to above. Hence we may infer with certainty that they are true species, not mere varieties, and that each species, as a general rule, interbreeds with itself alone. For, if any two of the seven bred promiscuously with one another, we should inevitably often find intermediate varieties; just as when you cross a Fantail Pigeon with a Tumbler Pigeon, you produce a mongrel pigeon which is neither Fantail nor Tumbler, but something intermediate between the two.

And now once more, Messieurs Vine-growers, is this your "Thrips?" Or, if neither of the above two is your "Thrips," what in heaven's name is it?

Postscript.—Since the above was in type, the mystery has been cleared up—the enigma has been unriddled—and like Archimedes, when he had solved his knotty problem, we may exclaim EUREKA! The so-called "Thrip" of the Western vine-growers, as it turns out, is really nothing but Grape-vine Leaf-hopper, (*Tettigonia vitis*)—at least so says the Committee on Entomology in their Report to the Missouri State Horticultural Society. (*Aggr. Rep. Missouri, 1865, App. p. 342.*) Now then at last we know what a "Thrip" is; and the patient reader, who has joined me in this Pursuit of Knowledge under Difficulties, can see the

picture of a veritable "Thrip" above. Prettily as he is spotted, he is a very ugly beast to have in great swarms on one's grape-vines. B. D. W.

UNIVERSAL REMEDIES.

There is scarcely a quack medicine advertised in the newspapers, that is not good for some disease or other, under some peculiar circumstances. The mischief is, that such remedies are usually advertised, as being sure to cure all diseases whatever under all imaginable circumstances. Gout, rheumatism, neuralgia, dyspepsia, pains in the head and pains in the great toe, softening of the brain and ossification of the heart, are all warranted to be cured by the same Infallible and Universal Elixir. Just so with noxious insects. We perpetually see remedies proposed, not for the destruction of some particular insect, the habits and history of which have become well known, but for the extirpation of all insects indiscriminately, no matter what their peculiarities may be. With philosophers of this description the whole vast world of insects is comprehended under the genus "Bug," while in the larva state it is classified under the genus "Worm," sometimes, for the sake of variety and euphony called "Grub;" but whether the "Bug" develops into the "Worm," or the reverse, or sometimes one and sometimes the other, "the said deponent sayeth not." Take the following, for instance, which is now going the rounds of the Agricultural Press, as an amusing specimen of a universal remedy against the genus "Worm:"

PROTECTING TREES AGAINST WORMS.—The bandage system, which we were the first to suggest some fifteen years ago, and often referred to since, is the only effectual protection we have yet seen against the operations of the worm in fruit trees. We repeat again, that in not a single instance have we ever had a worm in our dwarf pear trees, where this system was properly followed. It is simply to bandage the bottom of the tree with any kind of muslin or cloth, and tie it, letting the bandage be about six inches above ground and two inches below. It should be applied in February, or as soon as the ground is in a fit condition to go upon. These bandages should be removed at the end of October. As long as this is continued we defy the worm. The bug lays its eggs an inch or two above the ground, early in the spring, that is, as soon as the warm days in March will admit of its coming forth from its winter quarters; the eggs are soon hatched by the sun, being laid on the sunny-side of the trunk, and the young grub finds its way down to the soft bark beneath the soil, where it gradually works its way in. The bandage prevents both the laying of the eggs and the descent of the grub. Let doubters try it. One man will bandage two hundred trees in a day. We have no doubt it will also protect the peach tree in the same way.

"The worm in fruit-trees!!!" As if fruit trees were not afflicted by hundreds of different "worms," differing from each other in size, shape, color, habits, length of life, time of coming to maturity, &c., as much as a Horse differs from a Hog! Yet the universal Bandage System is warranted to kill them all. Does the Apple-worm bore your apples? Bandage the but of the tree and he perisheth forthwith. Does the Web-worm spin his web in the branches? Bandage the but, and he dieth immediately. Does the caterpillar known as the Red-humped Prominent, or the Yellow-necked worm, strip the leaves off? Bandage the but, and *hey presto!* he quitteth his evil ways. Does the Buprestis Borer bore into

the upper part of the trunk or into the branches? Still you must bandage the but with the same universal calico, and in a twinkling he vomoseth the ranch. Be the disease what it will, the Universal Patent Never-failing Pill is certain-sure to extirpate it—provided you take pills enough. In the words of the advertisement, "As long as this is continued, we defy the worm." In obstinate cases, it may perhaps be necessary to bandage the whole tree—trunk, branches, twigs and all—but if you only apply bandages enough, the Great Bandage Anthelmintic Vermifuge is sure to be a specific against the genus "Worm." The genus "Bug" may perhaps require a distinct prescription—something in the nature of a Cataplasm or an Emollient Lotion.

In sober serious earnest, this "Bandage system" is available against just two, and only two insects—the striped Borer of the Apple-tree (*Saperda vittata*), and the Peach-tree Borer (*Trochilium exitiosum*). In both these two species, the mother insect has the habit of laying its eggs almost exclusively at the but of the infested tree, and any such substance as tarred paper, cloth bandages, straw wrappings or the like, placed on the but of the tree, prevents that mother insect from reaching the particular spot, where Nature directs her to deposit her eggs. Limited in this manner, the remedy is as old as the hills, and would not be sufficiently "sensational" to be copied by a single Agricultural Journal. Blazoned forth as a universal remedy against every species of the great genus "Worm," it tickles the popular palate, and runs like wildfire through the Agricultural Press. In the former case it is indeed true—but then it does not make the reader open his eyes wide with astonishment. In the latter case it is an absolute and unmitigated falsehood; but then it makes people stare and crowd into the Circus-tent, to see the wonderful performance; and in the meantime the Ticket-seller has his hands full of business.

Long live King Humbug! He still feeds fools on flapdoodle, and many of them have large and flourishing families, who will perpetuate the breed to the remotest generation. B. D. W.

POISONING NOXIOUS INSECTS.

The following is from a correspondent of the Agricultural Bureau, in Trimble Co., Kentucky, and appears in the Monthly Report for September, 1866, p. 343:

"The tobacco worm is the most formidable adversary the farmer has to contend against in the culture of the weed, and this season many planters in this country and elsewhere, are providing and administering poison to the fly which lays the egg. The process generally pursued is to drop a few drops of ratsbane, or other poison, in a liquid form, into the flower of the Jamestown weed, wild morning-glory, &c., into which they are sure to insert their large bills and die almost instantly.—With the death of each fly, or miller, as they are termed, three to five hundred eggs are destroyed, each of which produces a worm."

This is an entirely new idea, so far as I know, and may probably be carried out in other directions so as to prove very serviceable. For example, the notorious Cotton Caterpillar or Cotton Army-worm,

(*Anomis [noctua] xyliana* Say), which has this year done millions of dollars' worth of damage to the Cotton crop, is treble-brooded, the first brood of larvae appearing towards the end of June and during July, and hatching out from eggs deposited by those few moths which have managed to survive the winter; as is also the case with the common house fly, the different meat-flies, &c. Now, if this first brood can be wholly or partially destroyed, either in the larva or moth state, it is evident that in a proportionate degree the propagation of the two succeeding broods will be put a stop to, and the evil nipped in the bud. In order to effect this, I should recommend a quantity of coarse molasses—the coarser and ranker the better—to be mixed with a little rum and a small quantity of some poisonous drug in a fluid state. Then, at the time of the year when the first brood of the cotton moths may be expected to make their appearance, and especially on warm, dark, cloudy evenings, when all these night-flying moths come out in great force, smear the mixture on the trunks of trees, or on a few boards set up for the purpose, in the cotton fields. The moths will be attracted by the smell of the rum and the sweet taste of the molasses, and will fall victims to their own gluttony. Of course, if every female cotton moth could be thus destroyed before it laid any eggs at all, the further breeding of this pest of the cotton-planter would be definitively checked. But as this, under ordinary circumstances, is not likely to be the case, it would be advisable to repeat the process through the whole season.*

For many years back, collectors in England have practiced this method of attracting certain night-flying moths, omitting, of course, the poison, as their object is merely to attract the moths, and the killing them is accomplished by other methods, which it is not necessary here to particularize. The idea was first suggested by an English collector's having found that certain moths were attracted in large numbers by an empty sugar-hogshead, and the plan, which is technically termed "sugaring," was first brought to its present state of perfection by the celebrated English entomologist, Doubleday. It has been found, however, that where willows, or ivy, or any other plant peculiarly attractive to the moths, happens to be in flower in the immediate vicinity, the "sugaring" process measurably fails. And in case any such moth-frequented flowers exist near the cotton fields, the cotton-planter who wishes to try the process recommended above must govern himself accordingly. In this, as in so many other instances, a knowledge of the peculiar habits of the insect, which we are attacking, will be found of great practical utility. The trapper and the hunter must study the habits of the wild animals which each is in pursuit of, before he can become a successful trapper or hunter. And just in the same

* I observe that Mr. Glover has hit upon this same idea. Speaking of this moth, he says:—"Could not some favorite aliment be found on which the moth prefers to feed, as in the case of the Tobacco-fly, and then poison them with some effective agent?" (*Monthly Rep. Agr. Dep. 1866, p. 335.*)

way, before we can trap insects successfully, we must become acquainted with all the minutiae of their mode of life.

At first sight it might be supposed, that the above method would be equally applicable to all night-flying moths, for example, to the Apple-worm Moth (*Carpocapsa pomonella*), the Handmaid Moth (*Datana ministra*), the Tent-caterpillar Moth (*Climacampa americana*), the Canker-worm Moth (*Anisopteryx vernata*), &c., &c. But English entomologists, who have been familiar for years with this system of "sugaring," tell us that it is almost exclusively the Owllet-moths (*Noctue*) that "come to sugar," as they phrase it. Now, the Cotton Moth, the Boll-worm Moth (*Heliothis armigera*), the Southern Grass Caterpillar (*Laphygma macra*), our Northern Army-worm Moth (*Leucania unipuncta*), and the various species of Cut-worm Moths (*Agrotis* and *Hadena*), all belong to the Owllet-moths, and may consequently be expected "to come to sugar;" but most of our other noxious moths, including the four referred to above, belong to other families, and would, therefore, not be likely to be entrapped and slain in the manner recommended above. *Verb. sat. sap.* B. D. W.

Bag-worms alias Basket-worms alias Drop-worms. (*Thyridopteryx ephemeraformis*.)

BY S. S. RATHVON, PENNA.

The following passage in the PRACTICAL ENTOMOLOGIST (Vol. II, p. 33) is very likely to lead the reader into a grave error, in regard to the sphere of operations of the insect named therein.

For example, the "Basket-worms" that you speak of, which I suppose are the larvae of *Thyridopteryx ephemeraformis*, otherwise known as "Bag-worms," never have been known, I believe, to attack any of the trees grown in our orchards for fruit.

My attention was first called to this insect upon an Apricot tree, in the summer of 1849, in the City of Lancaster, Pa. The tree stood alone in a yard, and was literally covered with them, and the crop of fruit rendered almost worthless, on account of the early deprivation of the leaves. From that period to the present, I have observed this insect in greater or smaller numbers every year, on the following trees:—Plum, Apple, Quince, Apricot, Cherry, Pear, Linden, Silver Maple, Red Cedar, Locust and Arbor Vitæ. On the Linden and Locust especially, I have found them in thousands, if not tens of thousands, stripping them almost entirely of their leaves. On fruit trees I have found them most abundant on the Apricot and Quince. In a small enclosure of my own, which contained an Apple, a Quince, a Plum and an Arbor Vitæ, they seemed to prefer the latter. I believe I have never seen them on the Peach, and but rarely on the Cherry, and then only in limited numbers.

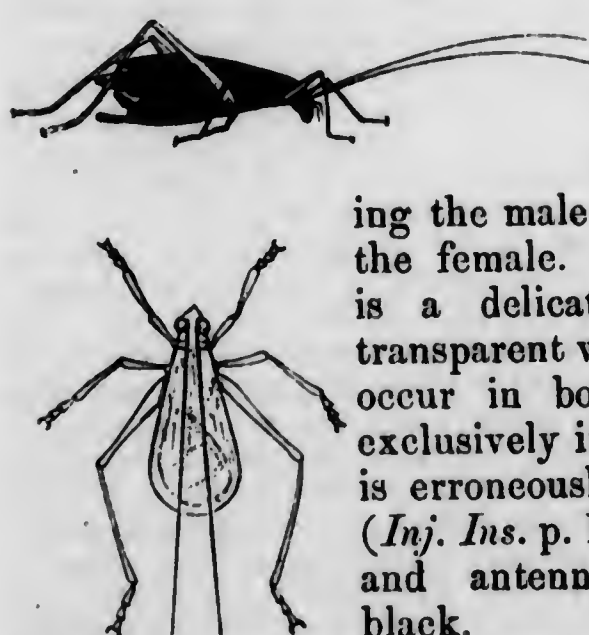
On one occasion I had retained some of the cases or "follicles," inhabited by the wingless female of this species of moth, in my *sanctum*, where they were neglected for a few days. When my attention was directed to them again, I found that the eggs contained in them had hatched, and the young larvae

(which are then black) had each descended by its own silken cord, on some books and papers, on the wall, and on the floor, where they immediately commenced constructing their "habitaacula" (or cases) out of the substances upon which they rested. Some were of leather, some of paper, some of scales of lime, (whitewash,) and others of the straw matting with which the floor was covered. On trees I have seen them appropriate the outer bark of the trunks and branches for the same purpose. With me, they hatched out from the egg state, from the 20th to the 28th of May; and their cases then stand up at right angles to the surface upon which they rest, and look like so many cone-shaped warts or spurs. And they carry them thus until they are from ten to fifteen days old, when they begin to suspend themselves from the underside of the leaves and branches.

REMARKS BY B. D. W.—The reader will be much obliged to Mr. Rathvon for the above correction. Common as this insect appears to be in Pennsylvania, I am not aware of its having been hitherto found in Illinois; and the assertion I made was based entirely upon statements found in books. Speaking of this same insect, Mr. Glover says:—"The drop-worm, as it is commonly called, is occasionally found upon the cotton-leaf, but generally infests the arbor-vitæ, larch, and hemlock-spruce. It is also found upon almost all of the deciduous trees, such as the linden and maple." (See *Monthly Rep. Agr. Dep.* 1866, p. 423, where a figure of the worm and of its singular case, constructed from pieces of leaves, will be found.) From the last Report of the Insect Committee of the Cincinnati Horticultural Society, it appears that 15 cases of this insect were recently collected in Ohio on cedar bushes, "a few in a place, or singly, one upon a bush." Hence it does not seem to be at all common there at present.

HABITS OF THE TREE-CRICKET. (*Ecanthus niveus*.)

The annexed figures, which are copied from Harris, give a very good idea of the common Tree-cricket, the lower figure representing the male and the upper one the female. The general color is a delicate, greenish, semi-transparent white; but varieties occur in both sexes—and not exclusively in the female sex, as is erroneously stated by Harris, (*Inj. Ins.* p. 154)—with the legs and antennæ almost entirely black.



Miss Marion Hobart, of Port Byron, Ill., has ascertained that this insect deposits its eggs in the twigs of Sumac and Hazel, and has kindly furnished me with specimens. The eggs are yellow, cylindrical, but rounded a little at each end, about 0.13 inch long, and six times as long as wide, and strongly resemble those of the Katydid genus *Orchelimum*, as already described by myself. (*Proc. &c.* III, p. 232.) They are deposited in an irregular series nearly an inch long, lengthways of the twig, each egg sloping obliquely downwards towards the pith, and the series being indicated externally only by a slight brown roughness. A correspondent of Dr.

Harris found this insect to lay eggs in peach twigs, but no details of the operation have been hitherto published. A European species is said "to make perforations in the tender stems of plants, and in each perforation to thrust two eggs quite to the pith." (*Harris Inj. Ins.*, pp. 154-5.)

The same lady, as has been already stated, (*PRACTICAL ENTOMOLOGIST* I, p. 126,) found this same insect to feed upon plant-lice during the summer of 1866. As her observations have been continued since, and as I believe them to be perfectly reliable, I subjoin what she says on the subject:

I send you the identical insect that I found depositing its egg in the Sumac twig which I left with you. I kept it caged from October 13th to November 11th, giving it the best bill of fare that I could. There are two kinds of *Aphis*, one of which I find on the Pear-tree, [*Aphis mali*,] and the other on the same grape-vine, [*Aphis vitis*,] that it never refused. I do not find any other kind that is quite to its taste; though, if I remember rightly, I found in the summer that a kind of *Aphis*, which occurs on the Oak, was acceptable to a specimen which I then had in confinement. It will eat apples quite readily, and once when it had had a long fast it nibbled a little dried oak-leaf, which it soon left for the eggs of a moth, (*Orygia leucostigma*.) I have supplied it with a great variety of leaves since, but have never seen it eat any.

The Tree-cricket, therefore, like the Ground-cricket, appears to be rather a general feeder. But its peculiar taste for plant-lice is very remarkable and important. For the future, when these insects are noticed on trees infested by Plant-lice, instead of wantonly destroying them, we must say: "Well done, thou good and faithful servant. Eat your fill and do not spare the vermin. And even if you should occasionally nibble a piece of apple, we shall not grudge it to you, in consideration of your faithful services." B. D. W.

IMPORTING EUROPEAN PARASITES.

In the Compendium of the U. S. Census for 1860, (p. 82,) the New York State Agricultural Society is complimented very highly for its "philanthropic spirit," in having "introduced into this country from abroad certain parasites, which Providence has created to counterwork the destructive powers of predatory insects." In support of this assertion, a passage, occupying a page and a half of fine type, is quoted from a Report by Dr. Fitch, the Entomologist of that Society; but this passage says not a single word bearing upon the above subject, except that "we have no parasites in this country that destroy the Wheat Midge." The real truth of the matter is, that the New York State Agricultural Society has done nothing of the kind, which the U. S. Census asserts that it has done; though, like certain other Societies, it has got the credit of actually doing a thing, because it has simply talked about doing it. Unless my memory fails me, Dr. Fitch stated in one of his Reports that he had written to that distinguished English Entomologist, Mr. Curtis, to send him living specimens of the parasites that infest the Wheat Midge in Europe, but that, as might have been naturally expected, no practical results followed from that application. How could it be otherwise? Who, in this dirty, selfish, mean little planet of ours—which,

as Sterne has suggested, seems to have been made out of the refuse clippings from larger and better worlds—ever gives something for nothing? To set the matter in its true light, we may suppose Dr. Fitch's application, and the answer thereto, to have run somewhat as follows:—

DR. FITCH TO MR. CURTIS.—Imaginary letter.

My Dear Sir:—The State of New York is suffering an annual loss of many million dollars, by the fearful ravages of the Wheat Midge. Our State Agricultural Society is desirous of importing into the State some or all of the three parasites, which check and control that insect in your country, and prevent it from doing any material damage there. We wish for a very large number of living specimens of these parasites, so as to supply every one of the 59 counties in our State, and make it a moral certainty that the breed shall be permanently established in each. Of course, if the Society were to supply only one or two favored localities, it would give rise to a cry of partiality and favoritism, and would do us more harm than good.

Will you be kind enough to meet our wishes in this respect? I am well aware that your time is very fully occupied by scientific investigations, which will shed lustre upon your name to the remotest generation, and that what we ask of you will take up many months of your valuable time, and add nothing to your scientific reputation. I am well aware, also, that what we ask of you will probably cost you a few thousand dollars, to be paid out of your own private pocket. For example, as the Wheat Midge is comparatively quite rare in England, it would be necessary for you to run all over the country, in order to find some particular locality where it can be met with abundantly in company with its parasites; and having found that locality, you would have to establish yourself there for a few months, and go hard to work at collecting specimens. But as the work to be done can only be done, properly and effectually, by a man of distinguished Entomological attainments like yourself, and cannot safely be entrusted to a mere tyro in Entomology, I hope you will consent to assist us in the manner that we desire. Only conceive my mortification and disgust, if I were to be a party to the employment of some tyro for the object which we have in view, and that tyro, instead of sending us the Parasites of the Wheat Midge, were to send us some new Noxious Insect, in addition to the hundreds, which we have already imported accidentally from Europe, and which annually pick the pockets of our Farmers of hundreds of millions of dollars! Think, my dear sir, for one moment, of our Midge-ridden farmers in New York! Think that, by sacrificing a few months of your time, and a few thousand dollars out of your own private pockets, you will put millions of dollars into the pockets of our wealthy State, and, eventually, hundreds of millions into the pockets of the whole United States! With your well-known philanthropic sentiments, can you possibly, for one single moment, resist the temptation of making the American people more rich and more prosperous than they already are?

You will please distinctly to understand, that neither the Congress of the United States, nor the Legislature of the State of New York, nor the New York State Agricultural Society, have appropriated one cent towards the furtherance of the above very important subject. It is possible, therefore, that, in addition to your own personal expenses, you may have to pay, out of your own pocket, the freight and express charges on the packages of living Parasites sent from time to time to us. But even if you have to do this, think of the glory you will acquire by annually, for all time, adding hundreds of millions of dollars to the profits of the great American nation!

Very respectfully, yours, &c., &c., &c.
MR. CURTIS TO DR. FITCH.—Imaginary answer to the above.

My Dear Sir:—Very much obliged for your kind offer, but, as the old saying goes, "Charity begins at home." Please to accept the expression of my very distinguished consideration, &c., &c., &c.
Very respectfully, yours, &c., &c., &c.

ANSWERS TO CORRESPONDENTS.

L. D. Morse, Mo.—The two larvæ about $\frac{1}{2}$ inch long, which, as you say, "were found in Texas-grown Osage Orange seed, and are called by the Texans the Screw-worm," are quite new to me, and so far as I can see from their pressed and flattened condition, different from anything known to me. Please, if possible, send me several dozen living specimens, packed in a little pasteboard or tin box, that I may see the actual creature and not its squashed carcass. If this larva feeds upon Osage Orange seed, as I infer from what you say, it cannot be the same "Screw-worm," which, according to the item clipped from the Texan Newspaper, hatched out in the fly-blown nose of a sleeping man, "and penetrated the head so as to cause his death." As the item goes on to say that "this is the first human death we have ever seen recorded from that cause," I rather infer that the true Texan "Screw-worm" attacks stock in some manner or other, and that the specimens which you send, if they really do feed on seeds, are something quite different. It is impossible that any larva should sometimes feed on the body of a living animal, and sometimes on vegetable substances.

Thos. T. Smith, Minn.—The robust green worms, as big as a man's thumb, and with singular coral-red, yellow and blue warts growing on their backs, which you found feeding on wild plum leaves, are the larvæ of the *Cecropia* moth (*Attacus Cecropia*). Besides plum leaves, they feed on apple, cherry, currant, barberry and hazel leaves, and I have this summer found them actually eating hickory leaves. In a state of nature the larva attaches its tough, pale-brown, pod-like, silken cocoon to the side of a twig, and there it remains all winter exposed to the bitter blasts of heaven. Yet next May or June the chrysalis, into which the larva changed shortly after spinning up, scarcely ever fails to work its way out into the light of day in the winged moth form. This feat is gradually accomplished by the chrysalis rubbing its rough head from side to side against the upper end of the cocoon, where the silk is less dense; and the whole process—which has been performed under my own personal inspection—occupies about an hour, during all which time you can hear the persevering little animal rub-rub-rubbing for dear life. Of course, if the moth first came out of the pupal shell, and afterwards undertook to rub a passage-way for itself, it would wear all the beautiful downy hair off its forehead. In the writings of many closet-naturalists, you will find a great deal of nonsense about moths discharging an acrid fluid, which burns a passage-way for them through the cocoon. They do, in reality, almost all of them discharge a creamy fluid, either shortly before or shortly after emerging from their cocoons; but that fluid, which I have repeatedly dabbed over my own flesh, has no "acrid" or "burning" properties whatever; and moreover it is discharged from the tail of the moth and not from its head, so that, unless the moths emerged tail-foremost (which is never the case), it could not help them to escape, even if it was as strong as aqua-fortis. The *Cecropia* moth is, to my taste, the handsomest, as it is certainly one of the largest insects found in the U. S. States, expanding about six inches from wing-tip to wing-tip, and being of a rabbit-gray color with a large kidney-shaped eye in the middle of each one of its wings. Of the two specimens sent, one had died in the larva state, probably from not having been fully fed, and the other had changed into the chrysalis state and was alive and healthy. You will find an excellent figure of the moth in Harris's *Injurious Insects* (p. 387), but that of the larva (p. 388) is too elongate, having evidently been drawn from an alcoholic specimen.

Willie C. Fish, Mass.—Many thanks for the Apple-worm specimens, which arrived in good order. All you sent were in the pupa state when they reached me, and all belonged to the same species, those in the tin box merely differing in being pale immature individuals. They are identical with specimens previously received by me from Connecticut, and having the same habits as your insect. The insect is as yet undescribed in this country, though I suspect it to be an imported species, from the fact of its occurring only on the Eastern seaboard. Fitch's Apple Midge (*Sciara [molebrus] mali*) is quite differ-

ent, as that belongs to the Mycetophila Family (Nemourous Diptera), and is expressly described as having in the pupa state distinct wing-cases and leg-cases, like all the other species of that group; whereas this species has none at all, being what is technically termed a "coarctate" pupa, or, in other words, the true pupa being enclosed in the shrunken skin of the larva so as to hide its limbs. I hope to breed this insect to the perfect state in the coming summer; and as I shall then be better able to complete its history, I will defer till that time making use of the valuable information, with which you now furnish me respecting its habits.

As to the larva spoken of by Mr. Calvin Ward, as infesting his apples in Vermont, (PRACTICAL ENTOMOLOGIST II, p. 20), either he is in error in describing it as "the size of a common pin in diameter and almost $\frac{1}{2}$ inch long," or it must be a distinct species from yours. The larva of your species, as received by me from Connecticut, is about 0.15 inch long and 4 times as long as wide. Perhaps Mr. Ward described his larva from memory only, and not from actual measurement; in which case mistakes are very apt to occur, even with good entomologists.

C. Moran, Ky.—If you could send me specimens of your diseased grapes, I could say, with some degree of certainty, what ailed them. At present I can only guess and grope round in the dark. You assume that it was "a bug or beetle that destroyed your grape crop last summer," and yet you acknowledge that you "are entirely ignorant of the habits or even of the appearance" of this supposed insect. If it really was an insect that punctured your grapes, as the common Curculio punctures a plum, it is an entirely new fact. No insect is known to infest the grape in this manner, in the Northern States, though very possibly some such insect may occur in the South.

But I suspect that what ailed your grapes was the common "Rot," as distinct from "Mildew," which last is sometimes incorrectly called "Rot." "Mildew" usually appears at first in the form of white cottony patches on the lower surface of the leaves, and finally attacks the berries when they are no bigger than peas, causing them to shrivel up and never grow any larger. The true "Rot," on the contrary, according to Dr. Engelmann, "makes its appearance only on nearly full-grown berries, exhibiting in the first stage a discolored spot on the side of the berry, about $\frac{1}{4}$ inch in diameter, with a dark dot in the center; after which the berry gradually shrivels up and turns black." (See Report of the Agricultural Department, 1865, p. 332.) Let us see how this agrees with your statement of facts. "This season," you say, "I had ten thousand vines in vigorous bearing, and they set a fair crop with some Rot [Mildew?] in the early part of the season. About the time the grape had nearly attained its usual size, I noticed that the berries were all stung or punctured, each of them bearing a small black speck, and by the time they should have ripened there was not a handful of them on the vines, but the ground under the vines was filled with them. I learn from other cultivators, that a number of other vineyards in the State suffered in the same manner."

"Mildew" and "Rot" are each of them produced by a distinct microscopic Fungus, similar to the "Oidium" which some years ago played such havoc in the European vineyards; and, as in the case of the "Oidium," the most approved remedy is dusting the vines from time to time with sulphur. If, on the other hand, it should be some unknown insect that is preying on your grapes, I can indicate no remedy until I find out who and what the culprit is; and to do this I must have fresh specimens of the infested fruit to experiment on. Next season you may probably be able to supply me, in case you conclude that it is not the "Rot" that is troubling you. In any event, let me know the results which you arrive at.

Wm. Muir, Missouri.—The white conical galls, $\frac{1}{2}$ inch long, and about thrice as long as wide, with a few blood-red thorns scattered round the basal part of each, which you say were "found on the leaves of young oaks," are produced by an undescribed species of Gall-fly (Cynips)—the same genus which makes the well-known "Oak-apples" on the Black Oak (Quercus tinctoria.) Both the gall and the fly contained therein are closely allied to the *Cynips tubicola* of Osten Sacken, but still are quite distinct. That gall occurred on the Post Oak (Quercus obtusiloba), in clusters on the underside of the leaf. I should be glad

to learn on what species of Oak yours grew, and whether it grew in clusters on the lower surface of the leaf like its ally. As the insect producing this Oak-leaf gall belongs to the Order Hymenoptera, and that which produces the leaf-galls on the Clinton grape-vine to the Order Homoptera, of course the occurrence of the two galls on the same spot of ground was merely accidental.

The larva found in ash cord-wood, and supposed to be those of a Borer, are the larvæ of some species of Digger Wasp, which had made its nest there. The cocoons are too much broken to say with any certainty to what genus of Wasps they belong. None of the boring beetles make any cocoon at all; and the larvæ of Boring Moths—the Peach and Currant Borers for example—are quite different from yours, and make a very different cocoon. In a future paper, I propose to explain the natural history of our Wasps, and will, therefore, drop the subject for the present.

M. S. Hill, Ohio.—The Cicadas ("Locusts") which you now send, belong to the same species sent before—namely, the common seventeen-year Cicada (*C. septendecim*)—only they are more mature and highly colored. Similar variations occur in many species of insects. As to the difference in the song of the two, which you noticed, that was probably caused by the "drum" of the male not being as yet fully matured and hardened. Young male singing birds make similar imperfect attempts, when they first begin, as bird-fanciers call it, to "record." I must confess, however, that I do not at present recollect any analogous case among insects.

The "small whitish-green worms, about $\frac{1}{2}$ inch long," which you describe as eating their way backwards from the edge of the leaf of the Grape-vine, "in rows of fifty to a hundred," must either have been very young individuals of *Procris americana*, (See PRACTICAL ENTOMOLOGIST I, p. 10,) or some species unknown to me. The larva of that moth grows to be over $\frac{1}{2}$ inch long; but possibly you may only have noticed your larvæ when very young, as you say that their numbers were not "sufficiently large to injure the vines to any great extent."

W. H. S., Illinois.—The shining black beetles, with four reddish spots on their wing-cases, and not quite $\frac{1}{2}$ inch long, are the *Ips 4-signatus* of Say, with a single specimen among them of the closely-allied *Ips fasciatus* of Olivier. You say that they "eat into apples and pears, apparently burrowing into holes made by some other insect or by a bird," and that you "have found 10 or 12 in one hole in a single apple." Many years ago I received specimens of the *4-signatus* from Minnesota, with a statement that they burrowed extensively into sweet corn. I forwarded some of your specimens to Dr. Houghton of Philadelphia, and he replies that they do not resemble the "click-beetles" which attack his fruit in a similar manner, being less than half as long and broad, and differing otherwise. The genus *Ips* belongs to the *Nitidula* family of Beetles, which also includes the *Nitidula bipustulata*—a small, oval, dingy-black insect, with two red spots on its back—often found in great numbers preying on old cheese and sometimes on bacon.

F. T. Pember, N. Y.—The supposed *Iulus*, which you say that you have "often seen feeding on turnips, both before and after they were removed from the ground," is probably the *Polydesmus complanatus* spoken of by Dr. Fitch, as destroying the roots of young cabbages, onions, &c. (See PRACTICAL ENTOMOLOGIST II, p. 35.) It differs from true *Iulus* in the body being "flattened," just as you describe it, instead of perfectly cylindrical, and in having no perceptible eyes, whereas every species of *Iulus* has two very distinct eyes. You say yourself that it has only "something like 20 pairs of legs," whereas *Iulus* has usually almost a hundred pairs, the number increasing as the animal grows older. I shall be glad to receive the promised specimens.

Milton Conrad, Penna.—The facts you mention about the "gapes" in chickens being caused by a worm burrowing in the lungs, are very curious, and, I believe, new. If you can send me a specimen, I can tell at once whether it is the larva of some insect, or whether it is an intestinal worm belonging to the same Class—Entozoa—as the Tape-worm, &c., and never changing into a winged insect. Preserve it, if convenient, in a vial with alcohol, or else enclose it in a quill, tightly corked at each end, without suffering it to dry up, and adding a little alcohol before the second cork is put in.

C. P. Wickersham, Penna.—What I said in the passage to which you refer (PRACTICAL ENTOMOLOGIST I, p. 101) was that "both Harris and Fitch ignored the possibility of any larvæ [of the Wheat Midge] passing to the pupa state in the ear, and coming out as winged flies the same season." The passages you quote from Harris in no wise controvert this assertion, as they only refer to the larva state of the insect. As to the knotty question, whether the filmy membrane enveloping the full-fed larva of the Wheat Midge be its moulted skin or a true cocoon, I must again refer you to the passage in my Willow-gall Paper. (Proceedings III, pp. 560-9.) You will find that I there show, that in certain species of *Cecidomyia* beyond all doubt, and as I maintain in all species without exception, the envelop in question is not spun like the cocoon of a silkworm, nor moulted off from the body of the insect, but secreted in a gummy form from the general surface of the body, just as many Plant-lice and Bark-lice secrete a cottony or sugary substance from the general surface of their bodies. This theory disposes of your objection, that "under a high magnifying power there is no trace of any fibre in the so-called cocoon, while on the other hand there are traces of the rings of the body of the larva." Whether a pupal envelop formed in this manner is properly called a "cocoon," is a mere question of words and not at all a question of facts. But this whole subject is rather an extensive and recondite one, and I must refer you once more, if you wish to learn my views more fully, to the Paper quoted above, and to the concluding part of that Paper which is now in press.

Rich. Middleton, Penna.—In answer to your three questions, 1st. Frogs and toads are generally not only harmless but beneficial, as they chiefly live upon insects. Toads, however, will eat strawberries; but otherwise they are very useful in a garden. Frogs have the power of leaping; toads have not. 2nd. All spiders feed upon animal food and chiefly upon insects. So far as they feed upon noxious insects, they are eminently beneficial. 3rd. You need not be afraid to handle any insects, except Wasps and Bees, and even with these it is only the females that sting. It is true that there are a few hairy caterpillars, the hairs of which will sting the back of the hand, or any other part where the skin is thin, about as badly as, and no worse than, a nettle does. But if the palms of your hands are as hard and horny as mine are, you may handle even these with perfect impunity, as I constantly do. Again, there are a great number of insects that will try to bite, when roughly handled; but no such species known to me can do more than just pinch a little, without penetrating the skin or inflicting any wound. Moreover, there is a group of large, two-winged cannibal flies, (*Ailus* family), which fly with a loud, buzzing noise among herbage, and prey upon such large insects as Humble-bees and grasshoppers; and there are also the Water-boatmen (*Notonecta* family) found exclusively in water; both of which two groups will often puncture you with their beaks, if you let them. There are a few *Ichneumon* flies, too—particularly a large black species known as *Ophion morio*—the females of which will often penetrate the skin a short distance with their ovipositor, when roughly handled. But all this is no worse than the prick of a pin, as—unlike the female Bees and Wasps—none of these insects have any poison-bag attached to the instrument that penetrates your flesh.

M. M. S., Penna.—The minute white scales on the under surface of the leaves of your *Olea fragrans*, are a species of Bark-louse, otherwise called Scale-insect, which I have not hitherto met with. If you raise one of the scales at this time of the year with the point of a penknife, you will find underneath it a roundish yellow louse, often accompanied by some of the minute elongate-oval eggs which it has laid, and from which next spring there will hatch out a fresh brood of young Bark-lice. Under a single scale I was fortunate enough to find one of the males, which, as is usual in this family, had two long wings, the females being always wingless to the last moment of their existence. In this particular species, the "Scale" is not formed of the lifeless body of the female—as is the case with the common Apple-tree Bark-lice—but is a distinct integument, constructed by the female to protect herself and her eggs, and probably secreted from the general surface of her body. There is a very much larger Bark-louse which I have noticed to infest the leaves of

the Oleander; and some few years ago the Orange trees in Florida were almost entirely destroyed by another species, which infests that plant in Europe, and which had been accidentally imported on a single small mandarin orange-tree, and spread therefrom on to an adjoining orange-grove. In fact, the number of distinct species of Bark-lice, as of Plant-lice, is very large, each species, as a general rule, confining itself to a particular group of plants, and often to a single species of plants. But, from the general distaste for these insects, but few observations have been made in N. A. upon their history. Scientifically speaking, the Bark-lice belong to the *Coccus* family in the Order Homoptera. Disagreeable as many of them are, we are indebted to one species for our Shellac, and to another for our Cochineal.

In order to destroy these insects, you had better wait till the eggs hatch out in the spring, and then wash or syringe the whole of the infested plants with moderately strong lye. As lye when it is too strong is injurious to plants, it would be a good plan, after you have prepared it, to try it upon some plant that you care nothing about, by way of experimenting; and you can then, if necessary, reduce its strength. Your plants will lose nothing by your waiting till spring, as the old mother-lice are about giving up the ghost after depositing their quantum of eggs, and even the younger individuals will remain torpid under the protecting scale until the warm weather comes. If you prefer it, you will find tobacco smoke in a small close apartment fully as effectual as the lye.

The little green parasites on your rose-bushes are doubtless the Rose Plant-louse (*Aphis rosæ*.) The "tiny, little, white creatures, like moths, upon your plants," judging from your drawing, must have been a species of *Psychoda*, a genus of Two-winged Flies allied to the Gall-gnats, and in no wise injurious to plants; or perhaps a species of *Aleurodes*, a genus closely allied to the Plant-lice and with the same habits, one species of which I know to infest the Crab and the Apple-tree in small numbers.

You will greatly oblige me by mailing me a dozen or so of these infested leaves, packed as soon as gathered, in any of the little tight tin boxes. The specimens sent, as well as the insects upon them, were completely dried up, when they reached me.

Willie C. Fish, Mass.—Your insects are, 1st. *Hylastes pinifex* Fitch, dark variety. 2nd. *Tetraopes canteriator* Drap. 3rd. *Colaspis ovata* Say. 4th. *Cryptocephalus*, not determined. 5th. *Hippodamia parenthesis* Say. 6th. *Psyllobora 20-maculata* Say.—*Haltica chalybea* is quite different from No. 3, being more elongate, less globose, and having thickened hind thighs.

S. P. Monks, N. Y.—1st. The hundred-legged worm which you send, and which you state to have been found "in a rather damp place where there is much decayed wood," does not belong to the genus *Iulus*, which has its body almost as smoothly cylindrical as a goose-quill. I have forwarded the specimen to Dr. H. C. Wood of Philadelphia, who makes the *Myriapoda* his special study, and has published a valuable Paper on the subject, and he has obligingly informed me that it is *Polydesmus virginianus*, Say. I have never met with the species in Illinois. Among the *Myriapoda* (thousand-legged worms), there are no distinct stages corresponding to the larva and pupa state of insects, the more mature scarcely differing from the less mature worms, except by having a greater number of joints to their bodies. 2nd. The brown-black newts with orange-colored spots, that you speak of, so far as my observation extends, feed upon insects, &c. I usually find them under logs and stones in the woods, but twice I have found them in water. 3rd. I know of no work on Entomology exactly suited to be put into the hands of children. Harris's book is the nearest approach to what you inquire for. Some day or other I may write such a work myself.

Geo. Haines, N. J.—The flat-oval gray eggs about 3-16ths inch long, and glued in two regular rows to the side of a grape-twig, are, as you correctly suppose, those of a *Catydid*.

Geo. W. Smith, Michigan.—In a future article on Wasps and their habits, I will explain the phenomena which you witnessed. The wasp was no doubt the common blue species, known to entomologists as *Sphex cerulea*.

C. V. Riley, Ill.—The *Scolytus* you send, which you say is "very destructive in this country," though you do not

specify the particular tree or trees which it infests, is apparently identical with an undescribed species, of which I dug several dead specimens out of a Hickory rail years ago. Most certainly it is not the *Scolytus destructor* (Olivier) of Europe, which preys exclusively on the Elm, nor the *Scolytus Ratzeburgii* (Janson) of Europe, which preys exclusively on the Birch, and has been confounded with *destructor* by many authors. I have another undescribed N. A. species, of which I obtained many specimens in South Illinois, from what I believe was a beech. For convenience' sake, I shall call this last species *fagi* and yours *caryae*, and proceed to distinguish the above-named two European and our four North American species in the following manner:—

A. Color chestnut-brown. Elytral interstices with more than a single row of punctures. (Venter finely, deeply and closely punctate; 3rd and 4th ventral joints ♂ ♀ with a minute tooth on their anterior margin.)

Scolytus destructor (Europe.)

B. Color black. Elytral interstices with a single row of punctures.

a. Venter very sparingly and rather obscurely punctate. (Elytral interstices with a single somewhat disorderly row of very minute punctures. The ♂ with a tubercle on the anterior margin of the 3rd ventral joint, and the anterior margin of the 4th joint acutely produced, reflexed and emarginate; the ♀ with the ventral joints entire.)

Scolytus Ratzeburgii (Europe.)

b. Venter closely and very distinctly punctate.

1. Elytral interstices each with a row of minute widely distant punctures, so as to appear polished instead of sub-opaque. (Head finely rugoso-punctate. Posterior tibiae simple. Ventral joints ♂ ♀ entire.)...*Scolytus fagi*, n. sp. (N. A.)

2. Elytral interstices sub-opaque, and each with a row of largish confluent punctures, so as to be almost punctato-striate, but much less coarsely and deeply so than in the case of the normal strie. (Head longitudinally aciculate. Posterior tibiae simple. Ventral joints ♂ ♀? ♀ entire.)...*Scolytus caryae*, n. sp. (N. A.)

3. Elytral interstices punctato-striate so as to be confounded with the normal strie of the elytra. (Head longitudinally aciculate. Posterior tibiae with long hairs behind. Ventral joints ♂ ♀ [and ♂?] entire.)...*Scolytus muticus* Say. (N. A.)

C. Color black, with reddish-brown elytra. Elytral interstices with a single row of obsolete punctures. (Head longitudinally aciculate. The 3rd ventral joint ♂ [and ♀?] with three spines, 4th joint with a single smaller spine.)...*Scolytus 4-spinosus* Say. (N. A.)

The male of *fagi*, n. sp., is distinguishable from the female by the front being widely and deeply excavated. All that I have seen of *caryae*, n. sp. seem to be females. *Scolytus pyri* (Peck), which infests the pear-tree, and has been erroneously supposed by many eastern authors to be the cause of the well-known "fire-blight," is not a *Scolytus* but, according to Harris, a *Tomicus*. (*Inj. Ins.* p. 91.) *Fagi* has been circumscribed from 6 specimens; *caryae* from 4, including that now sent to me. For the characters of the two European species I am indebted to Janson, (*Stainton Ent. Ann.*, 1856, pp. 87-9), and for those of Say's two species to Say's own descriptions. As I am not acquainted with either of these last, I may possibly have misunderstood the description of the elytral strie in *muticus*. Unfortunately Say does not state upon what tree or trees either of his two species occurred. But from the analogy of the other four species, and of the European *Scolytus hamorrhous* which attacks the Plum-tree, and the European *Scolytus pygmaeus* which attacks the Oak, I should infer that each of them inhabits some peculiar species or genus of trees, being what I have elsewhere called "Phytophagic species."

To prevent confusion it may be well to say here, that the insect known in England as *Scolytus destructor* is often designated on the continent of Europe as *Eccoptogaster scolytus*. But Janson has shown in the passage above referred to, that the generic name *Scolytus* (A. D. 1764) has priority over *Eccoptogaster* (A. D. 1763), although the

specific name *scolytus* (A. D. 1792) has priority over *destructor* (A. D. 1795.) As, however, we can scarcely call the insect *Scolytus scolytus*, we must violate here the strict law of priority and call it *Scolytus destructor*.

(Since the above was written, Mr. Riley has informed me that his species, which he has described in the *Prairie Farmer*, Feb. 2, 1867, under the name of *Scolytus caryae*, infests the Hickory, just as I anticipated. The proper designation of this insect will be *Scolytus caryae*, Riley.)

D. F. C., Ill.—The minute 4-winged insects, about 1-16th of an inch long, and with their wings of a dull milk-white color, are an undescribed species of *Aleurodes*. You found them on apple leaves; several years ago I found precisely the same species on the leaves of the wild crab. The genus gives its name to a family, which is closely allied to the Plant-lice and the Bark-lice, and consequently belongs to the Order Homoptera; and, as is so often the case in these last two families, each species is confined to a particular genus of plants and can live upon no other. In supposing that this minute Bug was a minute Moth, you are in very good company. Linnaeus, Reaumur and Geoffroy made precisely the same mistake.

This insect cannot be the cause of Fireblight, because it is quite scarce and Fireblight quite common. The minute larva, which is shaped much like a female bark-louse, does not live in the bark, but on the under surface of the leaves, sucking the sap therefrom like a Plant-louse.

Isaac Hicks, N. Y.—The pupae of Dr. Trimble's Apple-maggot reached me in good order, and are precisely identical with those previously received from Connecticut and Massachusetts. I hope to use the information you give me upon this subject in a future Paper.—I am quite unacquainted with the Bark-louse of the Tulip-tree, and shall be very glad to receive specimens of it. The "swarms of a new kind of fly, that made a noise like a swarm of bees" round the Tulip-tree that had been almost killed by these Bark-lice, were perhaps attracted there by the sap issuing from the minute punctures made by the Bark-lice. I once saw Hornets and other kinds of Wasps swarming in the same manner round a Black Oak, that had been badly bored up by a Sapsucker, and many of them settled upon the holes made by the Bird, and evidently drinking up the sap that oozed therefrom.—Many thanks for the facts you furnish about Birds and Insects, which I shall take a future opportunity to use.

The Critic criticized.

In the *Prairie Farmer* of Jan. 19, 1867, there appears a criticism of "the Report of the Entomologist in the Annual Agricultural Report, 1865," accusing the aforesaid Entomologist of "calling the perfect insect of the apple-tree Borer, *Saperda divittata*, a butterfly on page 205." Now, in the first place, the article, of which page 205 forms a part, is not written by the Entomologist, Mr. Glover, but by Mr. Wm. C. Lodge, of Delaware; and in the second place the writer, in the passage referred to, expressly calls the insect in question, not a butterfly, but a "beetle." He says, indeed, and says truly, that this beetle "flies about at night," but that is not calling it a "butterfly" nor even a moth.

B. D. W.

OBITUARY.

DIED, of Typhoid Fever, on January 11th, 1867, Dr. BRACKENRIDGE CLEMENS, of Easton, Penna. It was only the middle of December when he was at the Hall of the Entomological Society, in Philadelphia, looking as hale and hearty as ever. He was an excellent entomologist, with good, sound, general views, and had devoted his special attention to the Lepidoptera (moths) of this country. Readers of the *Practical Entomologist* will recall his name as having been more than once quoted as authority in the "Answers to Correspondents." Peace to his ashes!

NOTICES.

The *Sorgo Journal*.—This work is published monthly in octavo form, at Cincinnati, Ohio, at the low price of One Dollar per year, and is now in the fourth year of its existence. It will be found very useful to those who grow Sorgo, though it contains many excellent articles upon such other subjects as are generally interesting to the Farmer.

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THE

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PHILADELPHIA, MARCH, 1867.

CHANGE OF NAME.

At a meeting of the Entomological Society of Philadelphia, held March 11, 1867, the following By-Law was unanimously adopted:—

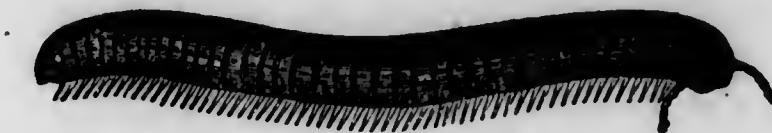
"Article 1, Chapter 1.—The Society shall be called the AMERICAN ENTOMOLOGICAL SOCIETY, and is instituted for the improvement and advancement of Entomological Science, and the investigation of the character and habits of Insects."

The above change has been made for two reasons. 1st. That the Society has to rely on the country at large for support, and in order to receive this support, the erroneous idea which is in many minds, namely, that the Society is a local institution, must be displaced. 2nd. It is believed that this change in the name will extend the reputation and claims of the Society, and awaken new and more extended exertions for the permanent support of the only Entomological Society in the United States.

Now that the Society has adopted a national name, it is hoped that ALL the readers of the *Practical Entomologist* who recognize the usefulness of an Entomological Society, will rally to its support. Any one may become a CONTRIBUTING MEMBER by the annual payment of a sum of not less than *One dollar*. The Society will furnish each member with a handsome diploma. Let all who are in favor of the diffusion of useful knowledge become Contributing Members of the AMERICAN ENTOMOLOGICAL SOCIETY.

WIRE-WORMS.

The ancient Romans had a proverb—"It is garlic that I am talking about, and you answer me about onions." (*Ego de alio loquor; tu de cæpe respondes.*) Americans, when they are talking about insects, sometimes in the same way answer one another at cross-purposes. For example, there are two entirely distinct creatures known by the name of "Wire-worms" in America. The first of these is not a true insect, but a Thousand-legged worm, belonging to the genus *Iulus* and the class *Myriapoda*.* A figure of one of these is repeated



Color, livid brown.

here from PRACTICAL ENTOMOLOGIST, II, p. 34, that the reader may see at once, that it has a very large number of joints to its body, and nearly four times as many legs as it has joints; and this kind of so called Wire-worm, never changes into anything materially different from itself. On the other hand, the second of the two above referred to, is a true insect, but still in the larva or imperfect state; and, as will be seen from the annexed figure, it has

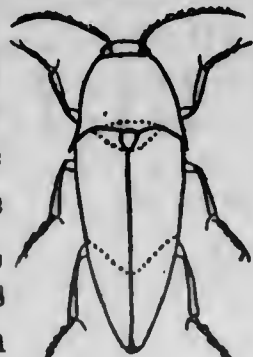


Color, pale shining mahogany.

only twelve joints to its body, exclusive of its head, and only six legs, which are placed two upon each of the three front joints of its body. Moreover it has no conspicuous antennæ on its head, whereas the other one has antennæ of some considerable length. This second kind of "Wire-worm"—which is the one that is properly so designated, both in Europe and America,—changes after the lapse of several years to what is popularly known as a "Click-beetle," (*Elater* family.) That from which the

* Harris states that *Iulus* is the American "wire-worm," *Inj. Ins.* p. 52.

above figure was drawn was quite large when I obtained it, and after remaining two entire years in my Breeding-jar, changed into the Click-beetle, represented in the margin and scientifically known as the *Ludius attenuatus* of Say. Like most of the larvæ of our click-beetles, this one fed upon decayed wood; but there are several species which feed underground upon living roots, one in particular which infests young corn in the hill, especially in newly-broken land; and as these come more particularly under the notice of the Farmer and the Gardener, it is to these that the name of "Wire-worm" more usually refers, unless indeed it should be the bogus Wire-worm, (or *Iulus*) that is spoken of. Of the perfect Click-beetles we have several hundred distinct species



Color, pitchy black.

found within the limits of the United States, and in the single State of Illinois I have myself met with about a hundred. But very few of them are known in the larva state, owing to the great length of time required to breed the larva to maturity.

In the *Country Gentleman* of Dec. 13, 1866, I find the following observations from a New York correspondent, who is evidently talking about the bogus Wire-worm (*Iulus*), and replying to another correspondent from New Hampshire, who has been talking about the true Wire-worm. This is quite plain from the fact, that the former speaks of his so-called "Wire-worms" laying large numbers of eggs; which the true Wire-worms never can do, that office being reserved for the fully matured Click-beetle.

The wire-worm is an oviparous insect, like the ant. He excavates cells like the ant in the hard subsoil, some eight or ten inches under the surface of the earth, and in those cells deposits his eggs, very much resembling ants' eggs, and the sun hatches them out. This they do from the commencement of warm weather in spring until the cold in the autumn. This is proved by plowing, when a careful observer will discover worms of all sizes, from the large, fully developed insect, to the smaller ones of all sizes, down to worms not over one-eighth of an inch long. I have also found the eggs. Now, it may be asked, what of all that? I answer that deep plowing, and using the subsoil plow, will disturb those egg cells and prevent their hatching out, by scattering them about on the surface. I think one thing is certain—there is no way to destroy the worm but with the plow. Frequent plowing, and late plowing, cannot fail to be found the most effectual way to get rid of the insect, particularly in frosty days, when, as soon as the worms are exposed, they are stiffened by the cold and frozen hard during the ensuing night. This I am certain of, for I have tried it, and after plowing, have found them dead on the surface, and seen them blown by the wind on the snow to some distance in winter.

By the way I cannot agree with your New Hampshire correspondent, that the wire-worm turns into a snapping-bug. I have been here in the midst of them for three years and over, and during all that time have never seen a snapping-bug. I think your correspondent has fallen into an error.

Yes, sir, you are quite correct; your so-called Wire-worm never does or can change into a "Snapping-bug," or Click-beetle" as others call it. But the true Wire-worm of the correspondent from New Hampshire does so change. The difference between you two correspondents, is merely a difference in words, and not in things. You are designa-

ting entirely different creatures by the same popular name, and hence naturally arises confusion, misconception and error. One of you is talking of garlic and the other of onions; one is disputing about chalk and the other about cheese; one has a thousand-legged worm in his mind's eye and the other the larva of a Click-beetle. Those who ridicule the use of scientific terms, as disagreeable and unnecessary, should ponder well into what sloughs of mystification the use of popular names, unaccompanied by the corresponding scientific names, will sometimes lead us.

As to the assertion of the gentleman from New York, that, during a period of three years, he had "never seen a Snapping-bug" in the fields where his so-called Wire-worms were found, all I can say is, that Click-beetles must be very scarce in the State of New York. In Illinois I do not think that I ever collected for a few hours, without meeting with scores and often hundreds of specimens, of some species or other of the great Elater family.

B. D. W.

CEDAR APPLES.

These are smooth, roundish, pale reddish brown bodies, about $\frac{1}{2}$ or $\frac{3}{4}$ inch in diameter, and attached by a very short stem to the twigs of the Red Cedar. They were mistaken for Galls by Dr. Fitch, and supposed to be produced by Gall-flies. (*New York Reports*, II. § 285.) In reality they are Epiphytous Funguses (or Mushrooms), growing upon the twigs of the Red Cedar, as many Lichens and Mosses grow on the trunk and the main limbs of a variety of trees. They commence their growth very early in the season, and by the forepart of April they have nearly attained their full size in the latitude of Rock Island, Ill. At this time and for more than a month afterwards, they are whitish and fleshy inside; whereas the old last year's specimens, which still hang on the trees, are rust-red inside and of a hard, dry, spongy texture. Between the middle of April and the latter part of May, there put forth from the surface of these new Cedar Apples, many filaments, about $\frac{1}{4}$ inch long and 7 or 8 times as long as wide, bearing on their surface a quantity of a fine rust-red powder, which consists of the "spores" or seeds of the fungus.

As these Funguses are often so abundant as to be very injurious to the Cedar, it is well to know how we may easily get rid of them. All that is required is, early in April to cut off and destroy the young growing "apples" before the "spores" or seeds commence to develop themselves. The old, dead, dry "apples," may, of course, be allowed to hang on the twigs, as they have long ago shed their seed. By persevering in this system for a year or two, or perhaps even for one year only, these unsightly excrescences may be subdued. But it is not improbable that some of the spores may remain in the crevices of the twigs for over one season, before they finally vegetate, just as the seeds of some weeds lie in the ground several years before they start to grow.

B. D. W.

BLACK-KNOT.

In the first volume of the *PRACTICAL ENTOMOLOGIST*, pp. 48—51, I showed that Black-knot is nothing but an assemblage of minute funguses, which perfect their seed, or "spores" as Botanists term it, the latter end of July; and that consequently, as this fungus is an annual plant, by cutting off and destroying the Black-knot early in July its further propagation may be effectually stopped.

My observations and experiments referred exclusively to the Black-knot on the Wild Plum, (*Prunus americana*.) But from the evidence which will be adduced below, it appears to follow as a necessary consequence, that the Black-knot on the Cherry is caused by a distinct species of fungus from that on the Plum. It is possible therefore, that the period at which the Cherry fungus matures its seed, may differ somewhat from that at which the Plum fungus matures its seed; and in that event the proper period for cutting off and destroying it, must also differ more or less.

The following appeared in the *N. Y. Sem. Tribune* of Feb. 2, 1866, from the pen of Mr. Jas. H. Parsons, of Franklin, N. Y.

"Are the black-knots which infest the plum and the cherry-trees the same in kind? Thirty years ago we had a number of large and thrifty plum-trees, which bore an abundance of fruit every year. When the black-knot appeared, the plum-trees rapidly disappeared. We then set out cherry-trees which thrived for a dozen years or more, when the black-knot attacked them also, and this year, for the first time, they yielded no fruit, and may be considered dead, as the black-knots upon the few that yet remain are more numerous than the leaves were the last summer. In the meantime several plum-trees have started up, and more are appearing every year, and all of them are apparently healthy; scarcely a black-knot is to be found upon any of them, and upon some, none at all. And yet all of these trees stand less than two rods from infested cherry-trees.

Dr. Trimble in his work on Fruit Insects, remarks to the same effect as follows:—

In the outskirts of Buffalo and Black Rock, N. Y. * * there were Black-knots on the Plum-trees, but I saw none on the Cherry-trees, as in New Jersey and many other places. (p. 90.)

So far as regards the Wild Plum (*Prunus americana*), and the Wild Black Cherry (*Cerasus serotina*), I can state the same thing from my own observations in the neighborhood of Rock Island, Ill. Both trees are very common there; and I have been familiar with both for many years. Yet, although on the former Black-knot is very common, I never saw a single specimen on the latter. Neither, so far as I am aware, have we any Black-knot on the cultivated Cherry.

But from the following observations of Mr. Isaac Hicks, of North Hempstead, N. Y., it would rather seem as if there must be more than one kind of fungus growing on the Cherry—one kind probably originating from the Wild Red Cherry, (*Cerasus pennsylvanica*), which is closely allied to the cultivated Cherry, and thence spreading on to the latter, and the other growing on the Choke Cherry, (*Cerasus virginiana*),* which, as well as the Wild Black

* The wild Choke Cherry in some places is nearly dispatched by the ravages of the Black-knot." (*Gardeners Monthly*, June 1866, p. 170.)

Cherry (*C. serotina*), differs remarkably from the tame Cherry in the fruit growing like currants in "racemes." Clearly Black-knots of all kinds must have originated in Native American trees, and spread thence to our cultivated trees; for Black-knot is utterly unknown in Europe, whence both our cultivated Plums and our cultivated Cherries were originally imported. It will be remarked that Mr. Hicks, in the course of his very acute and valuable observations, confirms the above statements, as to the Plum Black-knot not extending on to Cherry or the reverse.

It is evident there are several of the fungus that attack fruit-trees. There is one peculiar to the Wild Cherry, one to the common Cherry, such as the Morello and Duke class, and one that belongs to the Plum. Each variety of trees mentioned has its peculiar style of fungus, as much as different species of animals and insects have peculiar parasites which prey on them. About forty years ago the Black-knot swept off all of a kind of bitter-sweet Cherry that was quite common here, the name I do not know. About seven years ago the fungus attacked the Cherry-trees to the west of this place, in King's county, Long Island, especially the Kentish and Early Richmond, and nearly killed them all. It gradually spread to this place, moving eastward, and attacked the trees on the west side of the orchard first. All efforts by burning and cutting, proved unavailing, for being propagated by minute spores, they spread from my neighbor's trees, and hence our single efforts were unavailing. They now appear to be clear from this pest such as were not killed, and perhaps this generation will not be troubled again.

The Plum fungus has its periods of increasing, in certain places, to a great extent, and again being nearly extinct. We may state that the Plum knot did not prevail here at the time of the Cherry-tree disaster, nor did the Wild Cherry knot show any thing of an increased abundance. The spores of the Cherry-tree fungus find more resistance, or rather the bark of certain kinds does not allow them to lodge and grow on those varieties as well as on others, as the Morello class were sadly knotted, while the Mazzard was entirely free, and Elton, Downer's Late, Honey, &c., were nearly or quite free.

Now we believe and argue, that the kind of fungus that destroyed the bitter Cherry forty years ago, could not be the same as the present fungus on the Cherry, or else it would have also attacked the Kentish and others then. And if the Plum knot is not caused by a different fungus from the Wild Cherry, why does one prevail on one kind of tree at a certain period while the other is free from it? (*Gardeners Monthly*, November, 1866, p. 335.)

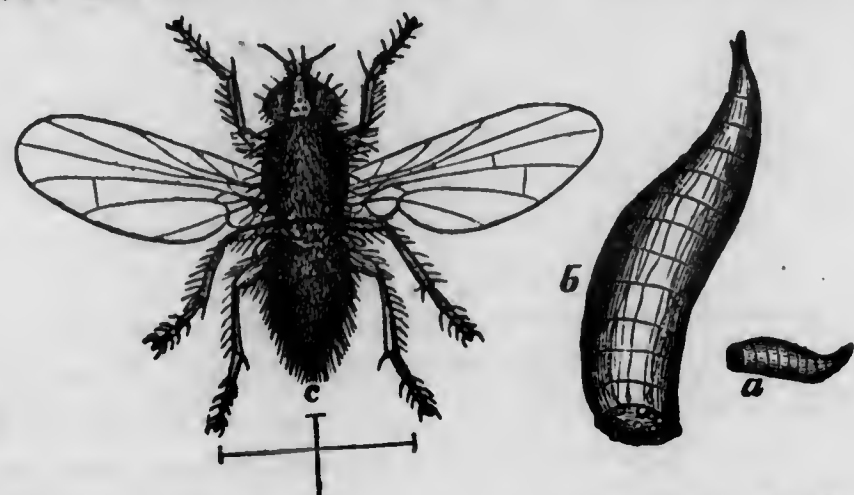
The practical inference to be drawn from the above theory is, that plum-growers need not be alarmed when their neighbors' cherry-trees are swarming with Black-knot, and cherry-growers need not be alarmed when their neighbors' plum-trees are infested in the same manner. For the disease can only spread from plum-tree to plum-tree, and from cherry-tree to cherry-tree; just as the Mildew and the Rot on grape-vines can never spread on to apple-trees or currant-bushes. It would further seem to follow, that Black-knot growing upon the wild Choke Cherry cannot spread upon our cultivated Cherry, and still less upon our cultivated Plum-trees; but Black-knot undoubtedly can and does spread from the wild Plum-tree on to the tame Plum-tree, and probably from the wild Red Cherry on to our tame Cherry-trees.

Strictly speaking, this Black-knot question belongs to the Botanists rather than to the Entomologists. But as the saying is, I have already "put my foot into it," and according to another old saying, "One may as well be hung for a sheep as for a lamb."

B. D. W.

IMPORTED INSECTS.—THE ONION FLY.

Dr. Fitch has recently shown, that the maggot that terribly infests the bulb of the Onion in the Eastern States, often to such an extent as to cause men to give up growing that crop, is produced by an imported Two-winged Fly, (*Anthomyia ceparum*.) According to him, it has been in this country forty years or more. (*Ann. Reg. Rur. Aff.*, 1867, p. 91.) The annexed right hand figure shows this insect in the maggot or larva state; the



left hand figure the perfect fly bred therefrom. So far as I am aware this little pest has not yet spread into the Western States; but doubtless in due course of time it will do so.

More than a year ago Dr. Shimer, of Carroll Co., Ill., showed that the onions in his garden were infested in the same manner by another two-winged Fly. This fly, upon being submitted to competent entomologists, proved to be the *Ortalis flexa* of Weidemann, which is not an imported but a Native American insect, and which had been previously credited to the State of Georgia. The annexed figures show the larva and the perfect insect of this species, the hair lines here and before denoting the natural length of each. It will be seen at once that it differs widely from the imported insect, not only in the shade of the larva, but in the coloring



of the Fly, which, instead of glossy transparent wings, has them of an opaque black color, with three conspicuous white stripes on each.

It is very remarkable, that while the imported Onion-fly is such a grievous pest in the East, the Native American Onion-fly seems not to occur at all in the East, and to have been only noticed as yet by a single individual in the West, unless indeed, which is probable enough, the "Western onion maggot" found near Peoria, Ill., by Mr. E. G. Johnson, belonged to this species. (*See N. Y. Tribune*, April 10, 1866.) Yet the insects belong to allied genera of the great *Musca* family. How then

can we account for this strange fact? We can only account for it, I think, upon the same principles, upon which I recently endeavored to explain the analogous case of the two Gooseberry Sawflies—namely, that our N. A. creation is of an inferior and weaker and less highly developed type, than that of what is popularly known as the Old World. (*See PRACTICAL ENTOMOLOGIST*, I, pp. 117—9.)

There is still another analogous case, illustrative of the above theory, to be met with in the Meal-worm Beetles. The imported species (*Tenebrio molitor*) swarms throughout the whole country and is a great pest; while the Native American species (*Tenebrio obscurus*), is comparatively rare and is scarcely known to the millers and flour-dealers.

A third case of the same kind may be found in the Imported Bark-louse and the Native American Bark-louse. (*See PRACTICAL ENTOMOLOGIST*, II, p. 31—2.) And it would not be difficult to show, that many more such cases are to be met with in the various departments of Entomology.

As to the best mode of destroying these Onion-maggots, it has already been shown in this journal, (I, p. 20.) that boiling hot-water poured over the young plants will destroy the maggots, without at all injuring the plants. The only other known remedy that is reliable, is to pull up such plants, as from their drooping state, may be known to contain maggots in their bulbs, and destroy them in any convenient manner. B. D. W.

DO CUT-WORMS DESTROY TREE BUDS?

By JOHN TOWNLEY, OF MARQUETTE CO., WISCONSIN.

During the last two years at least, young apple-trees in this locality have been much injured by having their buds destroyed. My observations last spring led me to conclude, that a worm very like the cut-worm, and having the same habit of hiding just beneath the surface of the soil during the day and feeding by night, was the cause of the mischief. But as, in no work on gardening matters to which I had access, could I find the cut-worm included in the list of insects injurious to fruit trees, I had some doubts as to whether my conclusions were well founded. I find, however, in the June number of Vol. I of the *PRACTICAL ENTOMOLOGIST*, that not only is it probable that these cut-worm-like insects destroy the buds, but that the fact is comparatively new to Entomologists, as well as to the growers of fruit generally. I have thought, therefore, that a brief account of my experience in this matter here, might not be unacceptable.

Soon after snow had gone in 1865, I pruned a lot of apple-trees then four years planted. The wood at the time seemed alive and sound. When older trees were coming into leaf, these remained almost destitute of foliage; and on examining them, it was found, that most of the buds, especially those on shoots formed the preceding year, were gone—removed as clean as if they had been picked out with the point of a knife. The bark in small patches near the ends of some of the shoots had also been eaten or chipped off. As many small birds had been seen about the trees, the conclusion was

arrived at that they had probably eaten the buds. In the fall, mounds of earth were thrown up around the stems of these trees, and of another lot two years planted. These mounds were being levelled on the 6th of May last; and soon after commencing the work, several rather large cut-worm like grubs were noticed. This, coupled with the fact, that in the preceding spring, I had caught a worm like these in the very act of eating out a bud high up the stem of a young Catalpa, around which I had thrown a blanket the evening before, to shield it from frost, induced me to suspect that they and not the birds destroyed the buds. This led to an examination of the untouched mounds; and in the soil immediately surrounding the stem of each tree, I found from about five to ten of these worms. Twenty-three were taken from the soil round a plant of the Rome Beauty apple. To save my trees, I knew of nothing likely to be so efficient as persistent hand-picking. I therefore searched the soil round the trees every other day, (a stout table fork is handy for this purpose,) taking one lot one day and the other the day after; and I continued for some time to find more or less of the worms, and always near the stems of the trees.

Previous to the 6th of May, buds had been destroyed but not to the same extent as in the preceding year, owing probably to the spring being a late one. On a warm dewy night about the middle of the month, I took a lamp and suddenly jarred several of the trees; when some of these worms came tumbling to the ground. The evidence against them would have been more conclusive, if I had searched the branches and found them there and at work. That however, I omitted to do. I have had fruit-trees planted here sixteen years, but never had the buds destroyed so as to attract my attention before the last two years; nor have I had any complaints from my neighbors on this point, except during that time. Orchards are not very common here, but in three others in this town, I know young trees have been injured as in my own during the last two years.

There is a paragraph in the *Agriculturist*, for June, 1866, in which I suspect birds are blamed for the work of these insects. It is said there, that J. Hyde, of Washington County, Ill., finds his peach-trees wholly stripped of buds; and that he thinks it was done by a bird, and wishes to know what bird does it. It is then remarked, that partridges eat buds of apple-trees, but were not known to touch those of the peach. In deep snows, when hazel catkins have become scarce, partridges will visit the orchard, usually very early in the morning and late in the evening; but the buds they feed upon are blossom buds, or the prominent buds of spurs, not unfrequently wrenching off and swallowing part of the spur as well as the bud. Partridges, however, could not stand on many shoots on my trees, the buds of which have been destroyed, nor could they reach them from neighboring branches.* And I think it would puzzle even a

* [In further illustration of this subject, which has already been referred to in the *PRACTICAL ENTOMOLOGIST* (Vol. II, p. 46, note 2nd.), I clip the following from the

wren or the white-throated nuthatch, to eat the buds and the bark of some slender, nearly horizontal twigs which were thus injured.

The *PRACTICAL ENTOMOLOGIST* states, that by the term "cutworm" is to be understood a 16-footed worm. I counted 14 legs only on these worms—three pairs of spine-like legs in front and four pairs of what appear to be called prolegs in the hinder part. Are the two others situated on the last joint of the body counted to make up the number 16, and are these two the so-called "anal prolegs"? [Yes; B. D. W.]

I have not found the young shoots of trees or shrubs cut off in summer, as described by Dr. Harris. In the extract from the *Prairie Farmer*, it is said that "these worms prefer dwarf pears and apples, and that the longer stemmed trees of orchards are almost exempt from their attacks." I grow no dwarf apples; mine are all standard trees worked on the ordinary apple stock. I have not noticed whether fruit buds are first taken, but older bearing trees have not had their fruit buds destroyed the last two years. Currants, gooseberries, and raspberries, though growing near these infested apple-trees, have not had their buds destroyed. My last year's crop of the two last named fruits was indeed the best I have ever grown here. The buds of Roses, Spiraeas, Weigelias, Honeysuckles and Lilacs have not been taken hitherto. Grape vines have had some buds destroyed, but by what means I do not know. Every bud save two was destroyed on the Catalpa, the night it was covered. The buds were but just starting, appearing to the naked eye like small purple points, and they were eaten away to the very wood. A small plant of the common snowball shrub planted last spring had two sets of buds destroyed. I then cut the head well back and tied it up in musquito netting. Latent buds finally started, and my plant was saved. The buds of this plant were probably destroyed by the cutworms, but I have no proof that such was the case.

The various expedients I have adopted, to keep down the ordinary cutworm, are probably generally known. Hand-picking ranks first. By taking advantage of the odds and ends of time, garden plants may be looked over daily, and wherever a plant is cut down the worm should be found and destroyed. By taking a lamp and making a raid upon them on warm still nights, their ranks may be considerably thinned. The paper funnel affords considerable protection to newly-planted things, if stiff writing paper is used. An old lady of my acquaintance is in the habit of placing manure under any plant she

New York Semi-Weekly Tribune, March 1, 1867.—B. D. W.]

In a Bad Box.—D. BRON WATTE, Springwater, N. Y.: I have an orchard adjoining a few acres of beech and maple, with heavy undergrowth, and the partridges come out and eat and strip the buds from the apple-trees, and last year those nearest the woods did not bear a peck, while those at a distance bore well. I have not killed a partridge for fifteen years. I do not believe in killing birds; but what shall I do?

The answer is, do nothing. It would not be proper even to scare the partridges, for that would hurt their feelings.

wishes to protect from cutworms; her notion is that the worms will feed upon the manure in preference to the plant. [This must be a mere notion. B. D. w.] I have observed where manure has been applied as a top-dressing early in the fall, as to rhubarb and asparagus, or as a mulch in summer to fruit-trees, and not forked under in the fall, that the following spring, soon after frost was out of the ground, it would contain great quantities of cutworms, sometimes so numerous and so small that I think they must have been bred there. [Scarcely: they hid under the old dry manure during the day. B. D. w.] Hens make short work of them when found in such situations. Those who have no hens, or who prohibit them from entering the garden, may easily destroy the worms by first turning the manure upside down, and then applying boiling water from the rose of a watering can. I have also found that numbers of moths may be captured and destroyed, by leaving a window of an upper room open during summer; and it has occurred to me that if some safe lamp were placed in a milk pan half full of water, on a chair, so as to be about level with the opening in the window, this trap would prove very efficient. Does any reader know any better method of keeping under this pest, than those stated above? If cutworms are so numerous and annoying throughout the United States, as they have been here the last two or three years, the genius, who can invent some cheap and effective apparatus to destroy moths by wholesale, would deserve to be held in everlasting remembrance, and the nation could well afford to pay him a very large pecuniary reward.

["Surgaring," with poisoned molasses will probably be found the cheapest and most effective and most wholesale method of destroying the moths, both of these Tree-cutworms and of ordinary cutworms. For directions, see PRACTICAL ENTOMOLOGIST, II, p. 53.—B. D. w.]

ENTOMOLOGY RUN MAD.

The following article, from the pen of an anonymous writer, appears in the North Carolina *Rural Journal* for September 1866, and contains almost as many errors as sentences. The author seems to have confounded together four very distinct insects. 1st. Some unknown species feeding on the buds of plants, perhaps a Tree-cutworm (*Hadena*.) (See PRACTICAL ENTOMOLOGIST, I, p. 85, and II, p. 64, 67.) 2d. A Spindle-worm burrowing in the stem of the young corn, probably allied to the notorious *Gortyna zea*. 3d. A larva boring the stem of the hogweed, probably, like the Spindle-worm, that of some moth, or it may be that of some Saw-fly, (*Tenthredo*.) 4th. "The active and sparkling fire-fly," as he calls it, which must be some species of Lightning-bug, (*Photinus* and allied genera,) as the only other luminous genus of true insects, (*Pyrophorus*), belongs to the Click-beetles (*Elaterr* family), and is not found, I believe, further north than Louisiana. Now, in the larva state, all these "Lightning-bugs" are cannibal insects, preying upon various species of borers; and consequently

a vegetable-feeding larva, such as he represents his "bud-worm" to be, could not change as he represents it to do, into a "fire-fly."

THE BUD WORM.

This little insect, whose rapacity the farmer has so much reason to regret, is not more than a half inch in length, with a black or dark brown head, body of a white color. The peculiarity of having a dark-colored head will serve to identify the worm in the earlier days of its growth, but I have observed that the head becomes of the same color as the body, as the worm approaches maturity. Its growth is quite rapid, but during the few days necessary for its maturity it will destroy a score of stalks of corn. One fact that struck me with peculiar interest, is that the ovum from which this worm is produced is hatched during the fall, and the insect attains to very nearly the size of which we see him in early spring, inclosed in the size of a weed, (generally the hogweed.) The pith of the center of a weed, (generally the hogweed.) You may readily detect the point at which the egg was deposited by the small perforation in the weed, and you may thence track him for several inches by the delicate canal he has left behind. About the eighth day after leaving the place of incubation, there appears a great change in his original appearance. The body which has grown to twice its original diameter and increased somewhat in length, becomes marked with longitudinal streaks of a black color alternating with white ones of the same width, the head as we have said losing its peculiar color. The motions about the worm now become sluggish, and there appears about the upper third of the body, and on either side, an enlargement of the skin, resembling a puff in a lady's sleeve. This indicates the point at which the wings are soon to protrude. The worm is now ready to make one of the changes of insect life, and as if providing against a period of inactivity, he selects a large stalk of corn. A day is now all that is necessary to effect the metamorphosis, and instead of the loathsome budworm we now have the active and sparkling fire-fly. This is the history of the budworm obtained from careful observation and experiment. But, of what is of vastly more importance, namely, a remedy against its ravages, I am sorry to say that I know nothing. J. S. D.

Commenting on the above is almost like commenting on the Book of Mormon; but it may perhaps be worth while to point out a few of the more obvious mistakes.

1st. We are told that "the peculiarity of having a dark-colored head will serve to identify the worm in the earlier days of its growth." I know more than a thousand larvæ that have this "peculiarity." In fact, with a few exceptions, all boring larvæ have a dark or reddish or yellowish head, and a pale body.

2nd. Speaking of the hogweed borer, we are informed that "you may readily detect the point at which the egg was deposited by the small perforation in the weed." This is not the case with any borer known to me. The minute hole by which the egg is inserted, or by which the minute larva eats his way in after hatching out from the egg, always closes up and becomes undistinguishable. The hole seen by this writer must have been that made by almost all boring larvæ, to afford a passage for the perfect insect.

3rd. The "great change" spoken of as occurring in the same larva, after it has migrated from the hogweed to the corn, is simply due to the hogweed borer being an entirely distinct species from the borer that inhabits the corn. Although many larvæ change color very remarkably as they progress to maturity, yet it is absolutely incredible that a larva when young, should be white with a dark

head, and, when full-grown, have its body striped lengthways with black and white, and its head "the same color as the body." Evidently J. S. D., not being aware that there are thousands of different kinds of borers, and finding one borer in Hogweed stalks and another in Corn stalks, jumped to the conclusion that the two must be one and the same insect, and manufactured "out of whole cloth" that story about its migrating from Hogweed to Corn, which is contrary to all entomological analogy.

4th. The "enlargement of the skin on the upper third of the body, resembling a puff in a lady's sleeve," is rather loosely defined, seeing that the writer does not refer us to any particular fashion-plate in any particular Lady's Magazine. But I suppose from the context, that this must refer to the insect's passing into the pupa state. Now, in the pupa state, all borers without exception lie still and eat nothing; in fact they have then neither legs to walk with, nor mouth to eat with, nor anus to discharge their feces, although many of them have an apparatus of little hooks, by which they work their way for some short distance out of the earth or the vegetable substance, in which they had previously lain imbedded. How then can it be possible for this boring pupa of J. S. D.'s to travel about in the open air and "select a large stalk of corn?" He might as well tell us that a corpse screwed up in a coffin could travel about in a Cemetery, and select a large and handsome tomb. One thing is just as possible as the other.

5th. The North Carolina farmers need not go to work to destroy the "fire-flies," under the false idea that they produce "bud-worms;" for, as I have already shown, fire-flies in the larva state are beneficial and not noxious insects—the friends and not the foes of the farmer.

MORAL.—Before men undertake to write about the Natural History of Insects, they should learn the rudimental principles of Entomology. B. D. W.

THE IMPORTED GOOSEBERRY SAW-FLY. (*Nematus ventricosus*.)

Mr. Jas. H. Parsons, of Franklin, Delaware Co., N. Y., informs me that it is this insect, and not the Native American Saw-fly (*Pristiphora grossularia*.) that infests his currant bushes, as the larvæ were "green covered with black dots." "It first," he says, "made its appearance in his neighborhood three years ago, completely defoliating currant-bushes in certain localities, in others scarcely injuring them at all. In 1865 it was very destructive, generally continuing till late in August. But in 1866 it appeared and disappeared in May on his own bushes, re-appeared in June, but disappeared again before the close of the month and was not seen afterwards." The re-appearance in June was probably caused by some of the pupæ, that had wintered underground, failing to develop into flies as early as usual, as I had several flies of the second or summer brood, that did not come out till nearly a month later than usual. (PRACTICAL ENTOMOLOGIST, Vol. I, p. 120.) The non-appearance of the usual second brood in 1866, must have been due to

the first brood having been preyed upon extensively by some insect or other enemy, or possibly to heavy rains or other peculiarities of weather.

Mr. Parsons also says that "measure currant-worms" (evidently those of the *Ellopi ribearia* of Fitch,) "about 1½ inches long and of a yellow color with black dots, were found upon his bushes in 1865 and 1866, though in small numbers. In a pint of the green worms of the imported Saw-fly there would not be found perhaps more than a dozen of the yellow measuring worms." (Respecting these last, which are a Native American insect, see PRACTICAL ENTOMOLOGIST, Vol. I, p. 122.) B. D. W.

TREE CUT-WORMS.

On pages 85-6 of the First Volume of the PRACTICAL ENTOMOLOGIST, I gave an account of certain Cutworms, which Mr. Riley of Chicago had ascertained to climb trees and destroy the buds thereon. I then and there stated my belief, that these insects would prove to belong to the genus *Hadena*. At the Illinois State Fair I saw a moth in Mr. Riley's collection, which he had bred from one of his three tree-cutworms, described by him as the "Dark-sided Cutworm;" and it proved to be really a *Hadena*, and either identical with or closely allied to the species known as *chenopodii*, which I had myself bred from pupæ dug up in my garden. B. D. W.

DOCTORING FRUIT TREES AGAIN.

The following article is from the *Industrial Gazette*, Louisville, Kentucky, of December 15, 1866. There is no Saratoga county in Kentucky, and consequently the "fact worth knowing" probably hails from Saratoga county in New York.

A gentleman of Rochester was lately in Saratoga county, and was there shown an apple-tree in fine healthy condition, which had been ill, subjected to treatment with calomel, and thoroughly cured. This tree was afflicted with insects, which were destroying it and rendering it unproductive. A hole was bored into the body of the tree nearly through the sap, and two grains of calomel inserted. As soon as this calomel was taken up by the sap, the vermin on the tree died, and it began to bear fruit and has done so for three years, to the entire satisfaction of the owner. Sulphur may be mixed with the calomel and produce a good effect. This is a fact worth knowing.

It is much to be regretted, that the author of the above did not see fit to inform us, what particular kind of "insects" were infesting the sick apple-tree. It is possible that Calomel may be good against Bark-lice, and bad against Plant-lice, effective against Borers and useless against Canker-worms, death upon Caterpillars and life and health to the Apple-worms that bore into the cores of our apples. Or must we believe that, like certain quack medicines for the use of the Human Species, Calomel will cure every ill that Apple nature is subject to? There cannot be the least doubt, however, of what the article asserts, namely, that "as soon as the Calomel was taken up by the sap, the vermin on the tree died." For it is chemically impossible that the sap ever should "take up" calo-

mel, seeing that sap can only take up such substances as are soluble in water, and calomel, as every child knows, will not dissolve in water. The writer might as well try to make us believe, that sap can "take up" sand or gravel, as "take up calomel." One thing is just as possible as the other. And the same remark applies to the sulphur, which is recommended to be mixed up with the calomel. In the 1st volume of the PRACTICAL ENTOMOLOGIST, (p. 125,) will be found recorded a case, where sulphur had been introduced into several 1/2 inch auger holes, bored in peach-trees, and still remained there two or three years afterwards. Whereas, according to the New Patent Tree-doctors, it ought to have been long ago absorbed into the circulation of the tree. And on page 96 of the same volume there is another case recorded, where 27 pounds of sulphur, plugged up in 120 apple-trees, utterly failed in killing the cankerworms.

I lately heard of a lady who was cured of a violent headache, by her husband presenting her with a new bonnet. As soon as the bonnet was put on her head, the head-ache left her, and never returned for three or four years afterwards. This is just as good proof that bonnets cure head-aches, as the above quoted case from New York is that calomel cures sick apple-trees. I strongly suspect that, in both instances, there would be certain unexpected facts developed on a rigid cross-examination of the witnesses.

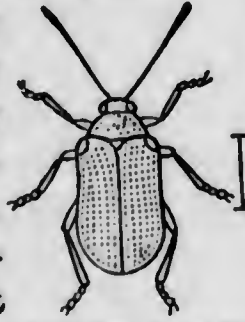
B. D. W.

THE GRAPE-VINE COLASPIS.

(Colaspis flavida Say.)

From several answers to correspondents it will have been noticed, that this insect has preyed extensively on the terminal shoots and young leaves of the grape-vine, in Ohio and Illinois, in the summer of 1866. From a letter of Dr. Fitch's published in the *Country Gentleman*, of Aug. 30, 1866, it appears that what from his description must be the same insect has "destroyed grape-vines by the wholesale" in Massachusetts, and that in New York, in Dr. Fitch's own neighborhood, "it has been the worst enemy that has attacked the vine, riddling the leaves with small round holes, interspersed with larger irregular ones." Dr. Fitch has also heard of it in several other parts of the country; and what is probably the same species is mentioned by Mr. Glover, as having been near Washington in 1866 "very injurious to the foliage of the grape-vine, in which the perfect insects eat innumerable small holes." (*Agric. Report* 1865, p. 91.) The annexed figure will give a good idea of this little pest, the hair-line showing its natural length.

Instead of referring this insect to the *flavida* of Say, Dr. Fitch has chosen to name it as the *Colaspis brunnea* of Fabricius. Fabricius's descriptions are generally so very short, that it is often impossible to be certain, from the descriptions alone, what particular species he refers to, when several distinct species co-exist in the same country which resemble one another very closely. This is the case in the pre-



Colors, cream-color and black.

sent instance. There is another beetle of precisely the same size and shape, which is equally abundant with Say's *flavida* and occurs in the same localities, and to which Fabricius's description will apply nearly as well as to Say's species. This second beetle, however, is a very distinct species, and is the *Colaspis costipennis* of Dejean's Catalogue, as I have been informed by Le Conte. It differs from *flavida*, in the thorax and head being of a dark metallic greenish color, (not yellow tinged with rufous,) and in the wing-cases being pale brown, each with four smooth slightly elevated pale yellow longitudinal lines, the two outside ones and the two middle ones respectively uniting behind in an acute angle. In *flavida*, on the contrary, there are on each wing-case, eight (not four) such pale yellow lines. It differs also from *flavida* in the last 3 or 4 joints of the antennæ, being uninterruptedly brown-black; whereas in *flavida* the last joint or two and the tip of the last joint but four, are brown-black, leaving the intervening two or three joints always pale yellow or cream-color. This very remarkable colorational peculiarity occurs also in *Colaspis prætexta* Say, but it does not appear to have been hitherto noticed by authors, either in *prætexta* or in *flavida*, and Dr. Fitch does not notice it in the description of his *Colaspis* referred to above.

As a general rule, where an old author, like Fabricius, has described an insect so loosely and briefly, that it is impossible to identify it with any certainty, and a modern author, like Say, has published a good and full description of it, it is better to use the modern name. For the law of priority, according to which the name given by the first describer takes precedence of all succeeding ones, only applies when the description is such that the species may be identified with comparative certainty. There is no greater nuisance in science, than authors who are perpetually exhuming old dead and buried and forgotten names, based upon descriptions which are good for nothing, and foisting them into the places of names which are in universal acceptance in the scientific world. Science should deal as much as possible in things and as little as possible in words.

It may seem strange to novices, that a particular insect, which had never been noticed before as injurious, should swarm in this manner all over the United States in a particular year, on the particular plant which it infests. But in this case the insect is what would be popularly called a small one, and it is only of late years, that people have begun to awake to the practical importance of attending to such matters. Besides, it is only of late years, that the grape-vine has been extensively cultivated in the United States. There can be no doubt whatever, that the insect has always existed in this country, in the woods, preying upon the different species of wild-grape. I have never failed myself for the last eight years, to capture numerous specimens of it in the woods in Illinois, every year. Instead of wondering why particular insects should swarm in particular years, far beyond their usual numbers, the wonder with me has always been—

considering the prodigious number of eggs laid by almost every species—that the great Antagonistic Balance between cannibal and parasitic insects and other insect-devouring animals on the one hand, and the plant feeding insects on the other hand, should be so admirably arranged by an All-wise Providence, that but very few disturbances occur in the harmonious adaptation of all the parts of the great System of the Creation.

B. D. W.

ANOTHER UNIVERSAL REMEDY.

I find the following in the *Country Gentleman* of Jan. 10, 1867, evidently reprinted from some California paper. It has since started on its travels through the Agricultural Press, with most of the references to its Californian origin suppressed.

One Smith, of Tolano county, [in California.] having had his trees very much injured by worms, said he would very willingly give fifty dollars to know of a remedy that would keep them down. We advised him to try one remedy, viz: To bind a bundle of the boughs or twigs of the red cedar around the body of each tree, with the butts uppermost. We have since heard that the experiment was entirely successful; though armies of worms made a charge upon them, he had a full supply of peaches and other fruit.

It may not be generally known, that worms and insects of any kind are very rarely seen upon any of the varieties of the cedar family. We think that red wood and white cedar thus packed around the body of trees, would be very advantageous in protecting any kind from the miller or worms, to be applied near the ground every spring.

Kern County, Cal.

S. W. JEWETT.

It is quite manifest, that such a remedy as this can be of no avail whatever against winged insects, that deposit their eggs on the limbs or twigs or leaves of the tree. Against species, such as the notorious Cankerworm, where the female moth is wingless and has to crawl up the trunk of the infested tree, in order to deposit her eggs thereupon, it may be more or less effectual; on the same principle that bands of cotton-wool round the trunk, or tarred bandages wrapped round the trunk, or sorghum molasses smeared on the trunk itself, form a mechanical impediment to the ascent of the female insect. It may also prevent the periodical ascent of tree-cutworms from the ground on to the tree; (see PRACTICAL ENTOMOLOGIST, I, pp. 85-6,) for it has been already shown that they have such worms in California. (*Ibid.*) Lastly, it may prevent such worms or caterpillars as, having stripped the tree on which they were raised of its leaves, are on their travels in search of other trees, from mounting the tree thus protected. But that it can be of the least use against any other insects, I do not believe. It is a mistake to suppose, because a particular insect will not eat Red Cedar, that therefore the presence of a bunch of Red Cedar a few yards off would be offensive to it. If this were so, trees growing near a Red Cedar bush would be free from insects, which is certainly not the case.

The trouble in this, as in so many other cases, is, that inexperienced persons do not sufficiently attend to the very wide difference in the habits of different Insects. Because Red Cedar boughs have prevented Tree-cutworms and one or two other particular insects, under particular circumstances, from

mounting fruit-trees and destroying their buds or their foliage, therefore it is inferred that it will keep off all other "worms." As well might we infer, because Sulphur cures the Itch, that therefore it will cure the Gout. As well might we argue that, because a Cow will eat timothy hay, therefore a Hog will do the same. Finally, we might as well insist upon it, because the Indians of California habitually eat rats and mice, lizards and snakes, grasshoppers, crickets and caterpillars, and consider as an especial delicacy a white grub as big as a man's thumb found in old rotten wood, that therefore civilized Americans have the same eccentric habits.

B. D. W.

BOREES.—The Plug-ugly Theory.

The following is going the rounds of the Agricultural Press, and as it contains the very quintessence of conceit, ignorance and folly, I propose to nail it to the counter as base coin.

BOREES IN APPLE TREES.—Much has been written about this pest, and the whole of it does not amount to any thing. When you find that one has made a hole in the tree, drive in a plug. That is death to them.

The writer evidently supposes, that the borer perishes for want of air when the plug is driven in. So far is this from being the case, that in breeding borers, as I know by experience, the great object is to exclude the air from them as much as possible. Several years ago, having split several boring larvae, nearly an inch long, out of honey-locust timber in the spring of the year, and being desirous to find out what beetle they would change to, I took a solid block of honey-locust wood, bored three nice smooth holes in it, to the depth of an inch or two, with a stock-and-bit of suitable size, slipped a single larva head foremost into each hole, and then plugged up each hole with a round oaken plug; driven in with a hammer so as to be as nearly airtight as possible. According to the "Plug-ugly" theory, all of these three larvae ought to have died forthwith. The plug would have been "death to them." But what were the facts? They lived and flourished, boring hither and thither in the block, but never boring to the surface till twelve-months afterwards, shortly after which they came out all three of them as perfect beetles—the *Eburia 4-geminata* of Say.

Most boring larvae make their way to the surface of the infested tree shortly before they are ready to assume the perfect form, or so nearly to the surface as to be merely separated therefrom by a thin layer of bark. If the hole that they have bored is plugged immediately, they will simply bore a new one, thereby doing additional damage. If the hole is plugged after they have assumed the pupa state, it may perhaps imprison the perfect beetle and prevent his making his way out to propagate the breed, but it in no way lessens the damage done by the individual insect. But if, as is most usually the case, the hole is plugged after the perfect beetle has escaped, it is merely locking the stable door after the steed is stolen.

So much for the "Plug-ugly Theory." What next, gentlemen?

B. D. W.

A MASS OF MISTAKES.

I find the following letter in the *Prairie Farmer* of Feb. 9, 1867, from a Nebraska correspondent:—

REMEDY FOR THE BORER.

EDS. PRAIRIE FARMER:—As I see that a remedy for the borer worm is inquired for, I send you mine, which you can publish, if you think it useful. For the last eight years, I have practiced hauling hickory wood on my farm every year, and placing it where it would attract the borer moth, and then burning it with the worm in it before the end of two years. I think that I have thus kept the worms in subjection, and that it will take but a small quantity of the wood to keep them so, if the requisite pains are taken to burn it before the worms come out.

Short as this communication is, it contains no less than three mistakes, as follows:—

1. None of the different kinds of borers that are known to infest Hickory wood could live in Fruit-trees; neither would the Beetles, produced from these boring larvæ, ever lay their eggs upon fruit-trees. They know better than that; for if they did so, the larvæ hatched from those eggs would perish.

2. There is no "Borer moth" known to breed in Hickory. All the Borers of the Hickory produce Beetles and not Moths; though the common Borer of the Peach and that of the Red Currant do produce Moths.

3. The "worms" never come out of Hickory as "worms" but as Beetles, into which the "worms" have previously changed.

Destroying the boring-worms in Hickory wood will have no more effect towards diminishing the number of boring-worms in Fruit-trees, than one Farmer's butchering a lot of hogs will diminish the number of his neighbor's sheep. Those that desire fuller information on this subject, can refer to my Paper on Borers, in the PRACTICAL ENTOMOLOGIST, Vol. I, pp. 25—31.

B. D. W.

HOP-GROWING IN THE WEST.

There is a prospect that, for several years, a deal of money may be made by growing Hops in the Valley of the Mississippi. The Hop Plant-louse seems to have generally established itself within the last three or four years, in those Eastern districts where Hops were formerly grown to a very large extent, and to be utterly ruining the crop. The probability is, as I have already suggested, (PRACTICAL ENTOMOLOGIST, II, p. 41.) that this insect has been recently imported from Europe; and in that case it will probably continue its ravages for a considerable length of time in the East, before it finally works its way to the West. Hence, for many years to come, Western Hop-growers will have a great advantage over their Eastern competitors. The following extracts from a letter, which appeared in the *Country Gentleman* of Jan. 31, 1867, will give a very good idea of the amount of damage done by this insect, wherever it has once become firmly established.

In the year 1864, hops were attacked by lice so as to nearly destroy the crop, but some picked early and got a fair yield. But perhaps the experience of my first neighbor to the south would be a fair sample of many others. Geo. B. Brewster had a new yard of two acres; the culti-

vation was perfect; it was a model yard. He harvested over one ton (2,000 lbs) of hops in 1865, which he sold for 30 cents per pound. In the spring of 1866 he hired two other yards, an acre or more in each. In his own yard he harvested 200 lbs. In one yard that he hired he got \$55 worth, and the other he plowed up and sowed to oats, getting less than 500 lbs. where he might reasonably expect 2,000 lbs. The roots nearly all died in the winter. There seems to be a prospect that this branch of agriculture will soon become extinct, unless the causes which have proved so detrimental can be removed.

Z. E. JAMESON.

Trasburgh, Vt.

In the year 1866 a few acres of Hops were planted in the immediate neighborhood of Rock Island, Ill.; and the owner, who is an experienced English Hop-grower, informs me that the plant flourishes there, and that he has noticed no Plant-lice on it. It may not be amiss to caution Western men, to be careful how they import the roots or sets from infested Districts in the East. The Plant-louse of the Hop passes the winter in the perfect state; and a single female Louse, accidentally mixed in among a lot of sets, might propagate the breed here to an indefinite extent, before it was noticed by any one.

B. D. W.

THOUSAND-LEGGED WORMS.

[FROM A LETTER FROM JAMES H. PARSONS, OF FRANKLIN, NEW YORK.]

My Onion crop last summer did very poorly. Instead of 40 bushels as I expected, I had but about 12 bushels. The onions were small or medium size, and when I pulled them, I was surprised to find that they had no roots, or at least very short ones, not more than half an inch in length. I was unable to account for the phenomenon, as I found but few onions affected with the "maggot;" and yet I noticed that the roots of every onion were covered with little "thousand-legged worms." (See Answer to Geo. W. Robinson, in December No. of PRACTICAL ENTOMOLOGIST, p. 34.) It did not occur to me then that these worms had done the mischief, as I had never seen them before on living vegetables—only on dead seeds in the ground, that had failed to germinate. They were from 1/2 inch long to nothing—some of them so small as to be scarcely visible. The smaller ones were white, the larger ones light brown, their bodies very lively and flexible, and their legs long as compared with the diameter of their bodies, say 1-16th of an inch in length, their bodies being considerably less than 1-16th inch in diameter. It occurs, but I concluded that they were harmless creatures and it would not be worth while. I will send you some as soon as I can find them in the Spring, if you do not receive them from some other source. They may prove to be a great pest. I presume every square rod of my garden has hundreds of thousands, if not millions, of these worms, little and big.

REMARKS BY B. D. W.—The thousand-legged worms on your onions, were most probably the same species which I have described in the passage referred to above. Mr. Robinson mentioned that they occurred of various sizes, and that the young ones were, as you describe them, whitish. According to Dr. Wood, to whom I forwarded a specimen, my species is undistinguishable from his *Iulus curuleo-cinctus*. In fact, although the body when recent is brown, as I have described it, when dried up it is always banded with blue on each segment. Dr. Wood's name must, of course, take precedence of mine. I shall be glad to receive the specimens promised by Mr. Parsons.

FIGHTING THE CURCULIO.

In the *Genesee Farmer* for 1853, p. 125, may be found the following decidedly original mode of heading off the "Little Turk," from the pen of a Canadian correspondent.

It would have done you good had you seen my Jeffersons, Washingtons, Hulings Superbs, Green-gages, Columbias, Golden Drops, Apricots and Nectarines last year, all bending under a tremendous load of the finest fruits ever beheld in the neighborhood of Fort Dalhousie, saved as follows:—Placed two or three well-made windmills in the head of each tree, with a clapper attached to each, which struck upon a piece of steel, and when the wind blew kept up a terrible jingling noise; one and a half yards of flag tied up so as to float nicely in the air, as close to the tree as possible without touching it; and lastly, when dinner was over each day, I would catch up a sheet made for the purpose, and say, "Come, boys, hold the sheet," and I would jar the trees and kill all that fell upon it.

This reminds one of the old receipt for making good rich soup out of flint stones, which runs as follows:—

Take three or four large flint stones; wash them very nice and clean, and let them simmer without boiling in two gallons of clear water for four hours, till the water has extracted nearly all the richness from them. Lastly, add three pounds of fresh beef, a few handfuls of sliced carrots and turnips, and a spoonful or two of sweet herbs, pepper and salt, and boil the whole for two hours longer. It would do you good to taste this soup and see how rich and palatable it is, and all made out of such cheap and common ingredients as flint stones.

I take it that the "windmills" and the "flags" were of no more use towards heading off the Curculio, than the flint-stones were towards making the rich soup. Without the "jarring" process, the Curculio recipe would be as ineffectual as the Flint soup recipe would be without the beef and trimmings. But the fools are not all dead yet; and when one does die, he always leaves a large family behind him.

B. D. W.

[FROM THE CINCINNATI GAZETTE, OHIO, AUGUST, 1866.]

A few mornings since, Mr. B. F. Davidson, who resides on Madison street, between York and Columbia, in Newport, Ohio, was greatly astonished, upon rising at an early hour, to find his yard covered to the depth of several inches with butterflies, the most of them dead, and the balance so benumbed apparently as to be unable to move much. The bodies of the insects were as large as a man's forefinger, and their wings measured six inches from tip to tip. How they got into Mr. Davidson's yard, when not one was to be found in any other place in the city, is quite a mystery. Our informant thinks that there must have been ten bushels of them. Boys were engaged all morning in carrying them off by the basketful.

OBSERVATIONS BY B. D. W.—From the statement that the bodies of these so-called butterflies "were as large as a man's forefinger," it is evident that they were not butterflies, but moths; and from the expanse of their wings being stated as "six inches," they must have been some one of the four species of *Attacus* common in the United States, probably the *Attacus cecropia** of Linnæus, the larva of which feeds on Fruit-trees, &c., and which I have recently found actually feeding on Hickory, the usual food-plant of *Attacus luna*. No other case is on record of these insects occurring in large numbers; but the papers have recently contained ac-

* I find a notice in the *Prairie Farmer* (July 21, 1866), about the larvæ of *Attacus cecropia* having "almost stripped" an apple-tree.

counts of flocks of butterflies, several miles long, occurring in California and the Eastern States. Many such cases are also on record in Europe. All our U. S. butterflies may be readily distinguished from moths by having a knob at the tip of their antennæ; and most moths are torpid or "benumbed" by day. It is very desirable that, when cases of this kind occur, a few specimens should be sent to some reliable Entomologist, so as to verify the species.

ANSWERS TO CORRESPONDENTS.

Thos. L. J. Baldwin, Delaware.—The blister-like elevations on the tubers of your potatoes, each about 1/4 inch in diameter, and many of them run together into confluent groups, with almost all these blisters burst open above, and showing inside a rough, scaly, brown surface, are, I have little doubt, caused by some insect or other. But what insect? That question is difficult to answer, without receiving fresh specimens at various seasons of the year, from the time that you first notice this scabby appearance on your potatoes to the end of the autumn. As you say yourself, that you believe this "scab" on the potato to be the work of some insect, and yet that "you have not as yet been able to fasten the guilt on any insect, though you have been watching closely for several years," I should infer that the damage must be done by some species of such a minute size, that it escaped your notice. Otherwise it might be attributed to the depredations of some Snake-millipede (*Iulus*—see PRACTICAL ENTOMOLOGIST, II, p. 34, and figure) or centipede, or of some insect-larva, such as those of the Click-beetles (*Elater* family) or the common White Grub, which is the larva of the May-bug, (*Lachnosterna quercina*).

Inside one of the blister-like scabs, in one of the two specimens sent, I found four thread-like milk-white cylindrical larvæ, over 1/4 inch long and 10 or 12 times as long as wide, with a large shining jet-black head. These evidently belong to the Order Diptera, (two-winged flies,) and, I think, to the *Mycetophila* family, and probably to the genus *Sciara* in that family. From the presence of their excrements in many other "scabs," which contained no larvæ, I infer that most of the "scabs," perhaps all of them, were formerly tenanted by these same larvæ; but that the great bulk of these larvæ went underground before the potatoes were dug, to pass into the pupa state and come out into the winged fly state next summer, in time to infest other potatoes. The insect that would be produced from these larvæ, if they had lived, would be a minute gnat, resembling a mosquito, except that its legs are shorter, and it has got no long beak to suck blood with.

I incline to suspect that it is these insects that cause the "scab" in your potatoes, and that not improbably they have been introduced along with seed-potatoes from Europe. At all events, I have never heard of any such "scab" among potatoes in the Valley of the Mississippi. There are several species of *Sciara*, which are known to infest rotten potatoes in England, and some observers there have believed that they were the cause of what is called "scab" in that country on the tuber of the potato, which may or may not be identical with your "scab." (See Curtis's *Farm Insects*, pp. 460—1, where a larva very like yours is figured and described as breeding in decaying potatoes in England, and producing a certain species of *Sciara*.) It is possible, however, that the "scab" on your potatoes may be caused by some insect, entirely different from these which I find in the specimens sent by you; and that the latter have merely bred there, as they would breed in any other mass of decaying vegetable matter. I can only decide this point on the receipt of additional specimens during the ensuing summer.

That your "scab" is caused by the action of some insect depositing its egg in or near the immature tuber, say about June or July, seems to be indicated by the fact which you mention, namely, that "the tubers first formed are the ones most affected, and that it is those which are evidently of later growth that retain their natural smooth surface." This hypothesis is further confirmed by the

fact, that a neighbor of yours whose potatoes have long been afflicted in this manner, "says that he introduced the disease upon his farm in seed-potatoes, procured from a distance about 10 years ago."

According to your account, this "scab" was "first noticed in Delaware about 10 years ago, is now widely-spread and is increasing every year, and if not checked, will eventually ruin the potato crop." I have little doubt that, as you suggest, it was to this disease that Mr. Thos. Conard, of Pennsylvania, referred, when he said that "his potatoes were badly nibbled by some bug or worm, and often almost ruined;" (See PRACTICAL ENTOMOLOGIST, I, p. 111.) though I erroneously understood him to refer, not to the tuber but to the leaf of the potato. Of course the "Three lined leaf-beetle" of the potato (figured PRACTICAL ENTOMOLOGIST II, p. 25), can have nothing to do with causing your "scab"; more particularly as you say, that you "do not think there were over 200 of the larvæ of this beetle last year in about two acres of your potatoes, the vines growing luxuriantly;" and yet that "two-thirds of your potatoes are as scabby as the specimens sent," the tubers thus affected being "generally the smallest on the vine and evidently stunted by the disease."

It is, of course, impossible to indicate any certain remedy for this "scab," till we know for certain what causes it; and if it is caused by an insect, what are the habits of that insect. Until I can institute further and fuller investigations, I can only guess and grope round in the dark. But supposing my guess to be a correct one, I should recommend your farmers not, on any account, to plant any scabby potatoes, and not to keep any on hand or allow any to be about in the open air after spring opens. In cutting potatoes for seed, the scabby part should be removed and destroyed; and wherever possible, let the potato patch be located a considerable distance from last year's patch. By this means the multiplication of this year's gnats may be measurably checked; and if the gnats should really cause the scab, the scab will also be checked.

I should be obliged by your mailing me a dozen or two freshly cut specimens of your "Scab," packed in a tight little tin-box. The two already sent were as dry as tinder and pressed as flat as a pancake; and on soaking them in hot water to restore them to something like their natural condition, the larvæ got killed. I am very desirous to breed a parcel of these larvæ to the fly state this season, so as to complete the history of the insect at as early a date as possible. As to the gnats in Chickens, see the Answer to Milton Conrad in the last number of the PRACTICAL ENTOMOLOGIST, (p. 56.)

E. Dagg, Illinois.—The mass of eggs which you found on the branch of a plum-tree, are, I think, those of the moth of the Apple-tree "caterpillar," (*Clisiocampa americana*). Besides the Apple-tree, this moth lays its eggs upon the Cherry, the Willow, the Birch, and several other trees; yet, strange to say, though the Pear is so closely allied to the Apple, all accounts agree that it never infests Pear-trees. Almost universally the eggs of this insect completely surround a small twig; but in the specimen sent, which was on a branch, they only reach about half way round. Possibly, therefore, they may be the eggs of another species of *Clisiocampa* (*Cl. sylvatica*), which is occasionally found on apple and cherry trees, and the eggs of which have not hitherto been observed.

C. M., Illinois.—The eggs which you send as found both on pear and apple twigs, are those of the common Catydid, and precisely similar to those noticed in the Answer to Geo. Haines in the last number of the PRACTICAL ENTOMOLOGIST. I know from personal observation that our Catydids sometimes eat flies. Whether they feed almost exclusively on such diet, I do not know; but I incline to believe that they do. Otherwise, if they feed almost entirely on the leaves of the trees upon which they are found, what is to prevent them from occasionally appearing in vast swarms, as our common Grasshoppers do, and as certain wingless Catydids also do, which are known in California and the Rocky mountain region to have the same habits as Grasshoppers? All previous writers, however, have assumed, that all the species of the Catydid ever, have assumed, that all the species of the Catydid family feed exclusively upon vegetable substances. On the general principle that we ought not to destroy life wantonly, I should be inclined myself to let these eggs alone, wherever I found them.

Henry Morey, Illinois.—I cannot tell from your description what the "caterpillars" were, of which you found so

many "nests" on the wild cherry, in the latter half of July. The caterpillar of a white moth, the *Hyphantria texior* of Harris, often makes web-nests on that tree, and sometimes on apple-trees, but much more generally on the Pig-nut Hickory, about that time of the year. But that is a 16-footed larva, not very unlike the common "caterpillar" of the apple-tree, except that it is only half as large; and having "two spines at one end and four at the other, black and about 1-16 inch long." You say nothing about the size or color of your "caterpillars," or about the kind of "nests" in which they lived; and if your description be correct, they cannot be "caterpillars" in the entomological sense of the term, i. e. the larvæ either of butterflies or of moths. Please send specimens next summer.

Peter Ferris, N. Y.—The egg-bunches on your apple-tree twigs belong, there can be little doubt, to the caterpillar which devastated the orchards in your neighborhood so terribly last year. They are clearly distinct from those of the common tent-caterpillar (*Clisiocampa americana*), and, in spite of your belief to the contrary, I cannot help strongly suspecting that they will turn out to be those of the Forest tent-caterpillar (*Clis. sylvatica*), which ordinarily infests forest trees, but has been known sometimes to swarm on apple-trees. But in any case, time will soon solve the problem, as I expect to hatch plenty of larvæ from the eggs sent, which arrived in excellent order. Your neighbors are doing the very wisest possible thing, by gathering and destroying these egg-bunches, in order to rid themselves of the plague of caterpillars next year. As you say that from 50 to 100 egg-bunches are often formed on one tree, it is evident that, if left undisturbed, that quantity of eggs would produce caterpillars enough to strip the entire tree of every green leaf.

The double row of eggs so beautifully arranged in two parallel rows on an apple-twig are quite new to me. They are certainly not the eggs of any Grasshopper or Catydid; and I think they will prove to be those of some true Bug, (Order Heteroptera), as they strongly resemble those of *Nabis fera*, a Canibal Bug found on grasses and the cereal plants. There are several kinds of the large stinking Bugs often found on blackberries and raspberries, which, as I have shown, habitually feed on caterpillars; and I should not be surprised if these eggs belong to some of these. I shall probably, however, breed from them, in which event I will let you know the result. They can scarcely be the eggs of any moth; as I know the eggs of all the species commonly found on the apple-tree.

M. M. S., Penna.—In reply to your three questions:—1st. I do not think that the darker or paler coloration in *Attaeus Polyphemus* is caused by the food-plant. You say that those you fed one summer on honey-locust were, when the moths emerged, "of a clear pretty buff color," and those you fed another summer on silver maple, "of the usual color, dark or grayish." I have four specimens, all bred by myself from the oak, now before me, and they vary in coloration about as much as our language would seem to indicate. Similar variations occur in *Attaeus cecropia*. 2nd. The "brown woolly bears," which you speak of as often walking about in the winter, are, I suppose, the larvæ of *Arctia isabella*, which are brown-black at each end, and tan-red in the middle. Like several other lepidopterous larvæ, which often, on that account, puzzle the young breeders of insects, these pass the winter in the larva state, and "feed up," as it is technically termed, in the spring; i. e. go to eating a second time in the spring, so as to complete their full larval development. When you see them wandering about on warm winter days, they are not, as you suppose, "homeless and objectless, with no goal in view, dragging out a forlorn existence," but they are diligently and industriously searching for some stray blade of grass or small weed which, under the protection of the snow, has retained its greenness through the winter. They usually with me spin up early in May, and come out as moths some time in June. 3rd. The moths which you bred from green larvæ feeding upon you maple, were undoubtedly *Dryocampa rubicunda*. You will find a figure and description of it in Harris's *Injurious Insects*, p. 408; and a description of the larva, which feeds exclusively on maple and was unknown to Harris, from the pen of Mr. Lintner in the *Proceedings &c.* III, p. 426. The larva, as you correctly suppose, does not spin a cocoon, but goes underground to change into the pupa

state, as is the universal habit of the family to which it belongs.

John Townley, Wisconsin.—The large whitish 16-legged grubs, or rather caterpillars, which you send are all of them the larvæ of a large gray moth—*Cossus robinia*. They live very commonly in the heart-wood of living Black Oaks and sometimes of other kinds of Oaks and Locust trees, boring it up pretty extensively. This does not materially injure the health of the tree—for a tree can live with all its heart-wood completely gone—but it ruins it for anything but firewood. The grubs in stumps and decayed wood are quite different from the above—in- deed it is a very general rule, that the same insect does not bore indifferently into living and into decayed wood. Such wood-borers as are 16-legged produce moths; such as are 6-legged produce beetles of many different kinds, for example the different species of Horn-bugs, (*Lucanus*); such as have no legs at all or only 6 very minute nipples like legs, mostly produce Long-horned beetles (*Cerambyx* family). The common "White Grub," which is also 6-legged and feeds upon living roots, is different again, and so are those 6-legged grubs which feed upon dung.

The fact of one of the larvæ which you send having been repeatedly frozen "as solid as a piece of candy," and as repeatedly come to life again, after sustaining a temperature of nearly 24° below zero, is one which every field-entomologist is familiar with. These fleshy larvæ, however, both when they are alive and when they are dead, will stand a temperature much below 32° without freezing. I attribute this to the juices of their bodies being more or less mucilaginous; for cold that freezes water will not freeze gum-water. I quite agree with you in the inference you draw, as to cold winters having little or no effect in destroying noxious insects. It is excessively wet and excessively dry weather that often kills off insects; not excessive cold or excessive heat.

Besides the 17-year Cicadas (Locusts), which occur in great swarms once in 17 years, and a few individuals of which are stated on good authority to occur in Long Island, N. Y., in the intervening years, there are several other species of Cicadas, which are not periodic in the time of their appearance. The fact of the striped Cucumber-bug not having troubled your neighborhood for the last two years is only one of many such anomalies. For example, in particular years the Army-worm, or the Rose-bug, or the Gray Blister-beetle will swarm; in other years it will take an Entomologist to find any of them.

F. L. Van Arsdale, Wisc.—The hairy larvæ about 1/2 inch long which you send, and which you found in a case of insects apparently eating them up, are those of some of the destructive *Dermestes* family and probably of an *Attagenus*. They are a terrible pest in collections of Natural History, when they are once allowed to effect an entrance.

The best preventive is to keep a lump of good camphor, about the size of a walnut, in every case of insects, renewing it regularly every spring—to have your cases as tight as possible—and to keep them enclosed in an outer fortification, such as is afforded by a cabinet in which the cases slide as drawers, or by any tight closet, wardrobe or bureau, which you may find it convenient to fill with your cases. Camphor, however, does not kill the larvæ when they are already there. All it does is to deter the parent beetle from laying her eggs in such strong-smelling situations. To get rid of those larvæ which you have already in your cases, place the cases when the spring opens on some level surface; and you will soon see, from the gun-powder-like grains of excrement voided by the larvæ, which particular specimens are infested. Have ready a small tin pail with a tight lid to it. Lay a sheet of cork at the bottom of it, and place all the infested specimens on this cork. Then shut down the lid, and immerse the pail nearly, but not quite, up to the lid in boiling water, and hold it there for some ten minutes. You will find that the heat from the water will destroy not only all the larvæ, but all the eggs that would otherwise soon hatch out into larvæ, without wetting or otherwise injuring the specimens. If you have many cases, and they are all badly infested, it would pay you to have a tight tin envelop of the proper size made to contain a single case, and immerse the whole nearly up to the lid of the envelop in boiling water.

C. M. B., New Jersey.—The oval, flattened, gray eggs about 3-16ths inch long, attached in two regular rows to the sides of a twig, and lapping over one another a little,

but the contrary way to the lap of shingles on a roof, are the eggs of a Catydid. They are the same referred to in the answer to Geo. Haines in the last number of the PRACTICAL ENTOMOLOGIST p. 57.

Elias Nason, Mass., per THE HORTICULTURIST.—You say that "your winter squash vines grow splendidly up to a certain point, and then suddenly die;" that "you find no worm at the root;" and that "your neighbor's vines are quite as mortal as your own, and you must stop the disease or stop raising the article." In all probability it is the Squash-vine Borer that attacks an inch long when whitish 16-legged caterpillar, nearly an inch long when full-grown, which lives in the stem of the vines, usually pretty close to the crown of the plant, in August. It afterwards bores its way out, goes underground, and next summer comes out in the form of a pretty moth, (*Trochilus cucurbitae*), with its front wings black and its hind wings clear and glossy, which lays eggs on the young vines, from each of which eggs a minute borer hatches out and eats its way into the stem, the minute pin-hole, by which it entered, soon closing up behind it. You will find a good colored figure of this moth in Harris's *Injurious Insects*, Plate V, fig. 8.

The best mode of subduing this pest is to dig out and destroy the larva in every infested vine. Thus you will prevent it from going underground when full-fed, and coming out in the moth state the following season to lay its eggs for that year's brood. Wherever you find a vine drooping or sickly, dig into its stem near the root till you find the vermin. Do not be afraid of injuring the vine; for if you do not kill it, the Borer will, and the remedy cannot be worse than the disease, and may save the life of the patient.

The Editor of the *Horticulturist* observes, that he "has had the same trouble with his squash vines," but that now he "practices covering the vine lightly with earth close up to the first blossom, and thus generally succeeds in growing a crop of squashes." This is a very good pre-ventive, as it debars the moth from laying her eggs on her favorite spot, namely the main stem of the vine pretty close to the crown. We fight the Striped Apple-tree Borer and the Peach-tree Borer precisely on the same principle, i. e. by precluding them from any access to the but of the infested tree, which is the favorite spot of those two insects.

A. W. Brumbaugh, Penna.—The cylindrical holes bored in your apple-twig are made in May and June by the Apple-twig borer—the *Bostrichus bicaudatus* of Say. You will find a figure of this insect and a full account of its operations in my Paper on Borers, (PRACTICAL ENTOMOLOGIST, Vol. I, page 27.) The insect you send along with the bored apple-twig is a harmless one, belonging to the *Perla* family in the Order Neuroptera. In this family all the different species, so long as they are in the larva and pupa states, live in running water—under stones, and under and about floating saw-logs &c., &c. Finally the full-grown pupa, (which, like that of a grasshopper, is as active as the larva,) crawls out of the water—its skin splits open in front—and out comes the winged Fly. Some species of the *Perla* family are 1 1/2 inches long, and most of them, whether large or small, are known to Fishermen as "Shad-flies." In the Fly state they feed on decaying vegetable matter. The particular species which you send is the *Tanipteryx fasciata* of Burmeister, a very common insect.

The Rose-bug, as you suppose, deposits its eggs in the earth, where its larva hatching out feeds for two or three years on roots, before it finally emerges again to the light of day in the form of the perfect beetle. The best remedy is to jar (not shake) your infested trees upon a white sheet; or if you cultivate on a large scale, to use one of Dr. Hull's "Curculio-catchers," which will be fully described in the next number of the PRACTICAL ENTOMOLOGIST. Some grape-growers in the West find that the Clinton grape-vine is peculiarly attractive to this insect; and plant a single vine of this variety among their choicer varieties by way of trap. For the benefit of other subscribers, I will copy your description of the manner in which this pestilent beetle operates with you.

"In May and June they swarm in innumerable numbers, and are wonderfully destructive. I have a great many grape-vines; and they have taken all of them for the last 5 years. They destroy them when in bloom, and strip the vines of all the leaves. Next in rotation they

go on to the peach, crowding on the fruit as thick as possible, even when the size of a hulled walnut; and next they go on to the apples. They have destroyed the fruit nearly all of it off 50 of my apple-trees, when it was as large as a small egg."

Edward E. Sheldon, Mich.—The larva, which hatches out from eggs laid on the Wheat-plant in the fall by the Hessian Fly, lives through the winter and comes out next spring in the form of the perfect Hessian Fly. You will find the history of this insect in the PRACTICAL ENTOMOLOGIST, Volume I, pages 103-9.

J. M. Cole, Missouri, per Edr. RURAL WORLD.—What you take for "small white worms," about $\frac{1}{4}$ inch long, lying in the pith of a very small twig of the Delaware Grape-vine, "with small holes, looking as if they were partly grown over on the outside, by which they entered the cane," are not worms (or larvæ) but eggs. If you recollect, these supposed "worms" were not divided into many distinct joints or rings by transverse creases, but were smooth from one end to another like a sausage. By this character you may always distinguish the eggs of insects, (many other kinds of which are fully as elongate as those you send,) from the larvæ of insects. The eggs in question were deposited in the twig for safe-keeping last fall by the borer or ovipositor of the common Tree-cricket (*Ectanus niveus*), of which insect you will find a figure in the last number of the PRACTICAL ENTOMOLOGIST, (p. 51,) and also a notice of its habits; and if you had not meddled with them, they would have hatched out next spring into minute larvæ, only differing from the perfect insect in size and in having no wings.

This answers your first question, what these supposed "worms" really are. As to the second question, how are you to keep them off your vines, my advice is not to make any such attempt, but to allow the insect to breed and multiply as fast as he pleases. He is your FRIEND AND NOT YOUR ENEMY; for, as you will see from the Article already referred to, he feeds upon plant-lice; and I know from many Missouri correspondents, and Mr. Geo. Husman says the same thing, that plant-lice are rather more abundant than is agreeable on the grape-vines of your State.

J. H. Hunt, Ohio.—The little cases, containing minute 16-footed worms, which you found upon your bee-hives, are those of the larva of some small moth belonging to the *Tinea* family. From very similar, but rather larger cases, I bred long ago a small moth, which was described by the late Dr. Clemens, from specimens sent to him by me, as *Solenobia Walshella*. The moths that destroy our woollen clothes and our furs live in somewhat similar cases, while in the larva and pupa states. It was merely in search of a suitable place to pass the winter in that these worms of yours crawled upon your bee-hives. They can do no harm to the bees, as they feed upon some kind or other of vegetable matter. There is no coleopterous larva that lives in such cases as these; and besides, all coleopterous larvæ are either 6-legged, sometimes with a leg-like process at the tail, or else they have no legs at all. The specimens arrived in first-rate order.

Answers to John Murphy, Edward Orton, F. T. Pember, Isaac Hicks, E. E. Sheldon and Dr. Benj. Norris, will be given in the next number.

NEW ENGLAND ON THE PRACTICAL ENTOMOLOGIST.—During their recent session the Massachusetts State Board of Agriculture passed the following resolutions:—

Resolved, That in the opinion of the Massachusetts State Board of Agriculture, the Entomological Society of Philadelphia, [now American Entomological Society,] by its researches and its publications, has exhibited a commendable desire to increase the amount of human knowledge.

Resolved, That we regard with great favor the endeavors of this society to disseminate in an available form a knowledge of this important branch of Natural History among Farmers and Pomologists, and we specially recommend their publications and their gratuitous labors to the favorable notice of the community.

ERRATA IN NO. 17.

Page 50, column 1, lines 15 and 14 from bottom, for "flea-beetle, (*Haltica*)" read "snout-beetle, (*Apion*.)"
Page 56, column 2, line 35-6, for "I, p. 10," read "II, p. 10."

NOTICE.

The *Southern Cultivator*, now in the twenty-fifth year of its existence, is published monthly in large octavo form at Athens, Georgia; terms *two dollars* a year, payable in advance. Each number contains about 32 pages of reading matter and nearly the same amount of advertisements, whence we infer that its circulation is pretty extensive. In the number before us we notice many excellent articles on the cultivation of Rice, Sugar, Tobacco and Cotton, and the editors are live men, and thoroughly posted in their business. Success to the *Cultivator*, and may all its subscribers follow the advice which it gives them, namely, to send us specimens of the bugs that trouble them, snugly packed in a little tin box, with a supply of their natural food, and accompanied by as full an account as possible of the manner in which the animal operates. Southern bugdom, in many departments, is as yet a new and untrodden field; and it is only by the practical man cooperating with the scientific man, that noxious insects can be effectually counterworked.

JUMPING TO CONCLUSIONS.

The Editor of the *Wisconsin Farmer*, (March 2, 1867,) has an article upon "THE Potato Bug," in which, from his evident ignorance of the fact that there are no less than five different kinds of Potato Bugs, he arrives at some most astounding results. Because, as he shows, potatoes were infested by bugs at Zanesville, Ohio, in 1858, and at the St. Croix Falls, Wisconsin, in 1857, he jumps to the conclusion that these bugs must necessarily have been the true Colorado Potato Bug, (*Doryphora 10-lineata*.) If he will only refer to the PRACTICAL ENTOMOLOGIST, (II, pp. 25-27,) he will find four different kinds of Potato Bugs figured and named, which have infested various districts east of the Mississippi river for time immemorial; and he adduces not one particle of proof, that the Ohio bugs of 1858 and the Wisconsin bugs of 1857, were not some one of these four kinds. I say "not one particle of proof," because I do not call such reasoning as the following, in any correct sense of the term, "proof." "It would seem from their rapid increase, their destructiveness to the potato, and their indifference to caustic applications, that they must have been the genuine *Doryphora 10-lineata* of Colorado."*

When WILL Agricultural Editors quit talking about "THE Potato Bug," "THE Borer," "THE Grub," "THE Maggot," &c., &c? One might as well assume that there is only one kind of Bird in the whole United States, and that because a roasted Turkey makes very good meat, therefore a stewed Turkey Buzzard would be equally palatable, and equally wholesome diet.

But the cream of the jest is, that the *Wisconsin Farmer* publishes a letter from Mr. Byers, the Editor of the *Denver News* (Colorado,) in which the aforesaid Editor suggests, that I may have mistaken the Colorado Potato Bug for the Colorado Grasshopper!! What would Mr. Byers say if I were to insinuate, that he might possibly not know the difference between a "quod" and a "composing-stick?"

B. D. W.

* Since the above was in type, I have heard from the Editor of the *Ohio Farmer*, that the common Potato-bug in Ohio is the Striped Blister-beetle, (*Lytta vittata*, figured in the PRACTICAL ENTOMOLOGIST II, p. 26.) "This insect," as he correctly remarks, "is much narrower and thinner than your Ten-lined Beetle, (*Doryphora 10-lineata*), a sample of which I received from Iowa two years ago."

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THE COMMON CURCULIO AND ITS ALLIES.

There are at least three very distinct Snout-beetles, (*Curculio* family), which have been popularly confounded together by various persons in various parts of the country under the common name of "Curculio." Yet in the eyes of an Entomologist they differ from each other as widely, as do a Cow, a Sheep and a Goat, in the eyes of a farmer. As the habits of these three Snout-beetles differ considerably, and as they must consequently be attacked in somewhat different modes, and at somewhat different times, by the Fruit-grower, I propose in the following paragraphs to give a brief account of each. Two of the three I was the first to publish as destructive to fruit; and one of these—the Plum-gouger (*Anthonomus prunicida*)—I was the first to name and describe.

One reason why Fruit-growing is so profitable a business in the Pacific States, is that none of these insects, so far as is known at present, exist there, even in small numbers. Although in California the Blest, the Chinese immigrants have already erected their joss-houses, where they can worship Buddha without fear of interruption, yet no "Little Turk" has yet imprinted the crescent symbol of Mahometanism upon the Californian plums, and the Californian peaches. This, indeed, is only what, reasoning from analogy, we should be inclined to

expect. For though many species, both of plants and animals, occur both in the Atlantic and in the Pacific States, yet, as a general rule, the plants and animals of the one region of country are more or less different from those of the other.

The Snout-beetles, as a Family, are distinguished from almost all other Beetles by the front part of the head being more or less prolonged into a snout, which, in some genera, is as fine as a hair, and in others about as wide as the head itself, and at the tip of which the jaws are placed. This snout, being part and parcel of the head, is consequently immovable, except along with the head; so that it cannot be confounded with the beak or proboscis of the true Bugs and the two-winged Flies, or with the tongue of the Butterflies and Moths. For in all these last the part that projects in front, inasmuch as it consists of the variously modified organs of the mouth, articulates with the head, and is plainly movable with reference to what may be called the Skull of the insect. With a very few exceptions, the Snout-beetles have all their six feet (tarsi) 4-jointed, with the last joint but one split into two lobes—characters which they have in common with the Boring-beetles (*Cerambyx* family) and most of the Leaf-beetles (*Chrysomela* family), and which effectually distinguish them from a few small groups of Beetles, which have true Snouts but do not have all their six feet 4-jointed. There are many hundred species of them found within the limits of the United States; but at present we will speak of three only.

THE TRUE "CURCULIO."
(*Conotrachelus nenuphar* Herbst.)

This insect may be distinguished from all other N. A. Snout-beetles by having on the middle of each of his wing-cases an elongate, knife-edged hump, which is black and shining, so as to resemble a piece of black sealing-wax. Behind these two humps there is usually placed a broad clay-yellow band, marked in the middle with white; but sometimes this entire band is white.

The female "Curculio" makes her appearance early in the season, and as soon as the young plums are a little larger than a hazel-nut. Alighting upon a

plum, she then, with the minute jaws placed at the tip of her snout, proceeds to make the singular crescent-shaped slit in the skin of the fruit, which is characteristic of the species, and to which the popular name of "little Turk" refers. In this slit she excavates with the same instruments a hole such as a pin would make, to as great a depth as the length of her snout will allow, widening and enlarging it a little at the bottom so as to make it somewhat gourd-shaped. Depositing in the slit a single egg, she next proceeds to crowd it down with her snout, to the bottom of the hole, where the cavity is sufficiently large to avoid all danger of the flesh of the injured plum growing in upon and crushing the egg. She then repeats the same process upon other plums, or occasionally to the extent of three or four eggs upon the same plum, till her stock of eggs is exhausted. According to Dr. Trimble, who has dissected many of these insects, the greatest number of eggs ever found by him in a single female "Curculio" was twenty-five; (*Fruit Insects* p. 79;) so that certain calculations, which have been based upon the assumption, that each female "Curculio" lays about two hundred eggs, appear to be founded in error. After a few days' time, the egg deposited in the plum hatches out into a whitish, legless grub with a scaly head, which bores a tortuous path through the flesh of the plum, eating its way as it goes. Finally, after the lapse of several weeks, the plum falls to the ground, its natural growth having been checked by the workings of the grub, and gum having very generally exuded from the orifice of the original wound. The larva then bores its way out, having by this time reached its full growth, and penetrates into the ground a few inches beneath the surface, where, in a cavity hollowed out for that purpose, it changes into the pupa state, and at length, in three or four weeks' time, comes out in the form of the perfect Beetle.

But plums, though the natural food of this insect, and the only wild fruit upon which I have ever found it, are not the only fruit which it attacks in our Gardens and Orchards. Among our imported stone-fruits, it prefers the nectarine even to the plum, and it also attacks the apricot, the peach and the cherry. As some have doubted whether so small a fruit as a cherry, could raise the "Curculio" to its perfect state, it may be well to state here, that according to Dr. Harris "the so-called cherry-worm, which is very common in this fruit when gathered from the tree, produces at maturity the same Curculio as that of the plum" (*Inj. Ins.* p. 77); and Mr. S. S. Rathvon, of Pennsylvania, tells me that he has bred "curculio" from the cherry, in a glass jar half filled with earth. Of late years, the "Curculio" has also infested pip-fruit, more especially apples; pears and quinces being not very much to its taste. In every case, with the single exception of the cherry, the fruit containing the fully developed "Curculio" larva dies and falls prematurely to the ground. But where, as sometimes happens, especially in pip-fruit, the egg fails to hatch out, or the young larva perishes premature-

ly, there the fruit is not killed, but simply deformed and stunted, as may very often be seen in apples. Out of the choicest apples selected for exhibition at our State Fairs, a large proportion will be found, on close inspection, to be more or less blemished from this cause, being studded in places with brown more or less rotten spots, and unnatural hollows and protuberances. The utilitarian, perhaps, may object that, for practical purposes, such apples are none the worse; but somehow or other most people prefer apples with fair, smooth, rosy cheeks; and even in the matrimonial market, young ladies that are pitted with the small-pox are rather at a discount.

As with a great many other insects that go underground to assume the pupa state, the pupa is liable to perish, unless the earth in which it lies is kept moderately moist. Hence, as Dr. Trimble has shown, in clay soils which are subject to bake with long-continued drought, almost the entire crop of "curculios" sometimes perishes in very dry summers. This explains a fact which otherwise might seem unaccountable, namely, that in certain clayey localities a fair crop of plums may be obtained almost every year, without taking those precautions which, in moister soils, are absolutely necessary to secure a crop.

So far, we have traced the history of the "Curculio" from the egg to the perfect beetle. Some of these perfect beetles come out as early as the middle of July—some in August—some as late as the latter end of September. Hence, as it seemed incredible that a beetle coming out in July should live all through the winter, and until the next season's crop of plums were set, and as no one had as yet ascertained that any "Curculio" hibernated in the beetle state, Dr. Fitch and, in the earlier edition of his work, Dr. Harris, have suggested the hypothesis that the species is double-brooded; the second brood being supposed, from the analogy of a very distinct snout-beetle which attacks the plum in Europe (*Rhynchites cupreus*), to lay its eggs in the twigs of the infested trees, the larvæ proceeding from which eggs pass the winter in the twig, and afterwards produce the beetles that sting the fruit in the following summer. (*N. Y. Rep.* II. § 52, and *Inj. Ins.* edit. 1841, p. 68.) But, in the first place, there is no proof of any such fact; and, in the second place, I have already shown that Dr. Trimble actually found specimens of the "Curculio" hibernating under the shingles of a roof, in the chinks of stone walls, and under the bark of an apple-tree; (*Fruit Insects*, p. 99;) and since then I have been informed by Mr. Rathvon, that he has himself found specimens hibernating under the bark of the cherry and the wild cherry in the months of March and November. Dr. Harris has also recorded the fact, that he has "found these beetles as early as the 30th of March," (*Inj. Ins.* p. 75,) apparently in the latitude of Massachusetts—a fact which is quite irreconcilable with the hypothesis of their having come out from the pupa state at so early a date in so cold a climate, and evidently implies that they must have passed the

winter in the perfect state, and been tempted, as often happens in such cases, by some peculiarly fine and warm day, to come forth temporarily from their winter quarters into the open air. The truth of the matter is, that most authors have been disposed to underrate the duration of insect life during the perfect or winged state, putting the average period at a few days or weeks, when perhaps a few months would be nearer the mark. There is little doubt now, in my mind, that the "Curculios" bred from the fruit of one year are the same individuals that puncture the fruit of the following year.

Almost all the Snout-beetles will fall suddenly to the ground, when they are alarmed; and almost all Leaf-beetles (*Chrysomela* family) have the same habit. But this is preeminently the case with our friend the "Curculio," because, in common with many other Snout-beetles, nature has so organized him, that he can fold back his snout between his front legs, curl up his legs under his belly, and thus, when he falls, leave no part liable to strike against any obstacle and be injured. In this posture a "Curculio" looks quite unlike a living and moving insect, and would be readily mistaken by the inexperienced eye for a dried bud accidentally knocked off the tree. But place him on the ground for a few minutes—remain perfectly motionless yourself—and watch the proceedings of the seeming dry bud. One after another you will perceive the legs, the snout and the antennæ, gradually displayed; and finally, if the day is hot and you have patience to wait long enough, you will see the "little Turk" open his wing-cases, expand his long wings, and fly off in the air to renew his depredations. People commonly suppose that "Curculios" do not or cannot fly. In reality, they do not fly as strongly and as readily as many other beetles. But Dr. Harris "frequently caught them flying," (*Inj. Ins.* p. 76), and both David Thomas and Dr. Trimble testify that they often fly in the warm part of the day. (*Trimble's Fruit Insects*, pp. 42—3.)

Having thus made ourselves acquainted with the natural history of the "Curculio," we can now apply understandingly the most approved methods for counter-working this little pest. These are reducible to two, the first being directed against the insect in the larva state, and the second against the insect in the perfect or beetle state.

1st. Gather up and destroy all the wormy fruit, as fast as it falls from the tree, and before the larva has had time to leave the fruit and retire underground. Thus you nip the evil in the bud. The cheapest and easiest and most "Western" method, is to allow a gang of hogs the range of the orchard—hogs being very fond of green fruit and not having any squeamish scruples about the worms contained in it. This is the practice adopted by Dr. Hull, of Alton, Illinois, one of the most successful plum-growers in the West. Sheep and cows will also eat green fruit; but then they will also browse upon the trees, and perhaps occasionally bark them. Where hogs are objectionable, either because other crops are grown under the same fence with the fruit-trees, or because the sense of propriety and

neatness is offended by the habits of these animals, all that remains to be done is to hire that work done by human hands, which the hogs will do gratuitously and thank you for the chance. In any case, the work must be done systematically and regularly. It will be no earthly use to pick up and destroy the fallen fruit, after the larva has left it and gone underground.

Of course it will be understood, that by destroying the wormy fruit you do not diminish the crop of "curculios" for the current year, but only that for the ensuing year. And as "curculios" can and do fly, it will be seen that it is of the utmost importance that a whole neighborhood should cooperate in this plan. Otherwise a fruit-grower, who did not allow a single "Curculio" to come to maturity on his own premises, might be perpetually pestered with such as have been raised by his neighbors, flying in upon his fruit-trees, day after day and week after week. As cherries, unlike all other cultivated fruit, do not fall prematurely to the ground, when infested by the larva of the "Curculio," it is plain that in this particular case the above method can have no application. Hence, if cherry-trees are to be kept free from "Curculio," we must depend solely and entirely upon the following method.

2nd. Jar your trees regularly every day, catching and destroying all the "Curculios" that fall therefrom. But recollect that the tree must be suddenly jarred, not slowly and gradually shaken; for the wind shakes the boughs of every tree continually, and yet the "Curculios" do not fall to the ground in consequence. But how are we to catch the "little Turk," after he has fallen to the ground? The old method was to spread white sheets on the ground under the infested tree, and to pick up the insects by hand as they fall, and destroy them in any convenient manner. For this purpose, Dr. Trimble recommends a large square sheet to be prepared, with a straight strip of wood sewed along the whole length of one of its edges, by way of stretcher, and two shorter stretchers, each sewed to one half of the opposite edge, the sheet being slit from between these two short stretchers to its central point, to receive the trunk of the tree. By this means the sheet is more easily spread out, and the wind is prevented from roughing it up. But so long as the whole surface under the boughs of the infested tree is covered by white cloth, so that no "curculios" shall be likely to fall outside and escape observation, it is immaterial for the success of the process what fashion of cloth be adopted.

Where the tree is not very large, and a limb of an inch or two in diameter can be conveniently spared, it is a good plan to saw off such a limb so as to leave a short stump to strike with the mallet in the jarring process. Otherwise, if the trunk itself has to be struck, it becomes necessary to pad the mallet to prevent injuring the bark. Where trees are quite large, Dr. Trimble recommends that a common mop-stick be padded at the end and applied successively to the leading limbs, one after the other.

For those who grow fruit on a small scale, the above will probably be found the most practically useful method of fighting the "Curculio." But for extensive fruit-growers, Dr. Hull's "Curculio-catcher" will effect a great saving both in time and money, though like other labor-saving machinery it requires some little outlay of capital, and cannot conveniently be operated, except in an orchard where no other crop but fruit is attempted to be grown. I am indebted to Dr. Hull himself for the following description of this machine, which may be briefly characterized as a gigantic, inverted umbrella, mounted upon a gigantic wheel-barrow, with a quarter-blooded cross of one of the battering-rams used by the ancient Romans. It is the first authentic description which has as yet been published; though two or three years ago a figure and description of some such machine appeared in print, without giving a word of credit to the inventor, and so unskillfully modified that, as Dr. Hull informs me, it would have required horse-power to move it about the orchard. The liberality of the original inventor, in thus gratuitously making known to the world the practical results of his own long and laborious experiments, through the columns of the PRACTICAL ENTOMOLOGIST, cannot be too much commended. Under such circumstances, some men would try to monopolize the invention for their own pecuniary benefit—some would take out a patent for it, and peddle the Patent Right over every State in the Union—and perhaps not one out of a hundred would do as Dr. Hull has done.

To make a "Curculio-catcher," we first obtain a light wheel of about three feet diameter, the axle-tree of which should be about ten inches long. We next construct a pair of handles, similar to those of a common wheel-barrow, but much more depressed at the point designed to receive the bearings of the axle-tree, and extending forward of the wheel just far enough to admit a cross-beam to connect the two handles at this point. Directly in the rear of the wheel a second cross-beam is framed into the handles; and two feet further back a third. The two last named beams have framed to their under side a fourth piece, say two or three inches in diameter, which is placed centrally between and parallel with the handles.

To the handles and to these last-named pieces, our stretchers to support the canvas are to be fastened. The front part of the beam, connecting the handles before the wheel, is designed for a ram, and should be covered with leather and stuffed with furniture moss, a dozen or more thicknesses of woollen cloth, or other soft substance; care being taken to use no more than is sufficient to protect the tree from bruising. The frame of our Catcher being finished, we next ascertain the elevation the handles should have in driving, and support them in that position. Having ready twelve stretchers or arms, (six for each side,) which are to receive and support the canvas, we place the long front arms in position. These extend from near the centre of the wheel on each side, and beyond the wheel in front about six feet; and are wide enough apart to receive the largest tree between them, on which it is intended to operate. The remaining stretchers are supported on the handles, and attached to the three cross and parallel pieces in the rear of the wheel. These are so placed as to divide the space at their outer ends equally, between the first-mentioned stretchers and the ends of the handles.

We now have ready a strip of board, one-half inch in thickness and two and a half wide. One end of this is firmly secured to the forward end of one of the front stretchers; it is then secured to the end of the next, and in like manner to all the others on one side of the machine, and fastened to the handle. Both sides are made alike. The office of these two strips is to hold the outside ends of the stretchers in their proper position, and

prevent the two front stretchers from closing. These outside strips also receive the outside edge of the canvas, which is fastened to them, as well as to the several arm supports. Three of these arms, on each side, may be cut and hinged so as to fold up, thus making the machine more convenient for housing. In this case two additional sets of braces would be required, and each of the outside rims would be made in three parts, instead of one, as first described.

From the description thus far given, it will be seen that the wheel occupies a central position, and is nearly in the centre of the machine. To avoid an opening at this point, a frame is fastened to the handles on either side of it, and brought together over the top of the wheel. This, as well as the stretchers, is to be covered with canvas. The arms or stretchers are so curved, that the jarring motion in moving from one tree to another brings everything falling on the canvas to the most depressed points, where openings are made into funnels, to the ends of which the mouths of pockets or sacks are tied. These can be removed from time to time, and their contents destroyed by immersion in hot water. The whole machine, when completed, is about 10 feet in breadth by 11 or 14 long; or at most 11½ wide by 13 or 13½ feet long. These are for large orchard trees. Smaller trees could be protected with a smaller machine. The frame-work, when covered, should be so nicely balanced, as to require scarcely any lifting to hold it at the proper elevation.

The mode in which the "Curculio-catcher" is operated, is thus graphically described by its inventor:—"The machine is run suddenly against the tree three or four times, with sufficient force to impart a slight jarring motion to all its parts. The operator then backs far enough to bring the machine to the centre of the space between the rows, turns round, and in like manner strikes or butts the tree in the opposite row, and so on to the end of the orchard. In this way a man may operate on two or three hundred trees per hour. The captured insects may either be scalded, as recommended above, or drowned by an immersion for several days in cold water." It may be added here, that the "Curculio" prefers the nectarine, the plum, and other smooth-skinned stone-fruit, to such as have downy skins like the peach. Taking advantage of this propensity, Dr. Hull, according to the report of his speech at a Meeting of Pennsylvania Fruit-growers, published in the *Iowa Homestead*, (Dec. 19, 1866,) sometimes "plants plums and peaches in alternating rows; and as the Curculio does not resort to the peach as long as the plum is at hand, he saves both, by killing them on the plum."

The assertion is often made, that there is no effectual remedy for the Curculio, and that jarring on sheets does not save the crop. Neither does it, unless it be systematically and pertinaciously followed up. But that this insect may be subdued by patient perseverance in the jarring system, there is the best and fullest evidence from practical men. Dr. Trimble, who for twelve years owned large Orchards both of Plum and Apricot-trees, declares that it is so. Ellwanger and Barry, the celebrated nurserymen, of Rochester, New York, keep two men constantly employed during the Curculio season in jarring their trees, and thus grow magnificent crops of plums. Mr. Lucius C. Francis, of Springfield, Illinois, wrote me word long ago, that he raised good crops of plums from an orchard of about a hundred bearing trees, merely by jarring them upon sheets some two or three times a week. And finally Dr. Hull, of Alton, Illinois, grows

whole acres of the most superb plums, and slaughters the Curculio wholesale, and at railroad velocity, with his murderous machine.

All the other proposed remedies are mere moonshine, or at all events have not yet been fully tested. You can diminish next year's crop of Curculio, by destroying the wormy fruit as it falls; but when the Curculio is already upon you, destroying your fruit day after day, you can only subdue him with certainty by the jarring process. Those who desire to see a whole string of supposed remedies against the Curculio catalogued and refuted, can read Dr. Trimble's book. I will only add here, that a writer in the *Country Gentleman* (April 19, 1866) recommends fencing out this insect from growing fruit, by surrounding the but of the tree with a bandage covered with some sticky kind of paint, because, as he observes, "it is said that the female curculio cannot fly, but crawls up the tree, and when she attempts to pass over the paint she becomes impaled there and perishes." He might just as well recommend building a tight board fence round every corn-field, to fence out the crows and the blackbirds. For, as has been already shown, both male and female curculios can and do fly as well as any bird, during the warm part of the day.

There is, however, one other mode of fighting the Curculio, which is recommended on such high authority, that it must not be omitted here, although I confess to a little skepticism as to its being as universally reliable as is represented. It will be found in the following communication to this Journal, from the pen of Mr. N. W. Bliss, the Secretary of the Warsaw (Ill.) Horticultural Society.

During the season of 1856, Mr. Jas. B. Matthews, now of Marietta, O., had six or eight Chickasaw plums of extra quality, growing in a cluster in his garden, in Warsaw. On 4 of these he began throwing air-slacked lime, as soon as the fruit set, and continued it after every rain, and sometimes after a heavy dew, showering the trees till they were white with the fine dust. On one or two trees he used none at all; and on the remainder he commenced using the lime after the Curculio had attacked the fruit. The lime dust was applied as often as once a week. Result—not one plum on those trees on which he did not use lime—a full crop of good fruit on those on which he commenced using lime early—and on those on which the Curculios had begun their attack before he began to apply the lime, he drove them entirely away and saved a portion of the crop. I followed the same plan, and saved so many plums as to break down my trees, as I was absent from home, and so did not have a chance to thin out the fruit, though I had the lime applied faithfully while I was away.

The following from that distinguished Horticulturist, F. K. Phoenix, of Bloomington, Ill., is to the same effect, so far as it goes. But we should observe that in the case recorded by this gentleman, the remedy was only tested on one single tree for two successive years, and in Mr. Matthews's case only on a few trees for a single year. Unfortunately, Mr. Bliss has forgotten to tell us, upon how many trees he himself experimented or whether he continued the application of lime for more than one season.

A neighbor amateur has this year grown about a bushel of most delicious Imperial Gage Plums on one tree, passed to him some three years since by a brother,

who said, "No use for him to try to grow plums!" After it was planted out one year, the family wood-pile was corded up under and about it, and after the fruit had set, and so long as any fears of Curculio were entertained, a plentiful supply of air-slacked lime dust was scattered over the top every week. Last year it had a peck, and this year a bushel or so, and here you have the whole story.—From the *Horticulturist*.

Where the Curculio has already deposited its egg in any particular fruit, that fruit may be saved without any material damage, by cutting out the egg or the very young larva with a penknife or any other convenient tool. It is found that the wound soon heals over and leaves but a slight scar behind. But this is too slow and troublesome a process to adopt, except where young trees are fruiting for the first time, and it is desirable to test the quality of the fruit at any expense of time and labor.

It may interest some to know, that although they have a snout-beetle in Europe which attacks plums somewhat after the fashion of our "Little Turk," yet, according to Mr. Glover, he saw no insect, in his recent visit to the Entomological Convention in France, "which approximated our plum weevil in either numbers, manner of attack, or destructiveness." (*Agric. Rep.* 1865, p. 90.) Mr. Stainton, however, states that the larva of a minute moth—the *Opadia funebrana* of Treitschke—"feeds in the interior of plums [in England], and is very common, as those who are in the habit of preserving plums well know." (*Entom. Ann.* 1853, p. 54.) But as Mr. Stainton says that he only has two specimens of this moth, "and believes that a few others have been since met with," the word "common" seems to be used here in its entomological and not in its popular sense.

THE PLUM GOUGER.—*Anthonomus prunicida* Walsh.

This insect has nearly the same habits as the common "Curculio," and in northern and central Illinois is at least equally common, being often found in company with it on the same tree, and appearing and disappearing at about the same time of the year. Many have confounded it with the "Curculio," and one fruit-grower informed me that he had noticed it on his plum-trees, but had always supposed it to be the male of the "Curculio"—which it most certainly is not. In two remarkable respects, it differs in its habits from the "Curculio." 1st. It bores, not a crescent-shaped slit, but a round hole like the puncture of a pin wherein to deposit its egg, as many as five or six such holes being often met with on a single plum, with the gum copiously exuding from each. 2nd. The young larva hatched out from the egg, instead of living permanently in the flesh of the fruit, bores its way in to the kernel, and thereafter devours the substance of that kernel exclusively.—Occasionally, at all events, and probably as a general rule, the larva of this snout-beetle, instead of going underground to transform into the pupa state, as that of the common "Curculio" almost always does, transforms inside the stone of the fruit which it inhabits, the perfect beetle emerging as usual, through a round hole which the larva had previously cut for that express purpose. As fruits infested by this insect fall prematurely to the ground, just as when

they are infested by the "Curculio," this peculiarity gives the fruit-grower a better chance to check the multiplication of the species. In the one case, fallen fruit must be destroyed almost immediately, to work any benefit; in the other case, it may lie undisturbed on the ground for some weeks without its making any difference.

The thorax of the "Plum-gouger" is ochre-yellow; the head and hinder parts slate-color, the latter with irregular white and black spots. In common with the other species of the genus to which it belongs, its snout usually projects forwards, or at the most, is bent perpendicularly downwards; whereas that of the "Curculio" usually hangs perpendicularly downwards, like the trunk of an elephant, but is capable, as before stated, of being folded backwards between its front legs. The Plum-gouger is further distinguishable from the "Curculio" by its wing-cases being smooth and dull-colored, without any shining glossy humps on them.

Dr. Hull writes me word that this insect is an old acquaintance of his, but that it is not anything like as common near Alton, Illinois, as the "Curculio"—occurring, as he estimates from the insects captured in jarring his plum-trees, only in the proportion of about 1 to 50. Near Rock Island, in Northern Illinois, it is certainly to the full as common as the "Curculio," both on tame and on wild plum-trees. In Central Illinois it is also about equally common, both at Springfield, according to Mr. Francis, and near Bloomington, in the Orchards of Dr. Schroeder and Mr. Wm. Holmes. It has also occurred near Crescent City, Iowa, on the plum-trees of Mr. H. A. Terry. So far as is at present known, the insect is peculiar to the Valley of the Mississippi, and has not been met with in the Atlantic States. Dr. Hull remarks to me, that "it appears to be especially fond of the Smith's Orleans Plum, though other plums are also attacked by it, the yellow or green-skinned sorts the least."

As we should naturally anticipate, from the fact that this insect is physically incapable of folding up his snout and his legs into so compact a mass as the "Curculio" does, he does not drop to the ground quite so readily as the "Curculio." According to Dr. Hull, "it requires severe jarring to bring him down." Possibly, one reason why this gentleman found proportionally much fewer "plum-gougers" on his Plum-trees, than other fruit-growers have done in other parts of Illinois, is, that a larger percentage of the "Curculio" are dislodged by his "Curculio-catcher" than of the "Plum-gouger." Of course, where each separate limb of a large Plum-tree is successively jarred by a padded mop-stick or other such instrument, a Snout-beetle, that does not drop very freely and readily, will be more likely to come down, than where the trunk of the tree only is butted or jarred, as is the case when the "Curculio-catcher" is used.

THE FOUR-HUMPED CURCULIO.

(*Anthonomus 4-gibbus*, Say.)
This insect was named and described long ago by Say, as common everywhere in the United

States. It is of a dull-brown color, shading into rust-red behind, and may be readily distinguished by the four projecting humps on its wing-cases, none of which, however, are shining black, as in the case of the common "Curculio." The males have considerably shorter snouts than the females, which is also the case with a genus of Snout-beetles (*Balaninus*), with long snouts as fine as a horse-hair, which infest the acorn and the hazel nut.

Speaking of this insect in the *Prairie Farmer* of July 18, 1863, I stated that "I had always found it on the crab and the hawthorn, and that, perhaps, it may sooner or later attack the apple." In the very next year I received many specimens from Mr. Wm. Cutter, nurseryman, of Beverly, Illinois, together with some of the apples punctured by it, and the following account of its operations:—

The first we noticed of them was on the 26th of May, when they had marked but little of the fruit. To-day (June 12th) they have punctured full one-half of it, on trees of ours that promised ten to fifteen bushels this year. On the lower limbs, hardly an apple has escaped them, many having eight or ten holes in them; but on the top branches there is scarcely a single apple touched. To-day, it was no trouble to find ten or twelve of them by looking over the trees; so we tried shaking them on to a sheet, but found it impossible to jar them off. Full one-half of those we find have their long snouts plunged deep into the fruit—and we have noticed six on a single tree. The holes they make are perfectly round, and appear to be made for the purpose of eating, as we can see no eggs in them. There are no crescent-shaped marks on the apples, such as those made by the Little Turk, and our apple-trees seem to be entirely clear of all Turks and Gougers, except this one sort. We think we see some signs of their work on pears—but cherries, and what few peaches we have, are not touched by them."

Having, by way of experiment, gathered thirty or forty crabs that had been perforated by this same insect, I found that fully three-quarters of the holes contained neither eggs nor larvæ; in eight of the holes I found an egg; and in three of them young larvæ recently hatched out. Whence it results that most of these holes are bored, as Mr. Cutter suggests, "for the purpose of eating," and that eggs are deposited only in a few of them. The Plum-gouger seems to have the same habit; for Dr. Hull has found as many as 40 or 50 punctures on a single Smith's Orleans plum, and yet very seldom finds more than one egg in one plum.

Having sent a specimen of this "Four-humped Curculio" to Dr. Hull, (as well as of my "Plum-gouger,") and inquired whether the species infested apples near Alton, I received the following reply:—

So numerous are they, that I do not recollect to have seen a single apple the past season, grown at this point, that did not contain from one to twenty or more punctures made by this insect. He appears to vie with the Plum Curculio in rendering apples of as little account as possible.

I have never traced this insect through its transformations, and do not know how long the larva remains in the infested fruit—whether it retires underground to transform or transforms within the apple—or whether the perfect beetle makes its appearance the same season or in the following spring. Neither do I know whether apples containing these larvæ fall prematurely from the tree. Mr. Cutter observes, that he found it impossible to jar these

snout-beetles off the tree on to the sheets. I have always myself succeeded in dislodging any number of them from crab and thorn trees, by beating the boughs into an inverted umbrella. But no doubt, as it belongs to the same genus, and has the same structural peculiarities as the Plum-gouger, it will require equally severe jarring to bring it to the ground. Whether it can be effectually counter-worked in any other manner, can only be told after we become more fully acquainted with its habits.

There are several other snout-beetles which infest fruit-trees, either cultivated or wild; but their history and habits yet remain to be fully investigated, and I hope to be able to devote some considerable attention to this subject during the coming season. Mr. H. A. Terry, of Iowa, reports the *Epicærus imbricatus* of Say, "as doing great injury to the apple and cherry-trees, as well as gooseberry bushes;" but whether it operates upon the twigs, the buds, the leaves or the fruit, has been left uncertain to the present day. (See the *Prairie Farmer* of July 18, 1863.) From the analogy of certain allied European species, we may infer that it merely devours the leaves, and lets the fruit and the twigs alone. The New York Weevil (*Ithycerus noveboracensis*)—a gray species fully $\frac{1}{2}$ inch long—is likewise sometimes very injurious in nurseries in the Western States, by gnawing off and destroying the buds and the twigs of young apple-trees. I have also received from Mr. Francis, of Central Illinois, two other snout-beetles, (*Conotrachelus puncticollis* Walsh and *Balaninus robustus* Walsh MS.) as jarred off his plum-trees, in company with the common "Curculio" and the Plum-gouger. It is not improbable, therefore, that both these two insects occasionally, at all events, deposit their eggs in plums, in some such way as the "Curculio." But whether these two last be identical with two Snout-beetles which Dr. Hull finds on his plum-trees, and of which he has promised me specimens, remains to be proved. As two other Snout-beetles (*Conotrachelus crataegi* Walsh and *C. posticatus* Schönherr) are known by me to breed in the wild haw, it is not impossible that they may also occasionally attack the apple.

As to the three Curculios which I have described in the preceding paragraphs, they may be readily distinguished, one from the other, in the following manner:—The common "Curculio" has a snout which hangs down like the trunk of an elephant, and which he can, whenever he chooses, fold backwards between his legs, although he has no power to project it straight forwards. On the other hand, the Plum-gouger and the Four-humped Curculio usually carry their snouts projected horizontally or nearly so, in front of them; but upon occasion can depress them vertically, although they have no power to fold them backwards between their legs. Of these two, thus agreeing as to the structure of their snouts, the Plum-gouger is at once distinguishable by having a smooth back, without any humps on it, whereas the Four-humped Curculio, as its name indicates, has two very conspicuous humps

on each of his wing-cases. As regards their habits, the common Curculio infests stone-fruit more especially, but not unfrequently has been known to attack pip-fruit; while, so far as is at present known, the Plum-gouger is exclusively confined to stone-fruit, and the Four-humped Curculio to pip-fruit.
B. D. W.

THE IMPORTED APPLE-TREE BARK-LOUSE.

(*Aspidiotus conchiformis*.)

From the *Prairie Farmer*. By C. V. RILEY.

That this insect is not exterminated, is not for want of advertised cures; for the number of sham, empirical remedies—patented of course—that are now circulating through the country, and whose owners are wheedling the farmers into purchasing, is truly astonishing. Here Mr. Michael O'Sullivan of Rochester, Wis., scatters to the winds his circular, headed "Bark-louse Exterminator," with a liberality that is praise-worthy indeed, considering the high price of paper. He announces the fact that he has obtained from the patent-office, a patent for a compound which is a sure remedy alike for the Bark-louse, Borer and Canker-worm. It is to be introduced into a hole bored above one of the main roots of the tree, by means of a tin tube, rammed home, plugged tight, and covered up with the soil; and it kills the bark-louse in eight months, the borer in two, and the canker-worm in from forty-eight hours to five days.

As an illustration of how well such men are qualified to provide proper remedies for insects, a Mr. Allen of Mt. Morris, Ill., who has been canvassing Lee and adjacent counties with another bark-louse remedy, on being asked by A. R. Whitney, of Franklin Grove nurseries, what he knew of the insect's history, responded, that he didn't know how they first came on the trees, but supposed they became winged and flew off—that there was one animal under each scale, which scale, he had but little doubt, grew in the same manner as does the shell of a snail. Mr. Allen's remedy, however, is more rational than that of his competitor, being a wash for the bark, the principal ingredient of which is turpentine, if I am well informed.

That men are constantly being imposed upon by these sharpers is not to be wondered at, for insects are very generally despised creatures—their consequence being rated by their size—and there is great ignorance of Entomology even among the most intelligent. Take as an instance the last number of our new "American Journal of Horticulture," where, under the head of "Apple Culture—the Aphis," Alexander Hyde makes some very general and excellent remarks on the Bark-louse. The Aphis and Bark-louse are two very different insects, and yet they are there confounded, and the value of the article marred by the mere misapplication of a scientific term. As no comments are made by the editor, this statement might be doubted, but the insect in question is distinctly termed "Aphis mali" on p. 165, 4th line; and a little lower down the author says, "If, in the latter part of May, we carefully raise the body of the Aphis, we can discover numerous eggs," etc. Still further on he continues:

"The female, after laying her eggs, dies; but the outer skin remains as a protection to the eggs. When first hatched, the young have some motion, and disperse themselves over the tree. While in the larva state, the young lice grow rapidly, and must greatly exhaust the trees by drawing from them the nourishment necessary for their growth. In a few days they pass into the pupa or chrysalis state, and the females become fixed, never changing their location after they have once become stationary, and seem merely a rough excrescence on the bark."

Now these descriptions accord in every respect with our bark-lice, but the writer never saw the eggs of the *Aphis mali* under the female in May, nor is she the exact color of the tree, nor does she ever become fixed, except when preyed upon by a parasite. She in fact produces her young—of which there are several generations in a year—alive, without any aid from the males, as these only make their appearance at the approach of winter. After the females have coupled, however, they produce small, shiny, black eggs, which they secure in the crevices of the bark; and if the tree be smooth and infested

with the borer, the cracks at the mouth of its burrow may always be found lined with these minute eggs.

REMARKS BY B. D. W.—Incredible as it may seem, Mr. Riley's criticism on the *American Journal of Horticulture* is based upon actual facts. The writer in that Periodical absolutely does not know the difference between a Bark-louse (*Coccus* family) and a Plant-louse (*Aphis* family), and mixes up the names and the habits of the two in a most amusing, though certainly not a very instructive gallimaufry. The best idea that the reader can obtain of this astounding article, is by supposing some Agricultural Journal, recently started in Boston, and claiming "to supply a demand that has been long felt," to discourse as follows about Sheep:—

The Sheep (*Sus scrofa*) is the most useful animal that has been domesticated by man, inasmuch as it supplies him not only with Bacon, Tallow, Pickled Pork, Mutton and Lard, but furnishes all the wool that is worked up into clothing by the Manufacturers of New England. Though its flesh is so palatable, yet the sheep is a very foul-feeding animal, greedily devouring any kind of putrid carrion, and readily eating almost anything that any other creature will eat, except hay, straw and white beans. It has a remarkable propensity for wallowing in the foulest mud-holes, so as to daub itself all over with mud, which, after it has become thoroughly worked into the fleece, the sheep men call by the technical name of "oil;" or "yolk." Taking advantage of this nasty habit of the Sheep, the sheep men supply their flocks with abundance of wallowing holes; for this "oil," as they call it, is always sold along with the fleece at the same price per pound, although it must all be washed out before the wool can be spun and wove into cloth, and thus becomes a dead loss to the unfortunate Yankee manufacturer. Frequently the fleece of an improved Chester White Buck, worth \$3,000 after he has taken the First Prize at some Agricultural Fair, weighs when marketed 25 pounds, only 3 or 4 pounds of which is clean wool, the rest being nothing but mud, or the so-called "oil," which the poor wool-buyer is compelled to pay for at the same rate as the wool. Formerly the Berkshire sheep were the most highly esteemed; but they are objected to now on account of the generally dark color of their fleeces; and the Chester Whites, Infantasos, Suffolks, Vermont Merinos and Irish Graziers, are at present the most popular breeds.

The author of the above Entomological Article in the *American Journal of Horticulture*, figures twice over in the list of its regular Contributors, once in the department of "Vegetables and Cereals" and once in that of "Pomology." The *Journal* advertises two regular Entomological contributors—Mr. Scudder and Mr. Sanborn—either one of whom would have been utterly incapable of such ridiculous blunders as the above. Why not employ one of these gentlemen to write about Plant-lice, and confine Mr. Alex. Hyde to his Plums and Potatoes? What is the use of a "Journal of high tone and liberal ideas employing the best talent in America," if it sets Fruit-men to write about Bugs and Bug-men to write about Fruit? If this is the best the *Journal* can do, it will be some time before it attains that circulation of 40,000, which it so confidently anticipates in its advertisements. Horticulturists want a Magazine from which they can learn something, and not a farrago of articles written by men, who know nothing at all of the subjects which they discuss, and who thus pile error upon error and blunder upon blunder, till confusion becomes worse confounded, and the primeval chaos returns again, and all the fruits of Adam's labors,

in naming and distinguishing the different species of animals created by the Almighty, are lost, and, for the time being, annihilated.

In the Introduction to the first number of the *Journal*, the Editor promises that "Entomology, as connected with horticulture, shall be treated by competent writers" (p. 3.) It appears then, that, in the judgment of the Editor, a man is a competent entomologist who does not know the difference between a Plant-louse and a Bark-louse!! I am confident that not one of the excellent, long-established Horticultural periodicals, which are sneered at in the same page of the Introduction, as "having an interest in some horticultural establishment," would ever make such a laughable mistake.

CONFESSING THE CORN.

In the last number of the PRACTICAL ENTOMOLOGIST, (p. 58), I taxed the *Prairie Farmer* with two mistakes, 1st, attributing an Article to Mr. Glover, which on the face of it was written by another man, and 2d, accusing the author of the Article of calling the Striped Borer of the apple-tree a butterfly, instead of a beetle. The *Prairie Farmer*, as it appears, had already pleaded guilty to the first charge, before my paragraph was published; and I now beg leave to "confess the corn" as to the second charge. The author of the Article in question does actually call the Striped Borer a "butterfly," having only 16 lines before called it a "beetle." The word "butterfly" does not, however, occur on the eighteenth line of p. 205, as the *Prairie Farmer* of March 16, 1867, erroneously asserts; but part of it on the nineteenth line, and part of it on the twentieth line. We shall all of us get right at last on these important matters.

B. D. W.

THE PROPELLER FLY.

The following description of a new species of Fly, is from the pen of Captain Kingsbury, of the 14th Illinois Infantry. Probably it comes as near the truth as the descriptions of some of our modern "species-grinders." In other words, there is a very large superstructure of fancy, built upon a very slender foundation of facts. The insect is said to have occurred near Corinth, Mississippi; but it would puzzle Loew to decide to what family of Diptera it properly belongs.

Within the last week I have discovered a new kind of insect—I call it the Propeller Fly. It is not as large as one of our Yankee mosquitoes, but you ought to see and feel them bite. They light on you, raise their hind end—standing on their fore legs—and commence turning around. Their bill is like a corkscrew, and when they get it in the right place they start the machinery by advancing the right fore leg. They then work a propeller wheel, which is, of course, at the stern, and around they go like lightning, and in goes the corkscrew, and you cannot pull them off without unscrewing them. They are a "bad egg."

We want 1000 more subscribers to the *Practical Entomologist*. Will not each present subscriber try to send us another?

ANSWERS TO CORRESPONDENTS.

Dr. James Weed, Iowa.—The "small white worms," taken in company with the angle worms, out of the earth of flower-pots, in which plants were growing, are, as you rightly suppose, the young of the latter. If they occur in the earth of the flower-pots in anything like the numbers found in the earth you send, they must certainly be injurious to the plants. I should recommend re-potting the plants with fresh earth, free from these gentry. It is said that brine will kill them; but if made too strong, it would kill the plants at the same time. Angle-worms are of the hermaphrodite sex, though they unite for mutual impregnation; and consequently a single impregnated individual introduced into a flower-pot can propagate indefinitely, so long as the conditions of life are favorable. They could not be introduced in cistern water. There are tolerably well authenticated cases of small fish having been taken up by water-spouts and "rained down" upon the earth; but I do not believe that any water-spout or whirlwind could dig up angle-worms out of the solid earth, and after carrying them through the air rain them down upon the roof of a house, so that they would finally find their way into the cistern.

J. W., Iowa.—The canker-worm moths which you sent, and on which, by the way, I had to pay express charges, were absolutely worthless as specimens. Of course, if you put two or three dozen living moths loose in a half pint bottle, they will flutter every feather of their wings before they have travelled a mile. The specimen with short wings is a male, whose wings, as often happens with moths, have failed to expand properly on coming out of the pupa. Such specimens are technically said to be "crippled."

Huron Burt, Missouri.—The larvæ of which you turned up so many bunches in working over your asparagus bed arrived in excellent order, owing to having been packed in moist earth, in a little tin box. They produce the same two-winged fly, (*Bibio albipennis*), the larva of which I recently spoke of in the PRACTICAL ENTOMOLOGIST, (II p. 45), as having been found by a New England naturalist to be largely preyed on by the Robin. They feed exclusively on dead vegetable substances in a moist and decaying state, and are not very particular as to what that substance may be. Years ago I had a parcel of them feeding on damp leaves in a glass vase, and, on putting several dozen of our common "Oak-Apples" into the vase, I was surprised to find that they, most of them, quitted the leaves and burrowed into the Oak-Apples. I have always found them as you did—in large crowds together. They should not be destroyed, as they do no harm either in the larva or in the fly state. In this wide, wide world there is room enough both for flies and for men; and although we are justified in taking life for good and sufficient reasons, yet we should not do so wantonly.

L. West, Ohio.—The lice "found on the neck and some other parts of the body of a horse, but not very numerous, though there were eggs or nits in abundance" are not true lice (*Pediculus* family), but belong to the Bird-lice (*Nirmus* family). The latter have complete jaws, and are Biters (*Mandibulata*); the former have nothing but a beak to suck with, like the various species of True Bugs, (*Heteroptera*), and are Suckers (*Hausstellata*). This is all I can tell you about them, as I have never paid any special attention to this department of Entomology, and do not know of any one in America that has. Most probably, as the horse is an imported animal, not indigenous in America, these lice of yours have been imported along with him, and are well known in Europe; but I do not possess the works of those European authors who have written specially upon this subject. Undoubtedly, lice of any kind are injurious to any animal, if they are allowed to increase to any very excessive numbers. To get rid of them in your case, I should recommend kerosene to be sparingly applied to the parts infested by nits. But it would be dangerous to apply kerosene freely over the whole surface of a horse's body. Tobacco-water would also destroy them, but must be applied with still greater caution than kerosene.

A. A. Baker, N. J.—The cocoon sent, which you found suspended from a twig of Wild Cherry, is, I believe, that of *Atacus Prometheus*—a large moth expanding some four inches, and the male of which is remarkable

for being colored so differently from the female, that at first sight it would be taken for a distinct species. The species is not destructive to fruit trees, and is more usually found on Sassafras.

J. H. Hunt, Ohio.—You say that you have examined, under the microscope, the case-bearing lepidopterous larvæ, noticed in my answer to you last month, (p. 75), and that they are not 16-footed, but 6-footed. Lepidopterous larvæ, as you are probably aware, usually have only six true jointed legs in front, and behind a certain number of fleshy pro-legs (or shamlegs) varying from four to ten. In certain genera that mine the leaves of plants, both the legs and the pro-legs are reduced to nothing, and in many of these case-bearing genera the pro-legs are so indistinct, that they are only perceptible when the creature walks, being represented merely by a slight protuberance. You sent so few specimens that, being desirous to breed the moth from them, I did not before, and I do not now, desire to sacrifice an individual by extracting it out of its case. Likely enough you may be right as to the indistinctness of the pro-legs. By the way, in saying that "no coleopterous larva lived in such cases as these," I should have mentioned that the leaf-feeding coleopterous genera *Cryptocephalus*, *Chlamys* and their allies inhabit in the larva state somewhat similar, though much shorter cases. There can be no doubt, however, that your cases will produce minute moths and not beetles, judging from the lepidopterous character of their structure and that of the larvæ which they contain.

J. Pettit, C. W.—The strong smelling Carabide is *Haplochile pygmaea* Dej.

Jas. H. Parsons, N. Y.—The "thousand-legged worms" of which you sent many dozen specimens dug up in your garden, and which you suppose to be the same as those you saw last year eating dead seeds (beans, peanuts, &c.), are the *Iulus virgatus* of Wood. They differ from the species I described (PRACTICAL ENTOMOLOGIST, II, p. 34), in having 7-jointed (not 6-jointed) antennæ, and in having a conspicuous black line along the whole length of the back. The flatter "thousand-legged worms," of which you sent only a few, and which you think is the species that attacked your onions last year, is the *Polydesmus serratus* of Wood, and is very closely allied to the species which Dr. Fitch ascertained to prey on living vegetables, (*Polydesmus canadensis*). The specimens sent are only half-grown, (1-inch instead of 2-inch), which is the reason of their being much paler colored than those you saw last year. The "two yellow worms" are, as you suppose, true wireworms, and would have changed, if permitted to live, into some kind of Click-beetle. The two cocoons, one 1-inch, the other 1/2-inch long, are the pupa-cases of some two-winged fly of the great *Musca* family, and probably those of your common Onion-fly (*Anthomyia ceparum*). The "greenish globular bodies" which you suppose to be eggs, I cannot identify. As to the "single specimen of a thousand-legged worm 2 inches long," it must have furnished a meal to its brethren on the road; for there was not a vestige of it in the box.

F. C. Hill, Ohio.—I will candidly confess my mistake in saying that our American toads do not leap, (PRACTICAL ENTOMOLOGIST, II, 57). I must have been thinking, as you suggest, of the European species, which have not that faculty. Still, I never saw even our go-ahead American toads leap more than a few inches at a time, while frogs often clear several yards at a single jump. I never saw toads eat strawberries myself; but Dr. Trimble says that they will, and he is a decided friend to this poor maligned animal, (*Fruit Insects*, p. 74). The "glorified squash-bug, about 1/2 inch long, with a crest on his thorax," which, as you say, sometimes inflicts a severe puncture with his beak, must be the *Priodontus novenarius* of Say. I have received it from Pennsylvania, but was not previously aware that it occurred in the Northwestern States. Say states that "its puncture is very painful, benumbing the vicinity of the wounded part for a considerable time." But with all these species that pierce you with their beak, it is the easiest thing in the world to hold them in such a way that you cannot be attacked by them. All that you have to do is to grasp them laterally by the breast between your thumb and finger; and so long as you do not relax your hold, you are perfectly safe.

John H. Tice, Missouri.—The woody blood-brown gall, about four inches long and one inch in diameter, on the

cane of the Blackberry, is the work of the *Diastrophus nebulosus* of Osten Sacken. (You will find descriptions both of the gall and of the insect in the *Proceedings, &c.*, II, p. 36.) This insect is a four-winged fly, belonging to the *Cynips* family in the Order Hymenoptera; and the genus *Diastrophus* is confined to the Blackberry, as *Rhodites* is to the Rose, and *Cynips* to the Oak—all these genera belonging to the same family. Formerly entomologists used to refer at hap-hazard any gall that they knew nothing about to *Cynips*; and I believe I was the first to clearly point out, that *Cynips* is confined to the Oak, and that, as a general rule, each genus of Gall-making insects is confined to a particular genus of plants. Of course, your horticultural friends are mistaken in supposing, that this Blackberry gall contains the larva of the Curculio. You will breed from it a Gnat-fly that sponges upon the poor, honest makers of the gall, for board and lodging, and resembles them very closely, though it belongs to a very distinct genus of the same family; and also several true Parasites that prey on the bodies of the Gall-making larvae. But in all probability you will not breed from it a single Snout-beetle of any kind.

If you had sent along the "nest" out of which you took the wingless moth, I could have told you with tolerable certainty to what species the moth belonged. At present I cannot; for there are several species of these wingless gentry that are hard to distinguish. It certainly cannot be the female of *Hibernia liliaria*, as you conjecture, for that species transforms underground, like the Canker-worm moth, and makes no "nest" or cocoon on the infested tree. The specimen sent cannot be distinguished from the wingless female of the Canker-worm moth; but neither does that species make any "nest" on the tree. Perhaps a Canker-worm moth had accidentally crawled into a "nest" made by some other insect.

Dr. Houghton, Penn.—All the specimens of Bark-lice that you sent belong to the Native American species (*Coccus Harrisii*). I have searched carefully every twig that you have sent, and cannot find a single individual on them belonging to the Imported Species (*Aspidiotus conchiformis*). Consequently, although, as you say, you have 20,000 trees afflicted in this manner, you ought not to be greatly alarmed. I never knew a tree killed by this Native Bark-lice, while in this single State there have been millions of trees killed by the Exotic Bark-lice. Even if you do nothing at all towards counter-working this pest, I am persuaded that in process of time it will be more or less completely subdued by the Lady-birds and other insects that make war on it. Repeatedly in the woods I have seen clumps of crab-trees infested as badly as your trees seem to be; and two or three years afterwards not a scale could be found on them. Our Rock Island nurseryman, Mr. Kinney, has also had this species on a few of his apple-trees for seven or eight years, and he does not think that they have done him any very material injury, although he left them entirely to their own devices. Not that I would recommend you to follow neighbor Kinney's example; neither would I recommend you to fold your arms and do nothing, if some Irishman were coming at you with his shillelagh. Still, it is some comfort to know that, even if the worst comes to the worst, life is not endangered; and that the enemy is armed, not with bowie-knife and revolver, but only with a club.

The eggs were quite plump and healthy under the scales in all the specimens sent, except in No. 4, ("Bark-lice on dead bark,") where of a dozen scales examined, only three contained plump, healthy eggs, the remaining nine, which were probably old scales of A. D. 1865, containing nothing but the shrivelled remains of eggs. As the lot No. 2 ("Specimens taken from the body of a tree that was thoroughly painted last summer with a wash made by dissolving 1 lb. of concentrated lye in 1 gallon of water") contained perfectly healthy eggs, one of two things must necessarily follow; either 1st, that you did not have every single limb and twig of this tree painted with the lye, and thus that numerous bark-lice escaped death, and afterwards crawled on to the parts which had been painted, and then made last autumn the scales which you now send; or 2nd that, if you had the entire tree painted, twigs and all, even lye as unusually strong as that which you used, will not kill bark-lice when applied in the summer. I rather incline to the

former supposition, though I know nothing personally of the effects of lye upon bark-lice. All accounts, however, seem to agree, that lye, when applied in summer, checks up the bark-lice.

In applying kerosene to destroy any kind of bark-lice, my plan has always been first to prune very heavily all the limbs to which I am about to apply it, so as to leave nothing but wood of say $\frac{3}{4}$ inch in diameter. I do this partly for convenience' sake, and partly because a limb badly infested by bark-lice needs pruning as much as a transplanted tree does, because it is similarly weakened and impoverished by the loss of the proper supplies of sap. Although limbs thus pruned put forth new sprouts during the summer, yet it is always easy to distinguish them from unpruned limbs, and thus to follow out the results of your operations, without any danger of mistakes.

As to specimen No. 3, ("Bark thought to be injured by the lye applied to it,") in any case you would be a far better judge of this matter than I am; and having nothing but a partially dried specimen to form an opinion upon, I am doubly bound to hold my tongue.

I can add nothing of any value to what I have already said on this subject, further than to caution those who may be experimenting on the best and most successful mode of destroying bark-lice, not to be deceived by a very puzzling phenomenon: Both with our Native species and with the Imported species, old dead and dry scales, which were formed $1\frac{1}{2}$ or $2\frac{1}{2}$ years ago, and which had the eggs underneath them completely killed by kerosene or other such preparation 1 or 2 years ago, still adhere to the bark after the lapse of 1 or 2 years, and are externally undistinguishable from scales formed last autumn and containing healthy and plump eggs. They do not, however, adhere so tightly to the bark as do the recent scales, and when they are raised with the point of a knife, a lens of very moderate power shows at once that they contain no plump, fresh eggs, but only a shrivelled mass of old dead and dry eggs.

Edward Orton, Ohio.—The Plant-lice that infested the White Pine in your yard last summer was most probably the *Lachnus strobi* of Fitch, which, as that writer tells us, gives the bark of the infested trees "a peculiar black appearance," and is largely attended by ants. Their elongate-oval, shining black eggs, about 0.40 inch long, attached in regular rows of from 5 to 20, but usually, as you observe, in rows of 8, to the thread-like leaves of the pine, have, I believe, hitherto escaped observation. The specimens sent are precious, because, as I have already remarked in my Paper on the Plant-lice, there are certain species of Plant-lice which appear never to lay any eggs at all. I have myself described the eggs of a giant species of *Lachnus*, *L. caryæ*, Harris, which occurs not only on the Hickory, but on the Oak and Basswood. (*Proceedings, &c.*, I, p. 303.) If you wish to rid your tree of these lice, I should recommend you to catch a dozen or two Lady-birds and place them gently on the infested twigs about the time that the eggs of the Plant-lice are hatching out.

John Murphy, Georgia.—The cocoons full of eggs which you send are those of the female of the common Bag-worm, Basket-worm, or Drop-worm, (*Thyridopteryx ephemeriformis*), respecting which see Mr. Kathvon's article in the *PRACTICAL ENTOMOLOGIST*, II, pp. 53-4. The cocoon without any eggs in it is that of a male of the same species. In this species, as in our Northern Vaporizer Moth, (*Orygia leucostigma*), the female is wingless and never leaves her cocoon, the male, which has full-sized wings and can fly well, searching her out, and consummating the marriage rites at her own house. The only difference in the economy of these two insects is, that the female Bag-worm lays her eggs inside her cocoon, and the female Vaporizer Moth plasters them to the outside of her cocoon with a kind of varnish. Hence, as you will at once perceive, this species of insect cannot spread as rapidly through an orchard as those which have winged females, capable of flying to the other end of the county to search out a suitable tree on which to lay their eggs. For here it is only the larva of the female that is locomotive, and she, of course, has nothing but her legs to trust to, or perhaps an occasional squall of wind, for gaining another tree. The fact of your early apple-trees not being attacked, is probably due to their being located in a different part of your orchard. Possibly, however—for

insects are very capricious—the Bag-worms may prefer late Apple-trees for some unexplained reason. In the same manner certain varieties of Plum are peculiarly subject to the attacks of the Curculio, and the Peach-blow variety of Potato is avoided, when possible, by the Colorado Potato-bug.

To restore your late Apple-trees to a healthy bearing state, all you have to do is to pluck off and destroy, carefully and effectually, for one single winter, all these egg-bearing cocoons that you can find on them. You will then put a permanent check to the future propagation of the insect; for the females have no power to fly in upon your trees from other quarters, and the chances are greatly against one of the larvae reaching them for many a long year to come. Mr. Glover as well as yourself—as you will see from the passage which I have quoted from him—has noticed these Bag-worms to occasionally infest the Cotton-plant.

F. T. Pember, N. Y.—The centipede which you now send (No. 1) belongs to an entirely different group from *Polydesmus* and *Iulus*, having only a single pair of legs to each joint of its body instead of two pairs. This group is supposed by Dr. Wood to be carnivorous. No. 2 is the larva of some small beetle, somewhere in the neighborhood of the *Nitidula* family. Nos. 3, 4 and 5 are young individuals of the Pretty Porcellio (*P. limatus*) of Fitch, one of several species described by that author, and commonly known as "Sow-bugs." They are not insects, but Crustaceans. There is probably some mistake about the *Oniscus asellus* of De Kay's *Nat. History of New York*. Dr. Fitch says that the genus *Oniscus* does not occur in New York, and *asellus* is a European species. The "cocoons" found among the turnip roots are the coarctate pupae (puparia) of some species belonging to the great *Musca* family, which is now subdivided into many distinct families. They resemble one another too closely to refer them to any particular genus or species. I will give the information you desire about entomological apparatus in a future article.

Storrs, Harrison & Co., Ohio.—The eggs sent are those of a Catydid, and the same as those referred to in the answers to C. M. B., of N. J., and Geo. Haines, of N. J., in P. E. II, pp. 57 and 73.

Jos. Wood, Ohio.—When I said that "if any insect punctured grapes as the common Curculio punctures Plums, it was an entirely new fact," I meant that no such fact was on record. You think that you have observed such a fact, and say that you have "every year hundreds of thousands of grapes punctured by some insect, and afterwards find the larva eating the grape. The grape does not rot, but after a while drops from the stem before it becomes ripe enough to cut, sometimes showing a premature reddening. Mr. Moran's grapes, no doubt, had the black rot and nothing else." (See P. E. II, p. 56.) I shall be glad to receive the promised specimens next summer. The facts you mention certainly seem to show that you are right; but I can tell better what to think when I see what kind of larvae are in the diseased grapes. Several larvae producing two-winged flies are already known to breed in decayed grapes, just as they breed also in other kinds of decaying vegetable matter.

H. C. Munger, Virginia.—Your suggestions shall be attended to as early a date as possible; but we are often cramped for room in our little Journal.

J. N. McLeod, Wis.—Most of the cheap microscopes are good for nothing. As to the one advertised in the P. E., I am not acquainted with it. A really good microscope of very high magnifying powers costs a large sum of money; and for all ordinary purposes you will find simple lenses, either Stanhope or Coddington, such as you can procure of Jas. W. Queen & Co., of Philadelphia, amply sufficient and much more convenient.

John B. Lyon, Ohio.—The cocoon sent was manifestly the work of some large Moth, perhaps of *Attacus Prometheus*. Inside it I counted no less than 19 smaller cocoons, closely agglutinated together in an oval mass, and each containing a larva. These larvae had lived inside the body of the larva of the moth, devouring its vitals till they finally destroyed it after it had spun its cocoon, but before it had passed into the pupal state; for there was no pupal shell in the large enveloping cocoon. The 19 larvae, if undisturbed, would have developed this coming summer into some kind of *Ichneumon-*

fly, but what particular species I cannot say. I should have liked to breed the *Ichneumon*-fly from them, as they were entirely new to me, but, owing to not having been enclosed in a little pasteboard box, they reached me pressed as flat as a pancake, and ruined except as specimens for examination. Larvæ require as delicate handling as young babies; and I presume that in Ohio, when you want to send a baby any distance, you do not usually enclose it in a simple post-office envelop, and entrust it to the tender mercies of Uncle Sam's mail-bags.

Dr. Benj. Norris, Illinois.—The larvæ split out of Hickory wood are not Buprestidous but Cerambycidous, and no doubt belong to the pupæ which you send with them, and which were found in the same stick. If these last, as you suppose, belong to *Clytus pictus*, then the mature larvæ of that insect has got legs, and Dr. Horn must have been mistaken in supposing it to be legless. (See *Proc. &c.* V, pp. 204-5.) I suspect that the larvæ of both *pictus* and *robinæ* are legless when immature, and afterwards acquire short legs. At all events, young larvæ sent me from Kansas as those of the Locust-borer, were legless. The larvæ enclosed in cocoons are those of some Fossorial Wasp, many of which make their nests in the old deserted holes of Borers.

W. W. Linn, Illinois.—The eggs on your apple-tree twigs are those of the common Plant-lice of the Apple-tree, respecting which see my Article on Plant-lice in the P. E. II, p. 39. They may be found at this time of the year on almost all apple-trees in larger or smaller numbers. You need not alarm yourself about them, as these Plant-lice, almost as soon as they hatch out, will be attacked by myriads of Insect Foes, as I have explained in the Article already referred to.

Isaac Hicks, N. Y.—The Bark-lice of the Tulip-tree which you send is the most gigantic species I have seen in this country, and is hitherto undescribed. The specimen had been bored above by some parasitic insect, and from some of the others there jolted out on the road the pupa-cases of a parasitic two-winged fly belonging apparently to the genus *Leucopis*, which is known to infest bark-lice. I shall be glad of full-grown living specimens. What you take for "suspicious looking eggs" on the bark are the young bark-lice already hatched out.

The cocoon of the "Basket-worm" is exactly like one which I have just received from Georgia. This insect, as is perpetually happening, has been differently named by different authors, each ignorant that the preceding author or authors had already named it. In such cases the scientific etiquette is, that the first name which is accompanied by a good and sufficient description, takes precedence of all the others. Consequently, as has been shown by Dr. Clemens, *Thyridopteryx ephemeriformis* is the correct name of this insect. Your remark that "in one locality on Long Island, N. Y., they were very plenty and destructive to the evergreen only," is interesting, as it confirms the fact that they prefer evergreens to deciduous trees. I cannot identify the "vine-hopper" without specimens.

R. B. Palmer, Mo., per Edt. Rural World.—The apple-twig sent is infested with the terrible imported Bark-lice, not the native species which is comparatively harmless. See on this subject, *PRACTICAL ENTOMOLOGIST* II, pp. 31-2, where figures of both are given, so that he that runs may tell the difference between them; and see also the answer to Dr. Houghton in this number.

Answer to C. F. A., N. J., will be given in the next number.

NOTICE.

The *American Naturalist* is published in magazine form by the officers of the Essex Institute, Salem, Mass., at the usual price of \$3 per annum. It is devoted to the popular exposition of all departments of Natural History, and the first number, which makes its appearance this month, contains several valuable articles. We notice particularly the first instalment of an interesting paper on the American Silkworm, (*Attacus polyphemus*), by Mr. Trouvelot.

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The American Silk Worm, (with illustrations.) By L. Trouvelot. Continued.

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Reviews.—Preliminary Report of the Geological Survey of Kansas, by G. C. Swallow. Annual Report of the Smithsonian Institution for 1865; The American Journal of Conchology.

Natural History Miscellany. Botany.—The Tertiary Flora of Brognon, France; Drying Plants by Heat—two methods. Zoology.—Flights of Butterflies. Geology.—The First appearance of man on our Planet; The Eozoon in Austria.

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THE
Practical Entomologist.

A MONTHLY BULLETIN,

Published by the American Entomological Society, for the dissemination of valuable knowledge among Agriculturists and Horticulturists.

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MAY, 1867.

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PHILADELPHIA, MAY, 1867.

THE GRAPE-VINE FIDIA.
(*Fidia viticida*, new species.)

The annexed figure represents a leaf-eating Beetle, hitherto unnoticed by other writers as a noxious insect, which preys extensively upon the grape-vine in Kentucky, and probably in other Southern States. It exists also on the wild grape-vine in small numbers, as I have myself observed, both in North and South Illinois; and I once noticed a single specimen on a Catawba vine in my own garden. Hence it is not improbable, that in some future year it may swarm in Illinois, as abundantly as in 1866 it did in Kentucky. The following account of its operations in the latter State in 1866 is reproduced from the *PRACTICAL ENTOMOLOGIST*, Vol. I, p. 99.



Chestnut-red,
hoary with
whitish hairs.

According to Mr. C. S. Jackson, of Kentucky, this beetle is making great destruction in his vineyards. "It commences," as he tells us, "about the middle of June, first attacking the upper surface of the leaves by eating holes into it, and if not checked, increases with the heat of the season, until whole acres of leaves are changed into worthless shreds, or become as full of holes as a sieve." Most probably, as with the Flea-beetle of the Grape-vine, it is in the larva state that it does the principal part of the damage; and as the larvae of all beetles are altogether unlike the perfect insect, its identity with the perfect insect will often not be recognized. The larva of this species, as we may infer from analogy, will be a six-legged

grub, probably of some obscure shade of pale drab or brown, and resembling in form that of the Colorado Potato Bug, (figured *PRACTICAL ENTOMOLOGIST*, II, p. 13,) but of course proportionally smaller. It will be found sluggishly feeding on the surface of the leaves, along with the perfect insect, and as soon as ever they first appear in the spring, every exertion should be used to destroy them, in regions where they have been known to swarm. A single female larva destroyed at that time, may prevent the generation of a hundred thousand in the course of the summer; for I have little doubt that this species is many-brooded, i. e., that there are several generations of them in one year.

It will be observed that there is considerable resemblance in the general shape and make of the Grape-vine *Fidia* and of the Grape-vine Flea-beetle, (*Haltica chalybea*, figured *PRACTICAL ENTOMOLOGIST* II, p. 50.) The latter insect, however, is dark blue instead of chestnut-red, and smooth and polished instead of hairy and opaque; and it differs also in having the hind thighs much thickened, so as to enable it to jump like a Flea, whereas the *Fidia* has the hind thighs no stouter than the other four thighs and has no power to jump. Both insects, as well as the Striped Cucumber Bug, (*Diabrotica vittata*), the 12-spotted Flower-beetle, (*Diabrotica 12-punctata*, figured *PRACTICAL ENTOMOLOGIST*, I, p. 110, fig. 1,) the Colorado Potato Bug, (*Doryphora 10-lineata*), the Gold Bug, (*Cassida pallida*), which infests the Morning Glory and the Sweet Potato, the Striped Tortoise-beetle (*Cassida bivittata*), which infests the Sweet Potato in Southern regions, and the Grape-vine *Colaspis* (*Colaspis flavida*, figured *PRACTICAL ENTOMOLOGIST*, II, p. 68,) which in 1866 attacked the Grape-vine very generally throughout the Northern States, belong to a large group of Beetles, (the great *Chrysomela* family,) distinguished by having only four joints to all their feet, (tarsi,) and by their larvae almost universally feeding upon the leaves of various plants. Hence they are many of them very obnoxious to the Agriculturist. In common with another large group of Beetles—the great *Curculio* family, known in English as the Snout-beetles—almost all these beetles have the habit of doubling up their legs, when they fancy that they are about to be attacked, and dropping suddenly to the ground, where they lie still for a short time and pretend to

be dead. Among vertebrate animals we find the same remarkable habit of shamming death in the common opossum.

As it appears that this Grape-vine *Fidia*, though long well known to myself and other Entomologists, is a new and undescribed species, I annex a full description, for the benefit of those who are curious in such matters. Farmers generally are apt to think the details of differences, between different species of insects, a matter of no practical importance; but they should recollect, that without recognizing the minute distinctions between the Colorado Potato Bug and another allied species with which Dr. Fitch and had confounded it, (see PRACTICAL ENTOMOLOGIST, I, pp. 2-3,) it would have been impossible to arrive at any correct conclusions about the habits and future progress of the former. Just so with the Hateful Grasshopper of Colorado. (PRACTICAL ENTOMOLOGIST, II, pp. 1-5.) Without carefully distinguishing between this insect and the Red-legged Grasshopper, so common in the Valley of the Mississippi and on the Atlantic seaboard, our Illinois farmers might suppose that they were liable any year to inflictions, such as overtook Kansas and Nebraska last autumn, together with the far more terrible consequences which will not improbably follow, in this coming season of 1867.

Fidia viticida, new species. Chestnut rufous, punctured and densely covered with short grayish-white prostrate hairs, so as to appear hoary. Head rather closely punctured, with a very fine longitudinal stria on the vertex. Clypeus and mandibles glabrous and black, the clypeus with a subterminal transverse row of punctures, armed with long golden hairs, the mandibles minutely punctured on their basal half. Palpi and antennae honey-yellow verging on rufous, the antennae 2 as long as the body, with joint 4 fully 1 longer than joint 3. Thorax finely and confluent punctured, the sides in a convex rather wider behind than before, the sides in a convex circular arc of not quite 60°, the males with the thorax rather longer and laterally less strongly curved than the females. Elytra punctato-striate, the striae subobsolete, the punctures approximate, and rather large but not deep, the interstices flat and with close-set fine shallow punctures. Legs with the anterior tibiae of the male suddenly crooked 1/2 of the way to their tip; anterior tibiae of the female as straight as the others. Length ♂ .24-.27 inch; ♀ .24-.28 inch.

Described from 5 ♂, 5 ♀. Very near *Pachnophorus (Fidia) viticolus* [ola] Uhler, which is said to be .21 inch long; but Dr. LeConte, who has typical specimens, tells me that that species differs, not only in being smaller, but in the thorax being more strongly punctured; and that common as is *viticida* it is as yet undescribed. A species of *Fidia* of which I have 2 ♂ 3 ♀, is identified by Dr. LeConte from typical specimens as *Pachnophorus (Fidia) longipes* Melsh.; and differs from *viticida* only in being smaller, (.19-.21 inch,) and in the ground-color being black instead of chestnut rufous. The males have the anterior tibiae crooked in the same remarkable manner as in *viticida*. The genus *Fidia*, on careful examination, appears to differ from the genus *Pachnophorus* only in the body and legs being much longer, in the thighs not being clavate, and in the above-mentioned singular sexual distinction in the anterior shanks (tibiae.) The reason of this last character is ob-

vious. *Fidia* having very long legs, the male is enabled, during copulation, to entirely embrace the body of the female with his front legs; consequently it is an advantage to him to have the tip of the front tibiae suddenly crooked inwards. *Pachnophorus* having comparatively short legs, the male cannot thus clasp the body of his female, and therefore it would be no advantage to him to have the tips of his front tibiae crooked inwards.

It is astonishing how many different organs are worked in by nature, for this seemingly insignificant object of enabling the male insect to grasp the female firmly. For example, among the Ground-beetles (*Carabus* family,) almost all the males have either their two front feet or their four front feet (tarsi,) furnished with broad hairy cushions for this purpose. Among the water-beetles (*Dytiscus* family,) many genera have, in addition, the front feet of the male armed with a round flat sucker-like enlargement of one of its joints, to enable him to adhere to the slippery body of the female. In the male Dragon-flies (*Libellula* and *Agrion* families,) the appendages at the tip of the tail are modified in an almost infinite variety of curious patterns, to enable them to embrace the neck of the female. The male Horn-bugs (*Lucanus* family,) have their awes enormously enlarged, lengthened and armed with teeth, for a similar purpose. And in a genus of the Darkling-beetles (*Tenebrio* family,) known as *Penthe*, a few of the middle joints of the antennae of the male—3 joints in one species, four in the other—are dilated and furnished below with a cushion of hairs, precisely as in the front tarsus of a male Ground-beetle, and obviously for the same end. Finally in a large and common Ground-beetle (*Calosoma scrutator*), as has been observed by LeConte, and in a small and rare beetle, (*Xylophilus basalis* LeConte,) as was first noticed by myself, the middle tibiae (or shanks) of the male are curiously bowed inwards for the same almost universal purpose. Thus we find that five distinct organs of the body—the tarsus or foot, the tibia or shank, the appendages at the tail, the jaws and even the antennae—are variously modified in various species, and perverted, so to speak, from their normal functions, in order to facilitate the reproduction of the species.

Whether, with the old school of philosophers, we believe that each species of insect was originally created by the great Author of Nature, with all its present organs precisely as they now exist—or whether we believe, with a more modern school, that in pursuance of certain laws of variation and inheritance, originally established by the same great Author of Nature, the insects found in one geologic epoch have been very slowly and gradually modified and developed into those which occur in succeeding geologic epochs—the mind is lost in admiration at the beautiful and harmonious co-adaptations which we continually meet with, as page after page we turn over the Great Book of Nature.

B. D. W.

We want 5000 more subscribers to the *Practical Entomologist*. Will not each present subscriber try to send us another?

ENEMIES OF THE RICE CROP.

Rice, as is well known to southern planters, is grown in plots of marshy land below the high-water mark of the adjoining rivers, but enclosed by embankments in such a manner, that they can be flooded or laid dry at the discretion of the rice-grower. By this alternation of wet and dry, not only are aquatic weeds scorched out and upland weeds drowned out, but noxious insects are effectually subdued upon precisely the same principle. As may be learnt from some very valuable articles on the cultivation of rice in the *Southern Cultivator* of Feb. 1867, "the rice in light lands is often attacked by grubs, which feed upon the roots; but a flow of 12 hours effectually destroys them." But, like St. Paul, the rice-crop is not only "in perils by land," but it is also in "perils by water." After the rice-fields have been flooded some time and the water becomes foul, it appears that the crop is injured by certain maggots, otherwise known as "water-weevils," which "make their appearance about the roots of the plant and destroy them," and also "destroy the germ of the rice in fields which have been thrown out for some time, or in which the stubble has been turned in, rendering it necessary to replant." But there is a remedy for everything but death. Having fought the upland grubs with water, the planter now subdues the water-weevils with drought, laying his rice-fields dry, for this express object, for three or four days at a time, so often as may be necessary.

Northern farmers are too apt to look down upon the whole system of Agriculture in the South as unscientific and barbarous; but they might often learn a useful lesson from such simple, but effective processes, as have been detailed above. Instead of racking their inventions to devise new washes for subduing all manner of noxious insects, composed of a hundred different ingredients, five score of which are perfectly useless, if they would only, as the Rice-planter has done, study the peculiar habits of each of their insect foes, and attack each of them by some simple weapon aimed at his one vulnerable part, they might very soon effect something considerable. As it is, it is every day becoming more notorious, that instead of the Agriculturists gaining upon the Insects in the North, it is the Insects that are gaining upon the Agriculturists.

The "water-weevils" and the "grubs," spoken of in the above extracts as injurious to the Rice-crop, are, I believe, wholly unknown to the Entomologist; and it would be an interesting task to trace them through their transformations, and ascertain into what perfect insect they change. This could probably only be done in the South, because in the North we have no rice-plants to feed them on. But from the simple inspection of specimens of these larvae preserved in alcohol, it can be at once determined to what great group of insects each belongs; and even this would be something gained towards the increase of our stock of useful knowledge. Who will mail us such specimens, duly labelled, from the great rice-growing regions of the South?

B. D. W.

THE CANKERWORM ONCE MORE.

There is an excellent article on the best mode of fighting this pernicious insect, in the columns of the *Iowa Homestead*, of March 13, 1867, from the pen of W. G. C., of Monroe county, Iowa. The author's experience establishes the fact—which has been independently arrived at in several other parts of Iowa—that Sorghum is preferable to tar for preventing the wingless female moth from mounting the trunks of the doomed apple-trees, to lay her eggs thereon. His reasons in favor of Sorghum are, 1st, that it is cheaper and more readily procurable in the West than tar, the refuse skimmings, which would otherwise be fed out to hogs, being available for this purpose; 2d, that it does not dry up quite so fast as tar; 3d, that it can be applied directly to the bark of the infested tree without fear of injuring its health; while tar must be daubed on to a bandage, or if applied to the naked bark injures the tree more or less.

The facts ascertained by this writer, respecting the habits of the Cankerworm moth, tally exactly with those recently given in the PRACTICAL ENTOMOLOGIST. But I cannot resist the temptation of quoting his very graphic account of the mode in which he carried on the war against this pest of the fruit-grower:

In 1866, very early, (I cannot recollect precisely the time, but it appears to me that it was as early as the last days of February,) there were two or three summer-like days, but yet I had no idea that any insect could possibly be abroad; but curiosity led me to take a lantern in hand and go out into the orchard. I climbed up into the trees, (it was so cold that an overcoat was needed to keep comfortable,) and there I found the varmints having a perfect fandango all through the trees—up and down the limbs, two and two, and only one pair of wings between them. I found they had stolen a march on me. Next morning, however, I prepared a bucket of molasses and an old broom, and gave the trunks of my trees a good coating, and when the dusk of evening appeared, I examined the worst infested trees. I discovered large numbers wallowing in the syrup, and from ten to twelve feet from the trees, could see others coming from every direction, on a bee line for the trunks of the trees. No navigator could lay his course with more precision; but alas, when they arrived at the molasses, they were invariably swamped.

I employed two small boys every afternoon to go over my trees, (those infested), each with his bucket of molasses and old broom—giving the trunks a coating of eighteen inches or more, up and down the surface of each tree, and every morning we found ourselves well paid for the labor. I followed up this practice with my two little boys for over two months, and as long as I thought it paid.

I have the pleasure to say that the Cankerworm did my orchard no damage in 1866, and that I have had a reasonable amount of fruit, of which, perhaps, I will inform you further some day. One thing I verily believe, and that is, the man that does not protect his trees from the ravages of the Cankerworm will lose them, for their end is not yet.

NONE SO BLIND AS THOSE WHO SHUT THEIR EYES.

It is singular what a propensity some men have to go through life with their eyes shut. Here is the Editor of an Iowa Agricultural Journal, who is living in a State that is literally swarming with the New or Colorado Potato Bug, (*Doryphora 10-lineata*), and yet has not found out that the little pest can fly! He must have been present when

thousands of them flew across his path—but he winked hard, and would not or could not see them. Or perhaps, because, when flying, the insect displays a beautiful pair of rose-colored wings, he fancied that it was a Bee or a Butterfly. The following Editorial remarks occur in the *Iowa Homestead* for April 3, 1867:

If our Western Potato Bug, which so far as we can discover, is wingless, both male and female, can annually make sixty miles Eastward in its course, it is no wonder the Cankerworm should disseminate itself so rapidly.

Now the truth of the matter is, that the Cankerworm does not, as a general rule, disseminate itself rapidly. It may exist in one township for years, before a few larvæ are accidentally deposited on the garments of some person passing through an infested orchard, and thence carried to an adjoining locality to propagate the breed there. The reason is plain. The female moth of the Cankerworm is wingless. On the contrary, both the male and female beetles that are designated as the "Colorado Potato Bug," fly with the greatest ease on hot, sunny days, though certainly they are not quite as strong on the wing as a Honey-bee or a Dragon-fly. During the summer of 1866 I do not think that I ever took a walk, without seeing one or two of these insects on the wing, and often I saw them sitting on weeds or fences miles away from any potato patch. Hence their eastward progress is not dependent upon contingencies and uncertainties, as is the case with the progress of the Cankerworm from one place to another. And we may therefore predict, with tolerable certainty, (now that I have clearly shown why they did not sooner emigrate eastward from the Rocky Mountain region), that their eastward progress after the year 1866 will be about at the same rate as their eastward progress from 1859 to 1866—namely, about sixty miles a year, or at all events, somewhere in the neighborhood of those figures. B. D. W.

DO HOGS DESTROY GRUBS?

BY JOHN TOWNLEY, OF MARQUETTE COUNTY, WIS.

My observations lead me to conclude that the hog will root up the earth for at least three purposes. 1st, If in fattening he is confined in a pen, the floor of which is boarded, he will root up the ground for the sake of eating the earth itself, especially if not provided with charcoal. Other domestic animals will eat earth also; it would seem to be a sort of brute medicine. 2d, Hogs will root up the ground for the sake of feeding upon roots. This I have watched them do. They are, for instance, very fond of the Virginian Spider-wort, which was a common plant here when first this place was settled, and now grows in large quantities along side the fences of many fields, where hogs do not run; but one may wander a summer's day over unenclosed land where hogs and cattle roam at will, and yet be scarcely able to find a solitary plant. Other plants, which are still common in enclosed fields, have disappeared from the open woods in like manner. I do not believe that this is entirely the work of hogs; but I am persuaded

that they alone would have eradicated some species. 3d, Hogs will root up the earth in search of grubs. I was first made aware of this fact by noticing, when passing along a road where the soil was light, that the stumps by the road side seemed as if some one had been digging the earth away from them, and had laid bare their roots so as to cut out the grubs. I found afterwards the same labor had been bestowed on some stumps in a lane between my cattle-yard and a pasture; this was the work of hogs. A large white grub does good service by feeding on oak stumps underground, eating away the roots in time, and thus making the stumps easy to pull up. Is this something different from the two white grubs mentioned in the April number, as one is said to feed exclusively upon the roots of living plants, the other on dung? [Yes, it is probably the larva of the large chestnut colored Beetle, called Horn-bug, (*Lucanus*.) B. D. W.]

Again, in the summer of 1864, we had the so-called 17 years' locust. These were glorious days for the hogs. Early and late they were at work; never before had my wood-lot, in which they ran, such a rooting up as then. Indeed, they turned over so much ground that I took advantage of their labors by sowing tame grass seeds. At first the insects kept mostly in the woods, but when something was about to come of their amatory singing, they resorted to the orchard in great numbers; and not liking the deep incisions made in the branches of my trees by their formidable ovipositors, I went over my trees night and morning, the insects being then more easily caught than in the middle of the day, and with a table fork, I jerked or picked them off into a pail containing some hot water. [Why the table fork? Use your fingers. "Locusts" neither bite nor sting. B. D. W.] They were then poured into a swill-pail, some meal added, and the whole mixed up with boiling water, and afterwards fed to the hogs. Any one learned in hog language would have known by the amiable expression of their eyes, as they turned them up now and then, to grunt their thanks, that the locust-soup was exactly suited to their taste.

On the south slope of a ridge between my place and the Post-office, the locusts were very abundant; hazel-bushes grow here and there, scattered by the road side, and if you have ever seen hogs on a nutting excursion, you have a correct idea of the way I have seen them hunt round the bushes for the locusts.

Three or four years ago, when mowing timothy, we found a patch several yards square, which was brown, as if the grass had been attacked by some mildew or fungus, and so killed. A brief examination sufficed to clear up the mystery. The roots were cut off as effectually as if a knife had been run underneath the sod, and the fat grubs seen in the soil left little room for doubt that this mischief was their work. [No doubt these were the common White Grub, the larva of *Lachnosterna quercina*. B. D. W.] As soon as the hay was hauled off I turned my hogs into this field. They

soon found the spot where the grubs were, and worked it over most effectually. Now if they wanted earth to eat, surely they could have got what earth they required anywhere else, and with much less labor. If they were in quest of roots, they were sadly deficient in hog-wisdom to throw over ground in which the roots were already destroyed; but if they were hunting after grubs, then were they true to their hereditary instincts, and gave proof of their sagacity by hunting in the very spot where grubs were most abundant.

Hogs, I believe, are the cheapest and most efficient means most farmers can employ to destroy these grubs. Hogs are always on hand; and few farmers are provided with such a heavy roller or clod-crasher as alone would be effective, though to be sure it may be weighted.

If I may venture on a word of advice to my brother farmers in this matter, I would say, if you have a timothy meadow infested with the white grub, take a painful of shelled corn, and when your hogs are somewhat hungry, entice them to the spot where the grubs are at work. Scatter the corn over the ground; as soon as the hogs have eaten all they can see, their snouts will of course be at work hunting for stray kernels; the loose sod will give way under their pressure, and the grubs be found; after that, I apprehend there will be no need to fence the hogs in, as recommended by Dr. Fitch. When they are through with their work, run the harrow over the ground, gather up the dry sods into a heap, and smother-burn them, so as to reduce the vegetable matter they contain to charcoal, not to ashes. When cool, spread the charred stuff over the ground, and re-sow at once, if it is desired to keep the field longer in grass. I presume I need scarcely add further, if the primitive, long-nosed prairie-rooters are better suited to this work than the improved moderns—and judging from my own experience, I have no doubt they are—by no means gives up your short-snouted, chubby, quick-feeding Suffolks and their crosses, on that account; but if needs be, get rather a thoroughbred alligator, and keep him expressly for grub-hunting purposes.

SELF-TAUGHT ENTOMOLOGISTS.

I do not know how it is, but I am perpetually meeting with Farmers and Mechanics, who know a great deal more about the Natural History of Insects than I do myself. It is true, they have never spent much time in observing the habits of Insects, and still less in studying the minute, though perfectly constant characters, which often separate one species from another. Neither have they read anything on the subject, except what they pick up from an occasional article about insects in the Agricultural Press, with the sad percentage of blunders and misstatements usually met with in the entomological lucubrations, which appear in many Periodicals of that class. Still they are excellent entomologists—in their own conceit; and without taking the trouble to read what some pains-taking and well-informed author has publish-

ed about some particular insect, they never hesitate to jump into the scientific arena, armed at all points in the complete panoply of impenetrable ignorance, and throw down the gage of battle before that author's bewildered eyes. Why should they not? Mowing and cradling and ploughing all have to be taught; but knowledge of the habits and classification of insects comes by nature!

I thought that, having myself spent ten years in collecting insects in various parts of Illinois, and being acquainted with collectors in all parts of the Union, and having probed to the bottom several cases, where it was confidently asserted that the Colorado Potato Bug (*Doryphora 10-lineata*) had been captured in Illinois previous to 1864, and found those cases to be all of them without exception nothing but mistakes, I ought to know something about the geographical distribution of this insect, in my own State at all events. No such thing. A gentleman from Illinois rushes into print in the columns of the *Rural American* of March 15, 1867, and asserts that I am utterly mistaken in saying, that the Colorado Potato Bug had never been taken in Illinois previous to 1864. Why? Because he himself took a specimen on a rose-bush "in Naples, a village on the left bank of the Illinois River, in the spring of 1863, and placed it in his cabinet." But how does he know that it is the genuine Colorado Potato Bug? Shades of Linnæus and Latreille! He knows it, because he has seen in the *Rural American* "a faithful picture" of the insect in question, (which by the way was copied without acknowledgment from the PRACTICAL ENTOMOLOGIST,) and because his specimen is exactly like the picture! Moreover he has forwarded the specimen to the *Rural American*, and the Editor confirms his statement as to its being "just like the cut in the *Rural* of Feb. 1st, representing one of these bugs." Therefore it is the genuine Colorado Potato Bug. Therefore I am mistaken. Which was the the thing to be proved.

When lawyers assent to the truth of the facts asserted by the opposite party, but deny the conclusions deduced from those facts, they put in what is termed a "demurrer." So now do I "demur" to the plea of the gentleman from Illinois. I fully allow that his bug, captured in 1863, is exactly like the wood-cut of the Colorado Potato Bug which appeared originally in this Journal, and was so faithfully reproduced, line for line and shade for shade, (always without acknowledgement), in the *Rural* of Feb. 1st, 1867. I allow further that both these wood-cuts are as correct representations of the genuine Colorado Potato Bug, as can well be executed in that style of art, without magnifying the insect very greatly. Still I deny the conclusion to which the Illinois gentleman so confidently jumps, namely, that his Bug must be a genuine Colorado Potato Bug.

If this self-taught Entomologist from Illinois, instead of leaning upon a broken reed and trusting for Entomological facts to the Agricultural Press, had had the good sense to take in the PRACTICAL

ENTOMOLOGIST from its commencement, he would have found in the very first number of that Journal an article written by myself, in which it is conclusively shown that there are two perfectly distinct species of *Doryphora-juncta* and *10-lineata*—which are yet so remarkably alike in their markings and coloring, that they were confounded together by so excellent an entomologist as Dr. Fitch; although, by the way, seven years before that author wrote, some of the principal distinctions between the two, had been clearly pointed out by Rogers. Moreover, he would have perceived very clearly that the characters, that distinguish these two species, are not such as can be given in an uncolored wood-cut of the size of nature; and that consequently the very same wood-cut will represent one species just as well as the other. He would also have found there the proof, that *10-lineata* infests the potato and *juncta* never does; and that *juncta* had been captured for time immemorial in Illinois, but *10-lineata* not, so far as could be ascertained, till 1864. Lastly, he would have seen a Synopsis of the principal points of difference between the two insects, so that he could have established the fact at once, that his specimen was a true *juncta*, and "not by a jugful" a genuine Colorado Potato Bug.

This is not the first, nor the second, nor the third, nor the fourth time, that I have known it to be roundly asserted, and sometimes by entomologists who thought themselves "some pumpkins," that they had years and years ago taken the true genuine Colorado Potato Bug in Illinois. In every such case it turned out, on subsequent investigation, that they had mistaken *juncta* for *10-lineata*. I conclude, therefore, that the correspondent of the *Rural American* has fallen into the same error; more especially as we can readily gauge his entomological knowledge by his ludicrously absurd assumption, that an insect can be always identified with certainty from an uncolored and unmagnified wood-cut.

Let it be clearly understood here, that I blame no man, whether Editor or Correspondent, for not being a first-rate Entomologist. I know from my own personal experience, that it requires almost a whole lifetime to master the rudimentary principles of the science, and to acquire that practical knowledge of insect life which no mere book-knowledge can ever supply. We cannot all of us know everything; and even Editors, who are popularly considered to be, like the Pope of Rome, the very incarnation of infallibility, do actually sometimes, or at all events once or twice in a century, make some wee little blunder, in some department of knowledge with which they do not happen to be familiar. Even the admirable Crichton must have been very ignorant in Chemistry, Electricity and Geology; and Scott's Infantry Tactics would probably have puzzled to death either Julius Cæsar or Alexander the Great. Still it is provocative of sudden convulsions in the diaphragm, to see any man criticize what he has never read, and theorize in sciences of which he has not learnt the A, B, C. But

blessed are the ignorant, for they know nothing and think that they know everything; and there are some minds that are so intellectually uncultivated and unclothed, that like Adam and Eve in the Garden of Eden, "they are naked, and know it not." B. D. W.

PEAR-TREE AND APPLE-TREE INSECTS.

The Pear and the Apple are, as is well known to Botanists, very closely allied. Reasoning *a priori*, therefore, we should naturally infer, that insects which feed upon a great variety of widely distinct plants, including the Apple, would also be found on the Pear. For example, the great *Cecropia* moth feeds upon apple, plum, cherry, currant, barberry, hazel and hickory leaves, and also, as I have just heard from Dr. F. W. Brewer, of Boston, very extensively upon pear-leaves.

But there are two well-known insects, which, although they are common on the apple and a variety of other trees, yet never, so far as I can find out, attack the Pear. The first of these two is the notorious Tent-caterpillar (*Clisiocampa americana*), which feeds freely on Apple, Plum, Cherry, Birch and Willow, and yet, according to Dr. Trimble, will starve on the Pear. (*Fruit Insects*, p. 104.) The second is the Striped Borer of the Apple, (*Saperda bivitata*), which is death upon the Quince, a tree belonging to a distinct botanical genus from the Apple and Pear, and yet appears never to be found on the Pear, though it is so very common on the Apple.* At all events Mr. Coleman, of St. Louis, the editor of the *Rural World*, says that he "has been cultivating pears for a number of years, and has never been troubled with the borer;" and O. P. Moran, of Barnesville, Mo., states that he has "borers and caterpillars" on his apple-trees, but neither of them on his pear-trees, although of these last he has as many as fifty trees. (*Agr. Rep. Missouri*, 1865, append. pp. 134, 402.) In New Jersey, indeed, they found a very large borer troubling the butts of their pear-trees in 1866; but this insect, of which I received a specimen, does not even belong to the same family as the Striped Borer (*Cerambyx* family), but to the *Prionus* family, which is represented by larger and rarer beetles. What particular species this large pear-boring larva would have produced, I cannot say for certain, as the specimen after going underground unfortunately died. But I conjecture that it would have produced a large beetle, *Orthosoma cylindricum*, which may be found figured in Harris's *Injurious Insects*, (p. 96.) and which has been supposed, for very insufficient reasons, to feed upon pine. (See PRACTICAL ENTOMOLOGIST I, p. 90, and Fitch *N. Y. Rep.* II, § 239.)

From the above facts—if they be facts, as I believe them to be—we may draw two inferences, the one theoretical, the other practical. 1st. Not to be

* Harris says, that "the trees and shrubs principally attacked by this borer, are the apple-tree, the quince, the mountain-ash, hawthorn and other thorn-bushes, the June-berry or shad-bush, and other kinds of Amelanchier and Aronia." (*Inj. Ins.* p. 103.)

hasty in jumping to conclusions as to the food-plants of insects, from botanical analogies; and 2nd, that we need not soap the trunks of our Pear-trees in the spring to keep off the borer; nor go over their twigs in the winter in search of the egg-masses of the Tent Caterpillar Moth. B. D. W.

MORE UNIVERSAL REMEDIES.

The following appears in the *Monthly Report* of the Washington Bureau of Agriculture, February, 1867, p. 60. It was sent to us long ago, but we did not think it worth while to lumber our columns with such nonsense. Now, however, that it has made its way into print, we will furnish the bane and the antidote both together:

DESTRUCTION OF INSECTS.

A correspondent writing from New York communicates the following recipe for the eradication of insects, &c., with the assurance that where it is properly applied, these pests will, in a great measure, disappear from the orchards, graperies, &c. He wrote this direction for preparation and application:—"Preparation.—Saw a hog'shead in two; put twenty or thirty pounds of sulphate of iron into one half, and fill up with chamber-lye; (water will answer, but urine is best). When the liquid becomes black it is fit for use." "Application.—The preparation must be applied to the trunks and branches of trees, and poured round the collars, which will keep off ALL worms infesting these parts, and add vitality to the trees. It is also claimed that trees, grain, vines, &c., on being steeped (the roots) with the liquid a few hours before planting, will escape all worms which infest the roots, trunks, and branches, and the growth will be much accelerated." The writer further states that "sulphate of iron placed in the crotches of the tree and branches is of great benefit, and when applied early to the branches, trunks, and roots of trees, will avert the falling off of the fruit."

REMARKS by B. D. W.—1st. The insects that infest fruit-trees differ as much from one another in their structure and habits, as a monkey differs from a rabbit, or a bat from a field-mouse. Is it likely then, that the same chemical substance will be universally offensive to all of them? Perhaps the writer of the above found, or fancied that he found, his chamber-lye broth offensive to some particular insect. But does it therefore necessarily follow that it should be offensive to "all worms" infesting fruit-trees? Quinine cures the ague. Does it follow that it will cure the gout? Sulphur cures the itch. Does it follow that it will cure neuralgia?

2d. It is a distinguishing characteristic of a veritable quack, not to fix any limits to the dose which he recommends. "Being purely vegetable and consequently harmless, these pills may be taken in any desired quantities without any deleterious consequences whatever." Thus our Tree-quack orders half a hog'shead of his medicated urine to be prepared, and for aught that he says to the contrary, the entire hell-broth may be poured round the roots of a single small tree with the most beneficial results. I have known a large apple-tree, that stood in a boys' play-ground, killed in no very long time by the continual application to its roots of the unsavory fluid, which forms one ingredient in the above panacea.

3d. A man who believes that steeping the roots of a tree, for a few hours before planting, in the above mixture will kill any borers that may already

exist in its trunk, has more Faith than I have. "It is CLAIMED that, &c., &c." What we want is not *claiming* but *proving*.

4th. He that believes that sulphate of iron, placed in the crotch of a tree, in any quantity not sufficient to kill the tree itself, will prevent the fruit falling, if badly attacked by the Curculio or the Apple-moth, ought immediately to turn Mormon or Mahometan. To such a man's ravenous swallow, the simple truths of the Bible are not sufficiently strong food; he requires, in addition, the outrageous absurdities of the Koran and the Book of Mormon to satiate his appetite for believing.

HOP-GROWING IN THE WEST.

I recently cautioned Western Hop-growers, to be careful how they introduced the Plant-louse of the Hop into their Hop-yards from the Eastern States. (PRACTICAL ENTOMOLOGIST, II, p. 70.) I have since learned from an experienced Hop-grower at Rock Island, that this little pest has already made its appearance in great numbers in two different Hop-yards in Michigan. With proper care, it may be prevented from extending farther West for many years. But the mischief is that Hop-growers fancy that they know more about insects, than men who make such matters the study of their lives. Incredible as it may seem to well-informed Entomologists, I find that they very generally believe, that the lice in their yards are not propagated from other lice, in the ordinary course of nature, but that they are specially created from time to time in each locality by the Great Author of Nature. Yet these same men would laugh me to scorn, if I were to assert that a calf or a pig, or a lamb had been "specially created" some fine morning on somebody's farm. Why? Because they understand perfectly well the generative economy of Cows and Hogs and Sheep, while they know nothing at all of the generative economy of Plant-lice. But to those who are familiar with the Natural History of Plant-lice, one thing seems just as incredible as the other; and I could just as readily believe that a Colt was created out of nothing in my stable, as that a Plant-louse was created out of nothing on my Hop-vine.

The following extract from a letter, recently received from a Hop-grower in Michigan, will give some idea of the mischief that is being worked out in that State by this little insignificant fly, the body of which is scarcely bigger than a mustard seed. Of course the idea that it is the same species of Plant-louse that infests the Hop, the Grape-vine and the Currant, is a mistake. Indeed, if this were really so, since the Currant Plant-louse has existed time immemorial in the United States, there could then be no possible reason why it should never have attacked the Hop till the year 1863, in this country. Whereas, if it is a distinct species, and has been recently imported from Europe, we see at once why this should be so.

We have had rather a poor crop of hops last season. The Hop-fly has almost destroyed them in many yards—

mine ran about 600 lbs. to the acre [an average crop is from 1200 to 1500 lbs]. I think the prospect is worse for next year, as this part of the country is swarming with them. They are on the grape-vines and currant-bushes, and everything which they can live upon.

When will the world understand, that a decent acquaintance with the rudiments of the Natural History of Insects is of real practical dollars-and-cents' importance to the nation? Here is a Noxious Insect insidiously spreading by slow degrees over the whole country; and its progress cannot be effectually arrested, because the popular mind believes in the exploded absurdities of our great-grandfathers! The Hop-louse has already damaged the Eastern States to the extent of millions of dollars annually; and it is to be suffered to run the same destructive course in the West, because "Bugs" are little vermin, that are unworthy the notice of rational men!

If the rudiments of Natural History were taught, as they ought to be, in our Public Schools, such lamentable errors as those alluded to above, would not be so common. As much as a hundred years ago, Linnæus laid it down as a universal law, that every living thing sprang from an egg or seed, or some kind of germ. (*Omne vivum ex ovo*). But many otherwise well-educated teachers, believe to this day, that frogs are engendered out of mud, and insects out of decaying vegetable matter.

B. D. W.

THE WHEAT MIDGE.—Jumping to a conclusion.

In the *Maryland Farmer and Mechanic* for Aug. 1865, I find the following assertion respecting the Wheat Midge, which insect, as it appears, is popularly called in Maryland "The Milk Weevil." In the West, farmers know it as "the Red Weevil."

Usually there appears simultaneously with the weevil a parasite called the *Platygaster punctiger*, which is as destructive to the weevil as the weevil is to the wheat. Several years ago Dr. Asa Fitch, State Entomologist of New York, was of the opinion that this parasite had not yet reached this country; but the experience of this immediate section seems conclusive that it has. The weevil has appeared at least twice in Franklin county, but never prevailed three consecutive years.—In 1862 it entirely destroyed two patches of late wheat we had, and in 1863—it did not appear in any of our fields. The existence of the parasite is also proved by the Ohio Agricultural reports of 1860, in which it is shown that in forty counties the weevil increased for several years and then disappeared.

Granting that there really is some parasite that preys on the Wheat Midge, how does the above prove that that parasite is *Platygaster punctiger*? The assumption is quite gratuitous. *Platygaster punctiger* (properly *Pl. penetrans**) is one of the three species mentioned by Dr. Fitch, as infesting the Wheat Midge in Europe;† and the chances are always about 20 to 1 against any European insect being found also in America.

But, in point of fact, it is proved as clearly as any negative assertion can be proved, that the Wheat Midge is not infested by any parasites in America. Dr. Fitch, who has paid particular attention to the Natural History of this insect, states

* See Dr. Fitch's *N. Y. Report*, III, p. 260, "Errata."
† *Ibid.* p. 5.

as follows in the *Journal of the N. Y. State Agr. Soc.* for March 1862:—

After the full investigation of the subject which I have now made, I can state this fact with confidence—we have no parasites in this country that destroy the wheat midge. The insect so common on wheat, and which resembles the European parasites of the midge so closely that, in the New York Natural History, it is described as being one of those species, and in the Ohio Agricultural Reports it is confidently set down as another of them, I find has nothing to do with the wheat midge, but is the parasite of an ash gray bug [*Nabis fera*—a cannibal species] which is common on grain and grass, laying its eggs in the eggs of this bug, and thus destroying them. [See also Fitch, *N. Y. Rep.* III, pp. 78 and 112, and P. E. II. p. 29.]

The argument based upon the fact, that the Wheat Midge disappears suddenly in certain years, is worth but little when we consider, that *Thrips* is a cannibal insect, as I have shown, and not, as had been previously imagined by all authors, a vegetable feeder; and that *Thrips* is known to occur in very large numbers on ears of wheat infested by the Wheat Midge. B. D. W.

THE TREE-CRICKET AGAIN.

(*Ecanthus niveus*).

[From a letter from EDWARD ORTON, of Yellow Springs, O.]

The Tree-cricket is very abundant in this vicinity, and its work can be seen in any fruit yard. It deposits its eggs in the peach, the grape-vine, the currant, the raspberry, and the common elder, to my certain knowledge. In almost every case, the branch dies beyond the point where the eggs are inserted, and many persons on this account deem the work of the insect injurious; but in most cases, perhaps, it amounts to nothing more than a proper shortening-in of the branch. I kept portions of vines in which the eggs had been deposited, in a drawer of my writing desk last summer, until finally, on May 20th, the young insects made their appearance.

I shared in the popular prejudice last summer to such an extent, that I destroyed thousands of the *Ecanthus* eggs; and either from that cause or from some peculiarity of the season, their work is quite scarce this spring on my own premises. I shall be sorry enough for my crusade against them, if it turns out that they are aphid-eaters.

TREE CUT-WORMS.

Mr. Riley of Chicago, has favored me with specimens of the species bred by him from his "dark-sided cut-worm;" and it does not belong, as I anticipated, to the genus *Hadena*, but to *Agrotis*. It is very remarkable, however, that the species which has been, perhaps erroneously, named for me as *Hadena chenopodii*, and which has the male antennæ perfectly unfeathered, (i. e. not "bipectinate,") so closely resembles Mr. Riley's species in its markings, that at first view they appear to belong to the same species. Yet, as it turns out, they do not even belong to the same genus.

B. D. W.

QUACKS AND PHYSICIANS.

The difference, as I take it, between a Physician and a Quack is simply this, that the former always wants to find out what your disease really is, before he prescribes for you, and then varies his prescription according to the nature of the disease; while the latter does not trouble his head for one moment, to ascertain whether you are afflicted by Gout or Cancer, by Neuralgia or Dyspepsia, by Inflammation of the Lungs or Palpitation of the Heart, inasmuch as his Infallible Golden Elixir is warranted to cure all diseases that the Human Species is subject to.

As with the diseases of men, so with the diseases of plants. We often see men prescribe for plants that are infested with some insect or other, without taking the least trouble to ascertain what particular species of insect is doing the damage. As the habits of different insects differ very greatly, it is consequently all haphazard whether the proposed remedies can do any good or not. I find the following example of this "hit or miss" method of prescribing in that excellent Journal the *Western Rural* for March 30, 1867.

REMEDY FOR ROSE INSECTS.

Can you, through the columns of the *Western Rural*, give any plan for preventing the destruction of roses by insects? A little black insect has destroyed our roses for the past two seasons, by eating the buds just before blossoming. A. E. R.

Fayette, Iowa.

Remove the soil from around your rose-bushes to the depth of four or five inches, and the width of one and a half or two feet, and scatter it thinly over the surface of the garden, or pleasure ground, that the larvae of injurious insects which it contains may be exposed to destruction. Fill the excavation with rich compost, in which well-rotted cow-manure forms the principal ingredient. This will increase the vigor of the plants and enable them to withstand the attacks of insects. It will be found that unhealthy plants suffer most from the rose-bug, the slug and other pests. Dusting the leaves with ashes or road-dust has been found beneficial, also syringing them with soap-suds. The syringe is more suitable than the sprinkler; with it the insects on the under sides of the leaves can be reached.

What the "little black insect" spoken of by A. E. R. really be, it is impossible to say with any certainty; but likely enough it is nothing but the common Plant-louse of the Rose, (*Aphis rosæ*). In this case "removing the soil from around the rose-bushes" will not kill a single one of the pests, because that insect never goes under ground in any of its states. Certainly it cannot be the common Rose-bug (*Macrodactylus subspinosus*), that is afflicting A. E. R.'s bushes; for that insect is yellow, not black. Neither can it be the common Slug-worm of the rose, (*Selandria rosæ*), for that larva feeds on the fully-expanded leaves, and does not gather more peculiarly on the unexpanded tips of the twigs, as does the Plant-louse of the rose. I am acquainted with the larva of a small moth, (probably a species of *Argyrotoxa*), which in particular seasons bores the unexpanded flower-buds, especially of moss-roses, till nothing is left of them but a mere shell. But that larva is rather green than black; and if the *Western Rural* knows that it goes under ground to transform, it knows more than I do.

It is very true, that if the insect complained of be really a Plant-louse, "syringing the bushes with soap-suds" will probably be beneficial. But on that supposition, why impose on A. E. R. the additional labor of removing so much soil? Prescribing after this blindfold fashion is a good deal like pouring into the stomach of a human patient, who may perhaps be troubled with a cold in the head, remedies to cure the Gout, and remedies to cure the Itch, specifics against Rheumatism, and specifics against the Measles, and a variety of other medicines to operate specially upon the Lungs, the Heart, the Kidneys and the Liver. B. D. W.

THE EPHEMERON OR MAY-FLY.

It is popularly supposed that this insect lives only a few hours, or, as the Greek etymology of the word "Ephemeron" denotes, only a single day. So far as regards the perfect insect, this is true of certain species belonging to this Family; though it is recorded by authors, that other species live several days in the Perfect or Fly state; and I have myself kept one of our largest species—the *Palingenia bilineata* of Say—alive in my breeding-cages for nearly a week. But although in the Fly state the duration of life is very short, yet in the larva or grub state most of these insects live nearly a year, and some of them, as is said, nearly two years, all of them without exception inhabiting the water during that stage of their existence. Hence the beautiful and well known reflections, which Dr. Franklin puts into the mouth of "the ancient Ephemeron that had actually lived 370 minutes," however instructive they may be in point of Morality, are incorrect and untrue in point of Natural History. B. D. W.

A GROUNDLESS FEAR.

We clip the following item, with the accompanying editorial remarks, from the *Monthly Report of the Agricultural Department*, for February, 1867, (p. 62).

Dixon, Ill.—"Last year I had some very fine asters, and a long, slim, black bug destroyed them by eating the flower. In the morning I would kill them, and before evening another swarm would literally cover them. I saved a few seeds, but do not like to plant them, for fear I might be propagating the bug."

[The insect injuring the asters is probably the *lytta*, a species of the *cantharidae*, and which is very injurious to the aster.]

The particular species was no doubt the Black Blister-beetle, (*Lytta atrata*), which I know to be peculiarly hard on Asters, and which sometimes also attacks the potato plant. (See the PRACTICAL ENTOMOLOGIST, II, p. 26.) The gentleman at Dixon need not be apprehensive of propagating the "bug," or properly speaking, "beetle," by planting his aster seed. Its eggs are not laid upon the seed of the aster, nor upon any other kind of seed, but in the earth. And it is in the earth that the larva exclusively lives; feeding upon the roots of various plants, until it is ready to come out into the light of day, in the form of the perfect Beetle. B. D. W.

USE OF NATURAL HISTORY.

A correspondent of the *Scientific American* paid a visit in 1862, to Col. Pike, of Brooklyn, N. Y., an amateur naturalist. During the visit, the Colonel said: "I am very frequently asked what is the use of this study of natural history. Some of our very intelligent citizens say to me, 'How are you going to make anything out of this? What good does it do to catch butterflies?' Not long ago, I saw one of the wealthiest men in Brooklyn at work on the trees in front of his house. He had them all scraped and whitewashed at an expense of \$80. Said I, 'Mr. Hunt, what are you doing that for?' 'To keep off the worms,' he said. 'That's no use,' I remarked. 'Oh,' said he, 'I think it is.' Well, now, the insect was a *Geometra*, or measuring-worm; the moth that produces these worms, lays its eggs on the ends of the branches, and it is almost impossible to kill the eggs. The strongest Northwest winds have no effect upon them; I have seen them in Maine, and it is difficult to crush them with your nail. When they hatch in the spring, the young worm eats off the tender leaves. You can judge what good the scraping of the trunk would do. I went by some months afterward, and Mr. Hunt was in front of his house, looking up at his trees, which had not a leaf on them, and I remarked, 'Your trees are looking finely, Mr. Hunt; the scraping was more profitable than hunting butterflies.'"

FIRE-BLIGHT.

A correspondent inclines to believe, that Downing's Theory of Fire-blight, namely, that it is caused by frozen sap, is the true one. There is a remarkable fact which seems to show, that Downing's Theory cannot be the true one. On the continent of Europe, they have, in many countries where Pear and Apple-trees are commonly grown, just as severe frosts as we have and just as sudden changes in the weather. Yet there is no such thing as Fire-blight known there. The same reasoning applies to another hypothesis, which has been recently broached by Mr. Bennet, of Pittsburg, namely, that Fire-blight is caused by thunder and lightning. The facts seem to indicate that it must be caused either by some insect peculiar to America, or by some parasitic fungus peculiar to America; for on no other supposition can we readily explain, why it should not prevail in any part of the Old World.

If I may be allowed to hazard an opinion, or rather a guess—what is known as "Leaf-blight," i. e. a vast number of dead, brown-colored spots on the leaves, causing them to fall prematurely, is produced by a pale-green Leaf-hopper (*Chloroneura malefica* Walsh), of very nearly the same shape and size as the Grape-vine Leaf-hopper, (figured PRACTICAL ENTOMOLOGIST II, p. 51.) And what is distinguished as "Frozen-sap Blight," is produced by a minute parasitic fungus. But the subject is a very difficult one, and requires further and fuller investigation. B. D. W.

ANSWERS TO CORRESPONDENTS.

C. F. A., N. J.—In criticising an Article on Black-knot which appeared in the last number of this Journal, (p. 63), you say that you have "examined the Black-knot from the Wild Cherry, the Morello Cherry, and the cultivated Plum, and published an account of it in the *American Agriculturalist* for March, 1863, and found it in all cases to be identically the same *Sphaeria morbosa*." "The Wild Cherry!" Even if you had not known it before, you might have found out from the article which you attempt to criticise, but which you have evidently never read through, that there are no less than three perfectly distinct kinds of Wild Cherry trees common to the United States. I prefer not to accept as conclusive, on so difficult a botanical subject as the identity of two or three apparently distinct funguses, the evidence of a Botanist who does not know that there is more than one kind of Wild Cherry tree in America, or at all events confounds together, under such indefinite phraseology as "The Wild Cherry," species which, in such a question as this, ought to be carefully distinguished.

As to your notion that what is mistaken for Black-knot on cultivated cherries is almost universally caused by firing with shot at the birds, and thus injuring the twigs, Mr. Hicks informed me that he had not molested the birds for years on his grounds, and yet it seems that his Cherry trees were full of Black-knot in 1860. Consequently this strange new theory of yours will not hold water. Besides, you say that people in your neighborhood "are constantly complaining that they cannot raise any cherries because of the knots, some of which are as large as a man's fist." If then they do not raise any cherries, what occasion can they possibly have to fire into their cherry trees? Are they afraid that the robins will eat the black-knots?

Wm. Willcock, N. Y.—The long rows of punctures, each puncture containing an elongated egg, on the twigs of the Delaware grape-vine, are produced by the common Tree-cricket (*Cecanthus niveus*). They are the same spoken of in the Answer to J. M. Cole, of Missouri, PRACTICAL ENTOMOLOGIST, II, p. 74; and for advice what to do with them, I must refer you to that Answer. The single grape twig with several old scars on it, seems to have formerly had the eggs of some Tree-hopper (*Membracis* family) deposited in it; but I cannot be sure of the fact in so old a specimen.

J. B. H., C. W.—The large moth expanding nearly eight inches, which you hatched in a warm room from a tough silken pod-like cocoon attached to the twig of an apple-tree, can be nothing else but the *Cecropia* moth, (*Attacus cecropia*), as you say that the body was "striped." In this insect the abdomen is cross-banded with alternate bands of white, black and red, while in the only other common moths which are large enough to answer your description, (*Attacus polyphemus* and *A. luna*), the abdomen is respectively ochre-yellow or white, without any cross-bands. Its disappearance from the room in which it was confined, "leaving a portion of its wings neatly cut off," was probably due to some mouse or rat having made a meal of it. When hatched out in the natural manner, this moth flies well enough with a lazy flapping flight. The eggs it laid will produce nothing, as they were not impregnated by the male moth. You will find excellent figures of this insect and of its cocoon and pupa in Harris's *Injurious Insects*, pp. 387-9. The "thick yellowish jelly-like substance," found in the pupa that was inside the other cocoon, is what is usually met with in undeveloped pupae.

M. W. Phillips, Mississippi.—The specimens of pear-twig "varying in size from a pen-holder to a man's thumb," from which the tip end had been severed by the jaws of some insect, are, as you correctly remark, precisely similar to oak-twig amputated in the same manner by the Oak-pruner (*Elaphidion putator*). Whether similar work which you have noticed on Hickory and on the English or White Walnut, and which Dr. Fitch also noticed on the Beech, be produced by the same species remains to be proved. As there are several closely allied species of *Elaphidion*, I should rather guess that each distinct species confines itself to a distinct tree; but possibly it may not be so. The subject is well worth a careful inquiry.

J. M. Tracy, Michigan.—The blister-beetles you send, which arrived in excellent order, are the *Lytta aenea* of Say, a species so closely allied to *Lytta Sayi*, which devours the young pear itself, that some have doubted whether the latter be not a mere variety. Respecting this last, see PRACTICAL ENTOMOLOGIST, II, pp. 32-3. To avoid confusion, the term "*Cantharis*" is now generally dropped for the genus containing the Blister-beetles, because certain authors had applied this name to another very distinct genus of beetles now known as "*Telephorus*." As the facts you mention respecting the operations of this insect are quite new, I will transcribe them for the benefit of the general reader.

"These beetles are doing considerable injury to the orchards near South Pass, Mich., and were first observed on the 19th of April, eating the blossoms of the pear. They always commence their meal by eating the corolla of the flower next the pistil and calyx, and often the just formed fruit; though they do not seem to relish the latter and never eat the whole of it. Under no circumstances will they touch the stem. If reduced to short commons, they will nibble a little on the tender young leaves. They work most at the top of the tree and at the extremities of limbs. Their number is great; sometimes more than a hundred are found on one small tree. None of the trees on which I have seen them exceed eight years standing. Cherry trees are also peculiarly subject to be attacked by them; nor do plums or quinces escape. On apple and peach trees they have not been observed.

"The jarring process is as effectual against these fellows as against the Curculio. A very slight jar causes them to 'play possum' and fall. Early in the morning, while it is cool, they will remain dormant for some minutes; but in the heat of the day they are soon up and off."

There is another Blister-beetle of about the same size and shape as *aenea* and *Sayi*, which I have always met with on the blossoms of the wild plum, and which will probably be found some day or other to be destructive to the blossoms of the tame plum. This species was described by Mr. Bland, from specimens furnished by myself, as *Lytta tarsalis*. The three may be readily distinguished one from the other by the following table; and they are all of them nearly of the same size, shape and make as the Blister-beetle figured in PRACTICAL ENTOMOLOGIST, II, p. 26, but are not striped as that is.

A. Head, thorax and wing-cases all colored alike.
a. Head, thorax and wing-cases all smooth.....*L. tarsalis*.
b. Head, thorax and wing-cases all smooth.....*L. Sayi*.
B. Head and thorax differently colored from the wing-cases. (Head and thorax downy, wing-cases almost smooth.....*L. aenea*.)

In all these species the legs are red, with the knees and more or less of the feet (tarsi) black. The three have been referred by Leconte to his genus *Pomphopsea*—which is one of many genera into which the very extensive old genus *Lytta* has been subdivided.

Henry Morey, Ill.—On the closest examination I can detect no positive signs of insect life in the specimens of apple-tree bark which you send. Even if the powdery appearance under the thin outside skin of the tree be the work of some unknown insect, you need not trouble yourself about it, as it evidently, just as you state, never penetrates any depth into the bark. There is no "borer," properly so called, working in this manner, but there are several minute bark beetles that do; none of them, however, are materially injurious to trees. I cannot tell, without seeing the specimen, to what insect the row of eggs found on an apple-tree limb belonged.

Dr. C. Greene, Ohio.—I cannot believe that the application of Gypsum, or of any other powder, to the flowers of a plum-tree would have the least effect in preventing the "Curculio" from laying its eggs in the fruit. Neither do I believe that any fumigation of the flowers with offensive odors would have any such effect. Dr. Trimble has shown that all kinds of offensive compounds, even when daubed upon the plum itself, fail to keep off the "Curculio." The grubs found under the hide of living oxen arise from eggs deposited there by a large two-winged fly—*Cestrus bovis*—belonging to the same family as the fly which produces the Head-maggots in sheep, and another which produces the "bots" in horses. Another still larger fly belonging to this family, which has the size and the general appearance of a large Humble-bee, deposits its eggs in the neck of our common rabbit, and the larvae

arising from these eggs produce very extensive tumors in the affected part.

Peter Ferris, N. Y.—The second batch of eggs arrived safely, but some few of the larvae had already hatched out on the road. I notice that Dr. Fitch says that the web-nests of *Clisiocampa sylvatica* are very commonly overlooked, "even though diligently sought, being of so slight a texture and placed along the side of the trunk or of one of the larger limbs of the tree and hereby rendered inconspicuous." (*N. Y. Rep.*, II, p. 321.) The larvae hatched from the first lot of eggs have already spun slight webs. "The other eggs on one of the twigs" are those of the common Apple-tree Plant-louse, which is going to be very destructive and abundant this year. They had hatched out all of them on the road.

S. Siewers, Iowa.—You can get insect pins of James W. Queen & Co., Philadelphia.

NOTICES.

The *American Bee Journal* is published monthly at Washington, D. C., in octavo form, so as to make annually a handsome volume of 240 pages. It contains a vast amount of valuable information on the practical management of Bees, partly from American correspondents and partly translated from the numerous periodicals on the same subject which appear in Germany and other parts of Europe. The price is \$2 per year. We can only suggest one improvement to the Editor. The gigantic Drone Bee, of which a wood cut is given on the wrapper, is of very impure breed and should be replaced by something truer to nature. It must be a cross between a Blue-bottle Fly and a Honey-bee; for it has only got two, instead of four wings; and instead of the regular and definite pattern of vein-work found on the wings of every honey-bee without exception, the artist has given us a system of vein-work such as is found in no insect whatever that God ever made upon the face of this terrestrial globe.

The *Farmer's Advertiser* is a 16-page quarto journal, which appears bi-monthly at St. Louis, Mo., at \$2 per year, payable in advance, and is exclusively devoted to such matters as concern the Agricultural interest. It is well printed and edited, and the Market Reports are peculiarly full and instructive, exhibiting in a tabular form the separate price of each article for the three preceding weeks, so that the farmer can see at a glance whether the market is rising or falling for anything that he has* to sell.

The *Massachusetts Teacher* is published monthly in octavo form, at Boston, so as to form annually a handsome volume of nearly 450 pages, at the low rate of \$1.50 per year, payable in advance. Although this Journal is chiefly, as its title indicates, devoted to educational subjects, yet it occasionally contains matter of much interest to the Farmer and the Gardener. Judging from the advertisements stitched up along with it, it must have a very extensive circulation.

The *Horticulturist* is an old established Monthly of twenty-one years standing, and is published in New York at \$2.50 per year, the twelve numbers making an octavo volume of nearly 400 pages. It is very copiously and handsomely illustrated, and is well printed and edited.

The *Gardener's Monthly* is published in Philadelphia, in the same form and style as the above, at \$2 per year. The well-known name of the Editor—Thomas Meehan—is a sufficient guarantee that nothing but what is practically valuable shall find admittance into its columns.

The *New England Farmer* is an excellent Weekly Newspaper, devoted in large part to Agricultural matters, and published in Boston at \$2.50 per year, payable in advance. To New England farmers it is peculiarly valuable, and being now in the twenty-first year of its existence may be considered as having attained years of discretion.

The *New England Homestead* is a new quarto 16-page Agricultural Journal, published every month at Northampton, Mass., at the ridiculously low price of fifty cents per annum. It is well printed on paper of fair quality, and edited with talent and judgment. How the publishers can afford it at such prices, unless they steal their paper and borrow the use of their types, we do not know; but there seems to be no limit to Yankee ingenuity and progressiveness.

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Contents of Vol. I, No. 2.—April, 1867.

The Moss-Animals, or Fresh Water Polyzoa, (with a plate.) By Alpheus Hyatt.

The Fertilization of Flowering Plants. By J. T. Rothrock.

Insects and their Allies, (with illustrations.) By A. S. Packard, M. D.

The American Silk Worm, (with illustrations.) By L. Trouvelot. Continued.

The Land Snails of New England, (with illustrations.) By E. S. Morse. Continued.

Reviews.—Preliminary Report of the Geological Survey of Kansas, by G. C. Swallow. Annual Report of the Smithsonian Institution for 1865; The American Journal of Conchology.

Natural History Miscellany. Botany.—The Tertiary Flora of Brognon, France; Drying Plants by Heat—two methods. Zoology.—Flights of Butterflies. Geology.—The First appearance of man on our Planet; The Eozoon in Austria.

Correspondence.—Wasps as "Marriage Priests" to Plants. Illustrated.

Natural History Calendar.—New England Reptiles in April; Ornithological Calendar for April; The Insects of Early Spring.

Proceedings of Scientific Societies.
Glossary for the Number.

Contents of Vol I, No. 3, May, 1867.

Some Errors regarding the Habits of our Birds. By Dr. T. M. Brewer.

The Food of the Sea Urchin. By J. W. Dawson, LL. D. Illustrated.

The Moss Animals, or Fresh-Water Polyzoa. By Alpheus Hyatt. Continued. With a plate.

The Land Snails of New England. By E. S. Morse. Continued. Illustrated.

The Tarantula Killers of Texas, (with a cut.) By G. Lincoln, M. D.

The Birds of Spring. By J. A. Allen.

The American Silk Worm. By L. Trouvelot. Concluded. With two plates.

Reviews: Observations upon the Cranial Forms of the American Aborigines, by J. A. Meigs, M. D. A Treatise on some of the Insects Injurious to Vegetation, by T. W. Harris, M. D.

Natural History Miscellany. Botany.—The May Flower; The agency of Insects in Fertilizing Plants. The annual increase in the Circumference of Trees. Curious Flower. Zoology.—A new Insect Box. (Illustrated.) Parasites of the Humble Bee; Habits of Carpenter Bees; Mimetic Forms among Insects. Geology.—The absence of the Northern Drift Formation from the Western Coast of North America. Microscopy.—Test objects; Diatoms; Methods of teaching Science.

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As letters still pour in from parties desiring to obtain the Works advertised for sale by me, in the October (1866) number of the *Practical Entomologist*, I hereby give notice that all of the Books I advertised, were disposed of soon after the issue of the number containing the advertisement.
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The above may be considered as the normal life of the Wheat Midge. Some individuals, however, instead of going under ground, construct their filmy cocoon in the ear of the wheat, where they passed their larval existence, attaching it very slightly, and usually at one end only, to the chaff of the ear. This cocoon fits so closely to the body of the larva that, being transparent, nothing can be seen of it but the small portion of it that projects at one end beyond the body of the larva. In this respect it agrees exactly with the cocoon of a Willow Gallnat, (*Cecidomyia s. brassicoides*), which I have described, and of which I have closely examined many hundred specimens; and no naturalist, who compared the two together, could hesitate for one moment in pronouncing that the two are of precisely similar nature. In both cases, if the larva is allowed to remain undisturbed, it remains within its cocoon; but in the case of the Wheat Midge, when the wheat is thrashed, or when a few infected ears are rubbed out in the hands, that portion of the cocoon by which it was slightly attached to the chaff of the ear, sometimes becomes ruptured. Then, and then only, the larva crawls out of its house, being apparently unable to repair the damage to the old cocoon. Many other insects will do the very same thing.

Upon this slender foundation of facts, a mythical theory was based by certain American authors, namely, that it was the "skin" of the insect, and not its cocoon, that under these circumstances it crawled out of; and that it was the normal habit of the larva to moult its "skin" in the ear of the wheat, and then go under ground and pass into the pupa state, without forming any cocoon whatever. Whereas it is contrary to all entomological analogy, that any larva should moult, after it is full fed, until it gets ready for the final moult into the pupa state; the various moultings of the larva being only performed for the sake of allowing its body to grow larger, and any larval moult after it is full fed being utterly causeless and unnecessary. And, moreover, it has since been clearly proved by Dr. Fitch, that the larva of the Wheat Midge does really, whenever it goes under ground to transform into the pupa state, form a filmy cocoon in the manner described above. (*N. Y. Rep. III, pp. 60-1*). Hence it is but reasonable to infer that, if the insect makes a cocoon when it goes under ground, it will also make a cocoon in the comparatively few and exceptional cases, when it stays above ground and transforms in the ear of the wheat.

A few cases have been noticed in Europe, where the larva of the Wheat Midge transforms into the pupa state in the ear of the wheat the same season, and comes out into the fly state the same season, instead of lying dormant till the following summer. I am not aware that any such cases have been actually observed by practical entomologists in this country, but there is reason to think that in America, as well as in Europe, this occurs occasionally. In the same manner most of the Canker-worm moths come out in March, but some few make

their appearance the preceding autumn. And so with many other insects.

The practical inference to be drawn from our examination into the Natural History of this insect is, that whenever wheat known to be infested by the Wheat Midge is thrashed and winnowed, the "tailings" should always be either scalded or burnt up. They will almost always be found to contain a great number of the larvæ of the Wheat Midge, most of them still enclosed in their tight-fitting filmy cocoons; and these, if allowed to live, will probably produce Flies next June to re-stock the farmer's wheat-fields with this destructive pest.

As to the specimens sent me from Pennsylvania by Mr. Rathvon, they were all, so far as I could see, naked and without any enveloping cocoon, or so-called "skin." I explain this fact in the following manner: The violent swash of the waters broke up a certain percentage of the cocoons that it disinterred, washing away the coating of earth and rupturing the delicate membrane that remained. Hereupon, as is their habit, the larvæ crawled out of their desolated houses, or were washed out of them by the flood, and floating above the heavier particles of earth carried along by the water, formed an orange-colored scum on the surface, after the waters subsided. On the other hand, such cocoons as did not have the coating of earth washed away from them, would be apt to settle down lower in the mud left by the flood; or even if they remained on the surface, would escape notice on account of their being of the same color as the mud. When the naked larvæ revived from their half drowned state, they naturally burrowed under ground, by way of effort to attain a position where they could safely pass into the pupa state. I doubt very much whether nature would enable them to form a new cocoon under ground; and in default of the natural protection from excessive drought or excessive moisture afforded by that cocoon, I doubt also whether such individuals will ever succeed in attaining the Fly state. Possibly some few may do so, as the time is but short which they will have to bridge over between the Larva and the Fly state. But I do not believe that many will.

The reason, in all probability, why but very few of these conspicuous orange colored larvæ were met with anywhere else in the field, except in the hollow that had been flooded, and on the higher portions none at all, is because they were only visible to the eye when they were washed out of their earth-colored cocoons by the flood of waters. Dr. Fitch has remarked that it is "almost impossible to discover these cocoons, even with the aid of a magnifying glass, where they lie in their natural situation in the ground of old wheat-fields." (*N. Y. Rep. III, p. 61*). Hence it would be a very unsafe inference to arrive at, that because the orange colored larvæ were only seen by the farmer of Lancaster Co. in certain portions of his field, therefore there were none in the remaining portion. Mr. Rathvon tells me that

he recommended the farmer "to plow down immediately the most infected portion of the field with a deep subsoil plough," of course with the idea of burying the larvæ beyond any hope of resurrection. The advice was probably good, but to be on the safe side, the whole field should have been subsoiled. For just as likely as not, there were full as many larvæ on the uplands as on the lowlands; only in the latter case they were exposed to the eye, in the former case they were hidden from view in their earth-colored cocoons.

Mr. Rathvon seems to think it a strange thing that the larva of the Wheat Midge should, as a general rule, remain in the larva state, without eating anything, from July to the following May. But it should be recollected that for the greater portion of this time it is enclosed in a cocoon, which, although filmy and thin to the last degree, is yet to all appearance impervious to water, and must therefore check evaporation almost totally. Besides, many other insects do precisely the same thing. I have often had the larva of the gigantic Saw-fly of the elm (*Cimbex americana*) spin up early in July; yet as Dr. Harris observes, and as I know from my own observation, the insect remains in the larva state in its tough pod-like silken cocoon all through the winter and until the following spring, without the possibility of its obtaining any food there. (*Harris, Inj. Ins., p. 519*). Hence Mr. Rathvon's query, that "there may be some substance under the earth upon which the larva of the Wheat Midge could feed during the long summer," must be answered in the negative. Even if there were some such substance, how could they reach it, when each is bottled up tightly in his cocoon, and has to remain there until June in the following year?

THE NEW, OR COLORADO POTATO BUG.

Since my last article on this insect was published, I have collected a few additional facts regarding its geographical distribution, &c., which it may be worth while to lay before the reader.

Mr. T. T. Smith, of St. Paul, Minnesota, noticed it at that place in 1866. "They troubled the Peach-blow Potatoes," he tells me, "very little, but almost entirely stripped the leaves from the St. Helenas." We had not previously heard of it in this State. I had long ago showed that it had passed from Nebraska into Iowa; but how extensively it prevailed in Nebraska, I have not been able to ascertain.

The Editor of the *Wisconsin Farmer* (April 13, 1867), finds that it was in Grant Co., Wisc., which lies in the extreme South West corner of the State, as early as 1862, and that it was abundant on the St. Croix river, which bounds the State on its North Western border, in 1865. Mr. Townley, of Marquette Co., Wisc., which lies a little South of the central part of the State, writes me word that it existed in that neighborhood in comparatively small numbers, in 1865, and swarmed there in 1866. Already in 1865 he had heard that "there was a bug, which, for two years at least, had been

making havoc with the potato plant in the region West of Marquette Co., and that it was considered to be making its way thitherward." Hence we may infer that this insect invaded Wisconsin some two years before it invaded Illinois; i. e., in 1862 instead of 1864; which is in accordance with the general principle already laid down by me, namely that the Southern columns of the Grand Army have uniformly lagged behind the Northern columns, as they marched Eastward towards the sea.

According to a letter from Mr. Byers, of Colorado, which was recently published in the *Wisconsin Farmer*, the Colorado Potato Bug is found only in comparatively small numbers upon the Potato-plant in that region. This is in accordance with what, reasoning *a priori* upon general principles, we should naturally anticipate. The Rocky Mountain region, as I long ago demonstrated, is the native home of this insect; and as many species of insects occur in that country which are not found further East, it is not improbable that some cannibal or parasitic insect preys upon it there extensively, which is not met with in the Valley of the Mississippi. Wherever any animal has existed for indefinite ages, there the Balance of Life has been gradually adjusted, until by natural causes that animal is controlled and kept within reasonable limits. When this same animal suddenly migrates into a new country, it is generally unaccompanied by the species that had preyed upon it in its native home; and until the System of the Creation has been slowly and gradually modified, so as to originate a new Balance of Life—which process will probably occupy a very long time—it will often run riot and sweep the whole country before it. We have but to recur to the well known history of the Hessian Fly, the Wheat Midge and the imported Apple-tree Bark-louse, to see how these principles have already operated in the United States.

To sum up all the known facts in a few words. This Colorado insect now occupies more or less completely Kansas, Nebraska, Iowa, Minnesota, Wisconsin, Illinois and Missouri. I shall be greatly deceived if we do not hear of it in Indiana, and perhaps in Michigan, during the season of 1867.

Mr. Tilden, of Davenport, Iowa, (the author of the Tilden Tomato), says that he lost 30 acres of potatoes in 1866 by this insect, and hardly feels like going extensively into the business again. (*Prairie Farmer*, April 6, 1867). Mr. Suel Foster, of Muscatine, in the same State, thinks that they will have to give up growing potatoes in that region of country, and depend for their supplies of that vegetable upon those districts which have not as yet been invaded by the Bug. For himself, he says that he does not propose to plant any potatoes at all in 1867, except a few early ones, which he intends to start in a hot-bed, and try to hurry forward to harvest by the 4th of July. (*Ibid.*, Jan. 26, 1867).

The general result of all the evidence is precisely what I stated in the first instance, when for the first time, in the first number of this Journal, I laid open the Natural History of this insect.

There is no instance on record where, having established itself in any settlement, it afterwards leaves that settlement and passes on elsewhere or disappears. Colonies are from time to time pushed forward in all directions, especially towards the unoccupied region that lies to the eastward. But the old original homestead is never deserted. Farmers and others will govern themselves accordingly. On the whole, I am satisfied that in a region of country which has been already fully occupied and possessed by this little pest, it will not pay to attempt to grow potatoes in towns and thickly settled sections, where one is surrounded by neighbors who plant potatoes, and think it too small business to make war upon such an insignificant creature as a Bug. In that case, no matter how much pains the farmer may take to clear his own vines, fresh armies will be perpetually invading him from the fields of his less diligent neighbors, and finally he will have to give up in despair, and own himself beaten. The best chance is where a farm is located several miles from any potato-growing neighbor. In such a situation Mr. Brown, of Woodbury Co., Iowa, states that he raised a moderate crop in 1866, in spite of the Bug. "As soon as the first rows could be seen," he says, "the bugs were found on nearly every plant. A day's work at this time, before eggs are laid, is equal to weeks of work later. [Yes, for these are the ones that have passed the winter underground, and start the first brood. B. D. W.] These earliest bugs were picked closely, but for the first week they increased. After this eggs were found, but the bugs decreased in number, with each picking. A small black-winged yellow bug appeared soon after eggs were found, and fed upon them, rendering valuable assistance. [Probably some species of Ladybird. B. D. W.] The good bug was kindly treated. There were scarcely any potato-bugs seen after the 1st of July, but all that were seen were destroyed." (*Ibid*, March 9, 1867).

The Law lays it down as a general rule, that a man must so use his own property as not to damage his neighbor. But the Law does not always practice what it preaches. If it did, it would prohibit every man from keeping cattle which are notoriously breachy. If it did, it would inflict capital punishment upon all the sheep-killing dogs in the country. If it did, it would make it a penal offense to allow a single Canada thistle to run to seed. If it did, it would not permit a slovenly orchardist to grow, every year, millions of the moth which produces the "Caterpillar" of the Apple-tree, so as to stock the whole country with hundreds of millions of "Caterpillars" next season. If it did, it would compel every fruit-grower to gather up and destroy all his wormy fruit, so that his neighbors might not be plagued next year with the Curculios which he has raised. If it did, it would prohibit every man from growing potatoes in the infested district, unless he destroyed all the Potato-bugs that he raised, so that they should not trouble his neighbor. But we must console ourselves with the reflection that this is a free country,

and that every free-born American citizen claims the privilege of making himself a public nuisance, as often as he chooses, and to as great an extent as he chooses. B. D. W.

ANSWERS TO CORRESPONDENTS.

M. W. Philips, Mississippi.—The little thorn-like, conical, green "galls," about $\frac{1}{2}$ inch long, growing in bunches of three or four from the under side of the leaf of the "Texas Mustang" Grape-vine, are made by some undescribed species of Gall-gnat (*Cecidomyia*). I formerly received very similar ones from Mr. Foster, of Pennsylvania, which grew on the Isabella grape-vine, a cultivated variety of the northern Fox grape. (See PRACTICAL ENTOMOLOGIST, Vol. I, p. 101.) Whether the two are identical, I should not like to decide positively, but I incline to think that they are not. The general rule—to which, however there are numerous exceptions—is that each species of gall is confined to a distinct species of plant; and even when the same gall occurs on distinct species of plants, those species invariably belong to the same botanical genus. There are whole hosts of these "galls," as naturalists call them, or unnatural growths of every conceivable shape, size and color, made by insects belonging to many different Orders. The great bulk of those found in the United States are at present undescribed and unknown to science. Baron Osten Sacken enumerates no less than 58 species made by different species of Gall-fly (*Cynips*) on different species of Oak, and I am myself acquainted with many others which are undescribed. The well known "Oak-apples," which grow exclusively on the Black Oak, are a familiar example of a "gall;" and there is another very distinct kind of "Oak-apple" growing on the Red Oak, which differs in containing no spongy substance inside it, the central cell, in which the larva of the Gall-fly lives, being only connected with the skin of the Oak-apple by regularly radiating filaments, instead of the interval between the two being filled up with dense brown sponge. Both the above galls are made by a Gall-fly (*Cynips*, Order Hymenoptera.) Other galls on other genera of plants are made by Sawflies (*Tenthredo* family in the same Order). Others by Plant-lice (*Aphis* family, Order Homoptera). Others by small moths (Order Lepidoptera). Others by different groups of two-winged flies (Order Diptera), and especially by the Gall-gnats (*Cecidomyia*), all of which are slender, long-legged insects, having much the appearance of a common Musketto, except that they lack his long blood-thirsty beak. In every case the larva or larvae of the parent fly lives inside the gall, deriving nourishment from the unnatural growth which is technically termed a "gall." In the case of the Plant-lice, the mother insect lives and propagates inside the gall, bringing forth alive therein a numerous progeny of young plant-lice. One gall of this kind, shaped somewhat like a cock's comb, is very abundant on the upper surface of the leaves of a species of Elm, and many other kinds may be found on Poplars and Hickories. In most other cases the Mother-fly simply deposits an egg or eggs, along with a drop of poison, in the infested part of the plant, and then goes off and dies. In due time the egg hatches out into a larva, and the larva subsequently changes into a fly—destined to run through the same cycle of changes as the Mother-fly from which it took its origin. Thus year after year the breed is propagated. Taught by a mysterious instinct, every kind of gall-producing insect knows the particular kind of plant in which alone its future larvæ can subsist, and selects that kind with as unerring certainty as the best Botanist in "the whole world could do.

Besides the Grape-vine gall which you send, and the similar ones received from Mr. Foster, I am acquainted with a very much larger one which is undescribed, and Osten Sacken has described two other kinds, all of the above being made by Gall-gnats. You may ask how I know that your galls are made by Gall-gnats, seeing that I cannot have had time as yet to breed the fly from them. The answer is, that there is a peculiar "breast-bone," as it is called, found in the larvæ of all known Gall-gnats (*Cecidomyia* family), and never in any other kind of larva. Consequently, I had but to open one of your galls,

extract the larva, glance at it with a lens, and I knew at once what kind of insect had made the gall.

The caterpillars feeding on the leaves of the same "Texas Mustang" Grape-vine, which you send, belong to two different species of Sawfly (*Tenthredo* family). More than this I cannot tell you, as the species are both unknown to me. The larvæ of the Sawflies, although they belong to the same Order (Hymenoptera) as the Bees, Wasps, Ants, &c., yet have the general appearance of the larvæ of the Moths, which belong to the Order Lepidoptera. They may be distinguished, however, by usually having from 18 to 22 legs, (whereas the larva of no moth has more than 16 legs,) and by the pro-legs or sham legs behind the 6 true legs in front being not furnished with the numerous minute and almost microscopic little hooks generally found in the larvæ of the moths. They differ also in other respects, which it would be tedious to particularize.

Willie C. Fish, Mass.—The flat bark-beetles are *Prometopia 6-maculata*, Say. The larger *Tomiscus* is *pini*, Say; *Calligraphus*, Germar, (= *exesus*, Say,) is very similar, but one-third longer. The smaller *Tomiscus* agrees with the description of *pusillus*, Harris; but as that species is said by Fitch to inhabit the trunks and limbs of sapling pines, and yours inhabits small twigs, your species is not improbably the European *ramulorum*, which closely resembles *pusillus*, and has the same habits as your insect.

Aoulous, Kentucky.—This Journal is not the place for long and purely scientific discussions about Guest-gallies. For such I must refer you to my Papers on the Willow Gall insects, published in the *Proceedings*, and to Baron Osten Sacken's Papers on *Cynipidae* in the same publication. I will only say here, that I have proved that certain species belonging to certain genera are Guest-gallies, and not true Gall-makers; whence it is reasonable to infer, in the absence of any proof to the contrary, when other species belonging to these genera are bred from galls, along with species belonging to genera known to produce galls, that the latter are Gall-makers, and the former Guest-gallies. As to the Blackberry Gall, as you send no specimens of the insects bred therefrom, I cannot tell you what they are, whether the gall-making *Diastrophus* or the guest-gallier *Aulax*; but you can easily find out by referring to Osten Sacken's Paper. If you are correct in saying that the wing of the larger fly "has but one vein," it is not a Gallfly at all, but a *Chalcis* fly and a parasite.

The green *Cicindela*, which you speak of, is probably *sequestrata*, Fabr. I cannot identify a *Coccinella* from a curt description and a pen-and-ink sketch. Send specimens always, if you want the correct name for any insect. It always saves both parties a deal of unnecessary trouble; and one insect named with certainty is better than a dozen guessed at.

Samott Casil, Kentucky.—The milk-white "miller," expanding about an inch and a half, which you send, is the common *Arctia Virginia*. The larva is a hairy caterpillar, swarming in every garden in the Northern States, and feeding upon the leaves of almost everything. I once found a large brood of them on an apple-tree; but more usually they infest herbaceous plants. In color this larva varies most astonishingly, ranging from almost white, through various shades of tawney, to almost black. It is an unmitigated pest, and both larva and moth should be slain without mercy, wherever they are found. The snout-beetle which you send, is the same *Episcærus imbricatus*, to which I recently referred in this Journal, Vol. II, p. 81. You say that "something has caused a number of your one-year old apple scions to crack near the bottom," and that you found a single specimen of the above Snout-beetle in one of the cracks. Possibly he may be the author of the mischief; but from analogy I should rather infer not. As you say that the diseased young trees contain no borers and no signs of borers, and that "the cracked place averages from half to two inches" long, I am at a loss to know what can have caused it, and can therefore indicate no remedy.

Thos. McGraw, Wisc.—The cocoons sent are those of the gigantic moth *Attacus cecropia*. Usually but one or two larvæ are found on a single tree; but a case has been recorded in the *Prairie Farmer*, where this larva swarmed on a particular tree. Respecting the above moth, see answer to Thos. T. Smith, PRACTICAL ENTOMOLOGIST II, p. 55.

S. Davis, Ill.—I gave the information you desire in the first number of the current volume of this Journal.

Addison Kelley, Ohio.—The insect infesting your grape-vines is the common Grape-vine Flea-beetle, (*Haltica chalybea*), figured and noticed PRACTICAL ENTOMOLOGIST, II, p. 50. See also I, p. 40, for an excellent account of this insect by Mr. Kirkpatrick of your State. I have recently ascertained that it passes the winter in the perfect state, coming out early in the spring to lay its eggs on the young shoots. Hence, by destroying a single one at this early season of the year, you stop the propagation of untold thousands thereafter. You remark that, "if not picked off and destroyed, it often kills the vine by destroying the buds, so that the vine dies down to the root." Hence, as it seems, it would be well worth while to go over your vines in early spring, and kill as many of these blue-coated gentry as you can find on them. The popular belief that it deposits its eggs "in the bark" is, as you rightly suggest, an error. The following account of the depredations of this beetle, is copied from the *Proceedings of the Alton, (Ill.) Horticultural Society*, for May 2, 1867:—

Dr. Hull presented specimens of the *Haltica (graptocebra) chalybea*, or steel-blue flea-beetle. He had found them very numerous. Has had them in his grounds for some years, but was not aware of their habits until taught by experience, and had not consequently looked to their destruction as a necessity. The experience of last season was of such a character as to leave no doubt, but that to grow grapes successfully they must be first destroyed. The spring of 1866 they were very numerous, and before he was fully aware of his danger his grape crop was nearly destroyed. This spring, in a small vineyard, one of the first planted, they swarmed by thousands, and he had burnt them out, by surrounding them with fire and letting the fire run in the dry grass through it. It was a rough remedy, but as his crop was destroyed, he let the beetles follow suit.

H. B. Howarth, Wisc.—The small two-winged fly, with 2 dark bands on each wing and the head prolonged on each side into a short pillar, at the tip of which the eye is placed, is the *Sphyraphepha brevicornis* of Say, subsequently described by Fitch as *Sph. subfasciata*. Late in the autumn I have found this insect retiring for the winter, in prodigious numbers, into the cracks in limestone cliffs on Rock River, Illinois. Say found considerable numbers in a similar situation on the Upper Missouri in 1819. By some unaccountable oversight, Dr. Fitch asserts that in Say's species the tip of the wing is dusky, (*N. Y. Rep.*, I, p. 70); whereas in reality Say describes the tip of the wing as glassy transparent, just as it is described in Dr. Fitch's supposed new species. Yet it is solely upon this illusory difference that the so-called new species *subfasciata* is based! It is by similar confusions and substantiations, and the lust of species-grinding closet-naturalists to immortalize themselves by giving names to their fancied new species, that synonyms are piled mountain-high, one on top of the other, till science becomes a mere mass of verbiage, instead of being what it ought to be—a systematized accumulation of facts.

C. H. E., New York.—The large dark brown beetles, of which you dug up such numbers from an old clover sod, are the common "May-bug," (*Lachnosterna quercina*), the larva of which is known everywhere as the "White grub," being white with a red head, and is very destructive to the roots of various plants, particularly to strawberries and lettuces, and also to young trees in the nursery and to tame-grass meadows. If you had let these beetles alone, they would have come out of the ground in May. You will probably find these larvæ very injurious to the strawberries and pear and apple stocks planted on your clover sod. Both the specimens sent are females.

"Josh," N. Y.—The moth is *Arctia virgo*, Linn. Of the beetles, the large elongate brown one is *Orthosoma cyndricum*. Ditto shorter, *Lachnosterna quercina*. Black, with many-grooved elytra, *Harpalus caliginosus*. Black, with 3-keeled elytra, *Silpha surinamensis*. Black, with red scutell, *Penthe obliquata*. Black, wrinkled, *Osmoderma scabra*. The insect without wings or elytra is the larva of a *Blatta* (cockroach.) The best work for you to begin with is Harris's *Injurious Insects*. Your specimens reached me all broken to pieces, and the numbers you had attached to them loose in the box, the box itself being pressed as flat as a pancake. I cannot for the future undertake to name specimens that reach me in such miserable condition.

Dr. Houghton, Penn.—The Blister-beetles which you send and which, as you say, "appear to feed upon the flowers of the pear-tree and also upon the fruit when it is young and tender," are the very same species (*Lytta aenea*) that was recently sent me from Michigan with a statement that it infested there the flowers of the Pear-tree. (See Answer to J. M. Tracy in the last Number.) Possibly it may be this identical species that also attacks the young fruit; but I rather suspect that it is *Lytta Sayi* which attacks the fruit, and that *L. aenea* confines itself to the flowers. The two species—though perfectly distinct and never running into one another by intermediate varieties—yet resemble each other so very closely, that even that most accurate observer Say supposed the one to be a mere variety of the other. Your specimens reached me in excellent order. When I receive some taken off the fruit, I can solve the above question with certainty.

As to the Barklouse that infests your orchard, I should recommend you to catch and place upon your infested trees as many as you can procure of the Twice-stabbed Ladybird, (*Chilocorus bivulvatus*, figured in this Journal II, p. 42). You can beat them in reasonable numbers off the boughs of forest trees into an inverted umbrella; oaks in particular are full of them. I do not know by actual experiment that this remedy will prove effectual, but I know that this insect preys upon barklice, and I am going to try the operation upon my own trees this year. You see I do not preach one thing and practice another. In any case this remedy can do no possible harm to your orchard—which is more than can be said of some of the Patent advertised washes.

Andrew S. Fuller, N. Y.—The opaque-white boring larva, about one inch long, with a red head and a blackish mouth, which you found "boring the stem of a Blackberry near the surface of the ground," reached me in excellent order, owing to having been carefully packed in damp moss, and I hope to breed the perfect insect from it this summer. It will produce some moth, and probably some species of *Ageria*—the same genus to which the common Peach-tree Borer appertains. No such larva has hitherto, so far as I know, been recorded as infesting the Blackberry, the common Borer of that plant being a legless grub, and producing a Beetle—the *Oberia perspicillata*, of Haldeman—whereas your larva has sixteen legs, and must necessarily therefore produce some kind of moth. Besides the *Ageria* which inhabits the Peach-tree, there are distinct species known to infest the Pear-tree, the Ash, the tame Currant, the wild Currant, the Grape-vine, the Squash and Pumpkin vine, the Poplar, the Maple and the Lilac. As a general rule, each species seems to confine itself to a distinct genus of plants, but the Peach-tree borer is occasionally found to attack the closely allied Cherry-tree and Plum-tree. Do not be afraid of "boring" me by sending such specimens as the above. The more you send me, the better pleased I shall be.

PUBLISHER'S NOTICE.

The subscribers to this Journal will no doubt be surprised to receive this month a number of only eight pages; and many will join in with the regret of the publishers, that three more numbers will, for the present, close this work. The decrease in the size of the numbers, is caused by the want of sufficient funds, on the part of the Society, to issue more pages, the expense of publishing the Paper having already considerably exceeded the receipts.

It has become very evident that the time has not yet arrived, when the Agricultural community—to whom economic entomology is of the most importance—will sustain a work devoted exclusively to that subject.

The devastations of injurious insects will, no doubt, continue to increase as long as the farmer, gardener and orchardist remain ignorant of the habits of these insects, and until they learn how to distinguish their friends from their enemies. They will doubtless awake from their apathy when they find that the "Hessian Fly," the "Wheat Midge," and the "Chinch-bug" have destroyed the crops of grain,—the "Potato-bug" the crop of potatoes,—the "Curculio," the "Plum-gouger," the "Codling Moth," the "Bark-louse," and the various kinds of "Borers" the crop of fruit; and then, perhaps, they will—when too late—seek for practical knowledge how to destroy their insect-enemies and how to encourage and foster their insect-friends.

ILLINOIS STATE FAIR.

We have received the Premium List of the Fair of the Illinois State Agricultural Society, to be held at Quincy, Sept. 30th—Oct. 5th, 1867. As the Iowa State Fair will be held at Lyons the week previous, and the great St. Louis Fair the week subsequent, this arrangement will be very convenient, both in time and locality, for those desiring to attend all three Fairs. The premiums offered are exceedingly liberal and very judiciously apportioned; and as we are informed, "the citizens of Quincy, with great liberality, have guaranteed to the Society every facility for making the Fair a success, except weather." What can the Quincy people mean by such a few extra dollars and bribe the Clerk of the Weather to lock up his watering-pot during Fair Week? Such conduct is as bad as that of the old miser who subscribed a thousand dollars for some charitable purpose, and then deducted one-eighth of one per cent. for prompt payment.

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take characters which separate one of them from the other, call them generic characters, coin some long-winded new generic name, and then—hey presto!—we have a new genus.

Mrs. Monks might have added that, in addition to the discrepancy in nomenclature between Harris and Trouvelot, Dr. Fitch has adopted a third set of names, following English, instead of German or American authorities. It will be found that he names the four moths enumerated above, *Actias Luna*, *Attacus Cecropia*, *Attacus Promethea*, and *Hyalophora Polyphemus*. The genus *Hyalophora* (in English "glass-bearer"), it may be incidentally remarked, was constructed, or as Mr. Grote would say, "eliminated," by an English writer (Duncan) to receive certain species with "glassy" spots in their wings; and he had the incredible carelessness to refer the *Cecropia* moth to this new genus of his, erroneously supposing that it had such glassy spots. If, on the other hand, we reject Packard's and Grote's new genera, and rely exclusively on Hübner, we shall get a fourth set of names, *Tropæa Luna*, *Samia Cecropia*, *Samia Promethea* and *Telea Polyphemus*. And so on, almost *ad infinitum*.

It will be observed, however, that throughout all these changes in the names of the genera, the specific names remain unchanged. The reason of this is, partly because it is contrary to scientific etiquette to change any specific name, after it has once been published and ratified by a good and sufficient description, and partly because species have a real existence in nature, while genera, as I believe, are the more creatures of the human brain, and to a great extent are dependent upon the whim and caprice of the genus-grinder. For example, the very same author will often, at different times and in different publications, refer the very same insect to three or four different genera. Even the very best entomologists have occasionally done this; and with the smaller fry it is almost the rule, rather than the exception. Now if, as Agassiz maintains, genera have as real an existence in nature as species, how does it come about, for instance, that while all authors have always been agreed that the *Promethea* moth is a distinct species from the *Cecropia* moth, and all of them give these two moths the same specific names, there is such a wide difference of opinion as to whether or not they belong to one and the same genus—Drury, Hübner, Duncan, Westwood, Walker, Fitch and Harris holding that they do, and Prof. Agassiz, Dr. Packard and Mr. Grote holding that they do not? This argument might be multiplied indefinitely; but one such case is enough for my purpose.

If my opinion is asked as to the four insects referred to above, I believe that they belong to three distinct groups, *Luna* to one, *Cecropia* and *Promethea* to another, and *Polyphemus* to a third. But nobody has yet been able to define the difference between a genus and a subgenus, and whether these groups are genera, or subgenera, or mere generic sections, and whether, if they are subgenera, subgenera ought to receive a distinctive name, and

whether in that event we ought to write *Attacus (samia) cecropia* or *Samia cecropia*, are doubtful and disputed questions, about which I do not much trouble my head. Upon such questions authors always have differed, and always will differ to the end of time. And, after all, they are questions of words, rather than questions of things; and science ought to deal as much as possible in things, and as little as possible in words. Unfortunately for the cause of peace and quiet, the scientific world is, not a monarchy, but a democracy; and there is no tribunal to which we can, in the last resort, appeal, to resolve such knotty and insoluble problems as the above, or to fine and imprison refractory and impenitent members of the worshipful fraternity of Genus-grinders.

One cause, perhaps, of the undue tendency in these modern times towards the multiplication of new genera, is a practice which has been introduced, of quoting as authority for the name of a species, not the name of the author who first described that species, but the name of the author who has for the first time referred it to the latest and most fashionable new genus for the current year. Thus the same insect, which in 1767 is *Attacus Cecropia* Linnæus, becomes in 1816 *Samia Cecropia* Hübner, in 1852 *Hyalophora Cecropia* Duncan, and in 1865 *Platysamia Cecropia* Grote. According to this rule, Linnæus is robbed of the honor of attaching his name to the species which, as all allow, he was the first to name and describe; and a positive premium is held out to writers to do what most modern naturalists, with the honorable exception of Lacordaire and a few others, are already too apt to do, namely, to multiply unnecessarily the number of new genera.

As long ago as 1807, the great French Entomologist, Latreille, expressed himself as follows:—"New genera should not be founded upon trifling differences, but only when the differences are considerable, and when necessity demands the subdivision of an old genus, for example, when the number of species included under that genus is inconveniently large." (*Gen. Crustac. Insect III*, p. 61.) It is greatly to be desired that some of our younger North American naturalists would pay a little more attention to these eminently useful and practical suggestions. B. D. W.

CURRANT PLANT-LICE. (*Aphis ribis*.)

[FROM THE PROCEEDINGS OF THE ALTON, ILL., HORTICULTURAL SOCIETY, MAY 2, 1867.]

Mr. J. Huggins, chairman of the committee on Entomology, presented leaves of "Currant," evidently diseased—cause to him unknown. The leaves were marked by reddish-brown blotches of irregular form, the surface whenever attacked was raised up and thickened.

REMARKS BY B. D. W.—From the description, this is probably nothing but the work of the Currant Plant-lice, (*Aphis ribis*). I have referred to it more fully in my article on Plant-lice, in the PRACTICAL ENTOMOLOGIST, II, pp. 37—8. If it is not this, I do not see what else it can possibly be; unless the Alton Currant-bushes are afflicted in some manner unknown in Northern Illinois.

ANSWERS TO CORRESPONDENTS.

Sam. Haycraft, Corr. Secr. Kentucky Pomol. and Hort. Soc.—The chestnut-brown beetle, two inches long, and with pronged jaws, like a buck's horn, almost as long as its body, is the male of *Lucanus elaphus*. It is commonly known in your State, unless I have been misinformed, as the Buck-bug—a pretty fair translation of the scientific name of the species which is the Greek word for Deer (*elaphus*). The female has jaws only of the ordinary size, and is very rare in collections—indeed I know of no collection but my own that possesses a specimen of that sex. I took mine in South Illinois, six years ago. In North Illinois the species is not met with, though we have two other species of the same genus which are common enough, one of which is also common in South Illinois, and probably with you also. It belongs to the *Lucanus* family of beetles—all the members of which feed in the larva state on decaying wood, and none of them on living vegetable substances. Instead of being injurious, they are consequently beneficial, by clearing away decaying matter that would otherwise generate fevers and agues.

The males throughout the *Lucanus* family have much longer jaws than the females, but in no North American species are they so enormously lengthened as in your insect. Both males and females of this family are popularly known in the North as "Horn-bugs;" though the appendages in question are confined to the male sex, and in reality are not horns, but true jaws. I recently, in the PRACTICAL ENTOMOLOGIST, (p. 88), referred to this case as one of those, where an organ is perverted from its normal functions in order to enable the male to grasp more readily the body of the female. We find another such case in a gigantic Fly with four gray wings, common near large rivers, (*Corydalis cornutus*), where the jaws of the male are lengthened into the shape of the finger of a grain-craddle, evidently to enable him to embrace the soft body of the female; for, as jaws to bite or gnaw with, they are absolutely useless. In this instance, although the jaws both of the perfect female fly and of the larva are armed with strong horny teeth, yet the jaws of the perfect male fly are quite smooth. The reason is evident. If they were armed with sharp prongs and teeth, they would penetrate the soft body of the female fly, and thus defeat the purpose for which nature constructed them. The Horn-bugs, on the contrary, are, as is well known, enveloped in a strong coat of mail, and here we find the prehensile jaws of the male armed with sharp prongs and teeth, and curved in such a manner as to give the best possible grip on the slippery, shelly body of the female. Thus does Nature, ever prompt and ever thoughtful, modify her plans to suit the particular circumstances of every case; and even in the beetle that we every day crush ruthlessly under our feet, we may find the clearest proofs, that the world, as it now exists, could never have been generated by the fortuitous concurrence of atoms, as was formerly believed by the old Epicurean school of philosophers, and is still believed by a few scattering individuals in these modern times.

Thos Siveter, Iowa.—I have no specimens of *Trichina spiralis*. The cocoon must be that of some species of *Attacus*, perhaps of *Attacus luna*, the great grass-green moth with long tails to its hind wings. But it is a great deal larger than any that I ever saw.

Thos. Gregg, Illinois.—The gray snout-beetle, that you find on apple and plum trees, is the New York Weevil (*Ithycerus noveboracensis*), so called because it was originally described by Forster from a specimen found in New York. It is, however, comparatively quite rare in the Eastern States, but in the West it is common, and sometimes swarms in nurseries and ruins hosts of young trees. Its mode of working is to devour the buds and young shoots. It should be slain without mercy, wherever it is found.

J. J. Jackson, Delaware.—The large beetle you send is the same *Necrophorus americanus*, which I have mentioned in the Answer to A. D. Strong, in this number of the PRACTICAL ENTOMOLOGIST. For the habits of these "Burying-beetles" I must refer you to that Answer. Their larvae are active six-legged grubs.

Henry Morey, Illinois.—There are two broods of Codling Moths every year, at all events, there are two in these latitudes, though possibly in New England there may be

but one. The first comes out in June, about the time that the apples are as big as hazel nuts, from pupæ that have passed the winter in that state. After pairing, the females of this brood lay their eggs in the blossom end of the young apples, the larvæ hatching out from which burrow into the core and live there till they are full-fed. The moths from this brood make their appearance about the end of July or the beginning of August, and deposit a second crop of eggs in the apples of the same year's growth, the larvæ from which leave the apples probably towards the end of September. There are, however, a few late individuals of the first brood of larvæ and early ones of the second, so that practically one must search for their cocoons all the time, from July 15 to September 30. I have myself bred numbers of the moths about the end of July from apples of the same year's growth, thus proving that it scarcely takes two months for the insect to pass through all its stages from egg to moth. The larvæ of both broods bore their way out of the apple when full-fed, and usually spin up under loose bark, under hay-bands or cloths wrapped by way of trap round the trunk of the tree, &c. The "little apples that fall off about the 1st of July" are very probably infested by this insect; or they may be attacked by the "Four-lumped Curculio" of which I recently spoke.

Thos. Wiggins, Ohio.—The beetle reached me in good order and alive. It is a male of a species (*Clytus pictus*) which produces one of the borers of the Hickory. What is very remarkable, and what I was the first to point out, is the female of this species is absolutely undistinguishable from the female of the species (*Clytus robinia*) which produces the destructive borer of the Locust, though the males are very different, and both sexes of each come out in the perfect beetle state at very different times of the year, namely, the Hickory-boring Beetle in May and June and the Locust-boring Beetle in August and September. Indeed, until I published on the subject, all authors had confounded together these two very distinct species. For further information on this matter I must refer you to my Paper on Borers, in Vol. I of the PRACTICAL ENTOMOLOGIST, where on p. 29 you will find a figure of the male of your species.

The second insect that you send, is the larva of *Corydalis cornutus*—a gigantic four-winged fly with gray wings, which flies by night near large rivers. Its larva lives in the water, but crawls out and hides under stones, logs, planks, &c., to pass into the pupa state. It makes excellent fish-bait. For further particulars I must refer you to the Answer to Jos. S. Lewis, in the PRACTICAL ENTOMOLOGIST Vol. I, p. 113.

G. W. Smith, Mich.—As my promised Article on "Wasps and their Habits" will be crowded out of the PRACTICAL ENTOMOLOGIST, I will now state briefly that the Blue Wasp which you saw bury a large spider in a sandy place, placed it there as food for its young larva, having first stung the spider so as to paralyze but not to kill it. This is the general habit of all the Digger Wasps—to which group the Blue Wasp (*Sphex caeruleus*) appertains. But they do not all employ Spiders for this purpose, many selecting various kinds of insects, as Snout-beetles, Grass-hoppers, Caterpillars, Plant-lice, &c. Neither do they all burrow underground to form nests for their future larvæ, some boring into decayed wood, and some making clay-cells in the open air, as for example the well-known Black and Yellow Wasp (*Pelopaeus lunatus*) that constructs the so-called "mud-dabs."

S. P. Monks, N. Y.—The minute parasitic flies, of which you found such numbers inside a chrysalis, belong to the *Pteromalus* group of the great *Chalcid* family. These *Chalcid* flies very commonly transform inside the pupa upon which they prey. From one pupa of a moth I once obtained 99 such flies. On the contrary, the true Ichneumonids emerge to the light of day to pass into the pupa state, and so do most of the spurious Ichneumonids (*Brachonidae*), though the *Aphidius* group of these last transform inside the body of the Plant-lice that they have preyed on. One reason, perhaps, for the above difference in habits is, that the *Chalcid* flies spin no cocoons at all, and all the true Ichneumonids and most of the spurious Ichneumonids spin silken cocoons.

You object, on grammatical grounds I suppose, to the use of such plural forms as "Chrysalises" and "Funguses," and advocate, as I infer, the use of the Latin plurals "Chrysalides" and "Fungi." I think that when "Chry-

salis" and "Fungus" are used as English words, they ought to have an English, and not a Latin plural. And upon the same principle, if custom did not forbid, I would prefer to write "genuses," rather than "genera," as the plural of "genus." You yourself would surely not say that "Washington and Franklin were great geni" instead of "geniuses?" But our language is such a mass of contradictions and anomalies, that neither here nor elsewhere can we lay down any infallible and incontrovertible rule. Other matters elsewhere.

W. V. Andrews, N. Y.—When I said, that with the Bees and Wasps it was only the females that had stings, I included the Workers or so-called "Neuters" of the Social species in the term "females." They are in reality a "dimorphous" form of the female sex—the two forms not running into one another by intermediate grades, and yet in the case of the Honey-bee the very same egg being capable of producing either a Queen or a Worker, according to the mode in which the larva is fed and lodged. Worker honey-bees do when occasionally lay eggs, without intercourse with the drones or males, and these eggs develop into drones. In the case of the Social Wasps, as stated in the Answer to Miss Hobart, (PRACTICAL ENTOMOLOGIST II, p. 33,) the Workers are even capable of generating other Workers, also without any intercourse with the male or drone Wasps. The Queen of the Honey-bee has a sting, just as well as the Worker Honey-bee, and the same is true of the large Females, or Females *par excellence*, of all the Social species of Bees and Wasps found in the United States. There are indeed certain genera of Social Bees (*Melipona*, &c.) where neither the Females nor the Workers have stings; but these are chiefly natives of South America and Australia, though a few species occur in Mexico and Cuba. In the case of all the Bees and Wasps that are not Social, there is only one kind of female, or, in popular language, there are no "workers" as distinct from the ordinary females, and the females perform all the labor of constructing nests for their larvae, the males being idle gentlemen, solely occupied in sipping honey and gallanting the ladies, as is also the case with the males of the Social Bees and of the Social Wasps.

Volney Abbey, Kansas.—The cutworms reached me, alive and in first-rate order, in the tight little tin box in which you had enclosed them along with some moist earth. They are, as you rightly suppose, true cutworms, and will, in the course of the summer, produce moths or so-called "millers." I cannot identify either species of the two which you send, with any that has been hitherto described. Likely enough, in Kansas you have distinct species of this genus of moths (*Agrotis*), as you have of many other genera of insects.

I can recommend no plan to destroy the foe that is now actually attacking you, but the old-fashioned one of digging them out with your fingers, wherever you find your vegetables "cut" by them. This seems at first sight "slow business," but it is not in reality so slow, as any one would suppose who has not tried it. Killing the moths when they appear in the course of the summer, will diminish the crop of cutworms for next year, but will not help you in any way this year. And after all, unless a whole neighborhood were to unite in this plan, it would be comparatively ineffectual, as the moths fly to great distances in the night to deposit their eggs. I have already recommended the use of poison to destroy these moths, and incline to believe that this method would be far more deadly to them than lighting fires at night as you suggest. But, like all other modes of fighting noxious insects, it requires to be practically tested, before it can be recommended as a sure remedy. You will find full directions for poisoning these moths in the PRACTICAL ENTOMOLOGIST Vol. II, pp. 52-3.

Wm. Smith, Iowa.—The brown bug, looking like the sow-bug that is often found on small fruit, which you have noticed to prey on the larva of the Colorado Potato Bug, is probably a species of the *Scutellera* family in the Order of the True Bugs (Heteroptera). These insects have all of them the peculiar smell of the Bed Bug, which they often impart to Blackberries and Raspberries that they have been walking over, and have been heretofore noticed to plunge their long beaks into the Potato Bug larvae, and suck them dry in the manner that you describe. What are properly called "Sow-bugs" are the gray, 14-legged creatures found under boards in cellars, &c., and are not Insects at all, but belong to the same Class (Crus-

tacea) as the Crabs, Lobsters and fresh-water Craw-fish. As to the Catydid attacking these Potato Bug larvae, it is entirely a new fact, and I should be glad of a specimen taken in the act, so as to determine the species. I have myself observed Catydids to prey upon flies, so that your statement is by no means improbable. Specimens of grapes, supposed to be punctured by some insect, will be very acceptable.

J. R. Towksbury, Ill.—The black bug about $\frac{3}{4}$ inch long, which you found on the root of a peach-tree, is the pupa of *Pirates picipes*—an insect belonging to the *Reduvius* family, (all of which are cannibals,) in the Order Heteroptera (True Bugs). The perfect insect scarcely differs from the pupa, except in having complete wings reaching to the tip of its abdomen. I always find it underground, and it no doubt preys there upon some of the subterranean larvae, that do so much mischief, and are so difficult for us two-legged bugs to get at. The wasp-like moth, about $\frac{3}{4}$ inch long, belongs to the same genus—*Egeria*—as the common Peach Borer (*Egeria exitiosa*), though it evidently differs from that species. What particular species it really belongs to, cannot be told, as the specimen was rubbed almost completely bare, probably in catching it, and broke up into about fifty pieces, by shaking about loose on the road in the tin box in which you enclosed it. But all the known species of *Egeria* are borers in the larva state, and should, therefore, have no mercy shown them. Of course, though they some of them look like wasps, they have no stings.

A. D. Strong, Ohio.—The shining black beetle, about an inch long, with two irregular orange-colored bands across its wing-cases, is the *Necrophorus marginatus* of Fabricius, and belongs to the *Stapha* family. There are several other species belonging to this genus found in the United States, one of which—the *americanus* of Olivier—is nearly twice as large as your species, and is one of the handsomest insects that we have. All of them have the same remarkable habit of burying small pieces of carrion—such as a dead rat or a dead bird—and laying their eggs therein, the larvae proceeding from which are thus enabled to monopolize the savory food for themselves. You can easily obtain specimens of our four commonest species, by depositing small pieces of carrion on soft earth anywhere, and visiting them from time to time, having previously marked the exact spot. Do not be surprised, if you find the bird or the rat apparently abstracted 12 hours after you placed it there; but dig down in the exact spot where you had left it, and you will find it, and the insect sexton or sextons most probably still working away to undermine and bury it deeper yet. Hence, in English this group is termed the "Burying-beetles," or sometimes the "Sexton-beetles." In common with many dung-beetles (*Geotrupes*, *Hister*, &c.), the Burying-beetles, as you remark, are often infested by numerous lice, which are not, however, true six-legged lice, such as infest the human species, but eight-legged Mites, belonging to the same Class as the eight-legged Spiders; whereas the true Lice belong to the Class of Insects, all of which in the perfect state have six legs, neither more nor less. Perhaps, however, the most available criterion to distinguish a Mite from a Louse is the circumstance of its having no head distinct from its thorax. For very many of the Mites use their front legs as antennae, so that to the inexperienced eye they seem to have only six legs; and some few genera have really only six legs.

M. S. Hill, Ohio.—Your insects are named as follows:—1. *Desmocerus palliatus* Forst. 2. *Gnorimus maculatus* Knoch. 3. *Tetraopes tornator* Fabr. 4. *Dichelonycha subvittata* Lec. 5. *Chrysomela similis* Rogers. 6. *Chr. cyanea* Melsh. 7. *Telephorus carolina* Linn. 8. *Tel. bilineatus* Say. 9. (The true bug) *Pentatoma carnifex* Fabr. They are all pretty common, except Nos. 2 and 6, of which I should be glad to receive a few additional specimens, if you have them to spare. Your observation that the larvae of No. 6 feeds on rhubarb and dock leaves is, I believe, new to science.

E. Daggy, Ill.—The very minute and almost microscopic colorless insects, which you "discovered in immense numbers—millions upon millions of them—in your hotbeds, clustering upon the ground, but so far as you can discover, feeding upon nothing so as to injure it," must be the very young larvae of a species of Ground Flea belonging to the genus *Sminthurus*, and are probably the Garden Flea of Fitch (*Sminthurus hortensis*), which you will find

figured in the perfect state in the *New York Reports* III, p. 188. These Ground Fleas are quite distinct from the true Fleas, and belong to the same *Podura* family as those lead-colored, wingless, jumping insects, commonly found in small numbers under old logs, and appertaining to the genus *Podura*. The most correct English name for these Ground Fleas is "Springtails," as both genera have a process at their tails, which, when bent under their bodies and suddenly released, enables them to jump like a flea. In *Sminthurus* this process is two-forked, and is very distinctly seen in the specimens sent, though, as is usually but not invariably the case with insects—for example, it is just the reverse with the Dragon-flies—the larva is much more elongate than the perfect insect. The location of these "Springtails," in a Natural system, has perplexed systematists much. As they have a distinct head with two antennae and six legs, although they never obtain wings, the least objectionable course, perhaps, is to unite them with the Dragon-flies, May-flies, Shad-flies, &c. (Sub-order Pseudoneuroptera). The genus *Podura* is derived from two Greek words signifying "foot-tail," and the genus *Sminthurus* from two Greek words signifying "Rat-tail." The latter term has hitherto been often incorrectly printed "Smynthurus," and it has been still further perverted by Dr. Fitch, by printing it eight times over in the passage already referred to, as "Smynthurus."

I do not believe that any of these insects are injurious to living vegetation, though Dr. Fitch thinks that "when a Flea-beetle (*Haltica*) perforates a hole in a leaf, these Garden Fleas afterwards gather around the perforation to feed upon the soft matter which is there formed by the evaporation of the exuding juice." In the perfect state the Garden Flea is said to be scarcely half the size of a mustard seed, and of a dull black color, so that they resemble grains of gunpowder. In all probability they found congenial food in the decaying vegetable matter of your hotbeds, and will do your young plants no material injury. If, however, you wish to get rid of them, dusting the plants with ashes, sulphur, &c., is said to be an efficacious remedy; but I should not like to vouch for it myself.

Aouless, Kentucky.—As you have now sent on specimens of those flies which you bred from the Blackberry gall, (which, by the way, reached me in good order), I can tell you what they are. Those of which you sent seven specimens, (1 ♂ 6 ♀), are the true makers of the gall—the *Diastrophus nebulosus* of Osten Sacken, rather small specimens, however. In this gall-making genus, as you will observe, the abdomen is evidently composed of several segments. Those of which you sent two specimens, both females, are the *Aulax sylvestris* of Osten Sacken, and are Guest-gallflies. In the female of this genus, the abdomen is apparently composed of but a single segment—as is also the case in both sexes of certain other genera of Guest-gallflies, but never in either sex of any known genus of true Gallflies—but what is very remarkable, and specially characteristic of the genus *Aulax*, the abdomen of the male is apparently composed of two segments. The third insect, of which you sent only pupae, and the winged fly of which has, as you correctly remark, but a single vein in the front wings, does not belong to the Gall-flies (*Cynips* family) at all, but to the *Chalcis* family, and is neither a Gall-maker nor a Guest-fly, but a parasite, feeding in the larva state upon the bodies of the larvae of the Gallflies, and not, as the latter do, upon the substance of the gall itself. It probably belongs to the group *Eurytoma* of the *Chalcis* family, of which both Osten Sacken and myself have bred a representative from this same gall; and from your description all your specimens are females. In this particular case, there is no direct evidence that the *Diastrophus* is the Gall-maker and the *Aulax* the Guest-fly, and not the reverse, inasmuch as both insects inhabit cells placed promiscuously side by side, in one and the same gall. But as Osten Sacken bred this same *Aulax* from a very distinct Blackberry gall, producing a very distinct *Diastrophus*, this is pretty strong, indirect evidence. Suppose, for example, that this *Aulax* is the real maker of your Blackberry gall. Then one of two things necessarily follows, either, 1st, that the same insect produces two entirely distinct galls on the same genus of plants, or, 2d, that the same insect is a Gall-maker in the case of one Blackberry gall and a Guest-fly in the case of the other gall. This latter supposition is as contrary to all entomological analogy, as it would be to all ornithological analogy, to suppose that our American Cowbird or the European Cuckoo some-

times builds a nest for itself and sometimes lays its eggs in the nests of other birds. The former supposition, from a large experience with gallmaking insects, I believe to be utterly untenable. Therefore, the *Aulax* cannot, allowing the above data to be correct, make your Blackberry gall; which was the thing to be proved.

James Barratt, Mass.—The blue, long-horned beetles, over $\frac{1}{4}$ inch long, which you split out of Yellow Pine (*Pinus mitis*), arrived in excellent order, and are the *Callidium antennatum* of Newman. You will find a good colored figure of the species in Harris's *Injurious Insects*, (Plate II, fig. 11). Harris mentions its being very injurious to the Pine in New England, but supposing it to be identical with a similar species found in Europe, has named it as *C. violaceum*. Possibly it may turn out in the end that Harris was right. The two you sent were, as you rightly supposed, male and female, the male differing from the female not only in having much longer antennae, but in having a remarkable shield-like plate sculptured on his thorax, which is not seen in the other sex. There is another very similar species—the *Callidium anthracinum* of LeConte—which infests the Red Cedar, and which Dr. Fitch believed to be a mere variety of your species. But in the Red Cedar insect the male never has the shield-like plate on the thorax always met with in the Pine insect, besides four other differences which I have pointed out. (See *Proceedings* V, p. 206-7, and *Fitch N. Y. Rep.* II, p. 237.)

Chas. H. Peck, N. Y.—The Plant-louse found on *Pinus strobus* is doubtless the *Lachnus strobi* of Fitch, though you send no winged individuals, which according to Fitch are scarce. In this genus I believe that the females do not acquire wings at all; at all events it is so in *Lachnus caryx*. I should be glad of some winged specimens, if you can meet with such and have them to spare. The eggs on the pine leaves are identical with those received from Mr. Orton of Ohio, (see PRACTICAL ENTOMOLOGIST II, p. 84,) and are laid, I have little doubt, by the *Lachnus*. As to the little black Bark-louse found on Sumac (*Rhus glabra*), it is the most extraordinary insect I have seen for a long time, having two enormous lateral plates to its thorax, the front one sweeping forwards so as to enclose the large head upon each side, and give the whole insect somewhat the appearance of a Tortoise-beetle (*Cassida*). I can find no genus to which it can be referred with any propriety; and so far as I am aware, the species is new to science. In fact, the Bark-lice have never been much worked at by any one in this country, anomalous and otherwise interesting as the family is. You will do well to try and obtain the winged males of this species, though probably they will be found, as usual in this family, to be very scarce.

John Townley, Wis.—The cut-worms sent all belong to the same species, except a single darker-colored one, which is probably the one which you noticed yourself as being darker-colored than the others, and which you found feeding on peas. As some of the above were taken by you feeding on the buds of trees, grape-vines and rose-bushes, and some were taken cutting peas and lettuces, it seems to follow that, in this particular case, the same species varies greatly in its habits. I should add, however, that three or four specimens were killed on the road by their friends by way of provision, and that those you had insulated in the paper box, bored their way out and got mixed up with the rest. Neither of the two species, which reached me alive, agrees with any of Mr. Riley's three described species. Besides the plants above mentioned, you say that you have found cut-worms "eating the buds of lilacs, of the Tartarian honeysuckle and of the common Snow-ball shrubs;" and that round the last two you "had tied branches of the Norway Spruce, which did not stop them. Bright tin, however, they cannot climb up." This agrees exactly with what Mr. Riley has said on the subject.

Thos. L. J. Baldwin, Del.—The specimens of Potato Scab were received in excellent order. I hope for more during the summer.

Robt. L. Walker, Penna.—The small light-green insects on your Currant leaves are the common Currant Plant-louse (*Aphis ribis*), which I briefly referred to in my recent Paper on Plant-lice. The best way to get rid of them, is to catch a number of the Lady-birds that prey on them, and scatter them among your bushes. With a

common Entomological Sweeping-net—i. e. a bag of strong cloth fastened to a hoop of strong iron wire, and the hoop attached to a short staff—you may, by brushing the herbage backwards and forwards, catch any number of these Lady-birds. They are readily distinguishable from all other common insects by having only three joints to their tarsi or feet.

Miss Isaura A. Plucke, N. Y.—The elongate, red, long-horned beetle, fully half inch long, that you found on milkweeds, (Asclepias), are the *Tetraopes tatorator* of Fabricius, and belong to the *Cerambyc* family. I find them every year abundant on the same plant, and mixed up with them in small numbers, a species very closely resembling them, but differing, among other characters, by the antennae being beautifully banded with black and white, instead of being plain black. This last is the *Tetraopes femoratus* of LeConte. The short-oval beetles over quarter inch long, with cream-colored wing-cases, dotted and streaked with black, are not Ladybirds, as you suppose, but leaf-feeding beetles, belonging to the great *Chrysomela* family. They are the *Chrysomela bigsbyana* of Kirby; and I have ascertained that the larva, which is a miniature edition of that of the Colorado Potato Bug, feeds on Willows. There is a very closely allied species—the *Chrysomela philadelphica*, of Linnaeus—which scarcely differs, except in the thorax being dark bottle-green, instead of rust-red behind and cream-colored in front. What this last feeds on in the larva state, I do not know, and should be glad to hear. It is very rare with me, though common elsewhere; the other one is tolerably common here. You may always distinguish Ladybirds (*Coccinella* family), from any other beetles that you will be likely to meet with, by their feet (tarsi) having only three joints; whereas all the *Chrysomela* family, some of which are spotted much like Ladybirds, have four joints to their feet. This criterion is of great practical importance, because with a single exception (*Epilachna borealis*, figured *PRACTICAL ENTOMOLOGIST* II, p. 42), all the Ladybirds are our friends, preying upon other insects, and all the *Chrysomelas* are our enemies, feeding upon the foliage of various plants.

As to what you take for living "animals, found in eggs," I think you must be mistaken. What you send appears to me to be merely a part of the egg itself, probably developed by a short incubation. Certainly it is not any insect, and is therefore out of my jurisdiction. I know of no such living animals ever having been found in bird's eggs by any one. As to living parasites in the eggs of insects, that is a different affair altogether.

Answers to J. J. Kelly, V. T. Chambers, William Kite, E. T. Snelling, Jr., Edgerton, Saml. D. Martin and G. W. S., Conn., will be given in the next number.

FERTILIZING PLANTS.

Few entomologists are aware, what an important part is played by insects in fertilizing certain kinds of plants. The old idea among Botanists was, that hermaphrodite flowers shed their own pollen upon their own stigmas, thus, as stock-raisers term it, "breeding in-and-in." But it has recently been shown, that there is an almost infinite variety of contrivances in Nature to prevent this, and that in many such cases bees and other insects, flying from flower to flower, convey the fertilizing pollen from one flower to another, and that without their agency either no seed at all, or seed inferior, both in quantity and quality, is perfected. It is remarkable that almost all flowers which are fertilized by the aid of insects are gaily colored, so as to attract insects; and Mr. Darwin observes that he does not know of a single flower, fertilized exclusively by pollen blown upon it by the wind, that is not of a dull unattractive appearance.

B. D. W.

THE PEACH WORM.

Dried peaches, as is well known, are often so much infested by a small worm as to become worthless. But it has not yet been recorded, that this worm is the larva of a small moth or "miller," belonging to the same family (*Tinea* family) as the well-known moths which destroy woollen clothes, furs, carpets, &c. Having myself bred very numerous specimens to the perfect state, I am enabled to identify it as the same insect, (*Ephestia zea*), which was long ago described by Dr. Fitch as infesting "stale Indian meal and emptying cakes made thereof," (*N. Y. Rep.* I, p. 320, and Plate IV, fig. 1,) and which Dr. Clemens states to feed on "rye, corn, clover-seed, garlic-heads and preserves, especially those contained in jars." (*Proc. Ac. Nat. Sc. Phil.* 1860, p. 206.) While in the larva state, it is preyed upon to a very considerable extent by a small Ichneumon-fly, and also by a small Scorpion-like Spider with claws like those of a crab—the *Chelifer oblongus* of Say. B. D. W.

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PHILADELPHIA, AUG. AND SEPT., 1867.

VALEDICTORY.

In taking my final leave of the readers of the PRACTICAL ENTOMOLOGIST, I feel that I ought not to omit returning my best thanks to the numerous gentlemen who have rendered me their valuable assistance during the current year. It is perhaps invidious to specify a few names, where so many have cooperated, but I cannot avoid mentioning in particular Dr. J. L. LeConte, Mr. E. T. Cresson, Mr. S. S. Rathvon, and Dr. J. S. Houghton, of Pennsylvania; Mr. H. Ulke, of D. C.; Baron Osten Sacken, Dr. Wm. M. Smith, Mr. Peter Ferris, Mr. Isaac Hicks, and Mr. J. H. Parsons, of New York; Mr. W. C. Fish, of Mass.; Mr. M. S. Hill, of Ohio; Mr. John Townley, of Wisconsin; Dr. E. S. Hull, Dr. H. Shimer, Mr. Elmer Baldwin, Mr. M. S. Dunlap, Mr. F. K. Phoenix, and Miss Marion Hobart, of Illinois; and Mr. J. Pettit, of C. W. Would that I could with propriety add Dr. B. Clemens, of Penna., to the list! But alas! he is gone from among us, and we shall not soon see his like again. B. D. W.

THE STATE ENTOMOLOGIST OF ILLINOIS.

The *Canada Farmer*, in its issue of July 15, 1867, congratulates the State of Illinois upon their discernment and public spirit in creating and liberally endowing the Office of State Entomologist, and

is "much pleased to learn that the appointment has been conferred upon the talented Editor of the PRACTICAL ENTOMOLOGIST." As I find that a similar delusion is very prevalent throughout the United States, and as I do not wish that the State, in which I am for the present residing, should be complimented for doing what in reality it has not done at all, I think it proper to give here the true facts of the case.

On the last day of the regular biennial Session, in the winter of 1866-7, our Legislature, as the *Canada Farmer* correctly states, "passed a Bill authorizing the appointment of a State Entomologist, with a salary of \$2000 per annum," but only for a period of two years. By the terms of this law, the appointment was vested in the Governor, "by and with the advice and consent of the Senate." On the earliest possible opportunity, namely, at the Special Session held in June, 1867, the Governor accordingly sent in my name to the Senate for the office. But instead of either confirming or rejecting the Governor's nomination, the Senate postponed all action upon it till the next regular biennial session in the winter of 1868-9, when, by the terms of the Law itself, the Office of State Entomologist will already have ceased to exist. In other words, they in effect vetoed a law which they, in common with the House, had in the first instance voted for; or, which is the same thing, took such action that the law became, for all practical purposes, mere waste paper.

It strikes me that this is a good deal like the platform of the facetious politician, who professed himself to be theoretically in favor of the Maine Liquor Law, but strongly opposed to its practical enforcement. B. D. W.

THE THREE SO-CALLED ARMY-WORMS.

There are three perfectly distinct caterpillars, or "worms" as they are popularly called—producing three perfectly distinct moths—which at various times and at various places in the United States have been designated as "Army-worms." The habits of the three insects being quite distinct, this, as we might naturally anticipate, has given rise to

endless misconception and confusion. It is much as if hogs, dogs and cows were all in a certain locality to be called "cows," and the habits of the three kinds of animals were, in consequence of the misnomer, to be jumbled up promiscuously together. Mistaking one for another, farmers would then attempt to make butter and cheese out of sow's milk—they would take dogs' flesh to market and attempt to sell it for beef—and the true veritable cows they would perhaps expect to keep watch over their houses by night.

The first of these three caterpillars is the destructive Cotton caterpillar or "Army-worm" of the South, which feeds, so far as is known, exclusively upon the leaves of the Cotton plant, generates two or three distinct broods every year, and makes its cocoon above ground by drawing together the leaves of the plant upon which it feeds. This larva changes the same season to a reddish-gray moth (*Anomis zylina*) belonging to the great group of the Owlet Moths (*Noctua* family.) It must be carefully distinguished from another species belonging to the same family, the Boll-worm Moth of the South (*Heliothis armigera*), which burrows indiscriminately either in the Boll of the Cotton plant or in the ears of Indian Corn, and is found in the more southerly of the Northern States as well as in the South. On the other hand, the Cotton caterpillar has never been met with, except where cotton is grown—i. e. in the more southerly of the Southern States.

The second species, which is that which is correctly termed Army-worm, feeds upon the grasses, the cereal plants, and a few other herbaceous plants, but never under any circumstances has been known to attack trees or shrubs of any kind, and occurs from the extreme southern point of Illinois, in the latitude of Petersburg, Va., to the northern parts of Maine. Of this insect (*Leucania unipuncta*) there is but one brood produced in one year, the larva going underground to pass into the pupa state, and the moth usually appearing a few weeks afterwards, though a few lie under ground all through the winter, and do not transform into the moth state until the following spring. The larvæ have the remarkable habit of migrating, in vast armies or crowds, from one field to another; and in such cases they are often successfully fenced out by digging long ditches across their path, up the perpendicular sides of which they are unable to climb. From this habit of theirs evidently arose the very appropriate and significant name of "Army-worm." Like the preceding, this species belongs to the great group of the Owlet-moths; and it further resembles that insect in appearing, in vast numbers, only in particular years and particular seasons, though a few may be met with every year by the careful collector.

A third species which has been locally known as the "Army-worm" for many years back, in the north-west corner of the State of New York, I have recently ascertained to be the Tent-caterpillar of the Forest (*Clisiocampa sylvatica*, figured Harris *Inj. Ins.*, Plate 8, fig. 19)—a species which, both

in the larva and in the perfect moth state, very closely resembles the common Tent-caterpillar of the Apple-tree (*Clisiocampa americana*, *ibid.* fig. 13.) It may, however, be readily distinguished in the larva state from the latter, by having along its back a row of eleven irregularly shaped, white blotches instead of a continuous white stripe. Its eggs, like those of the latter, are laid in a cylindrical ring round a twig, but they may be distinguished by the cylinder being almost squarely docked at each end, instead of sloping off considerably at each end so as to present an oval appearance; and also by their much less densely plastered over with brown cement by the mother moth. I am indebted to Mr. Peter Ferris, of Orleans County, North Western N. Y., for specimens of this insect, both in the egg, larva and pupa state; and as authors hitherto seem to have given a somewhat incorrect account of the habits of the larva, I shall now copy what he says on the subject. Both Harris and Fitch, it may be observed, assert that this larva lives in large communities under a common web or tent, which is made against the trunk or beneath the principal branches. The young larvæ, which I myself hatched out from the egg, did indeed spin a common web; but they lived on it and not under it. According to Mr. Ferris, after the larvæ have attained some considerable size, they spin no webs at all. In a somewhat similar manner, the common Tent-caterpillar lives in society under a common web till it is about $\frac{2}{3}$ grown, and then deserts it, each shifting for itself as it best may.

These worms make their appearance on Apple-trees at or about the same time or soon after the common Tent-caterpillar of the Apple-tree. When they begin to grow, they soon spread over the tree, feeding on the leaves as they come to them, instead of being confined to one branch until all of its leaves are consumed. When the weather begins to get warm, they may be seen gathered in the sunshine, in bunches or patches on the upper side of some of the higher limbs, but without spinning any web. In hot days in June, when the worms are getting large, they often gather in large bunches on the lower limbs near the trunk, and on the trunk of the tree, out of the sun, still spinning no web. These bunches are from a few inches to two or three feet long and often many inches in width. On large trees that have been neglected there are often found as many as eight such bunches, of different sizes; making undoubtedly in some of the worst cases several quarts of worms. After they are about half-grown, they become very voracious, often stripping a large tree, that had previously appeared but little injured, in a few days. They are great travelers, not only in going all over the top of a tree, and from one tree to another; but when one orchard is used up, they will go to another. On such occasions they seem to prefer a smooth track like a hard road, or a board fence with a cap-board on top of it, along which they travel with great rapidity. They are much the worst where several orchards lie close together. Within a circle of not much more than half a mile from where I am now writing, there are 12 orchards. The damage done in these orchards in 1866 cannot be less than one thousand dollars; and counting the labor expended in killing worms, in those that were taken care of, must be much more. On all trees and parts of trees stripped of their leaves, there will not only be no fruit in the following year, but the trees themselves are always more or less injured, the numerous dead limbs indicating that they cannot stand such treatment many years longer. Isolated orchards are much less liable to be troubled with this pest.

These worms have been more or less troublesome in Western New York for twelve years or more. They have a peculiarity sometimes observed in other insects, name-

ly, of disappearing in particular seasons. Some nine or ten years ago they were very destructive in this neighborhood, some orchards being entirely stripped. Yet the next summer there was scarcely one to be seen. In 1867 they have swarmed here worse than they ever did before.

Harris states that the Tent-caterpillar of the Forest occurs on "oak and walnut trees," (*Inj. Ins.* p. 375), and Fitch classifies it as one of the larvæ found on Oak. (*N. Y. Rep.* II, § 321.) There is considerable Oak and Walnut timber in this section, but I have never seen or heard of any larvæ, such as those which infest our apple-trees, being found on those trees. A neighbor of mine has a butternut (*Juglans cinerea*) in the middle of his orchard, that has not been eaten at all in 1867, while he has had great difficulty in saving his apple-trees. And to-day I have seen a butternut standing in full leaf on one side of an orchard, where the apple-trees are stripped all around it. Another neighbor has several black-walnut trees (*J. nigra*) along the road by his buildings, one of which is almost, if not quite, in actual contact with his apple-trees. Yet these trees are never troubled, while the caterpillars are very bad in his orchard. Next to apple-trees they appear to prefer black ash, white ash and basswood. I have just been to the woods, and find many of these trees nearly denuded of foliage, while oak and walnut in the immediate vicinity are not injured. They are also found on beech and dogwood, and we meet with a good many on quince bushes. I understand that they work on pear-trees also this year. Cherry-trees are not much injured by them.

The only other locality, besides Western New York, where this insect has ever been noticed as swarming on apple-trees, is the State of Maine, as has been recorded by Harris, but exclusively in the later editions of his *Injurious Insects*, (p. 375.) I suspect that certain caterpillars seen on apple-trees in Maine in 1866, by Mr. G. E. Brackett, which built no tents and yet strongly resembled the common Tent-caterpillar, could have been nothing but our friend from the Forest. Mr. Brackett, however, suggests that "there may have been something in the weather which caused the departure from their general habit of tent-building," and asserts that they are "the true tent-caterpillar." (*Maine Farmer*, June 28, 1866.)

As to the question whether this same larva ever feeds upon oak and walnut, as stated by authors, it may probably be the case that there are distinct races of this species feeding on those particular trees, and indisposed or incapacitated to feed upon apple-tree leaves. Thus there is a distinct race, or as I have called it "Phytophagic species," of the Handmaid Moth (*Datana ministra*), which, as I have experimentally proved, will feed upon Walnut or Hickory, but will starve upon Oak or Apple-tree; and another distinct race, which feeds upon Oak and Apple-tree, but will starve upon Walnut or Hickory. Many other such cases I have already published as occurring in America, and many more may be met with scattered through the works of European Entomologists as occurring in the Old World. For example, Curtis has recorded the very remarkable fact, that in England the larva of the Sawfly of the Turnip (*Athalia spinarum*) generally attacks exclusively the common Turnip, but in particular localities attacks the Swedish Turnip exclusively. (*Farm Insects* p. 50; see also, on this subject, a Paper by Mr. McLachlan in *Trans. Ent. Soc. London*, 1865, p. 467.)

In confirmation of the above theory—which, however, requires further and fuller investigation

before it can be finally adopted as certain—it may be remarked that S. R. Williams, M. A., Principal of the Sayre Institute in Kentucky, writes me word that "he finds the Tent-caterpillar of the Forest (*Clisiocampa sylvatica*) only on Black Walnut (*Juglans nigra*);" and Mr. Ferris has called my attention to a paragraph in the *Evening Journal*, (Albany, N. Y.,) stating that "the Army-worm is now [1867] committing great ravages in the oak forests of Virginia," and subsequently observing that the same worm is very destructive to the orchards in Niagara Co. in Western New York. The same fact, namely, that this insect "is sometimes so plentiful in Virginia as to strip the oak-trees bare," had previously been recorded by Abbott, but on very insufficient grounds, has been discredited by Dr. Fitch. (See Harris *Inj. Ins.* p. 375, and Fitch *N. Y. Rep.* II, § 321.) On the whole, unless we adopt some such theory as the above, it seems difficult to account for the circumstance that, while the Tent-caterpillar of the Forest occurs, according to Harris and Fitch, generally throughout the Eastern States, it should only have been proved to attack the Apple-tree there to any noticeable extent in two localities, namely, Maine and North Western New York.

All the Tent-caterpillars, instead of belonging to the Owlet-moths (*Noctuae*), belong to the great group of Spinners (*Bombyces*). Like the Cotton-caterpillar, but unlike the true Army-worm, they all make their cocoons above ground, and they agree with the true Army-worm and differ from the Cotton-caterpillar in there being but one brood of them in one year. Like both these two insects, they come out into the Moth state the same season. As is usually the case with the Spinners, the cocoon of all the Tent-caterpillars is constructed of silk, spun from the mouth of the larva. But instead of spinning its cocoon in out-of-the-way holes and corners, as is the habit of the common Tent-caterpillar, the Tent-caterpillar of the Forest, as I am informed by Mr. Ferris, always spins it upon trees, folding together one or more leaves by way of envelop for its cocoon, and often deserting the tree it had fed on for this purpose.

Mr. Ferris having sent me seven or eight of these larvæ, and selected the smallest specimens he could find, for convenience of packing, they were every one of them a day or two afterwards destroyed by the larvæ of parasitic two-winged Flies, belonging to the *Tachina* family, which dropped from their bodies on the ground, leaving the shrunken skins of their victims strongly adhering, as is usual in such cases, to the surface upon which they had rested in the agonies of death. Similar parasitic larvæ largely infest the true Army-worm, as I have shown, and also the larvæ of the Handmaid Moth (*Datana ministra*), which in some sections of country is a great pest upon apple-trees. What percentage of the whole crop of these Tent-caterpillars in Western New York is destroyed in this manner, it is impossible to say with any certainty; but I strongly suspect that it is only the dwarfed and stunted specimens which are thus in-

fested, and that Mr. Ferris unconsciously selected his best friends to be banished to the Far West, when he picked out the smallest specimens he could find to send me, leaving such full-sized worms as were not infested by parasites, by way of seed for another year.

But besides these *Tachina* flies, which, except in the tip of the abdomen never being red, are scarcely distinguishable from the species (*Exorista militaris* Walsh) infesting the true Army-worm, there is an *Ichneumon* fly which also preys upon this enemy of the Apple-tree in the State of New York, but apparently only to a limited extent. For, from a lot of about 50 cocoons sent me by Mr. Ferris, I bred one male and two females of an undescribed species of *Pimpla*, very closely allied to *P. melanocephala* Brullé, but differing from that species in the head being red and not black. Hence, as there are two distinct parasites now proved to infest this insect in New York, we can readily understand, why in particular years it is very scarce there, and in other years occurs in destructive swarms.

The moths produced from the above cocoons, which came out from July 10th to July 24th, are exceedingly variable in coloration, ranging from buff to brown, and some specimens having the "broad red-brown band across the front wing," noticed by Harris as an occasional characteristic of the species, and others being entirely without that band, with all the intermediate grades in both characters. On the closest comparison with a specimen of the moth formerly received by me from Eastern New York, and probably reared upon some forest-tree, I can detect no specific distinctions whatever. Possibly there may exist constant distinctive characters in the larvæ of the several races, feeding respectively on Oak, on Walnut, and on Apple-tree and other trees; but upon this point I am not at present prepared to give an opinion. Certainly, the Apple-tree feeding larvæ agree sufficiently well with the descriptions of Harris and Fitch, which are probably based upon larvæ feeding on Oak or Walnut-trees.

Evidently, as with the common Tent-caterpillar, the cheapest and easiest and most convenient way of getting rid of this pest is to cut off and destroy the bunches of eggs in the dead of the year, when the leaves are off the trees and when farm work is not usually pressing. In badly infested Orchards this, however, will be found to be a considerable task; for, according to Mr. Ferris, in such cases from fifty to one hundred rings of eggs are often found on a single tree. And, after all, to make this plan thoroughly effectual, whole neighborhoods should unite in carrying it out; otherwise one is liable to have a fresh crop of eggs laid every summer upon one's apple-trees, by the moths reared by less careful neighbors.

It will now, I hope, be clearly perceived that the true Army-worm is as distinct from this Tent-caterpillar of the Forest, which has been misnamed "Army-worm," as a Hog is from a Dog. The former lives exclusively upon herbaceous plants and

chiefly upon the grasses; the latter lives exclusively upon the leaves of trees. The former is an Owllet-moth; the latter is a Spinner. The former goes underground to pass into the pupa state; the latter spins a silken cocoon in the open air. The former is the special enemy of the Grain-farmer and Stock-farmer; the latter of the Orchardist. Finally, the former can be attracted in the night by sugary substances, having a long tongue adapted for sucking up honey; the latter cannot be thus attracted, having only a short rudimentary tongue, which is incapable of reaching the nectaries of honey-bearing flowers. It would be easy to point out a whole host of other structural differences; but for the general reader the above will probably be sufficient. It would puzzle many a farmer to catalogue more points of difference between a Dog and a Hog. He will exclaim, perhaps, that the general appearance of a Dog is entirely different from that of a Hog, while in his eyes a Tent-caterpillar and a true Army-worm look almost alike. But this is only because he has studied one group of animals, and has paid but little attention to the other. For, in the eyes of an Entomologist, the one kind of larva has an entirely different appearance from the other; and the same may be said of the Moths produced from the two larvæ.

By way of illustration of the confusion between different kinds of so-called Army-worms, I subjoin a paragraph, which appeared recently in the *New York Tribune*, (June 25, 1867.) The insect here referred to is manifestly the same Tent-caterpillar of the Forest as has been illustrated above. But, as will be seen, the Editor doubts whether it is the real Army-worm of the South, and, if not, he thinks it must be the so-called Caterpillar of New England. In point of fact, it is neither.

THE ARMY WORM.—In Niagara County, Western New York, the Army-worm is committing dreadful ravages among the orchards. In places, the whole population turns out to do battle to save their fruit and gardens. They attack a tree in such numbers as to cover the leaves and fruit, which they utterly destroy. If the trunk of a tree is covered with tarred paper they cannot ascend it, and they start for another orchard. It is doubtful whether this is the real Army-worm of the South, but it is probably the Caterpillar of New England. If it is the Army-worm, its progress can be stopped by plowing furrows and then digging ditches eight inches deep with straight sides. Into this they will crawl, and only with great difficulty can they get out. Then strew straw over them, set it on fire, and their day is done.

The "tarred paper" can evidently be effectual only in preventing these caterpillars from migrating from tree to tree along the ground. And as to digging ditches to stop them, it would be necessary also to tear down the board fences; for according to Mr. Ferris, they commonly make a roadway of the cap-board. B. D. W.

THE LITTLE TURK AND ITS CRESCENT.

[FROM A LETTER FROM FRANKLIN C. HILL, OF OHIO.]

In one of the late numbers of the PRACTICAL ENTOMOLOGIST, you have a very thorough article on the Curculio, which I read with much interest; but yesterday, having the chance to see no less than four specimens in the act, I feel called on to

correct your informant as to the way of depositing the egg. She first bores the hole as spoken of, not straight in, but slanting backwards, so that the egg cavity is just below the skin, pushing her snout down under herself. She then turns round and drops her egg into the hole which she has bored, turns again, pushes the egg home, and cuts the usual crescent in front of the hole, so as to undermine the egg, and leave it in a kind of flap formed by the little piece of the flesh of the fruit which she has undermined. Can her object be to wilt the piece around the egg and prevent the growing fruit from crushing it?

After watching two go through the work, I called on Mr. Orton, with a plum in which an egg was, without the crescent, and we adjourned to his cherry-tree and saw two more do it. So intent is she on her work, that Mr. Orton cut off the cherry with scissors and brought it down without stopping her. We did not time her, but I should think it must take at least five minutes to place an egg.

REMARKS BY B. D. W.—On careful examination, I am satisfied that Mr. Hill is correct in the above statement; and I have little doubt that his mode of accounting for the peculiarities of the operation is the true one. The statement in the PRACTICAL ENTOMOLOGIST, to which he refers, (Vol. II, p. 76) was based, not upon my own personal observations, but upon what I found recorded in books.

THE APPLE WORM. (*Carpocapsa pomonella*.)

This imported pest is ruining the apples and pears in all quarters this year. From Pennsylvania to Iowa, all accounts agree that it was never so destructive before. What is very remarkable, the same species, as I have experimentally proved by breeding the moth, has attacked the native Crab-apples near Rock Island, Ill. I have proved in the same manner that the species attacking the pear is identical with that which attacks the apple.

SPINDLE-WORMS.

Dr. Harris long ago described the transformations of a worm, that commonly bores the stem of young Indian Corn, and is known as the "Spindle-worm," naming the moth which is produced from it *Gortyna (achatodes) zœæ*. He further states that it is not confined to Indian corn, but sometimes bores the pith of the Elder, and sometimes the stem of the Dahlia. (*Inj. Ins.*, pp. 133—9.)

In the *Prairie Farmer* of Feb. 23, 1867, Mr. Riley has for the first time described the preparatory states of the moth, which had been previously named and described by the great French Entomologist Guenée, as *Gortyna nitela*. He found the larva of this moth to bore the stems of the Dahlia and Aster, and probably supposing it to be peculiar to these plants, he has named it the "Dahlia and Aster stalk-borer." Like Harris's species, however, it inhabits both the stem of the Dahlia and the stalk of our Indian corn. For from a larva found in a corn-stalk I bred many years ago, on the 4th of September, the very same species of moth that Mr. Riley obtained in the fore part of September from Dahlia and Aster stems. The pupa is remarkable

for not having, like the pupa of most other moths, a simple thorn at its tail, but a pair of slender thorns horizontally arranged, each about 1-16th inch long, which the insect when alive has the power of opening out in the form of an inverted V, or at discretion shutting them together so as to appear like a single thorn. This arrangement no doubt enables it to work its way out of the corn-stalk with more facility, preparatory to its bursting forth in the moth state; just as the hoof of an ox, which is capable of spreading open in a fork, does not sink so deep in a mud-hole as the hoof of a mule, which is about the same size, but is one solid piece.

The difference in the habits of the true Spindle-worm of Harris and this other Corn-stalk borer appears to be this: The former usually attacks the corn-stem when it is quite young, and before it shoots much upwards; the latter attacks the corn-stem, as a general rule, after it has shot up to some considerable height. The distinction, however, between the two is practically of no importance; for both are equally destructive to the crop, and both should be slain without mercy wherever they are found.

The curious inquirer may perhaps ask, how a moth which comes out in September, like Mr. Riley's insect, can manage to propagate its species, seeing that corn is an annual plant, and Dahlias die down to the root every winter. Manifestly it would be no use for the moth to attach its eggs to Dahlia stalks or corn stalks in September; for long before the larva could hatch out from the egg and attain any size, the stalks would be dead, dried up and destroyed. But in this, as in many similar cases, for example in the case of the common "Curculio," the perfect insect must, I think, live through the winter in the perfect state; and by the few that survive till the following spring the eggs are deposited in the course of the spring, on the young corn and young Dahlia plants, whence the crop of borers for the following year takes its origin. Doubtless the great bulk of them perish in the winter; for it is in the winter that insectivorous animals are the hardest pushed for food, and ransack every hole and corner where an unfortunate moth attempts to hide itself. But for this beautiful provision of nature, and supposing the moth came out in the spring, it would be almost impossible to grow corn; and where we now find one corn-stalk infested by the worm, we should then find almost every stalk in a field of corn bored up and worthless.

When we are disposed to grumble at the severity of our winters, and to wish that spring and summer could last all the year round, with flowers ever blooming and crops ever growing, we should recollect that one chief check would, in that event, be removed from the multiplication of noxious insects. For example, but very few house-flies escape through the winter to propagate the breed in the succeeding spring. But if we had perpetual summer all the year, they would increase in a wonderfully rapid geometric progression from one year

to another, just as they now increase, from a slender start in the spring, but in the same geometric progression; till about the close of the summer they become almost an unbearable nuisance.

B. D. W.

A PLANT GROWING OUT OF AN INSECT.

Mr. Gilbert, of Tipton, Cedar Co., Iowa, sends me a specimen of the common "White Grub," or larva of the May-bug, (*Lachnosterna quercina*), with a root over an inch long, and also a short sprout, growing out of the two corners of its mouth in the place where the lower pair of jaws or "maxillæ" ought to be. So firmly is the plant imbedded in the mouth, that it could not be detached by any reasonable force after the specimen had been well soaked in hot water. It is said to have been "found by Mr. Paulding in wet soil, about 1½ inches below the surface, and when found the shoot was of a light green color and thrifty."

But the most remarkable thing is that, as Mr. Gilbert informs me, "there were large numbers of such specimens turned up by the plough, and the root came from the worm in exactly the same part of the body in all; in some there was a shoot starting as well as a root." "Mr. Paulding," it is further remarked, "has planted out some of them to see what they will result in."

If only a single such specimen as the above had been met with, we might account for it by supposing, that the larva had accidentally died with the undevoured seed of some plant in its mouth, and that this seed thereupon vegetated and grew, using the body of the larva as manure to aid it in its growth. But how can we account for the "large numbers" of these specimens found in one place, at one time, and by one man? I can only explain these singular circumstances by supposing, that some particular kind of seed is poisonous to this larva, although the instincts of the larva do not prompt it to reject such seed as food. Hence it is to be hoped that Mr. Paulding's experiments will be continued, until he clearly ascertains what plant is produced from this vegetative larva. Possibly we might turn such knowledge to practical account, by sowing this particular kind of seed in places infested by the White Grub, and especially where, as with young trees in nurseries, we cannot conveniently reach our enemy with the plough, the hoe or the spade.

B. D. W.

THE IMPORTED GOOSEBERRY SAWFLY.

In my Article on this insect in the last number of the first Volume of the PRACTICAL ENTOMOLOGIST, I showed that the fact of the larva changing in its last moult to green, and losing the numerous black, hair-bearing tubercles that characterize it so remarkably in its early stages, had been overlooked by certain authors both in Europe and America. Hence, I doubted whether such a change invariably took place. But Dr. Smith having kindly sent me a number of these larvæ in a very early stage, I have clearly ascertained that it does; and

a correspondent from Columbia County, N. Y., who has also been investigating the same question, has arrived at the same result. After the last moult the larva invariably becomes of a very pale green, with the 1st and 11th joints, more or less of the anterior part of the 2nd and the posterior half of the 12th, all bright gamboge-yellow.

According to the gentleman referred to above, this is the third year that they have been troubled by the insect in Columbia County, "and so great have been their ravages this year in Canaan, in that county, and various other places, that even hellebore in very large doses has not proved a sufficient remedy." Columbia County lies to the east of the Hudson River; so that if, as it appears, this pest was originally imported from Europe at Rochester, N. Y., it has already travelled eastward 225 miles.

THE COLORADO POTATO BUG.

As I predicted, this insect has now spread into Southern Michigan and Western Indiana. According to Dr. Warder, it occurred in the latter locality even in 1866. A correspondent from Leavenworth, Ks., indignantly denies that this insect ever infested the Potato in his State, and accuses me of slander in making such an assertion. If he will refer to the PRACTICAL ENTOMOLOGIST, (Vol. I, p. 1,) he will find that Mr. Murphy, of Atchison, Ks., had his potato-vines overrun by them in 1861; and so recently as 1866 Prof. W. S. Robertson, of the Indian Orphan Institute, Highland, Ks., mentioned the fact that they were abundant in his vicinity in a letter to me. If Leavenworth has hitherto escaped their ravages, it is no more than what I have recorded as having happened elsewhere. Last year, for example, Putnam Co. in Illinois escaped the Colorado gentlemen, though they swarmed in the two Counties immediately north and south. This year, as the Papers state, Putnam is swarming too.

B. D. W.

APPLE-TREE PLANT-LICE. (*Aphis mali*.)

I had noticed the eggs of this insect to be unusually abundant last winter on Apple-trees, and as soon as the first warm days caused the buds to expand a little in the beginning of May, the young larvæ gathered in swarms upon them; and this not only on the tame Apple-trees, but also on the wild Crab-trees. As I had received the eggs of this insect from various Northern States, with accounts of their being very numerous everywhere, I hence inferred that our Apple-trees were going to be much troubled by Plant-lice in the spring of 1867. (See Answer to Peter Ferris, PRACTICAL ENTOMOLOGIST, II, p. 97.)

Now mark how dangerous a thing it is to prophecy, except in the single case where a prophet has the power of fulfilling his own predictions, as, for example, when a physician predicts the death of his patient. In the middle of May we had in the North Western States one or two pretty sharp frosts, which, however, did no material injury to the fruit, as the blossoms were not expanded. But

although the eggs of the Apple-tree Plant-lice had stood without any damage a temperature of some 15 or 20 degrees below zero, on several occasions during the winter of 1866-7, yet the young larvæ, freshly hatched out, and as tender and delicate as so many babies, could not stand a temperature of some 25 or 30 degrees above zero, in May, and perished wholesale, and as if they had been swept away by the besom of destruction. On inspecting my apple-trees, where three weeks ago every bud was alive with Plant-lice, I cannot now (May 25) find a single living individual. It might be thought at first sight that, as often happens in the summer, the whole generation of them had been destroyed suddenly by their numerous Insect Foes. But the weather has continued so unusually cold, that these foes of theirs have none of them yet stirred out of their winter quarters. Consequently the poor unfortunate little lice must all have been frozen to death—brought to an untimely end—and descended to the grave of the bad bugs,

"Unwept, unhonored and unsung."

After all, perhaps, I ought not to repine at this melancholy catastrophe. For though I may lose in reputation as an infallible prophet, yet I shall probably make it up to myself by a more abundant crop of apples.

B. D. W.

THE TENT-CATERPILLAR OF THE APPLE-TREE. (*Cistiocampa americana*.)

This insect was unusually abundant in 1866 all over the country, and this year is unusually scarce, at least in my own neighborhood. The above is, no doubt, attributable to its eggs having been largely depredated upon last season by a minute species of Egg-parasite, belonging to the *Pteromalus* group of the great *Chalcis* family. I bred great numbers of them last summer, and from the eggs ascertained that they were apparently the same insect which Dr. Packard bred in 1863, in the same month (August) from the same eggs, and which he erroneously, as it seems, referred to the genus *Platygaster*, in the *Proctotrupes* family. See his article on the subject in the first volume of the PRACTICAL ENTOMOLOGIST, pp. 14—15.

B. D. W.

A NEW FOE OF THE CORN.

Mr. J. J. Thomas, of New York, has received a snout-beetle from a correspondent in Onondaga County, N. Y., who states that "it is making sad havoc with corn-fields, destroying whole fields in some instances." This beetle, of which Mr. Thomas has sent me specimens, is a species of *Sphenophorus*—a genus closely allied to *Sitophilus*, which includes the true Grain Weevil and the Rice Weevil—but neither Dr. LeConte nor myself have been able to identify it with any described species. What is very remarkable and illustrative of the well-known fact, that in particular seasons certain insects will swarm, and then not be heard of again in any considerable numbers for many years; I lately received the same insect from Mr. Paschall Morris, the Publisher of the *Practical Farmer*, with a similar account of its operations in Pennsylvania. He states as follows: "A farmer at Concord, Delaware County, Pa., found numbers of this insect destroying the young shoots of corn which they puncture with their proboscis. They are found near the top of the ground. Most generally the corn dies; but if it survives, as the leaves unfold they show the punctures, which look like

shot-holes. He found four of these insects to one 'heart-worm,' as the Pennsylvania farmers call it. [Probably the insect called 'spindle-worm' in New England, which burrows in the heart of the young growing corn and produces a moth—the *Gortyna zea* of Harris. The same worm appears to be called the 'bud-worm' in North Carolina.—B. D. W.] This insect never appeared in Delaware Co. before this season, and it is doing great damage to the corn." So far as I am aware, the above facts are quite new in Economic Entomology.

Like several other species of *Sphenophorus*, this beetle appears to feed in the larva state on moist wood, situated in places where it is continually washed by water. Near Rock Island, Ill.; I have often met with it, and with several other species of the same genus, in decayed logs floating in our sloughs; and once I found it absolutely swarming, in company with five or six other species of the same genus, on the lake beach at Chicago, close to the wood piers at the mouth of the harbor. No doubt, in the larva state, it had lived upon the decaying and moist wood of these large piers. Its feeding on living vegetable substances when in the perfect beetle state, and on decaying and dead vegetable substances when in the larva state, is analogous with many facts well known to entomologists. For example, the Spotted Pelidnota, (*Pelidnota punctata*, figured in Harris, p. 25, and in Fitch's *N. Y. Reports*, Plate 2, fig. 6,) devours the leaves of the grape-vine in the perfect beetle state, and in the larva state lives on rotten wood. Judging from the habits of the larva, I am persuaded that this snout-beetle can only annoy the farmer in situations where there is a large accumulation of decaying drift wood, &c., in wet places, or at all events, a few miles from such situations. We may observe that Onondaga County, N. Y., encloses at one end Lake Skeneateles, which is 15 miles long, and at the other end borders upon Lake Oneida, which is 21 miles long; and that Delaware County, Pa., abuts on the Delaware River below Philadelphia. Hence, having bred in the moist drift-wood, &c., generally to be met with in such large bodies of water, and being possessed of a good pair of wings, this beetle is enabled, whenever it chooses, to fly off to the neighboring cornfields. In seasons when it has bred in moderate numbers, it is probably never noticed on the corn; but when in certain seasons it swarms—as often happens with a great variety of other insects—then its ravages become at once apparent to the eye and immediately attract attention.

It only remains to give a brief description of this insect, so that it may be recognized hereafter, whenever detected in the same operations.

Sphenophorus zea, new species? (The *Corn Sphenophorus*.) Color black, often obscured by yellowish matter adhering to the hollow places, which, however, can be partially washed off. Head finely punctured towards the base, with a large dilated puncture between the eyes above. Snout one-third as long as the body, of uniform diameter, as fine as a stout horse-hair, and curved downwards. Before the middle of the thorax a polished diamond-shaped space, prolonged in a short line in front and in a long line behind; and on each side of this an irregularly defined polished space, somewhat in the form of an inverted Y; the rest of the thorax occupied by very large punctures, which fade into finer and sparser ones on the polished spaces. Wing-cases with rows of still larger punctures, placed very wide apart in the usual grooves or striae; the sutural interstices, that between the 2nd and 3rd striae, and that between the 4th and 5th striae wider than the rest, elevated, and occupied by very fine punctures; a small elongate-oval polished spot on the shoulder and another near the tip of the wing-case. Beneath, polished, and with punctures as large as those of the thorax.—Length about three-tenths of an inch, exclusive of the snout. Comes very near *Sphenophorus truncatus* Say, but the snout is not "attenuated at tip" and has no "elongated groove at base above;" and moreover, nothing is said in the description of that species of the very large and conspicuous punctures, found in the elytral striae of our species.

Since the above was written, specimens of the same insect have been received from Robert Herrick, of Tioga County, N. Y., who gives the same account of their depredations on young corn, and says, that the sap flowing from the wounds made by them attracts myriads of ants, whence some of his neighbors have erroneously supposed that it was the ants that were the authors of the mischief.

He adds, that he noticed the insect upon young corn for the first time in 1866, when they were even more injurious than in 1867; and that he learns, that in 1867 some fields of corn near the Susquehanna River are nearly ruined by them.

It appears from the *Rural New Yorker* of June 29, 1867, that Mr. L. V. Smith, of Geneva, Ontario County, N. Y., had his corn troubled by this same beetle in 1866, and that in 1867 "they have increased to an enormous quantity, particular fields furnishing from six to twelve beetles to each hill." The Editor says, that "Dr. LeConte calls it *Sphenophorus antiquus*," but I know of no species described by any one under that name. Certainly, in 1861 Dr. LeConte was unable to name the species for me.

It may be observed that Geneva, N. Y., lies upon Seneca Lake, and that Tioga County, N. Y. lies upon the north branch of the Susquehanna River, in the immediate vicinity of which river the beetle, according to Mr. Herveil, has been most destructive. These facts seem to confirm the theory advanced above, namely, that the beetle breeds in marshy places in decaying wood, and migrates thence on to the corn. May it not be possible that it is sometimes carted out on to cornfields in swamp muck? It would be interesting to learn, whether fields that have been manured with swamp muck are more largely infested, than those which have not been so treated.

ANSWERS TO CORRESPONDENTS.

Henry K. Smith, Ill.—The large four-winged fly, with a three-fold tail as fine as a horse-hair, of which you send a very good drawing, can be nothing else but a female of *Pimpla (rhysa) atrata* Fabr. The long tail is the instrument which it uses for inserting its eggs into the solid wood of a tree; and it was long ago remarked that they often get stuck fast in performing this operation, just as you have yourself observed. You will find a good wood-cut of your insect in *Harris's Inj. Ins.* p. 539; and it is tolerably common everywhere in the Northern States. But instead of, as you surmise, "killing the hickories," which you found them piercing with their ovipositors, they do just the contrary. They are your friends and not your enemies. They are a species of the multifarious group of Ichneumon flies, and pierce the solid timber in order to reach the larvæ of certain timber-borers, and deposit their eggs in these larvæ. Most usually it is the larva of another large four-winged fly (*Tremex columba*), belonging to a very different Family, which they attack in this manner; and of the perfect fly of this last you will also find a figure in Harris (p. 536.) If you had extended your examinations, you would probably have found the larva of this Fly, which belongs to the *Urocerus* family in the Order Hymenoptera, at the bottom of the puncture made by the ovipositor of your insect.

Dr. Wm. M. Smith, N. Y.—Judging from the specimens you send, the Red Cedars in your neighborhood have been destroyed, not by any insect, but by a parasitic fungus. Whether or not this fungus is known to Botanists, I am not aware. Perhaps Sulphur dusted upon the trees might be found as effectual in destroying it, as it is in destroying the two distinct funguses on the Grape-vine known as "Mildew" and "Rot." The large tracts of pine-trees, killed years ago in North Carolina, were destroyed by Bark-beetles.

L. D. Morse, Secr. Mo. State Bd. Agric.—The "gray-beetles" which are "doing a great deal of damage to the vineyards near St. Louis, and also at Bluffton, 80 or 90 miles west of St. Louis, eating both leaves and fruit," are the same "Grape-vine Fidia" (*Fidia viticida*) which I illustrated in the May number of this Journal. A single specimen mixed in with the rest belongs to the closely allied species *Fidia longipes*, which is black, instead of chestnut-colored, under its gray hair. It appears, therefore, that both these species deplete on the grape-vine.

A. M. Burns, Ks.—The larva boring the twigs and stems of your Currant bushes is the same Currant Borer (*Agrota tipuliformis*), which I figured and illustrated in my Article on Borers in the 1st Volume of the PRACTICAL ENTOMOLOGIST, p. 29. It produces a moth, not a beetle, and is closely allied to the Peach Borer (*Egeria crixiosa*). Like the Apple-moth worm, it is an Imported, and not a Native American species. The insects that are prop-

ly called "currant worms" feed externally on the leaves, not internally on the wood and pith. There are three distinct species of these last, as I showed in my Article on the Gooseberry Sawfly in the last number of Volume I of the PRACTICAL ENTOMOLOGIST. One of the three is a Native American species and is a "looper" or "measuring-worm," producing a moth or "miller;" and two produce four-winged Flies (Order Hymenoptera) belonging to the family of the Sawflies (*Tenthredo* family). Of these two, one, as I have shown, is a Native American species, and does comparatively but little damage; the other is an Imported species, which is gradually overspreading the country, and is destined to be as destructive to the Currant and Gooseberry as the Colorado Potato Bug is to the Potato.

L. Mitchell, Ct.—You inquire whether the so-called "Swamp-apple" on the Azalea is a proper fruit, or a gall produced by the sting of an insect. If you will send along specimens, I will tell you what they are; but there are no Azaleas growing in my neighborhood, so far as I am aware, and I do not know what you mean by "Swamp-apples." Because you understand what is meant by a local name, it does not follow that everybody else does.

J. M. K., Iowa.—The insects that, as you say, have destroyed your apple-crop for the last three years, are the same Rascal Leaf-crumpler (*Phycita nebulo*) figured and described by myself many years ago in the *Prairie Farmer*. The little worms inhabiting the horn-like cases, often secured by silken cables among the crumpled leaves of the twigs, change to small moths in July. I know of no remedy but to pick off and destroy the cases, which can be most conveniently done in the winter, when the leaves are off the trees.

M. W. Seaman, Ill.—The specimens found on cherry and apple-trees, some on the trunk and limbs and some in a piece of old cloth hanging in the tree, are the matured larvæ of the Twice-stabbed Ladybird, (*Chilocorus bivalvatus*), enclosing the pupa. You will find a figure below of the larva and of the perfect beetle, in my Article on Plant-lice (PRACTICAL ENTOMOLOGIST II, p. 42.) As is there stated, the species preys upon Plant-lice and Bark-lice, and is consequently, not our enemy, but our friend.

C. Faxon, D. C.—The thousand-legged worm that infests the roots of your Strawberry plants, causing the plants to wither away, is not, as you suppose, the *Iulus* which I figured and described in the PRACTICAL ENTOMOLOGIST, (II, pp. 34 and 70.) Although it belongs to the same family as *Iulus*, yet it belongs to a very distinct genus (*Polydesmus*), which differs from *Iulus* in the joints of the body being much less numerous (about 20 instead of about 50), and in their being separated from each other by a wide space, instead of fitting closely one to the other, so that the whole body is almost as smooth as a goose-quill. The species sent is the *Polydesmus serratus* of Wood, which I have also received from New York as infesting gardens there. The experience of English gardeners, who have long been troubled with European species of this genus, shows that it does not, as you infer, confine itself to weak and sickly plants, but attacks perfectly vigorous ones, the sickly, withered appearance being the consequence of, and not the allurement to, its depredations. You say that "the least touch of hot water destroys them, without injuring the strawberry plants." This I can readily believe, from the fact that hot water will kill onion-maggots without hurting the young and tender onion-plants.—The cocoon found on your maples is that of the Basket-worm or Bag-worm (*Thyridopteryx ephemeriformis*), which has been repeatedly referred to in these columns.

N. E. B., N. J.—I can see no tokens of the work of insects in the specimens gathered from your cranberry vines; but, as they were not enclosed in any box, but simply folded inside your letter, they reached me dried up to nothing and pressed as flat as a board. Having, as you say, spent already some twelve thousand dollars on your cranberry plantation, you might have invested a few additional cents in postage stamps.

A. Gilbert, Iowa.—The pretty caterpillars, banded with orange and sky-blue, and with a conspicuous white patch on each side of the hind part of the body, are the larvæ of the Eight-spotted Forester (*Alypia octomaculata*)—a very beautiful moth. It is not a very common species in the Northern States, and has always been found where you met with it—feeding on the leaves of the grape-vine.

B. W. McLain, Indiana.—The depressed, oval, white, cottony masses, over $\frac{1}{4}$ inch long, and with a brown scale on one end of them, found on the leaves of the common Maple, are evidently the egg-masses of an undescribed species of Bark-lice, (*Coccus* family, Order Homoptera). The brown scale is the body of the female, as in other Bark-lice. Although the English name of this family is "Bark-lice," and although most of them do really inhabit the bark of various trees, yet many species—for example, one found on the Oleander—inhabit the leaves, as your insect seems to do. Since the above was in type, I have hatched out swarms of young Bark-lice from the specimens sent.

A. Gilbert, Iowa.—The minute oblong-oval white specks, so thickly salted over the bark of your apple-tree, are the larvæ of the Native Bark-lice (*Aspidiotus Harrisii*). You will find thinly scattered among them a few of the old last year's scales from which they hatched out, and also a few of the Imported Bark-lice (*Asp. conchiformis*). I had prepared materials for an Article on the subject of these Bark-lice and the methods of killing them, but, like many other such Articles, it will now be crowded out of the PRACTICAL ENTOMOLOGIST.

M. M. S., Penna.—1st. When an insect, which lives aboveground in the larva state, passes the pupa state underground, it is always the larva that enters the earth and not the pupa. Occasionally such insects transform into the pupa state aboveground among dead leaves, &c., but in that event the pupa never burrows underground. 2nd. Most pupa that pass that state underground have a peculiar apparatus for forcing their way to the surface, when the pupa-shell splits open in front and the winged insect emerges. Sometimes with this object in view the pupa is furnished with sharp thorns on its front part, sometimes the rings of the abdomen are provided with transverse rows of little thorns directed backwards, and very generally the tail is provided with from one to six stout thorns, by which the pupa gradually pushes itself forward to the light of day. By these means, even when the surface of the earth is baked hard, many pupæ work through it, but under such circumstances many more are retained underground and perish miserably. For these reasons, prudent breeders of insects always take care to keep the earth in their breeding-cages moderately moist.

P. B. Sibley, Mo.—No. 1, from potato vines, is the old-fashioned ash-gray Blister beetle (*Lytta cinerea*), which has infested the potato for time immemorial. (See PRACTICAL ENTOMOLOGIST II, p. 36.) No. 2, also from potato-vines, is the larva of the terrible New or Colorado Potato-bug (*Doryphora 10-lineata*), of the perfect beetle form of which, you say that you have found as yet only 5 or 6 specimens. Two years from now you will probably find bushels of them, and see to your cost how destructive they are. No. 3 is the immaculate variety of the Six-dotted Tiger-beetle (*Cicindela 6-guttata*). It occurs exclusively in the woodlands, and its larva, as I believe, lives in rotten logs, preying on the larvæ that bore therein.

E. T. Snelling, N. Y.—The little jumping beetles, infesting a new variety of radish recently imported from England, are nothing but the common Wavy-striped Flea-beetle (*Haltica striolata*), which you will find figured on page 129 of *Harris's Injurious Insects*. This is one of several species of Flea-beetles, that commonly in this country infest young cabbages, radishes, egg-plants, &c., eating little holes in their tender leaves and often the entire leaf. I thought at first you might have imported among us the European Turnip-beetle (*Haltica nemorum*), which very closely resembles your species, and which is such a terrible pest in England to the turnip crop. But on referring to colored figures and descriptions, I find that in that species, the yellow stripe on each wing-case is quite differently shaped, although in other respects the two insects resemble one another almost exactly.

John Edgerton, Iowa.—The olive-green worm, or rather caterpillar, about $\frac{1}{4}$ inch long, which you found on the roots of Blue-grass, changes to some kind of "Miller" or moth of the group of Owllet-moths (*Noctua* family). I cannot say to what particular species it would change. Indeed but very little is known of the preparatory states of most of our moths. You might have noticed on the right side of the specimen nine little oval yellowish eggs, like so many fly-bombs, firmly glued to the skin. These are the eggs of a *Tachina* fly—a group of two-winged flies, many of which resemble Bluebottle flies, House-flies, &c. After

a short time they would have hatched out into whitish maggots, penetrated the vitals of the worm and finally destroyed him, feeding themselves fat upon his substance. They would then have emerged to the light of day in the form of the parent fly that laid the eggs, ready to repeat the same operation upon other larvæ. From Army-worms infested in this manner I have myself bred a *Tachina* fly, and ascertained that, though several eggs are glued to each Army-worm, but a single one lives to be a fly, the others being probably either preyed on or starved out by their overgrown cannibal brother.

Wm. Prichard, Tennessee.—The egg-rings found on your Sugar-maples are apparently those of the common Caterpillar (*Chistocampa americana*), which infests many other forest-trees. What proportion of the eggs will hatch out next spring, depends upon how many egg-parasites have preyed on them.

J. H. Foster, Jr., N. J.—Of the two Click-beetles (*Elater* family), which you found eating the fruit of your Philadelphia Raspberries, the large brown one is *Melanotus communis*, a very common species, the larva of which I believe to breed in decaying wood; the small red one with black markings is *Monocrepidius vespertinus*, a rather rare species with me, and of the history of which I know nothing. I formerly doubted Dr. Houghton's assertion that his pears were gnawed into by true Click-beetles; but it seems now that he was in all probability right on this point. Certainly there can be no mistake as to Click-beetles eating raspberries; for you say that you saw five specimens of the smaller Click-beetles on one raspberry, into which they had eaten their way for nearly half the length of their bodies.

J. J. Kelly, Missouri.—The boring-beetle, which you found imbedded in the solid wood in the but of a Pear-tree, is the common *Buprestis* borer (*Chrysobothris femorata*), of which I gave a figure and an account in the 1st Volume of the PRACTICAL ENTOMOLOGIST, (pp. 26—27). As you will find it stated there, this insect is a very general feeder, infesting not only the Apple-tree, but the Oak, the Maple, and a variety of other Forest trees. It has not, however, been as yet recorded as infesting the Pear-tree. The specimen reached me alive and in excellent order. It was not at all necessary to give him any ventilation. He would have lived for a week or more, corked up tightly in a small vial.

V. T. Chambers, Ky.—I must refer you on the subject of the three Hickory galls, made by a genus of Plant-lice that has been currently called *Phylloxera*, to a Paper of mine which has just been published in the *Proceedings*, (Vol. VI, pp. 275—6 and p. 282, note). I have long been acquainted with the winged insects of all these three galls. The subject is too dry for a popular Journal.

Wm. Kite, Penna.—The gall on the flower-catkin of the Chestnut is exceedingly interesting and hitherto new to science. It is produced by a minute Plant-lice, which, so far as can be discovered from the pressed and distorted specimens enclosed in your letter, belongs to a genus which has been called *Phylloxera*. You would have conferred an additional favor if you had thought to enclose the specimen, with the accompanying flies, in some small paste-board box. Instead of any of the flies reaching me alive, as you hoped, they were all dead and squashed—alas!—as flat as a board.

B. F. Lazear, Missouri.—The large clay-yellow beetle with six black spots on his wing-cases, is *Pelidnota punctata*—a species which has long been known to feed in the perfect state on the foliage of grape-vines. The larva breeds in very rotten wood. The small shining black Bugs, about the size and shape of a radish seed, are the *Corimelana pulicaria* of Germar, and belong to the *Scutellera* family in the Order of True Bugs (Heteroptera). I have often noticed them swarming on flowers, &c., and I believe that they subsist on the juices of the plants that they inhabit. Almost all the True Bugs, except certain exclusively cannibal genera, emit when disturbed the nauseous odor of the Bed-bug, from two large openings on the lower side of their bodies. This is a defensive weapon with which Nature has provided them; and we see, or rather smell, the same thing in the common Skunk. The fact of their swarming in such numbers on your raspberries, as to render the whole crop offensive both to the smell and the taste and absolutely worthless, is new and very remarkable.

J. H. Parsons, N. Y.—The Striped Cucumber-bug (*Diabrotica vittata*, figured PRACTICAL ENTOMOLOGIST I, p. 110,) was ascertained, by Dr. Shimer of Illinois, to reside in the larva state inside the stems and roots of the vines or other plants that it infests. The writer in the *Agriculturist*, in saying that the eggs of the "Squash-bug" are found upon the leaves of the vines, is probably speaking, not of this insect, but of the Northern Ladybird, (*Epiclathna borealis*, figured with its larva, PRACTICAL ENTOMOLOGIST II, p. 42;) for he distinctly states that the larva is "hairy." The insect (*Coreus tristis*, figured Harris *Trj. Ins.* p. 194,) which is properly called "Squash-bug" is evidently the one which the same writer subsequently refers to as "a large black bug near the roots of the plants." Thus we see that three distinct insects—two of them Beetles and one of them a True Bug—are all popularly confounded under the common name of "Squash-bug." In the same manner there are, as I have shown in the PRACTICAL ENTOMOLOGIST (Vol. I, No. 12,) three distinct larvae—two of them producing four-winged flies, and one of them, which is a "measuring-worm" or "looper," producing a moth—which all feed on the Gooseberry and Currant, and are all popularly confounded under the name of "Currant-worm." The general reader usually considers scientific names as a nuisance; but there can be no greater nuisance than a popular name which means anything or everything.

Dr. Chas. Carpenter, Ohio.—The minute and almost microscopic creatures, which you have ascertained to cause "inflamed itching blotches in the summer on the persons of children and to some extent adults," are, not true insects but Mites, belonging to the same Class (*Arachnida*) as Spiders, Ticks, the Mite that causes the common Itch, the Cheese-mite, &c. The mites which you find "in abundance on grass, currant-bushes, strawberry-vines, &c.," are, I suspect, different from the specimens sent. I am acquainted with whole hosts of species found on plants, some of them causing curious galls and deformations and some apparently living at large; but none of them are identical with those which you send, although there is often a strong general resemblance. A minute red species closely allied to yours (*Leptus autumnalis*) is known in Europe as the "harvest-bug," and is said to bury itself in the flesh, producing tumors and intolerable itching, in the time of harvest.

G. S., Mass.—The small black Flea-beetles, swarming on your potato and tomato vines and eating numerous little holes in the leaves, are the *Haltica cucumeris* of Harris—a very common species. They have long been known to work in this manner. The single larva found on potato vines is that of a Ladybird (*Coccinella* family); protect and encourage him, for he is your friend. We are too crowded for space now in the PRACTICAL ENTOMOLOGIST to give an account of the habits, &c., of the woolen-moth.

M. H. Boye, Penna.—The disease of your grape-vines does not appear to be the work of insects; at least there are no signs of the operations of insects in the specimens sent. Of the insects sent, No. 1 is, as you suppose, the common "Curculio" (*Conotrachelus nenuphar*). No. 2, from Peach, is my *Conotrachelus crategi*, found in swarms on the Thorn everywhere in Illinois. If this Snout-beetle habitually infests the Peach also, it is a new fact. No. 3 is one of the Click-beetles, (*Melanotus communis*), and burrows into fruit, such as raspberries, &c., in the perfect state. The larva feeds on rotten wood. No. 4 is not a Beetle, but a Sawfly, (*Tenthredo* family, Order Hymenoptera). It is the two sexes of *Dolerus arvensis* of Say, who however describes the female only. The male, according to the general law which I have established among the Sawflies, is much darker colored than the female, lacking altogether her red markings. Many species of these Sawflies that come out early in the year haunt, as does this species, the flowers of fruit-bearing trees; but I do not believe them to be injurious. They may possibly even be beneficial, by carrying pollen from flower to flower, like the Bees, Wasps, &c. No. 5.—The small Flea-beetle is *Haltica helzines*, and varies prodigiously in color, specimens occurring that are blue, violet, green and metallic-brown. The larger beetle is, not a *Haltica*, but a *Bruchus*, belonging to a family of the Snout-beetles, and is nothing but our old friend the common Pea-bug, (*Bruchus pisi*). No. 6 contains three species. The broad one with flattened antennae is *Lucidota atra*; of the other two the one with immaculate elytra is *Podabrus rugosus*,

the one with elytra edged with yellow is *Podabrus modestus*. All three reside under bark in the larva state, feeding on bark-eating and wood-eating larvae; and in the perfect state also feed, to a limited extent, on other insects. The large clay-yellow beetle with 6 black spots, feeding exclusively on grape leaves, is *Pelidnota punctata*, notorious everywhere for the above habit; the other is one of the Capricorn Beetles, (*Desmocerus palliatus*), and its larva is said to bore the common Elder.—All the specimens reached me in first-rate order.

Huron Burt, Missouri.—The scorpion or lizard-shaped soft-looking insect, that preys on the eggs of the Colorado Potato Bug, is probably the larva of a Ladybird (*Coccinella* family). The green blow-flies, that haunted the currant-bushes infested by Plant-lice, were attracted there by the "honey-dew" exuded by the Plant-lice. (See my recent Paper on this subject, PRACTICAL ENTOMOLOGIST II, p. 39.) "The insect with a dark body, its back and sides covered with a white woolly substance," that preys on plant-lice, must be the larva of a *Scymnus*, (*ibid.* p. 42). The insect that for three or four years has ruined your honeysuckle by devouring the blossom-buds in the night; is most probably some one of the numerous kinds of Cutworms that are now ascertained to mount trees for this purpose. Mr. Townley, of Wisconsin, found his honeysuckles to be infested by them in the same manner. "The large, stinking vine-bug, with the odor of the Chinch Bug," is, I suppose, the common Squash-bug, (*Coreus tristis*), figured in page 194 of Harris's book. The other insects you mention I cannot identify from your descriptions.

Wm. C. Fish, Mass.—Of the two kinds of Hickory galls produced by Plant-lice, the small, roundish one on the leaflet, which opens with a slit below, is *Caryzglobuli* Walsh; the large roundish one on the footstalk of the leaf, which opens above usually in a cross, (X) is *Caryzcaulis* Fitch. The Beetles sent are *Serica tricolor* Say, *S. trocifomis* Burm., (var. with rufous elytra), *Agrius gravis* Lec., *Brachys obata* Web. and *Cardiophorus gagates* Er. The Bug belongs to the *Scutellera* family and to Amyot and Serville's genus *Vulsireca* and is very common here on oaks. I do not know whether it is described or not; but it is not among the species described by Say.—The Cranberry galls reached me in excellent order.

Thos. E. Hoge, Westtown B. S. Pa.—I can tell you nothing about the streak of thousands of small legless white worms, which you saw migrating over the sand and crawling over one another's backs as they traveled, except that they are the larvae of some kind of Two-winged Fly. The specimens sent, having been simply wrapped in paper and enclosed in your letter, reached me dead and in very poor condition. If you had enclosed them in a tight tin box, along with some moist earth, they would probably have reached me alive and in good order, and I could then have told you more about them.

Jas. Barratt, Mass.—The monstrous yellow Butterfly that you saw in the woods the last of June, could have been nothing else but the large yellow Swallow-tail, (*Papilio Turnus*). Some of the females of this species are truly gigantic. You will find this insect figured in Harris's book, p. 268. The Rose-bug, (*Macrodactylus subspinosus*), which as you say is swarming with you this year and doing a great deal of damage, does really, as you suppose, come out of the ground. Its larva lives upon the roots of plants, and changes into the perfect beetle underground.

D. W. Kauffman, Pres. Iowa State Hort. Soc.—The black blister-beetles that are infesting your potato-vines this year, near Des Moines, Iowa, are, as I have been informed by Mr. Ulke, the *Lytta (macrobasis) murina* of LeConte—a species not hitherto observed to infest the Potato. They strongly resemble at first sight the common Black Blister-beetle, *Lytta (epicaula) atrata*, which is said by Harris to infest potatoes in Massachusetts, but may be distinguished by the long second joint of the antennae characteristic of the genus *Macrobasis*, and especially of the males, and also by having four raised lines placed lengthways on each wing-case. This last *atrata* neither myself nor Mr. Ulke have ever known to infest potatoes, and we only meet with it in the autumn on flowers, and chiefly on those of the Golden-rod (*Solidago*). May it not be possible that, in some cases at all events, the former species has been mistaken for the latter? The specimens reached me all alive and in excellent order.

PUBLISHER'S NOTICE.

This number, or rather two numbers in one, closes the second and last volume of the PRACTICAL ENTOMOLOGIST. The reason of its discontinuance has already been given on page 104. At some future time, when there is enough interest taken by the Agricultural Community in the subject of Economic Entomology, to warrant the support of a journal of this kind, the publication of the Paper may be resumed.

Our thanks are due to many kind gentlemen for their valuable aid, but especially to BENJ. D. WALSH for the faithful and handsome manner in which he has filled the Editorial Chair—a task which, we believe, could not have been so well performed by any other individual in America.

To the Agricultural Press in general, our thanks are also due for the many liberal notices given of our little Paper. Not having the money to advertise extensively in papers of large circulation, the existence of the PRACTICAL ENTOMOLOGIST has been made known almost entirely through the liberality of the Agricultural Press.

In the publication of the two volumes of the PRACTICAL ENTOMOLOGIST, the expenses have considerably exceeded the receipts; and in order to balance the accounts as nearly as possible, we shall have copies of Vols. I and II neatly bound together in one volume, with full index, &c., which we shall offer at the low price of \$2.25; or unbound for \$1.25. We hope that our friends will do all they can to induce their neighbors to send for a copy of this work—which should be in the possession of every Cultivator of the Soil—and thereby help us to pay ourselves back at least a portion of what we have lost in its publication.

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J. Y. Smith, Wisc.—From your description, your worms seem to have been similar to those seen by Mr. Hoge; (see above;) but as you do not even send dead and dried up specimens, I cannot be certain.

S. R. Williams, Kentucky.—Your statement that "towards the end of June, 1867, you have destroyed several nests of the Tent-caterpillar (*Chistocampa americana*) on your pear-trees," and that "two or three summers ago you had your pear crop greatly injured by them," is very interesting. On pear-trees, however, the occurrence of this insect is certainly rare and exceptional. As to your finding the Tent-caterpillar of the Forest (*Cl. sylvatica*) only on Black Walnut (*Juglans nigra*), see my Article on "The three so-called Army-worms."

A. H. Mills, Vt.—The larvae now infesting your currant-bushes are the terrible Imported Gooseberry Sawfly, (*Nematus ventricosus*), respecting which see my Paper in the last number of the first Volume of the PRACTICAL ENTOMOLOGIST. "The common yellow worm with black dots," that formerly infested your Currant leaves, was probably the common Spanworm of the Currant (*Ellopija ribearia*); and the "very small green one" was perhaps my Native Gooseberry Sawfly (*Pristiphora grossulariae*), an account of which you will find in the paper referred to above.

Dr. Wm. Maus, Ill.—The new enemy of the Colorado Potato Bug, which you saw "destroying the larva, and so intent on its prey as to retain its hold even when you gathered the leaf on which it stood," is, I believe, the *Lebia grandis* of Hentz. This beetle is one of the vast group of Ground Beetles (*Carabus* family), almost all of which are cannibals; but the genus to which it belongs, unlike most of the other Ground-beetles, haunts plants and is active by day, instead of living on the ground and being nocturnal in its habits. That others as well as yourself may recognize this species, I may here state that it is $\frac{1}{2}$ inch long, with the head and thorax red and the wing-cases bright blue. The larger olive-green insect, about $\frac{1}{2}$ inch long, that preyed on the larva of the Potato Bug last year, is a True Bug (Order Heteroptera) belonging to the genus *Rhaphigaster* in the *Scutellera* family. It is a very common species, and I have noticed it transfixing with its beak a wild bee $\frac{1}{2}$ inch long appertaining to the genus *Andrena*; so that it seems to be rather a general feeder. This species, so far as I am aware, is undescribed. Other observers have noticed Bugs, belonging to this same family and probably to the same species, destroying the larvae of the Potato Bug. Like all the rest of the *Scutellera* family, it emits when disturbed the peculiar odor of the Bed-bug and the Chinch-bug.—The leaf that you send bears on its surface the eggs of a Golden-eyed Fly (*Chrysopa*). You will find a figure of these eggs in my Article on Plant-lice. (PRACTICAL ENTOMOLOGIST II, p. 42.)—The Ladybird that your friend found among the Plant-lice on his Cherry-tree, is the Fifteen-dotted Ladybird (*Myzia 15-punctata*)—one of the few species found promiscuously in Europe and America.

Fred. Blanchard, Mass.—I cannot identify the large *Prionus* found in wool waste. It is most probably, as you suggest, an exotic species.

Tipton & Melliott, Ohio.—See Answers to M. S. Hill, in PRACTICAL ENTOMOLOGIST, Vol. I, p. 46. and to Thos. C. Wright, Vol. II, p. 8.

The Colorado Potato Bug.

I find the following in the Monthly Report of the Agricultural Bureau for September, 1866, p. 344:

Indiana County, Pennsylvania.—"Potatoes are being somewhat injured by the bugs." [Probably the ten-lined spearman, *Doryphora 10-lineata*.]

Mr. Glover must, I think, be in error here. The New Potato Bug cannot have yet reached Pennsylvania, though in eight or ten years' time from now the inhabitants of that State will probably be contemplating, with admiration, its beautiful rose-colored wings and striped wing-cases, as it flies into their potato-fields, looking as innocent as one of these little angels in crinoline.

B. D. W

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He adds, that he noticed the insect upon young corn for the first time in 1866, when they were even more injurious than in 1867; and that he learns, that in 1867 some fields of corn near the Susquehanna River are nearly ruined by them.

It appears from the *Rural New Yorker* of June 29, 1867, that Mr. L. V. Smith, of Geneva, Ontario County, N. Y., had his corn troubled by this same beetle in 1866, and that in 1867 "they have increased to an enormous quantity, particular fields furnishing from six to twelve beetles to each hill." The Editor says, that "Dr. LeConte calls it *Sphenophorus antiquus*," but I know of no species described by any one under that name. Certainly, in 1861 Dr. LeConte was unable to name the species for me.

It may be observed that Geneva, N. Y., lies upon Seneca Lake, and that Tioga County, N. Y. lies upon the north branch of the Susquehanna River, in the immediate vicinity of which river the beetle, according to Mr. Herwell, has been most destructive. These facts seem to confirm the theory advanced above, namely, that the beetle breeds in marshy places in decaying wood, and migrates thence on to the corn. May it not be possible that it is sometimes carted out on to cornfields in swamp muck? It would be interesting to learn, whether fields that have been manured with swamp muck are more largely infested, than those which have not been so treated.

ANSWERS TO CORRESPONDENTS.

Henry K. Smith, Ill.—The large four-winged fly, with a three-fold tail as fine as a horse-hair, of which you send a very good drawing, can be nothing else but a female of *Pempia (rhysa) atrata* Fabr. The long tail is the instrument which it uses for inserting its eggs into the solid wood of a tree; and it was long ago remarked that they often get stuck fast in performing this operation, just as you have yourself observed. You will find a good wood-cut of your insect in *Harris's Inj. Ins.* p. 539; and it is tolerably common everywhere in the Northern States. But instead of, as you surmise, "killing the hickories," which you found them piercing with their ovipositors, they do just the contrary. They are your friends and not your enemies. They are a species of the multifarious group of *Tachinid* flies, and pierce the solid timber in order to reach the larvæ of certain timber-borers, and deposit their eggs in these larvæ. Most usually it is the larva of another large four-winged fly (*Tremex columba*), belonging to a very different Family, which they attack in this manner; and of the perfect fly of this last you will also find a figure in *Harris* (p. 536.) If you had extended your examinations, you would probably have found the larva of this Fly, which belongs to the *Urocera* family in the Order Hymenoptera, at the bottom of the puncture made by the ovipositor of your insect.

Dr. Wm. M. Smith, N. Y.—Judging from the specimens you send, the Red Cedars in your neighborhood have been destroyed, not by any insect, but by a parasitic fungus. Whether or not this fungus is known to Botanists, I am not aware. Perhaps Sulphur dusted upon the trees might be found as effectual in destroying it, as it is in destroying the two distinct funguses on the Grape-vine known as "Mildew" and "Rot." The large tracts of pine-trees, killed years ago in North Carolina, were destroyed by Bark-beetles.

L. D. Morse, Secr. Mo. State Bd. Agric.—The "gray-beetles" which are "doing a great deal of damage to the vineyards near St. Louis, and also at Bluffton, 80 or 90 miles west of St. Louis, eating both leaves and fruit," are the same "Grape-vine Fidia" (*Fidia viticida*) which I illustrated in the May number of this Journal. A single specimen mixed in with the rest belongs to the closely allied species *Fidia longipes*, which is black, instead of chestnut-colored, under its gray hair. It appears, therefore, that both these species depredate on the grape-vine.

A. M. Burns, Ks.—The larva boring the twigs and stems of your Currant bushes is the same Currant Borer (*Aegeria tipuliformis*), which I figured and illustrated in my Article on Borers in the 1st Volume of the *PRACTICAL ENTOMOLOGIST*, p. 29. It produces a moth, not a beetle, and is closely allied to the Peach Borer (*Aegeria crinita*). Like the Apple-moth worm, it is an Imported, and not a Native American species. The insects that are proper-

ly called "currant worms" feed externally on the leaves, not internally on the wood and pith. There are three distinct species of these last, as I showed in my Article on the Gooseberry Sawfly in the last number of Volume I of the *PRACTICAL ENTOMOLOGIST*. One of the three is a Native American species and is a "looper" or "measuring-worm," producing a moth or "miller;" and two produce four-winged Flies (Order Hymenoptera) belonging to the family of the Sawflies (*Tenthredo* family). Of these two, one, as I have shown, is a Native American species, and does comparatively but little damage; the other is an Imported species, which is gradually overspreading the country, and is destined to be as destructive to the Currant and Gooseberry as the Colorado Potato Bug is to the Potato.

L. Mitchell, Ct.—You inquire whether the so-called "Swamp-apple" on the Azalea is a proper fruit, or a gall produced by the sting of an insect. If you will send along specimens, I will tell you what they are; but there are no Azaleas growing in my neighborhood, so far as I am aware, and I do not know what you mean by "Swamp-apples." Because you understand what is meant by a local name, it does not follow that everybody else does.

J. M. K., Iowa.—The insects that, as you say, have destroyed your apple-crop for the last three years, are the same Rascal Leaf-crumpler (*Phycita nebulo*) figured and described by myself many years ago in the *Prairie Farmer*. The little worms inhabiting the horn-like cases, often secured by silken cables among the crumpled leaves of the twigs, change to small moths in July. I know of no remedy but to pick off and destroy the cases, which can be most conveniently done in the winter, when the leaves are off the trees.

M. W. Seaman, Ill.—The specimens found on cherry and apple-trees, some on the trunk and limbs and some in a piece of old cloth hanging in the tree, are the matured larvæ of the Twice-stabbed Ladybird, (*Chilocorus bifulvulus*), enclosing the pupa. You will find a figure both of the larva and of the perfect beetle, in my Article on Plant-lice (*PRACTICAL ENTOMOLOGIST* II, p. 42.) As is there stated, the species preys upon Plant-lice and Bark-lice, and is consequently, not our enemy, but our friend.

C. Faxon, D. C.—The thousand-legged worm that infests the roots of your Strawberry plants, causing the plants to wither away, is not, as you suppose, the *Iulus* which I figured and described in the *PRACTICAL ENTOMOLOGIST*, (II, pp. 34 and 70.) Although it belongs to the same family as *Iulus*, yet it belongs to a very distinct genus (*Polydesmus*), which differs from *Iulus* in the joints of the body being much less numerous (about 20 instead of about 50), and in their being separated from each other by a wide space, instead of fitting closely one to the other, so that the whole body is almost as smooth as a goose-quill. The species sent is the *Polydesmus serratus* of Wood, which I have also received from New York as infesting gardens there. The experience of English gardeners, who have long been troubled with European species of this genus, shows that it does not, as you infer, confine itself to weak and sickly plants, but attacks perfectly vigorous ones, the sickly, withered appearance being the consequence of, and not the allurement to, its depredations. You say that "the least touch of hot water destroys them, without injuring the strawberry plants." This I can readily believe, from the fact that hot water will kill onion-maggots without hurting the young and tender onion-plants.—The cocoon found on your maples is that of the Basket-worm or Bag-worm (*Thyridopteryx ephemeraformis*), which has been repeatedly referred to in these columns.

N. H. B., N. J.—I can see no tokens of the work of insects in the specimens gathered from your cranberry vines; but, as they were not enclosed in any box, but simply folded inside your letter, they reached me dried up to nothing and pressed as flat as a board. Having, as you say, spent already some twelve thousand dollars on your cranberry plantation, you might have invested a few additional cents in postage stamps.

A. Gilbert, Iowa.—The pretty caterpillars, banded with orange and sky-blue, and with a conspicuous white patch on each side of the hind part of the body, are the larvæ of the Eight-spotted Forester (*Alypia octomaculata*)—a very beautiful moth. It is not a very common species in the Northern States, and has always been found where you met with it—feeding on the leaves of the grape-vine.

B. W. McLain, Indiana.—The depressed, oval, white, cottony masses, over $\frac{1}{2}$ inch long, and with a brown scale on one end of them, found on the leaves of the common Maple, are evidently the egg-masses of an undescribed species of Bark-lice, (*Coccus* family, Order Homoptera). The brown scale is the body of the female, as in other Bark-lice. Although the English name of this family is "Bark-lice," and although most of them do really inhabit the bark of various trees, yet many species—for example, one found on the Oleander—inhabit the leaves, as your insect seems to do. Since the above was in type, I have hatched out swarms of young Bark-lice from the specimens sent.

A. Gilbert, Iowa.—The minute oblong-oval white specks, so thickly salted over the bark of your apple-tree, are the larvæ of the Native Bark-lice (*Aspidiotus Harrisii*). You will find them thinly scattered among them a few of the old last year's scales from which they hatched out, and also a few of the Imported Bark-lice (*Asp. conchiformis*). I had prepared materials for an Article on the subject of these Bark-lice and the methods of killing them, but, like many other such Articles, it will now be crowded out of the *PRACTICAL ENTOMOLOGIST*.

M. M. S., Penna.—1st. When an insect, which lives aboveground in the larva state, passes the pupa state underground, it is always the larva that enters the earth and not the pupa. Occasionally such insects transform into the pupa state aboveground among dead leaves, &c., but in that event the pupa never burrows underground. 2nd. Most pupæ that pass that state underground have a peculiar apparatus for forcing their way to the surface, when the pupa-shell splits open in front and the winged insect emerges. Sometimes with this object in view the pupa is furnished with sharp thorns on its front part, sometimes the rings of the abdomen are provided with transverse rows of little thorns directed backwards, and very generally the tail is provided with from one to six stout thorns, by which the pupa gradually pushes itself forward to the light of day. By these means, even when the surface of the earth is baked hard, many pupæ work through it, but under such circumstances many more are retained underground and perish miserably. For these reasons, prudent breeders of insects always take care to keep the earth in their breeding-cages moderately moist.

P. B. Sibley, Mo.—No. 1, from potato vines, is the old-fashioned ash-gray Blister beetle (*Lytta cinerea*), which has infested the potato for time immemorial. (See *PRACTICAL ENTOMOLOGIST* II, p. 36.) No. 2, also from potato-vines, is the larva of the terrible New or Colorado Potato-bug (*Doryphora 10-lineata*), of the perfect beetle form of which, you say that you have found as yet only 5 or 6 specimens. Two years from now you will probably find bushels of them, and see to your cost how destructive they are. No. 3 is the immaculate variety of the Six-dotted Tiger-beetle (*Cicindela 6-guttata*). It occurs exclusively in the woodlands, and its larva, as I believe, lives in rotten logs, preying on the larvæ that bore therein.

E. T. Snelling, N. Y.—The little jumping beetles, infesting a new variety of radish recently imported from England, are nothing but the common Wavy-striped Flea-beetle (*Haltica striolata*), which you will find figured on page 129 of *Harris's Injurious Insects*. This is one of several species of Flea-beetles, that commonly in this country infest young cabbages, radishes, egg-plants, &c., eating little holes in their tender leaves and often the entire leaf. I thought at first you might have imported among us the European Turnip-beetle (*Haltica nemorum*), which very closely resembles your species, and which is such a terrible pest in England to the turnip crop. But on referring to colored figures and descriptions, I find that in that species, the yellow stripe on each wing-case is quite differently shaped, although in other respects the two insects resemble one another almost exactly.

John Edgerton, Iowa.—The olive-green worm, or rather caterpillar, about $1\frac{1}{2}$ inch long, which you found on the roots of Blue-grass, changes to some kind of "Miller" or moth of the group of Owllet-moths (*Noctua* family). I cannot say to what particular species it would change. Indeed but very little is known of the preparatory states of most of our moths. You might have noticed on the right side of the specimen nine little oval yellowish eggs, like so many fly-blows, firmly glued to the skin. These are the eggs of a *Tachina* fly—a group of two-winged flies, many of which resemble Bluebottle flies, House-flies, &c. After

a short time they would have hatched out into whitish maggots, penetrated the vitals of the worm and finally destroyed him, feeding themselves fat upon his substance. They would then have emerged to the light of day in the form of the parent fly that laid the eggs, ready to repeat the same operation upon other larvæ. From Army-worms infested in this manner I have myself bred a *Tachina* fly, and ascertained that, though several eggs are glued to each Army-worm, but a single one lives to be a fly, the others being probably either preyed on or starved out by their overgrown cannibal brother.

Wm. Prichard, Tennessee.—The egg-rings found on your Sugar-maples are apparently those of the common Caterpillar (*Chisocampa americana*), which infests many other forest-trees. What proportion of the eggs will hatch out next spring, depends upon how many egg-parasites have preyed on them.

J. H. Foster, Jr., N. J.—Of the two Click-beetles (*Elatér* family), which you found eating the fruit of your Philadelphia Raspberries, the large brown one is *Melanotus communis*, a very common species, the larva of which I believe to breed in decaying wood; the small red one with black markings is *Monocrepidius vespertinus*, a rather rare species with me, and of the history of which I know nothing. I formerly doubted Dr. Houghton's assertion that his pears were gnawed into by true Click-beetles; but it seems now that he was in all probability right on this point. Certainly there can be no mistake as to Click-beetles eating raspberries; for you say that you saw five specimens of the smaller Click-beetles on one raspberry, into which they had eaten their way for nearly half the length of their bodies.

J. J. Kelly, Missouri.—The boring-beetle, which you found imbedded in the solid wood in the but of a Pear-tree, is the common *Buprestis* borer (*Chrysobothris femorata*), of which I gave a figure and an account in the 1st Volume of the *PRACTICAL ENTOMOLOGIST*, (pp. 26—27). As you will find it stated there, this insect is a very general feeder, infesting not only the Apple-tree, but the Oak, the Maple, and a variety of other Forest trees. It has not, however, been as yet recorded as infesting the Pear-tree. The specimen reached me alive and in excellent order. It was not at all necessary to give him any ventilation. He would have lived for a week or more, corked up tightly in a small vial.

V. T. Chambers, Ky.—I must refer you on the subject of the three Hickory galls, made by a genus of Plant-lice that has been currently called *Phylloxera*, to a Paper of mine which has just been published in the *Proceedings*, (Vol. VI, pp. 275—6 and p. 282, note). I have long been acquainted with the winged insects of all these three galls. The subject is too dry for a popular Journal.

Wm. Kita, Penna.—The gall on the flower-catkin of the Chestnut is exceedingly interesting and hitherto new to science. It is produced by a minute Plant-lice, which, so far as can be discovered from the pressed and distorted specimens enclosed in your letter, belongs to a genus which has been called *Phylloxera*. You would have conferred an additional favor if you had thought to enclose the specimen, with the accompanying flies, in some small paste-board box. Instead of any of the flies reaching me alive, as you hoped, they were all dead and squashed—alas!—as flat as a board.

B. F. Lazear, Missouri.—The large clay-yellow beetle with six black spots on his wing-cases, is *Pelidnota punctata*—a species which has long been known to feed in the perfect state on the foliage of grape-vines. The larva breeds in very rotten wood. The small shining black Bugs, about the size and shape of a radish seed, are the *Corimelana pulicaria* of Germar, and belong to the *Scuteller* family in the Order of True Bugs (Heteroptera). I have often noticed them swarming on flowers, &c., and I believe that they subsist on the juices of the plants that they inhabit. Almost all the True Bugs, except certain exclusively cannibal genera, emit when disturbed the nauseous odor of the Bed-bug, from two large openings on the lower side of their bodies. This is a defensive weapon with which Nature has provided them; and we see, or rather smell, the same thing in the common Skunk. The fact of their swarming in such numbers on your raspberries, as to render the whole crop offensive both to the smell and the taste and absolutely worthless, is new and very remarkable.

J. H. Parsons, N. Y.—The Striped Cucumber-bug (*Diabrotica vittata*, figured PRACTICAL ENTOMOLOGIST I, p. 110,) was ascertained, by Dr. Shimer of Illinois, to reside in the larva state inside the stems and roots of the vines or other plants that it infests. The writer in the *Agriculturist*, in saying that the eggs of the "Squash-bug" are found upon the leaves of the vines, is probably speaking, not of this insect, but of the Northern Ladybird, (*Epiclathra borealis*, figured with its larva, PRACTICAL ENTOMOLOGIST II, p. 42;) for he distinctly states that the larva is "hairy." The insect (*Coreus tristis*, figured Harris *Inj. Ins.* p. 194,) which is properly called "Squash-bug" is evidently the one which the same writer subsequently refers to as "a large black bug near the roots of the plants." Thus we see that three distinct insects—two of them Beetles and one of them a True Bug—are all popularly confounded under the common name of "Squash-bug." In the same manner there are, as I have shown in the PRACTICAL ENTOMOLOGIST (Vol. I, No. 12,) three distinct larvae—two of them producing four-winged flies, and one of them, which is a "measuring-worm" or "looper," producing a moth—which all feed on the Gooseberry and Currant, and are all popularly confounded under the name of "Currant-worm." The general reader usually considers scientific names as a nuisance; but there can be no greater nuisance than a popular name which means anything or everything.

Dr. Chas. Carpenter, Ohio.—The minute and almost microscopic creatures, which you have ascertained to cause "inflamed itching blotches in the summer on the persons of children and to some extent adults," are, not true Insects but Mites, belonging to the same Class (*Arachnida*) as Spiders, Ticks, the Mite that causes the common Itch, the Cheese-mite, &c. The mites which you find "in abundance on grass, currant-bushes, strawberry-vines, &c.," are, I suspect, different from the specimens sent. I am acquainted with whole hosts of species found on plants, some of them causing curious galls and deformations and some apparently living at large; but none of them are identical with those which you send, although there is often a strong general resemblance. A minute red species closely allied to yours (*Leptus autumnalis*) is known in Europe as the "harvest-bug," and is said to bury itself in the flesh, producing tumors and intolerable itching, in the time of harvest.

G. S., Mass.—The small black Flea-beetles, swarming on your potato and tomato vines and eating numerous little holes in the leaves, are the *Haltica cucumeris* of Harris—a very common species. They have long been known to work in this manner. The single larva found on potato vines is that of a Ladybird (*Coccinella* family); protect and encourage him, for he is your friend. We are too crowded for space now in the PRACTICAL ENTOMOLOGIST to give an account of the habits, &c., of the woollen-moth.

M. H. Boye, Penna.—The disease of your grape-vines does not appear to be the work of insects; at least there are no signs of the operations of insects in the specimens sent. Of the insects sent, No. 1 is, as you suppose, the common "Curculio" (*Conotrachelus nenuphar*). No. 2, from Peach, is my *Conotrachelus crataegi*, found in swarms on the Thorn everywhere in Illinois. If this Snout-beetle habitually infests the Peach also, it is a new fact. No. 3 is one of the Click-beetles, (*Melanotus communis*), and burrows into fruit, such as raspberries, &c., in the perfect state. The larva feeds on rotten wood. No. 4 is not a Beetle, but a Sawfly, (*Tenthredo* family, Order Hymenoptera). It is the two sexes of *Dolerus arvensis* of Say, who however describes the female only. The male, according to the general law which I have established among the Sawflies, is much darker colored than the female, lacking altogether her red markings. Many species of these Sawflies that come out early in the year haunt, as does this species, the flowers of fruit-bearing trees; but I do not believe them to be injurious. They may possibly even be beneficial, by carrying pollen from flower to flower, like the Bees, Wasps, &c. No. 5.—The small Flea-beetle is *Haltica helvinae*, and varies prodigiously in color, specimens occurring that are blue, violet, green and metallic-brown. The larger beetle is, not a *Haltica*, but a *Bruchus*, belonging to a family of the Snout-beetles, and is nothing but our old friend the common Pea-bug, (*Bruchus pisi*). No. 6 contains three species. The broad one with flattened antennae is *Lucidota atra*; of the other two the one with immaculate elytra is *Podabrus rugosus*,

the one with elytra edged with yellow is *Podabrus modestus*. All three reside under bark in the larva state, feeding on bark-eating and wood-eating larvae; and in the perfect state also feed, to a limited extent, on other insects. The large clay-yellow beetle with 6 black spots, feeding exclusively on grape leaves, is *Pelidnota punctata*, notorious everywhere for the above habit; the other is one of the Capricorn Beetles, (*Desmocerus palliatus*), and its larva is said to bore the common Elder.—All the specimens reached me in first-rate order.

Huron Bart, Missouri.—The scorpion or lizard-shaped soft-looking insect, that preys on the eggs of the Colorado Potato Bug, is probably the larva of a Ladybird (*Coccinella* family). The green blow-flies, that haunted the currant-bushes infested by Plant-lice, were attracted there by the "honey-dew" exuded by the Plant-lice. (See my recent Paper on this subject, PRACTICAL ENTOMOLOGIST II, p. 39.) "The insect with a dark body, its back and sides covered with a white woolly substance," that preys on plant-lice, must be the larva of a *Scymnus*, (*ibid.* p. 42). The insect that for three or four years has ruined your honeysuckle by devouring the blossom-buds in the night, is most probably some one of the numerous kinds of Cutworms that are now ascertained to mount trees for this purpose. Mr. Townley, of Wisconsin, found his honeysuckles to be infested by them in the same manner. "The large, stinking vine-bug, with the odor of the Chinch Bug," is, I suppose, the common Squash-bug, (*Coreus tristis*), figured in page 194 of Harris's book. The other insects you mention I cannot identify from your descriptions.

Wm. C. Fish, Mass.—Of the two kinds of Hickory galls produced by Plant-lice, the small, roundish one on the leaflet, which opens with a slit below, is *Caryeglobuli* Walsh; the large roundish one on the footstalk of the leaf, which opens above usually in a cross, (X) is *Caryocaulis* Fitch. The Beetles sent are *Serica iricolor* Say, *S. trociformis* Burm., (var. with rufous elytra), *Agrius gravis* Lec., *Brachys obtata* Web. and *Cardiophorus gagates* Er. The Bug belongs to the *Scutellera* family and to Amyot and Serville's genus *Vulsira* and is very common here on oaks. I do not know whether it is described or not; but it is not among the species described by Say.—The Cranberry galls reached me in excellent order.

Thos. E. Hoge, Westtown B. S. Pa.—I can tell you nothing about the streak of thousands of small legless white worms, which you saw migrating over the sand and crawling over one another's backs as they traveled, except that they are the larvae of some kind of Two-winged Fly. The specimens sent, having been simply wrapped in paper and enclosed in your letter, reached me dead and in very poor condition. If you had enclosed them in a tight tin box, along with some moist earth, they would probably have reached me alive and in good order, and I could then have told you more about them.

Jas. Barratt, Mass.—The monstrous yellow Butterfly that you saw in the woods the last of June; could have been nothing else but the large yellow Swallow-tail, (*Papilio Turnus*). Some of the females of this species are truly gigantic. You will find this insect figured in Harris's book, p. 268. The Rose-bug, (*Macrodactylus subspinosus*), which as you say is swarming with you this year and doing a great deal of damage, does really, as you suppose, come out of the ground. Its larva lives upon the roots of plants, and changes into the perfect beetle underground.

D. W. Kaufman, Pres. Iowa State Hort. Soc.—The black blister-beetles that are infesting your potato-vines this year, near Des Moines, Iowa, are, as I have been informed by Mr. Ulke, the *Lytta (macrobasis) murina* of LeConte—a species not hitherto observed to infest the Potato. They strongly resemble at first sight the common Black Blister-beetle, *Lytta (epicauta) atrata*, which is said by Harris to infest potatoes in Massachusetts, but may be distinguished by the long second joint of the antennae characteristic of the genus *Macrobasis*, and especially of the males, and also by having four raised lines placed lengthways on each wing-case. This last *atrata* neither myself nor Mr. Ulke have ever known to infest potatoes, and we only meet with it in the autumn on flowers, and chiefly on those of the Golden-rod (*Solidago*). May it not be possible that, in some cases at all events, the former species has been mistaken for the latter? The specimens reached me all alive and in excellent order.

J. Y. Smith, Wis.—From your description, your worms seem to have been similar to those seen by Mr. Hoge; (see above); but as you do not even send dead and dried up specimens, I cannot be certain.

S. R. Williams, Kentucky.—Your statement that "towards the end of June, 1867, you have destroyed several nests of the Tent-caterpillar (*Chistocampa americana*) on your pear-trees," and that "two or three summers ago you had your pear crop greatly injured by them," is very interesting. On pear-trees, however, the occurrence of this insect is certainly rare and exceptional. As to your finding the Tent-caterpillar of the Forest (*Cl. sylvatica*) only on Black Walnut (*Juglans nigra*), see my Article on "The three so-called Army-worms."

A. H. Mills, Vt.—The larvae now infesting your currant-bushes are the terrible Imported Gooseberry Sawfly, (*Nematodes ventricosus*), respecting which see my Paper in the last number of the first Volume of the PRACTICAL ENTOMOLOGIST. "The common yellow worm with black dots," that formerly infested your Currant leaves, was probably the common Spanish of the Currant (*Ellopija ribesaria*); and the "very small green one" was perhaps my Native Gooseberry Sawfly (*Eristiphora grossulariae*), an account of which you will find in the paper referred to above.

Dr. Wm. Maus, Ill.—The new enemy of the Colorado Potato Bug, which you saw "destroying the larva, and so intent on its prey as to retain its hold even when you gathered the leaf on which it stood," is, I believe, the *Lebia grandis* of Hentz. This beetle is one of the vast group of Ground Beetles (*Carabus* family), almost all of which are cannibals; but the genus to which it belongs, unlike most of the other Ground-beetles, haunts plants and is active by day, instead of living on the ground and being nocturnal in its habits. That others as well as yourself may recognize this species, I may here state that it is $\frac{1}{2}$ inch long, with the head and thorax red and the wing-cases bright blue. The larger olive-green insect, about $\frac{1}{4}$ inch long, that preyed on the larva of the Potato Bug last year, is a True Bug (Order Heteroptera) belonging to the genus *Rhaphigaster* in the *Scutellera* family. It is a very common species, and I have noticed it transfixing with its beak a wild bee $\frac{1}{2}$ inch long appertaining to the genus *Andrena*; so that it seems to be rather a general feeder. This species, so far as I am aware, is undescribed. Other observers have noticed Bugs, belonging to this same family and probably to the same species, destroying the larvae of the Potato Bug. Like all the rest of the *Scutellera* family, it emits when disturbed the peculiar odor of the Bed-bug and the Chinch-bug.—The leaf that you send bears on its surface the eggs of a Golden-eyed Fly (*Chrysopa*). You will find a figure of these eggs in my Article on Plant-lice. (PRACTICAL ENTOMOLOGIST II, p. 42.)—The Ladybird that your friend found among the Plant-lice on his Cherry-tree, is the Fifteen-dotted Ladybird (*Myzia 15-punctata*)—one of the few species found promiscuously in Europe and America.

Fred. Blanchard, Mass.—I cannot identify the large *Prionus* found in wool waste. It is most probably, as you suggest, an exotic species.

Tipton & Mellott, Ohio.—See Answers to M. S. Hill, in PRACTICAL ENTOMOLOGIST, Vol. I, p. 46. and to Thos. C. Wright, Vol. II, p. 8.

The Colorado Potato Bug.

I find the following in the Monthly Report of the Agricultural Bureau for September, 1866, p. 344:

Indiana County, Pennsylvania.—"Potatoes are being somewhat injured by the bugs." [Probably the ten-lined spearman, *Doryphora 10-lineata*.]

Mr. Glover must, I think, be in error here. The New Potato Bug cannot have yet reached Pennsylvania, though in eight or ten years' time from now the inhabitants of that State will probably be contemplating, with admiration, its beautiful rose-colored wings and striped wing-cases, as it flies into their potato-fields, looking as innocent as one of these little angels in crinoline. B. D. W.

PUBLISHER'S NOTICE.

This number, or rather two numbers in one, closes the second and last volume of the PRACTICAL ENTOMOLOGIST. The reason of its discontinuance has already been given on page 104. At some future time, when there is enough interest taken by the Agricultural Community in the subject of Economic Entomology, to warrant the support of a journal of this kind, the publication of the Paper may be resumed.

Our thanks are due to many kind gentlemen for their valuable aid; but especially to BENJ. D. WALSH for the faithful and handsome manner in which he has filled the Editorial Chair—a task which, we believe, could not have been so well performed by any other individual in America.

To the Agricultural Press in general, our thanks are also due for the many liberal notices given of our little Paper. Not having the money to advertise extensively in papers of large circulation, the existence of the PRACTICAL ENTOMOLOGIST has been made known almost entirely through the liberality of the Agricultural Press.

In the publication of the two volumes of the PRACTICAL ENTOMOLOGIST, the expenses have considerably exceeded the receipts; and in order to balance the accounts as nearly as possible, we shall have copies of Vols. I and II neatly bound together in one volume, with full index, &c., which we shall offer at the low price of \$2.25; or unbound for \$1.25. We hope that our friends will do all they can to induce their neighbors to send for a copy of this work—which should be in the possession of every Cultivator of the Soil—and thereby help us to pay ourselves back at least a portion of what we have lost in its publication.

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