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The Practical Entomologist.

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PHILADELPHIA, MAY 28, 1866.

☞ We have been repeatedly urged by numerous subscribers to give a series of lessons on Entomology, for the instruction and accommodation of those who have not the means and opportunity of procuring the necessary works on the subject. By special request, Dr. A. S. Packard, Jr., of Maine—a thorough student of Entomology—has kindly undertaken the task, and gives his first lesson in this number, illustrated with two outline drawings, which will assist the reader in the study of this beautiful and fascinating science. The phraseology of the articles will doubtless appear too scientific for most of our readers, but it should be remembered that there is no art, profession or trade, which can be taught or learned without the use of technical words or phrases belonging to each, and which, to the inexperienced and untaught, are as unintelligible as the terms of science.

It is hoped that these lessons will receive the careful attention they most certainly deserve, and when the series is finished, the reader will, no doubt, have an elaborate insight into the principles of entomological science.

The advantages of studying Entomology.

Köllar, speaking on the advantages of studying Entomology to the Agriculturist and Forester, and on the method of doing so, says in the introduction to his excellent *Treatise*:—

The intimate connection in which insects stand to man, to domestic animals, and to the different kinds of vegetable productions, makes them well worthy the consideration of every one, and particularly of the agriculturist and the forester. Although insects are small and inconsiderable, the exceedingly great number of species, and the still greater number of individuals in many of them, fully compensate for their want of corporeal magnitude. The amount of the species of plants, and all the classes of other animals taken together, cannot (according to the latest estimates) equal in amount the species of insects, as we reckon about 300,000 species. If we consider the fecundity of many kinds of insects, which sometimes produce an offspring of several hundreds, or even thousands, (the females of the termites, or white ant, producing an offspring of 40,000,) and also that some kinds produce several generations in one year, it appears evident that the number of insects can hardly be estimated. As a proof of this, which perhaps to many may appear too bold an assertion, we need only to mention the enormous swarms of locusts [grasshoppers], which are sometimes so numerous, and in such masses, that they darken the sun, and when they alight, they frequently cover several square miles of land; also the *Rhagio columbaschensis* Fabr., a minute dipterous insect, but a fearful plague in many parts of the bannat of Temeswar [in Southern Hungary, Europe], and which, when congregated in the air, resemble dark clouds, although each individual is not more than two lines [one-sixth of an inch] long. Who could even reckon the myriads of gnats or midges, which in many years, like pillars of smoke, ascend in the air? Or who could succeed in ascertaining the number of inhabitants in an ant-hill? All these myriads derive their nourishment either from plants or animals, in their living state, or from their remains when dead; and there are even some

to which man himself must pay tribute with his blood.

"From such considerations are we not" (says Schrank, the worthy Bavarian naturalist,) "alarmed for our forests, gardens, and groves? Do not these innumerable millions of insects which incessantly labour at their destruction, confuse our understanding when we begin to reckon them, and terrify our imagination which magnifies them? And can I be believed if I assert, that I discover beneficence in such unspeakable destruction, beauty in these devastations, wisdom in this disorder, and life in this manifold death? Nevertheless it is so. Whatever many may say of nature growing old, the naturalist finds her always young and beautiful, always estimable, just as she came from the hand of her Creator, and as she indeed every moment issues afresh from the hand of the Almighty Being. In His hand the youth of nature is continually renewed; and under His all-ruling providence, all the millions of apparently destructive beings only labour in preserving her existence and embellishment.

"Let us here contemplate the whole economy of nature at a general glance, in respect to forests only; and let us view her as she is, without the aid of man, who often disturbs her general arrangement.

"Insects that feed on wood are not injurious to ligneous plants, except from their disproportionate numbers; and these numbers, when left to bountiful nature herself, are never disproportionate: two assertions which, however paradoxical they may seem at first sight, are yet admitted by the naturalist, who has proofs of them daily before his eyes, as principles, but which I must here demonstrate, because many persons who are engaged in studying the works of nature, either as professional men or as amateurs, are not naturalists.

"In a work on the Fruitfulness of Plants [also written by Schrank] it is stated that an elm twelve years old in one single year produces 164,500 seeds; which, in the course of another twelve years, (if no accident happened) would become as large trees as their parent: and from this calculation it appears that a succession of much more than 26,960 millions of trees might be obtained from one.

"This calculation is made from the fruit only, and not from the blossom of any tree, and is, therefore, applicable to all other trees. A single species of tree, such as we have them in one of our provinces the most scantily clothed with trees, would, during the life of man, cover a large extent of land with a thick forest, and after a few centuries it would appear as if the whole world had been made for it only—as if it alone would cover the whole extent of dry land.

"The great multiplicity of organized beings which makes the world as it is at present so beautiful, would then have disappeared; symmetry, which gives a charm to this multiplicity, and which delights the contemplator of nature in exalted enthusiasm, would have vanished; soon would all animal life in the habitable world be destroyed; a great number of birds which live only on insects which eat wood, we have already annihilated, by our presupposition that these insects do not exist; the thick impenetrable forest, which the kind of tree mentioned would cover, would soon supplant every blade of grass, kill every insect intended to live upon it, every bird to which these insects were intended as food, destroy all animals living upon grass that could not reach the tops of the high forest trees, and finally kill every beast of prey, which could not at last even find a carcase to satisfy its ravenous hunger..

"This is but too faint a picture of our earth, which, without the insects that live on wood, would be but too true. A wise hand has scattered them everywhere, and given to each kind its particular instinct, its peculiar economy, and great fecundity. With them, order and life are restored to universal nature. On their side, pursued by powerful, or weak, but not less numerous enemies, they unceasingly follow the given commands of Providence.

"The proportion which exists between their increase and the occasion for it, and their enemies, secures nature from the devastations which they would occasion, and restores all to the most admirable equality.

"A forest of firs more than a hundred years old, has already nearly terminated its appointed existence. A host of caterpillars first takes possession of the branches, and consumes the foliage. A superfluity of sap, (the circulation of which is rendered languid by the failing strength of the tree), an unnatural increase of the nourishing juices between the bark and the wood, and the separation of these parts, are the consequences.

"Another host of insects now appears; they bore through the rind into the inner bark, which they eat, and pierce through; or into the wood, which they pierce and destroy. The diseased trees are now nearly dead; the numerous destructive insects increase with the sickness which attracted them there; each tree dies of a thousand wounds, which it receives externally, and from the enervation which follows in consequence. The dissolution is accomplished by a third host of, for the most part, smaller insects, but still more numerous; and these are continually employed in reducing the decayed trunks to dust as soon as possible, while at the same time a thicker forest of young trees, and generally of a different kind, spring out of the earth, which had afforded nourishment to the dead tree. The first host certainly occasioned the deathly sickness of the forest; the second accelerated its death; and the third accomplished its total destruction. It need not be lamented. These trees would have died a few years later, without any utility resulting from their death. Their leafless stems would probably have remained there for half a century awaiting their destruction, of no use where they stood, and serving no purpose but as a fearful trophy of death in the field of life. They must die, because they are organic matter. But we only destroy a worn-out vessel, that a better may take its place, but are not able to make anything better out of it. It is not so with nature. Millions of sensitive beings

find a use in the remains of these dying trees, and under every step of near and approaching death, thousands spring forth endowed with vitality.

"Each host of these insects are again exposed to destroyers, which put a check to their too great extension. Other insects, and a great number of birds, clear away the caterpillars while they are feeding on the leaves, and when they have undergone their change, and are lying in the earth, the wild boar comes and stirs them out from their place of rest with his tusks, and devours them with the greatest eagerness. Those insects which conceal themselves in the inner bark or wood do not share a better fate. The woodpecker knows where to find them, and draws them out of the deepest holes. When they appear on the bark in the perfect state, they have the bitterest enemies in the fly-catcher, the tree-creeper, and all kinds of magpies. Whole hosts of these birds are found where these insects abound in multitudes; but they leave the place and disperse themselves as soon as the superfluity of nourishment is exhausted. In this state all nature is on a perfect equality; but man comes, and destroys the order—he annihilates the harmony of nature, and is astonished at the discordance. First, he sacrifices the wild boar to gratify his palate; takes possession of the wood, and, according to the usual fallacy of taking the consequences for the cause, considers the woodpecker his enemy, and finally, under various pretences, wages war with all the birds of the forest. Insects appear to him too contemptible for his pursuit, too small, too numerous, and too well concealed, to reward him directly for the trouble of endeavouring to extirpate them. They may, therefore, go on with their occupations undisturbed, and if they carry them too far, he then complains of Providence.

"After having wrested the lordship of the woods from the animals, we should pursue with wisdom the economy which heretofore the animals, from a blind impulse of nature, had practised. We should anticipate nature in her operations, and cut down trees that approach weak old age, or those that are checked in their growth by a stronger tree standing near them, or those that have been killed by lightning; and the teeth of the boar which prepared the earth for the seeds, should be replaced by the pick-axe, and our tame pigs ought to be employed in digging up the earth-grubs, which the boar was accustomed to do. We only are to blame if our finest forests are destroyed," &c. Such are the expressions of a practical naturalist on insects which are injurious to forests A similar picture may be formed of those which attack fruit-trees, field fruits of all kinds, and even our domestic animals.

The result of such contemplations will be, that we can only protect ourselves from the injurious influence of insects by an ample knowledge of the reciprocal relation in which one stands to another, and in order to obtain this, it is essentially necessary to acquire a knowledge of those kinds which are directly or indirectly injurious to man, their different stages of life, their nourishment, propagation, duration, and finally their natural enemies.

Popular remedies for Noxious Insects.

BY BENJ. D. WALSH, M. A.

We can scarcely take up an Agricultural Journal, without finding one or more prescriptions against the depredations of Noxious Insects, from the pen of some correspondent. If only a tenth part of these are what they generally profess to be—undoubted and reliable specifics against the particular Insect that they are intended to combat—it is strange that Agriculturists should be complaining more and more every day of the losses that they sustain from Noxious Insects. The remedies are in print, vouched for as infallible by A. B. or X. Y. Z. Why don't they apply them?

The real truth, however, is that many of these so-called remedies are demonstrably worthless—many are founded upon a very insufficient number of observations, and may or may not be more or less partially successful—and only a few of them are of any real value. Human testimony, I am sorry to say, is, as a general rule, to be received with very great caution. It is not that these writers lie wilfully and deliberately, but that they jump to conclusions without fully investigating the subject, and having once formed an opinion in their own minds, support it enthusiastically through thick and thin. Just in the same way, if we believed all the testimony that we see printed in every newspaper that we take up, we should come to the conclusion that for every disease of the human body there was an infallible remedy. Yet the physicians are as busy as they used to be—the sick obstinately persist in dying, in spite of the Golden Drops or the Specific Elixir—and the Undertaker and the Probate Court find their hands as full as ever.

More than a century ago the practice of Inoculation was introduced into Norway in Europe in order to check the Small Pox, and about the same time, from some unknown cause, the fish suddenly disappeared along the entire coast of Norway. All at once a great outcry was raised against Inoculation. It was a ruinous practice, said the Norwegians; it was killing off the fish, which were their chief means of support. Better that a few men should die of Small Pox, than that they should all die of starvation. The reader smiles, perhaps. But these simple people only made the same mistake that is so often made in more modern times—confounding the *post quod* with the *propter quod*, the After with the Because. Again, some centuries ago, the Goodwin Sands on the South-eastern Coast of England had enlarged so much as to be very destructive to shipping, and government sent a commission to the spot to enquire into the cause and the remedy for the evil. Several rustics were examined without arriving at any definite conclusion, till at last a grey-headed old man gave it as his decided opinion, that if they wished to get rid of the Goodwin Sands they must pull down Tenterden Church Steeple. "When that steeple," he argued, "was first commenced, the sands began to accumulate; as it progressed, they got worse and worse; and now that it is finished, they are a terror to all

the sailors." We laugh at such reasoning; for here again we see that the After is confounded with the Because. But many an American farmer often argues just as illogically. A certain insect is afflicting one of his crops. Forthwith he scatters lime, or ashes, or road-dust over it. The insect in the course of a week or so disappears, probably because the natural time had arrived for it to go under ground to pass into the pupa state. And then, *hey presto!* we have lime, or ashes, or road-dust recommended in print as an infallible remedy against the attacks of this particular insect.

Another most fertile source of error is the founding general rules upon a very insufficient number of experiments, just as the Quack Doctor, having given a certain dose of Calomel on the same day to a shoemaker and to a tailor, and having found that the shoemaker was badly salivated and that the tailor's gums were not at all affected, jumped to the conclusion that mercury always salivated shoemakers but had no influence whatever upon the constitutions of tailors Take, for example, the well known Fire Blight on Pear Trees, which attacks particular trees in particular orchards, apparently in the most capricious manner. Some years ago a letter was published from a correspondent of the *Rural New Yorker*, strongly recommending a remedy which he had found effectual on his own trees. In such a case as this, it ought to have been shown that out of a hundred trees, to which the remedy had been applied, none or next to none had been affected by Fire Blight, and that out of a hundred other trees in the same orchard, which had been left untouched, a considerable percentage had been blighted. No such facts, however, were shown in the letter. All that appeared was, that a few trees to which the remedy was applied were not blighted; and even of these, one, if my memory serves me, was said to have been partially blighted. But the remedy itself was so absurd, that it is difficult to see how any sane man could be deluded into trying it. We were to bore an inch augur hole into the trunk of the tree, fill it with ten-penny nails and sulphur, and then plug it up; the theory being, as the learned writer assured us, that the iron of the nails combined with the sulphur and formed Sulphate of Iron, and that this Sulphate of Iron was received into the circulation of the tree and cured the Blight. Unfortunately, however, for the theorist, every chemist knows that Sulphur and Iron will not, when mixed together, produce Sulphate of Iron, any more than Sulphur and Lime, when mixed together, will produce Sulphate of Lime or common Gypsum. Besides, if Sulphate of Iron is a real remedy for Fire Blight, why not purchase it ready-made at the Druggists, and apply it in the form of a poultice or cataplasm to the external surface of the tree, so as to do away with the necessity for that objectionable one-inch augur hole? Talk of borers indeed. Why a single one of these gigantic iron-tailed borers would ruin a small-sized pear-tree, and the remedy would be worse than the disease.

As regards the fallibility of human testimony, I may say that I have more than once tested by actual experiment the assertions of men, whom I considered perfectly trustworthy, and who I know would not intentionally deceive, and found those assertions to be utterly unsupported by facts. For example, I was once told by a fruit-grower, that he had killed all the plant-lice on his trees by making a dense smoke round them with burning tar on a still evening. I received particular directions how to go to work. I followed those directions in the minutest particulars. And the result was that the plant-lice on a particular bough, which had been enveloped in the densest smoke of all and for the longest time of all, were alive and kicking the next day. Do I therefore believe that my friend, the fruit-grower, lied? Not at all. But plant-lice often suddenly disappear in a few days or a week from the action of the numerous parasitic and cannibal insects that attack them His plant-lice were probably about to disappear in this manner, at the time that he smoked them, and mine were not. And hence we can easily explain why the two experiments resulted so very differently.

By way of practical comment upon the foregoing remarks, I subjoin several prescriptions against Noxious Insects, which have been taken at random from various recent publications, with a few observations upon each:

To Cure Wormy Trees.—The following recipe is published in the New York *Evening Post:*

With a large gimlet or augur bore into the body of the tree, just below where the limbs start, in three places, a groove inclining downwards. With a small funnel pour a shilling's worth of quicksilver into each groove. Peg it up closely and watch the result. Had it been done when the sap first started on its upward circuit it would have been more efficacious—yet, even now, it will greatly abate the nuisance.

The plan was first tried for a wormy apple tree by Samuel Jones, Esq., of Canaan, Columbia Co., N. Y., and with entire success. It is believed, that, far from damaging the trees, it will even add to the beauty of the foliage. In the case of the fruit-tree above mentioned the cure was surprising, not only the fruit becoming perfect and beautiful, but the very leaf seemed to grow larger and far more dark and glossy.

What is a "wormy tree?" Does the writer mean a tree afflicted by borers? Or a tree afflicted by the common "caterpillar," or by some other of the numerous "worms" or lepidopterous larvæ that infest the foliage of the apple? Or a tree the fruit of which is infested by the "apple-worm" which is the larva of the Codling-moth? Before one takes Patent Medicine, one usually likes to know what disease it is intended to cure. As to any effect that crude quicksilver would or could have upon the constitution of a tree, we know that it may be introduced into the human bowels in very large doses without affecting the system; while comparatively very minute doses of such chemical preparations of mercury as Calomel or Corrosive Sublimate produce disastrous results Hence it is reasonable to infer that crude mercury, when introduced into the trunk of a tree, would be perfectly inert, just as a leaden bullet fired into the trunk of a tree produces nothing but mechanical injury, while the same weight of white lead would probably be highly destructive to vegetable life On the other hand no reasonable man can doubt, that it must injure a tree more or

less to bore augur holes into it, especially when they slope downwards, so as to become a receptacle for rain water.

Remedy for the Currant Worm.—H. Stanton, Jr., of Syracuse, N. Y., under date of May 24th, sends the *Rural New Yorker* the following:—"We have recently made an important discovery here, which we wish to make public for the benefit of everybody in general, and their currant bushes in particular. The ravages of the terrible *currant worm* can be completely stopped, and the enemy destroyed by the simple application of *road dust*. We tried it last year with perfect success, and the same this year so far. Gather the dust when it is dry and fine, and keep it for future use. As soon and as often as the worm makes an attack sprinkle it on and throw it up under the leaves so that it will adhere to both sides. The best time is when the dew is on in the morning. Remember, *road dust* from the street or highway. Try it."

I believe that there is only one noxious insect, that can be successfully combated by lime or ashes or road-dust or any such matter, viz: the Slug-worm of the Pear. The reason is that this larva is covered by a slimy secretion, to which the lime or ashes adheres indissolubly and finally destroys it. All other insects, that commonly infest the Field, the Orchard or the Garden, have the faculty of cleansing themselves from any such extraneous matter, and are far too wise to take it into their mouths along with the food on which they subsist. Watch, for example, a common house-fly after it has daubed itself with molasses or any such substance, and you will see it cleanse one leg with another, as deftly as any Christian could do, and wipe its head and its wings with its legs. In all probability the writer of the above made his experiment shortly before the "currant-worm" was about to go under ground to assume the pupa state, and was thus deceived into supposing that his enemy was "destroyed."

Scotch Snuff put in the holes where crickets come out will destroy them.

This is probably extracted from some English publication. In England House-crickets are very common and frequent the backs and jambs of fire-places, ovens, &c.; but in this country they are rare, and, so far as I know, occur only in Southern Illinois, and according to Mr. Uhler, in Maryland. Harris, evidently referring only to the New England States with which he was best acquainted, says that they are unknown in the United States. The common white tree-cricket (*Œcanthus niveus*) sometimes indeed flies into our houses by accident in the Northern States, and annoys us by night by its chirruping; but the ordinary domicile of that insect is on trees and weeds.

To Prevent Weevil in Wheat.—F. J. Robinson, of Lexington, Georgia, writing June 10th to the *Southern Cultivator*, says:

"I send you the following 'Recipe for the Prevention of Weevil in Wheat,' which was given to me by my friend and neighbor, Major C. G. Hargroves, of this county, who, after many years experience, informs me that he has found his wheat to keep to his entire satisfaction: and has thus been enabled to secure, at all times, good flour for his own use, in cases where his succeeding crop was poor, by holding over *old* wheat. You will perceive that the remedy is a very simple one, and the expense next to nothing. Here is the recipe:

After thoroughly sunning your wheat—and sunning also your boxes or hogsheads—and, previous to taking up the wheat, prepare a small fire of cobs or trash, and when it is ablaze, put on it a small quantity of *sulphur*, and fumigate each box or tub well. Then, while the wheat is hot, and the receptacles for it also hot, put your wheat away, and rest satisfied that when you draw upon your bank of breadstuff, you will find your draft honored with 'wheat as is wheat.' Insects are not partial, you well know, to sulphur and its fumes, and hence the success of the physic."

I doubt very much whether the fumes of the sulphur would not entirely evaporate in a short time. Ladies straw bonnets are bleached with sulphur, and yet they have no perceptible sulphureous smell. The burning sulphur would likely enough, if applied for a sufficiently long time, destroy any weevils that were lurking in the crevices of the boxes or hogsheads, but it would not prevent, in my opinion, weevils bred in other localities from infecting the stored wheat.

Weevil in Barns.—I have been troubled with weevil, more or less, for fifteen years, in my grain bins, and have tried every remedy I could hear of—lime, whitewash, elderberries, &c.—but all to no purpose; so I determined to try something else. In July, 1864, my barn being empty of grain, &c., but occupied by millions of weevils, I took a bucket full of salt and sowed it in the barn as a farmer would sow grain, broadcast, about the granaries, mows, and every nook and corner which had had grain in. Ever since threshing time last year I have had grain in the barn, and not one weevil to be seen.—*Corres. Ohio Farmer.*

I am very skeptical as to the salt-cure, as well as the sulphur-cure. In both cases, perhaps, the After has been confounded with the Because.

Elder Leaves and Insects.—The leaves of the elder if strewn among corn or other grain when it is put into the bin, will effectually preserve it from the ravages of the weevil.—The juice will also kill bed-bugs and maggots. —*Exchange.*

Here we have another prescription—elder leaves —to head off the Weevil. The preceding writer says that he tried elderberries to no purpose. I should judge that the berries would, if anything, be more effectual than the leaves; but I much doubt if either would have any perceptible effect. As to the assertion that "insects never touch elder bushes," that is certainly incorrect. The flowers are haunted by a variety of flies and bees, and a large and well-known Boring Beetle (*Desmocerus palliatus*) inhabits the stems in the larva state, and in the perfect state occurs on the leaves and the flowers.

The Corn Grub.—The corn crop has several formidable enemies to contend with, and among them is the grub, which sometimes literally destroys whole fields, or damages the crop seriously One of the best and most convenient remedies—perhaps the very best ever suggested —is the application of *salt* as soon as the plant makes its appearance above ground, prepared and used in this way: Take one part common salt and three parts plaster or gypsum, and apply about a tablespoonful *around* each hill. It will be found to be a sure protection. The mixture should not come in contact with the young plants, as it may destroy them. This method has been tried over and over again by some of the best farmers of Pennsylvania, Delaware and Jersey, and when properly applied, has never failed to be perfectly successful. We hope our farmers, who have reason to fear the depredations of the grub the present season, will try this mixture, leaving a few alternate rows without the salt, and communicate to us the result.—*Germantown Telegraph.*

Is it the so-called "White Grub" that is here spoken of, or the Wire-worm? But both these insects burrow under ground to reach the corn, and it is incredible to me, that so minute a dose of salt as one-third of a tablespoonful, scattered on the surface round a hill of corn so as not to touch the corn, i. e. in a thin line about a yard long, could stop them on their travels beneath the surface.

THE CURCULIO.—Take hemp tow, or anything else that will make good wrapping, and bind it around the tree two or three feet from the ground, having the band four or five inches wide. Then completely saturate the band with tar, and keep it so until the fruit is fully developed, and you will have no trouble in raising fine plums. My mother practiced this method more than thirty years ago, and has never known it to fail. A neighbor of mine says that he tried this method successfully on an apricot tree some two years ago. I have practiced it for several years on English plum trees, that never produced fruit fit for use until I made the trial. It must be done *soon* enough, continued *long* enough, and to succeed the bandage should always be kept wet with tar.—*J. H. Garrad, in Rural American.*

This proceeds on the hypothesis that the curculio has got no wings, and is compelled to climb up the trunk of the tree that it attacks. Unfortunately, however, for the new theory, it has got full-sized wings, and can fly with ease. If the insect did not fly, it would be impossible for it to search out and sting every plum on a tree so rapidly and completely as it often does. Fencing out the curculio by tarred bandages would be a good deal like fencing out the crows and black birds from a field of corn by a tight board fence.

TOBACCO.—The cut-worm will troublet he plants almost as soon as set, by eating them off close to the bud; hunt them out and destroy them, and replace any missing plants. The green worm is next to be fought and killed, or he will destroy your tobacco. He commences depredations when the plants get a foot in height, or before, sometimes, and works till the tobacco is hung in the barn, and longer, unless picked off and destroyed. The eggs of the miller, which produce the worm, are laid on the underside the leaf, and are a little lighter color than the leaf, and of the size of a pin's head; all of these destroyed, are so many worms destroyed in embryo. The miller is of a gray color, with orange-colored spots on each side of the body, and about as large as a humming bird: has a long, trunk-like tongue; when not in use, is closely coiled up and not observable; they are seen hovering about during twilight, at which time they may be caught and destroyed.—*W. H. White on Tobacco Culture, in Rural American.*

Quite correct.

HOW TO KILL SHEEP TICKS.—I have recently been experimenting with coal oil for killing sheep ticks. I took a couple of ticks and dropped a little oil on them, and it killed them. I then took two or three lambs that were ticky, opened the wool, and applied it to the ticks After several days I examined them and found the vermin that were touched with the oil dead. I then applied it to about twenty lambs, with good results. Try it, farmers. Take a bottle and fill it full of common oil used for burning after putting in the cork, make a hole in it, and introduce a quill, and open the wool, and whenever the ticks are found squirt it in. The ticks will die, and the wool and sheep be improved. This is my experience. Try it.—*W B. Disbro. in Rural American.*

From what I know of the effects of kerosene upon insects, I think the above very likely to be successful, though it would be called "slow business" out West. The common practice with shepherds, in England, is to rub a portion of Blue Mercurial Ointment on the naked surface between the hind legs of every sheep at shearing time, which is supposed to kill the ticks over the whole body of the animal. Whether it really does so or not, I have no personal knowledge; but every physician is aware that salivation is produced in the human subject by repeated rubbings of this kind, which proves that mercury, when applied in this manner, penetrates the whole system.

In Economic Entomology what is now wanted, is extensive and carefully conducted experiments upon the best mode of counterworking the insect foes of the Agriculturist. If all the remedies published at various times in various agricultural journals were collected together, they would probably amount to at least ten thousand in number, each vouched for by its author in the most emphatic and persuasive manner. The very multitude of the prescriptions is enough to embarrass and bewilder the afflicted patient. Which way is he to turn himself? Whom is he to believe? One physician recommends mercury, another sulphur, another sal-soda, another a hodge-podge of ingredients such as enters the witches' caldron in Macbeth. Can we wonder that under such circumstances the afflicted farmer, having tried three or four of the so-called remedies and found them practically useless, often turns away in disgust, pronounces Entomology a humbug, and consigns the devotees of that science to a place which it would shock polite ears to mention more explicitly?

ROCK ISLAND, ILL., April 16, 1866.

Outlines of the Study of Insects.

In these papers it will be the object of the writer to present, in as familiar language as possible, the leading points in the structure of insects, their relations to other animals, their mode of development, the forms of the different groups, and the special characters by which they may be recognized. These lessons will in great part be purely theoretical, as practical entomology, or the relations of insects to agriculture and the means of arresting their attacks are abundantly treated of in the other columns of this paper.

GENERAL VIEW OF INSECTS.

The animal kingdom was divided by Cuvier into four branches, the Radiata, Articulata, Mollusca and Vertebrata. He perceived that the essential point of difference which separates the articulates from all other animals, was the fact that their bodies were invariably made up of joints or cylinder-like rings which protect the organs within. In this respect an articulate animal differed from the soft massive sac-like shell-fish, such as the clam or oyster, which is often protected by a calcareous shell, and from the radiate animal, or star fishes and jelly fishes, whose organs or anatomical systems are arranged concentrically about the alimentary canal which forms the axis of the body; and lastly, from the vertebrate whose solid skeleton of lime forms the central support of the body.

That this classification is in exact accordance with nature Von Baer demonstrated, when following close upon the researches of Cuvier, by independent investigations into the growth of animals he showed that the vertebrate embryo first developed a bony skeleton which gradually closed around the nervous system and served as points of attachment for the muscles; that the young mollusc first appears as a simple sac or bag containing the viscera lodged within, and it is comparatively late in life that its shell grows about it; and that the young radiate from the first shows a radiated structure, while the young articulate first develops an outer jointed body-wall, through which the stomach, nerves and arteries can be seen gradually forming.

The articulates are by far the most numerous in species of either branch, the insects alone being supposed to number upwards of 500,000 species. The jointed worm seems to have been selected by nature as affording almost an infinity of modifications arising from variations in the number of rings, their relative size, and in the number and form of their appendages.

The idea of articulation which pervades this immense group of animals is seen best exemplified in the worm. The earth worm is long and slender-jointed, the body gradually tapers towards the head and opposite extremity. (Figure 1 shows a cross section of a worm.)

Upon making a section of the body we find the muscles attached to the inside of the body-wall, that the nervous system—which consists of a single cord, enlarging in each ring into a guaglion or nerve-knot, which in the Crustacea and Insects is doubled—rests upon the floor of the cylinder, the alimentary canal occupies the centre, while above it just under the back rests the heart or so-called dorsal vessel, consisting of a tube which pumps the blood from the tail towards the head, whence it flows in different currents back through the general cavity of body and returns in veins often incomplete. The breathing apparatus is also tubular like the other organs thus formed to pack closely in the tubular body. In the higher worms the breathing tubes or branchiæ are placed around the mouth. Very different from these are the air tubes or tracheæ of insects which as in the figure (2 *g*) enters through holes in the side of the body above the insertion of the legs, and ramify throughout the entire system, thus oxygenating the blood.

There are three grand divisions or classes of articulates, the Worms, Crustacea and Insects.

The worm is long and slender, composed of an irregular number of rings, all of very even size. Thus while the *size* of the rings is fixed, the *number* is indeterminate, varying from 20 to 200 or more. The outline of the body is a *single* cylindrical figure. The organs of locomotion are fleshy filaments and hairs (Fig. 1 *f*) appended to the sides.

The Crustacean, of which the lobster is an example, is composed of a determinate number (21) of rings in the typical forms, which are gathered into two regions, the head-thorax (cephalothorax) and hind body or abdomen. In this class we have first introduced true jointed legs attached both to the head-thorax and abdomen. In the Insects the rings are arranged into three groups.

The number of rings is twenty—seven in the head, three in the thorax, and ten in the abdomen. Thus, while in worms in which the abdomen greatly preponderates in size, the head is no larger than a single ring of the body; in the Crustacea the head-thorax is larger than the abdomen; in Insects there is the most equable proportion between the three regions; the head in the highest insects being but little smaller than the thorax, and the thorax not much smaller than the abdomen.

Thus the mass of organization is thrown forward towards the head; the organs of sense and locomotion have their greatest development over the organs which perform the functions of vegetable life, such as reproduction, and respiration, and digestion. Insects also differ from Crustacea in having wings and tracheæ (Fig. 2 *g*) of which the last serve to aerate the blood inside the body, while in the Lobster or Crab the gills are attached to the legs on the outside of the body, and thus act very imperfectly as lungs.

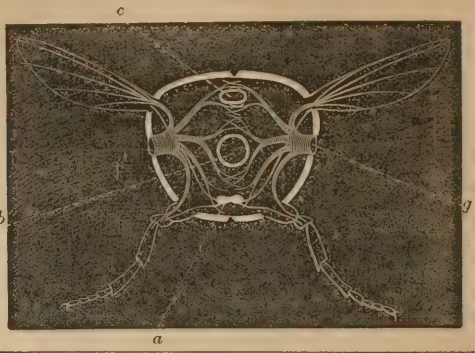
Size is an important element in classifying articulates, as those whose forms are most compact and consequently smallest, are in a general sense physically and psychologically of the most compact and of the finest quality, just as in man it is the finest quality, and compactness, and symmetry of structure that determines high intellectual and physical ability. The earliest insects of geologic ages were huge, vast, misshapen, entomological monstrosities like the mammoths and ichthyosaurus among vertebrates. The Honey Bee is of the size and compactness that affords a *type* of the highest physical and physiological development among insects, and thus stands at the head of the articulate series. The body is tough, compact, well knitted together. Its nervous system approaches nearest to that of vertebrates, as its brain is larger and better developed than in other insects. Its locomotive powers are immense, and its entire organization fits it for the highest grade of insect life. Witness its marvellous instincts, its social habits, the differentiation of the individual into sexes, and grades of sexes, for the better performance of the varied duties of a large and vast colony; its usefulness to man; its vegetable diet; though not carnivous, abundantly able to withstand the attacks of its enemies—all betokening the most equable development of the functions of both animal and vegetable life.

Contrast this with the Dragon fly and Ephemera, the lowest of insects. Their bodies are huge, lengthened, their abdomen worm-like. They are rapacious and carnivous. Their eggs are few in number. The young larvæ and pupæ pass their lives in the water. There is a great inequality in the development of the elements of their crust.

In classifying insects we must steadily keep in view the development and forms of the *crust* or wall of the body, and not the organs alone, which are but of secondary importance.

Fig. 1.

Fig. 2.



In Crustacea the standard of size would seem to be reversed, but the principal of *cephalization*, or concentration of parts headwards is more marked here than in insects. While in Insects the *head* is largest, in Crustacea the thoracic region is most developed, while in Worms the abdomen is largest, and the largest worms are highest in the scale.

In ascertaining the minor divisions of the insects we must keep in full view the principle of articulation and the relations of the rings to themselves and their mode of grouping, and not consider as of primary importance the appendages, which now first come into consideration. We shall find that all the minor divisions, or orders, sub-orders, families and genera, and even species, are but a more special working up of the primary principle of classification—which determine *rank* and *group*—and are all but modifications of an ideal form, becoming more special as the group becomes more limited, or smaller. As we approach *species* represented by the *individual*, slighter differences separate them, and are even apparent among individuals, enabling us by changes in form and ornamentation to detect differences between persons. No two individual insects can be found exactly resembling each other, just as no two men can be found to be precisely alike.

DESCRIPTION OF THE FIGURES.

Fig. 1 represents an ideal section of a Worm. *f* indicates the skin or muscular body-wall, which in each side is produced into one or more fleshy filaments tipped usually with bristles or hairs, which serve as organs of locomotion, and often as lungs. The nervous cord (*a*) rests on the floor of the cylinder, sending a filament into the oar-like feet (*f*) and also around the intestine or stomach (*b*) to a supplementary cord (*d*) which is situated just over the intestine, and under the heart or dorsal vessel (*c*). The circle *c* and *e* is a diagram of the circulatory system; *c* is the dorsal vessel or heart, from the side of which, in each ring, a small vessel is sent downwards and around to *e*, the ventral vessel. So that the circulation is a *closed* one in the higher worms, as well as the Crustacea and Insects.

Fig. 2 is an ideal section of a Bee. Here the crust is dense and thick, to which strong muscles are attached. On the upper side of the ring the wings grow out, while the legs grow out near the under side. The tracheæ (*g*) enter through the *stigma* or breathing pore, situated just under the wing, and its branches sub-divide and are distributed to the wings, with their five principal nervures as indicated in the figure, also to the dorsal vessel (*c*) the intestine (*b*) and the nervous cord (*a*). The two circles seen in fig. 1, representing the course of the blood vessels and nerves, are here left out so as to avoid confusion. The tracheæ and a nervous filament are also sent each into the legs and wings. The tracheæ also are distributed to the dorsal vessel and intestine by numerous branches. A. S. P.

Note on Black-Knot.

BY BENJ. D. WALSH, M. A.

In my article on Black-knot in No. 6 of the PRACTICAL ENTOMOLOGIST I incorrectly stated that the fungus growing on its surface is about the size of the head of a pin. It is only when seen through a pocket microscope that it appears so large as the *head* of an ordinary toilet pin. When viewed with the naked eye it is scarcely larger than the *point* of a dull-pointed pin.

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ACKNOWLEDGMENT.

We thankfully acknowledge the receipt of Three dollars from Mr. O. H. Peck, of Massachusetts, for this Paper.

ANSWERS TO CORRESPONDENTS.

BY B. D. WALSH, M. A.—ASSOCIATE EDITOR.

B. F. Scibert, N. J.—The insects you sent—oval, about one-fifth of an inch long, of a dull blue-black color, and with fine, long, silky hairs, especially on the thorax—are the *Serica tricolor* of Say. They arrived all alive and in first-rate order, and you did well in sending plenty of specimens. The species of this genus are numerous, and resemble one another very closely; and by examining several score out of the bountiful supply you furnished, I was enabled to ascertain, that the characters by which it differs from some very closely allied species are perfectly unchangeable, and do not run promiscuously those of one species into those of another. Although this insect is said to occur generally throughout the United States, yet I never met with it near Rock Island, though I have received it from my entomological friend, Dr. LeBaron, of Geneva, Illinois.

You say that "you find them very numerous as well as very destructive, as they have eaten all the leaves off your neighbor's and your own Pear-trees and Strawberry plants;" and that "the moment you touch the tree, they all drop to the ground." This is the first instance on record, so far as I am aware, of this particular species being injurious in the field or the garden. According to Say, "it abounds in hilly and mountainous situations, where, in the month of May, it may be seen flying about among the Whortle-berry bushes in great profusion." Harris states with regard to two other species of *Serica*—the *vespertina* and the *sericea*—that "they attack the leaves of the sweet-briar, on which they may be found in profusion in the evening, about the last of June." (*Inj. Ins.* p. 33.) A colored figure of *vespertina* is given in his plate II. fig. 14; and if you diminish the size and add some fine, silky hairs, the same figure would answer very well for our species.

These insects belong to the Order of Beetles (*Coleoptera*) and to the same great family (*Scarabæidæ*) in which are included our May-bug (or May-beetle) and our Rose-bug, and also the European Cockchafer—three ruinously destructive insects. It is not known where or how the larva lives, but it probably burrows under ground and feeds on the roots of living vegetation. The "dropping to the earth" when the tree, on which the perfect Beetle occurs, is touched, is not so common in this Family, as among the Snout-beetles (*Curculio* Family) and the *Chrysomela* family, which last includes the striped cucumber-beetles and several other injurious species.

Thos. Siveter, Iowa.—You refer to the article on "the Measuring Worm (*Ennomos subsignaria*)" in No. 7 of the PRACTICAL ENTOMOLOGIST, and you very justly state that the account there given of its habits does not at all agree with those of the Measuring Worm which infests your Apple-trees. No wonder. They are two entirely distinct insects. The insect that troubles you is evidently, from the very correct statement you give of its Natural History, the common Canker Worm—*Anisopteryx vernata*—which is as different from *Ennomos subsignaria* as a sheep is from a cow. Both, it is true, are Measuring Worms; but there are hundreds of distinct species of Measuring Worms found in the United States, each with its peculiar size, shape and color, its peculiar habits and its peculiar food-plant or food-plants.

The writer of that article, like many other learned men, supposed that those whom he was addressing were as familiar with learned names as himself, and that, by merely giving the scientific name of the insect which he was writing about, everybody would understand what particular species he referred to. There are, in fact, some things in that paper which I cannot understand myself, for example where he talks about the half-grown caterpillars "commencing their saltatorial exercises." "Saltatorial" means "jumping" or "leaping;" and if this particular Measuring Worm ever jumps or leaps, it is more than I ever saw any other kind of Measuring Worm do, though I am familiar with scores of different kinds. It is possible, however, that this may be a peculiar habit of this peculiar species, which, although it swarms in certain localities in the Eastern States, does not appear to be found in the West. But I have myself bred from the caterpillar another species of the same genus—*Ennomos magnaria*—which agreed with the *subsignaria* in spinning a loose cocoon of open net-work about the end of August and in coming out into the moth state the same season, viz: on Sept. 27. This caterpillar fed upon oak, while the *subsignaria*, if I remember right, is said to feed chiefly upon elm. But it performed no "jumping" or "leaping" operations whatever while it was in my breeding-cage.

You will find figures of both male and female Canker Worm moths in Harris's *Injurious Insects*, pp. 461—2. The other insect, which, as it swarms chiefly in cities, and especially in New York, may be called the "City Span-worm," is not noticed in that work nor in Dr. Fitch's *New York Reports*. The leading points of difference in the Natural History of the two Insects may be thus briefly stated:—In the Canker Worm it is the male moth that has wings, and they are ash-colored; in the City Span-worm both sexes have wings, and they are satiny-white. The Canker Worm goes under ground to pass into the pupa or chrysalis state; the City Span-worm goes to pupa in a thin gauzy cocoon which it spins among the twigs and leaves of the tree it inhabits. The Canker Worm generally lies in the pupa state till the following spring, though a few come out in the moth state late in the same autumn, and on warm days during the winter; the City Span-worm comes out into the moth state the same summer, and not many weeks after it has gone to pupa. The Canker Worm occurs chiefly on apple and elm trees, although it is sometimes found on cherry, plum, basswood, &c.; the City Span-worm, unless my memory fails me, is said to be found chiefly on the elm and only occasionally on other shade trees, but never on fruit trees. Hence it is evident that the two species must be attacked in very different methods; and that tarred bandages, leaden troughs filled with oil and placed around the butts of infested trees, &c., &c., which, when properly applied, are effective remedies against the Canker Worm, whose moth comes out of the earth and in the female sex is wingless, would be of no earthly use against the City Span-worm, whose female moth is winged and comes out among the twigs and branches of the trees it infests.

You will oblige me, as you seem to have more Canker Worms than you know what to do with, by sending me by mail a few dozen of them, packed in any kind of small box, with leaves enough to last them on their journey. The insect is not found near Rock Island, and I wish to breed it myself, so as to examine into its habits.

H. B. Howarth, Wisconsin.—The insects you send, with an enquiry whether they are not "the flies which produce the Chinch Bug," are the *Capsus oblincatus* of Say, otherwise named by Beauvois as *Phytocoris lincaris*. You will find the species figured in Harris's *Injurious Insects*, p. 201, and another figure with an accompanying article by myself in the *Prairie Farmer*, May 2, 1863. It is a very common and abundant species throughout the Northern States, and, as you may see from the passages referred to, sometimes does a great deal of damage. Like the Chinch Bug, it passes the winter in the perfect or winged state, which accounts for your finding it under shocks of corn in the middle of November. You notice that it has "the same disagreeable smell as the Chinch Bug;" but this it has in common with all the true Bugs (Order *Hcteroptera*) which are vegetable feeders and not cannibals; for example, the common Squash Bug (*Coreus tristis*)* and the Bed Bug. Not only is it a distinct species from the Chinch Bug, but it belongs to a distinct genus and even to a distinct Family.

You must disabuse yourself of the popular idea, that after an Insect has arrived at the perfect state, or in other words after it has obtained wings, it ever changes into any other kind of Insect. Many believe that Beetles change into Butterflies, Butterflies into Bugs, Bugs into Bees, and so on *ad infinitum*; and I once noticed a paragraph which ran the rounds of the Agricultural Press, gravely asserting that the common Rose-bug (*Macrodactylus subspinosus*) usually shed its yellow wing-cases and changed into a Horse-fly (*Tabanus*.) This is a mere delusion. No such change can or does happen. It is as impossible as for a Cow to shed her horns and turn into a Horse. All Insects pass through four stages only, 1st the egg, 2nd the larva, 3rd the pupa, 4th the perfect insect, when in almost all species wings are acquired, and in all species the male and female pair, the female lays her eggs, and then both male and female, having run their appointed course, die. In the human species and other ver-

*Figured Harris's *Inj. Ins.*, p. 194.

tebrate animals we may trace an anology with the above four stages as follows:—1st, the fœtus in the womb; 2nd, the baby feeding upon milk and without food at first; 3rd, the child feeding upon solid food and furnished with teeth; 4th, the adult man or woman, distinguished from the child by well known sexual characters and capable of propagating the species. The chief difference in the two cases is, that in Insects the change from one state to another takes place suddenly by a sudden moulting of the skin, or rather what is properly speaking the external skeleton, whereas in vertebrate animals it takes place slowly and gradually. For example, we can fix no precise day, and even no precise month, and scarcely any precise year, when the Baby becomes a Boy, or when the Boy becomes a Man, while it often takes but a few minutes for a Chrysalis (pupa) to change into a Butterfly, or a Caterpillar (larva) to change into a Chrysalis, and we may watch the whole process with the greatest ease, from beginning to end, by devoting an hour's attention to it.

In a very few species of Insects, such as the common Walking Stick or Prairie Alligator (*Diapheromera femorata*)* the perfect insect never has any wings at all; and in a few others, such as the common Bed-bug and the Flea, the Perfect Insect has only rudimental wings, or short stumps of wings, such as we usually see in the Pupa. But even here we may distinguish the different stages by the successive moultings, and we may know that the insect has arrived at the perfect state by its copulating. It is a universal rule that larvæ and pupæ never copulate, for the same reason that calves and lambs never copulate, i. e. because they are as yet in an immature state.

You will find the Natural History of the Chinch Bug well explained by Mr. Riley in an article in No. 6 of the Practical Entomologist (pp. 47—8.) The only point in which I differ from him is, that I believe that there are more than two broods of them every year, and probably as many as four or five in this latitude.

C. Cook, Mass.—The small cocoons you send from off the twigs of apple-trees contain a black pupa from which I have bred several specimens of a very minute moth, apparently undescribed. I am about to forward one to Dr. Clemens, who has made these small moths his special study, and who will probably name and describe it. All the specimens sent seem to belong to the same species.

From the mass of cocoons found attached to the egg of the Tent Caterpillar of the Apple-tree, which you formerly sent, I have bred several specimens of the very same species of *Microgaster* which we told you it was likely to produce, and also several specimens of another small Ichneumon-fly belonging to the genus *Hemiteles*. The question till remains to be solved, whether the larvæ of both these Ichneumon-flies lived as co-tenants in the body of their victim, the Caterpillar, and spun the mass of cocoons in common, or whether—which I decidedly incline to believe—one of them is parasitic upon the other, and if so which is parasitic upon which. From the fact that the *Hemiteles* came out several weeks before the *Microgaster*, I rather infer that the latter is parasitic upon the former. Please next year send me additional specimens, so as to solve this curious question.

Wm. Manlius Smith, N. Y.—You are quite right as to the cocoons of *Sclandria ribis* (Winchell) not being mere "balls of earth," as was wrongly stated in the Practical Entomologist, No. 3, p. 23, but true silken cocoons. From the specimens you sent I have bred four specimens of the insect, which were a welcome novelty to my cabinet, and from which I perceive that Prof. Winchell was mistaken in referring the insect to the genus *Sclandria*. It belongs to *Nematus*, having only one marginal cell, and therefore its true name is *Nematus ribis*. The female is very remarkable for having 10-jointed antennæ, while the male has the number of joints, viz. nine, that characterize the genus.

A very similar species of *Nematus* infests the Gooseberry and Currant in Europe, and it is perhaps the case that our American insect is the same species imported among us from the other side of the Atlantic. (See on the European species Westwood's *Introduction*, II. pp. 103—4.)

Charles Dadant, Illinois.—The eggs you send found in little slits in the bark of Pear-tree twigs are those of *Chloroncura malefica* (Walsh), a small green insect belonging to the *Tettigonia* family in the Order *Homoptera*. I published a description and figures of this insect in the *Prairie Farmer* Sept. 6, 1862, and of its egg-slits *Ibid.* April 4, 1863, p. 212, together with some account of its habits. The former article was reproduced in the *Proceedings of the Boston Society of Natural History*, 1864, pp. 314—317.

The similar egg-slits found in the bark of the Delaware grape-vine appertain to some other Homopterous Insect, probably to *Proconia undata*, a much larger species belonging to the *Tettigonia* family, which I know to oviposit in this manner in the grape-vine. You should have sent pieces of the twig containing the egg-slits, and not merely thin slices of the bark.

Jno. Flournoy, Mo.—The insects you send, found on the leaves and stems of the Chickasaw Plum, are some kind of Plant Louse (*Aphis*.) It is impossible to say what particular species they belong to, because they were simply wrapped in a piece of paper and reached me broken into a hundred fragments, and pressed as flat as a pancake. A naturalist might be able to say, with some degree of certainty, that a sausage contained dog's-flesh, from meeting with a dog's tooth in it; but it would puzzle even Cuvier or Owen to decide from such data whether the dog was a Terrier, a Spaniel or a Pointer.

As a general rule, almost every plant has its own particular species of Plant-louse; for example, that of the Apple is distinct from that of the Cherry, that of the Cabbage from that of the Currant, and so forth. They all live by sucking the sap of the plant they infest, and although the infested leaves often shrivel and curl up, yet it is impossible for them to be eaten bodily by this insect, for the simple reason that it has got no jaws to eat with—nothing, in fact, but a long beak to suck with. Consequently, "the stripping of the foliage" of your trees last year must have been caused by some entirely distinct insect—perhaps some kind of caterpillar. From the enormous rapidity with which Plant-lice breed, there is no doubt that if they were allowed to multiply without any check, they would in a few months ruin almost every plant on the face of the earth. But there are hundreds and hundreds of different insects that prey upon them voraciously, so that it is but seldom that they do material damage. I incline to believe, that in limited numbers, they operate as a summer pruning, and are therefore more beneficial than injurious to fruit-trees. In particular years the Hop Plant-louse has greatly injured the hops, and in other years the Grain Plant-louse in certain States has damaged the small grain considerably, but it is recorded to have been generally checked up in the end by myriads of Cannibal Insects, chiefly Lady-birds (*Coccinella*). I have myself seen the Devil's Darning Needles (*Agrion*) flying among my Currant Bushes and pouncing ferociously on the Plant-lice that swarmed on them. It is a good plan, and one which has long been practised by European gardeners, to collect a number of Lady-birds and place them on any plants that are grievously infested by *Aphis*. Fumigation with tobacco in a close room will kill Plant-lice on Green-house plants, and on choice garden plants, such as Verbenas, they may be destroyed by dipping the infested branches for a few minutes into strong soap-suds.

A. C. Hammond, Illinois.—You say that some of your Plum-trees are dying from the attacks of Borers, of which supposed Borers you forward three different kinds. The *first* of these—the "white grub"—is, as you suppose, the true Peach Borer, which in my article on Borers (No. 4, p. 27) was stated, on the authority of Dr. Fitch, occasionally to attack the Plum-tree. Hence your observations are valuable as confirmatory evidence of the fact, and of the further very remarkable fact that Plum-trees, when attacked by the Peach Borer, do not exude gum like Peach-trees. The *second* specimen—"the long, slender brown worm"—is the larva of some kind of "Click-beetle" (*Elater*), none of which are true Borers, though a great many of them live in decayed wood, and a few of them attack the roots of living plants, when they are popularly called "Wire-worms." Most of these larvæ, like the specimen sent, are hard, shining, cylindrical, mahogany-colored insects, looking like an inch or so of brown wire cut off nearly square at each end. The *third* specimen—"the short, dark worm"—arrived in such bad order, having been eaten up almost bodily by the Peach Borer on the road, that all that I can say is that it is distinct from the other two.

I apprehend it is the Peach Borer that is the real author of the damage to your trees; and you must fight him on the same principles precisely as if you found him on a Peach-tree. Most certainly the Wire-worm (or *Elater* larva) would not invaded your trees, but for their already containing decayed matter, the handiwork of the Peach Borer.

*Figured Harris *Inj. Ins.*, p. 147.

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PHILADELPHIA, JULY 30, 1866.

We repeat our request to those who feel interested in the permanent establishment of the PRACTICAL ENTOMOLOGIST, and who have not already sent in their names as subscribers for the second year, commencing with October 1866, to do so *without delay*, and not only send their individual names, but also those of their friends and neighbors. Almost every subscriber could induce one or more of his or her friends to subscribe 50 cents a year to a really useful paper.

Renewals come in pretty freely, and not only renewals, but some who now subscribe to only one copy, have put down their names for *ten*, *twenty* and even as high as *fifty* copies of the paper for the second year, intending, no doubt, to distribute copies among their friends and neighbors, and endeavor to secure their patronage for the third year. Many could readily afford to take five or ten copies of the paper and use them to much advantage by introducing it into their neighborhood.

We trust that our friends will exert themselves and that we will have our complement of 5000 copies subscribed for in time to announce the fact in the last number of Volume I, due on the 30th day of September 1866.

We take the liberty of inserting here a few extracts from letters received from subscribers in renewing their subscriptions; these will show how the paper is appreciated by those who see the grea importance of such a work.

A subscriber, from Illinois, says:

"As I regard your paper, I will rather go bail for fifty subscribers for the next volume, at 50 cents each, than have it stop. Don't think of giving it up—don't mention such a thing, but give us a chance one year more to spur them up."

Another, from New York, says:

"Please put me down for 10 copies of the new volume. I have learned more than $5 worth from the nine numbers so far published, and I do not want the work stopped."

Another, from the same State, says:

"You may put my name down for another years' subscription of your valuable paper; all who know its worth will not hesitate to send in their names, as 50 cents will not break them. It is truly worth double that amount; it is a paper that no farmer should be without."

Another, from Pennsylvania, says:

"I will subscribe for 10 copies of your valuable paper, and hope you will not be allowed to discontinne it through the apathy of the public. The study of our insect enemies and friends is of importance to the whole nation."

Another, from Virginia, says:

"I write to give timely notice of my wish to continue my subscription to the 'Entomologist' for the next year. Your Society has done a valuable public service during this year, and I hope you will be encouraged to continue."

Another, from the same State, says:

"You may consider me a subscriber for the future, and if it is necessary to pay double, I will cheerfully comply."

Another, from Ohio, says:

"Please put me down as a subscriber to the 'Entomologist' for the second year, commencing October next. I consider your little paper both interesting and valuable, and the small subscription price, fifty cents, is, I think, small indeed compared with the real value of the paper. Success to the enterprise."

Outlines of the Study of Insects.—II.

In our last article we endeavored to show that the classes of Worms, Crustacea and Insects were but modifications of a single articulated or jointed worm-like form, and that in all this unity there actually existed from the first, three quite different *types* or shapes, so that one need not confuse a worm with a Lobster, or a Lobster with a Honey bee. At first however, all *look* much alike, that is when in the egg, before the embryo is formed. The earliest form of all articulates is *wormlike*, that is, the embryos tend to become cylindrical, much longer than broad, and rounded off much alike at each end of the body.

In studying the lives of great men, we turn eagerly to the accounts of their childhood, and growth through the period of youth to adult life. So in studying insects we must trace them from the egg state, to the period of childhood, (the larva)—and from childhood to the adult fly-state.

At first the Worm leaves the egg as a little oval infusorium-like, microscopic body, covered over with little filaments or cilia, by the swift motion of which it circumnavigates a drop of water. Very soon it grows longer, and contracts at intervals, when the skin becomes partially infolded, giving it a ringed appearance, and it is at this time that we can tell whether the embryo is to be a lobster or worm, i. e. an *articulate*, or a clam or fish. The rings faintly marked out determine that in reality it is an Articulate and not a Mollusc (clam), or Radiate (Starfish). Soon the ciliæ disappears, regular locomotive paddle-like organs, grow out from the sides; feelers, and jaws and eye-dots appear on the front rings of the body, which are thus grouped into a head, though it is difficult in a large proportion of the lower kinds of worms for unskilled observers to distinguish the head from the tail. Thus we see throughout the growth of a worm, no attempt at subdividing the body into regions, as a head, thorax and abdomen, each provided with distinct organs, but only a perfection of the individual rings themselves as they advance in life. Thus in a worm, of which fig. 1, in the preceding article is a cross section, we see each ring is plainly distinguished into an upper and under, and in addition to these, a well marked side-area, from which oar-like locomotive organs grow out. It is on this side area in the rings composing the head of worms, that the eye-dots, feelers and jaws are situated. We see this arrangement distinctly in the Worms, but less apparently in the Crustacea and Insects, whose heads are made up not of a single ring, as is very generally supposed, but of *six and probably seven*, being in insects twice the number of those comprising the thorax.

In some of the low intestinal worms, such as the Tape Worm, each ring in the hinder two-thirds of the body is provided with a distinct portion of the ovary and male sperm-gland, so that when the body becomes broken up into its constituent elements or rings, as often occurs naturally in these low forms for the more ready propagation of the species, since the young are exposed to many dangers while living in the intestines of animals,—each ring may become a living independent worm, and add new rings to its body by the simple subdivision of the original one. This fact proves that in the *worm*, the vitality of the animal is very equally distributed to each ring. If we cut off the head or tail of some of the lowest of these worms, the pieces will become a distinct animal, but an insect or crab sooner or later dies when deprived of its head or tail, (abdomen).

The young of all Crustacea first begin life in the egg as oblong flattened worm-like bodies, each end of the body repeating the same form. The young of the low Crustacea, such as the Barnacles, and some marine forms like the Sow-bugs, and some lowly organized parasitic species inhabiting the gills of fishes, are hatched as microscopic embryos which would readily be mistaken for young worms. In the higher Crustacea such as the fresh-water lobster, the young when hatched, does not greatly differ from the parent, but it goes through the worm-like stage within the egg.

It is thus with Insects. Within the egg at the first dawn of life they are flattened oblong bodies curved upon themselves. Just before hatching their bodies unbend, they become more cylindrical, the limbs bud out on the sides of the rings, the head is clearly demarked, and the young Caterpillar steps forth from the egg-shell ready armed and equipped for its riotous life.

As will be seen by the figures below, the legs, jaws and antennæ are first started as buds from the side of the rings, being simply elongations of the body wall, which bud out, become larger, and finally jointed, until the buds arising from the thorax or abdomen become legs, those from the base of the head become jaws, while the anteunæ and palpi sprout out from the front rings of the head. Thus while the body of all articulates are built up from a common embryonic form, their appendages also so diverse, when we compare a lobster's claw with an insect's antennæ, or a spider's spinneret with the hinder limbs of a Centipede, are yet but modifications of a common form, adapted for the different uses to which they are put by these animals.

The changes which an animal undergoes while growing is called its *metamorphosis*. This metamorphosis is of course less marked in those animals whose forms are low and simple and which therefore do not depart greatly from the early embryonic stage. As we ascend higher, the changes become more marked, until in the true Insects, where the larva is so strikingly different in the majority of species, from the pupa, while the pupa again, assumes quite a different form from the winged fly we have a most thorough transformation, which led early observers to state that Insects differ from other animals in passing through a *metamorphosis*, not knowing as we do now, what surprising changes all animals pass through in order to reach the adult state.

EXPLANATION OF THE FIGURES.

Fig. 3 represents the embryo of a worm. *a* is the middle tentacle of the head; *e* one of the posterior tentacles; *b* the two eye-spots at the base of the hinder pair of feelers; *c* is one of a row of oar-like organs (*cirri*) at the base of which are inserted the locomotive bristles, with the cirri serving as swimming and locomotive organs; *d* the caudal styles, or tail-feelers. (From A. Agassiz).

Fig. 3.

In this figure we see how slight are the differences between the feelers of the head, the oar-like swimming organs, and the caudal filaments; we can easily see that they are but modifications of a common form, and all arise from the common limb-bearing region of each ring of the body.

The alimentary canal, with the proventriculus, or anterior division of the stomach, is seen to occupy the middle of the body; while the mouth opens on the under side of the head.

Fig. 4 represents the young of the fresh-water Lobster (Crawfish) before leaving the egg. The body is divided into rings, ending in lobes on the sides, which are the rudiments of the limbs. *b* is the rudiment of the eye-stalk, at the end of which is the eye; *a* is the fore antennæ; a^1 is the hind antennæ; *c* is one of the maxilla-feet; c^1 is the first pair of true feet destined to form the huge "claw." (From Rathke). Thus the eye-stalk, antennæ, claws and legs are moulded upon a common form, and at first are scarcely distinguishable. Here we see the embryo divided into a head, thorax and a tail

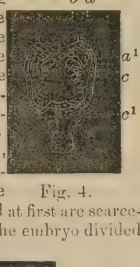

Fig. 4.

Fig. 5.

Fig. 5. A Case-fly. *Phryganea*, (after Zaddach), in the egg, with part of the yolk (*x*) not yet enclosed within the body walls. *a* antennæ; between *a* and a^1 the mandibles; a^1 maxilla; a^2 labium. *b*. the separate eye-spots, (ocelli) which afterwards increase greatly in number and unite to form the compound eye. The "neck" or junction of the head with the thorax is seen at the front part of the yolk mass; *c* the the three pairs of legs, which are folded once on themselves; *d* the pair of anal legs attached to the tenth ring of the abdomen, as seen in caterpillars, which form long antennæ-like filaments in the Cockroach and May-fly, etc. The rings of the body are but partially formed; they are cylindrical, giving the body a worm-like form. Here as in the other two figures, though not so distinctly seen, the antennæ, jaws and last pair of abdominal legs are modifications of but a single form, and grow out from the side of the body. The head-appendages are directed forwards, as they are to be adapted for sensory and feeding purposes; the legs are directed downwards and they are to support the insect while walking. It appears that the two ends of the body are perfected before the middle, and the under side before the upper, as we see the yolk mass is not yet enclosed and the rings not yet formed above. Thus all articulates differ from all vertebrates in having the yolk mass situated on the back, instead of on the belly as in the chick, dog, or human embryo.

A. S. P.

Chinch Bugs

"If any Western rustics are verdant enough to suppose that chinch bugs cannot be out-flanked, headed off and conquered, they are entirely behind the times. The thing has been effectually done during the past season, by Mr. Davis, Supervisor of the town of Scott, Ogle county, Ills. This gentleman had a cornfield of a hundred acres, growing alongside of an extensive field of small grain. The bugs had finished up the latter and were preparing to attack the former, when the owner, being of an ingenious turn, hit upon a happy plan for circumventing them. He surrounded the corn with a barrier of pine boards set up edgewise, and partly buried in the ground, to keep them in position. Outside of this fence deep holes were dug, about ten feet apart. The upper edge of the board was kept constantly moist with a coat of coal tar, which was renewed every day.

"The bugs, according to their regular tactics, advanced to the assault in solid columns, swarming by millions, and hiding the ground. They easily ascended the boards, but were unable to cross the belt of the coal tar. Sometimes they crowded upon one another, so as to bridge over the barrier, but such places were immediately covered with a new coating. The invaders were in a worse quandary than that of Butler and Weitzel at Fort Fisher, and, in that state of mind, crept backward and forward until they tumbled into the deep hole aforesaid. These were soon filled, and the swarming myriads were shoveled out of them literally by wagon loads, at the rate of thirty or forty bushels a day—and buried up in other holes, dug for the purpose, as required. This may seem incredible to persons unacquainted with this little pest, but no one who has seen the countless myriads which cover the earth as harvest approaches, will feel inclined to dispute the statement. It is an unimpeachable fact. The process was repeated till only three or four bushels could be shovelled out of the holes, when it was abandoned. The corn was completely protected, and yielded bountifully."—(*Prairie Farmer*, copied in *Valley Farmer*, June 1, 1866.

From what I have seen of the Chinch Bug, I have no doubt that the above is substantially correct.

B. D. W.

Doctors Differ.

BY BENJ. D. WALSH, M. A.

Those who read Agricultural Journals must have frequently noticed cases, where one Correspondent strongly recommends some infallible remedy against a particular Noxious Insect, and a few months afterwards comes an answer from another Correspondent, saying that he has tried the remedy and found it worthless. By way of practical illustration, I will give a few instances of the kind, taken at random from various sources. The following is from the Proceedings of the New York Farmers' Club printed in the *N. Y. Tribune*, July 14, 1863:

Oil upon Fruit Trees.—MR. HOPKINS says further: "In your discussions before the Club, oil is recommended to be rubbed on to fruit trees. I can only say, in regard to a single instance. A gentleman in Warsaw, Wyoming County, N. Y., applied common tanners' oil to his, both pears, plums, and cherries, and he killed them every one. They were thrifty, well-doing, healthy, and very productive before, but they never bore fruit or leaf afterwards."

The next example is from the same publication, but of three years later date, (June 12, 1866.)

Curculio—New Remedy.—MR. CARPENTER related the case of some one, who has succeeded in growing plums by keeping sheep in the orchard; and it was supposed by the owner, that the odor arising from the sheep affected the insects and kept them away.

MR. HICKS said his neighbors keep sheep, but it does not keep away the curculio.

But the most amusing case is from the *Prairie Farmer;* and I give it in full, because it is instructive as well as amusing. Strange to relate, a one-inch auger hole bored in a man's apple-trees and filled with sulphur failed to kill the cankerworms! Perhaps Mr. Lippincott would like to try next year a two-inch auger upon his trees, or—better still—a tool which is known as a post-axe and is used for cutting large mortises in fence-posts. With such a mortise cut deeply into every tree and filled with a few pounds of sulphur, we should be apt, as folks say out West, "to hear something *drap*"—but whether it would be the Cankerworms or the trees that gave up the ghost, is another affair.

EXPERIENCE WITH THE CANKER WORM.

EDS. PRAIRIE FARMER:—Some twelve or fourteen years ago, the canker worm commenced in one corner of my orchard, and increased year after year until they got all over the orchard, and would eat the leaves off the trees, until they would be as destitute of leaves in July as in January; and after trying various remedies to destroy them, I finally, with an inch auger, bored a hole nearly through the trunk some three feet from the ground, and put in 1¼ ounces of flour of sulphur, and plugged up the hole by driving a piece of pine wood in even with the wood of the tree, which effectually destroyed them the first year, and the trees fruited well that year and have ever since, and that is six years ago; the worms hatched out as before, but died without doing injury. This was done in the spring before the sap commenced rising; I think any time between now and the first of April is the proper time to do it. Although the leaves were so impregnated with the sulphur that the worms could not eat them, yet we were never able to detect it in the fruit.—JAMES TUCKER, Warren Co., Ill. (*Prairie Farmer*, March 31, 1866.)

SULPHUR FOR CANKER WORMS A FAILURE.

EDS. PRAIRIE FARMER:—In your number of March 31st, there is a communication from Mr. James Tucker of Warren county, Ill., giving an account of his experience with canker worms—how he destroyed them with sulphur.

Well, the story was so plausible, straight and simple, that I determined to try it, and did try it. I 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. It cannot be that this result is from a lack of faith in me, for my faith was so strong that I neglected my usual remedy of getting them off with a pole, and killing them at a stopping place made of tar and smeared on a strip of tin around the trunk of the tree.

Let not Mr. Tucker think that I am censuring him, for I have no doubt but what he thought the sulphur killed the worms.

Lately an old gentleman told me a similar story about sulphur killing the worms in the short space of three days. When I inquired of him what time of year the sulphur was put in, he said, "in wool-carding time." Now it is in wool-carding time that the worms mature and disappear of their own accord, and hence his idea that the sulphur had killed them. I am told of an orchard in this country where they disappeared all of a sudden without any known cause.

* * * *

It seems to me there is not enough said in your paper on this very important subject. Is it possible that the ingenuity of man cannot invent something to prevent a bug from crawling up a tree? The thing must be done; it can be done, and if nobody else will do it I am determined to do it myself.—WM. P. LIPPINCOTT, Vernon, Iowa. (*Prairie Farmer*, June 9, 1866.)

As to the popular belief that sulphur is highly offensive to the larvæ of moths, Dr. Fitch tried the experiment of feeding two parcels of the common caterpillars of the Apple tree, one parcel on clean leaves and the other parcel on leaves copiously dusted over with sulphur. Wonderful to relate, instead of dying, the sulphur-fed caterpillars throve finely and actually outgrew those that had nothing but the natural apple-leaves to feed on. But perhaps, if the Doctor had bored a gimlet-hole in the woodwork of his breeding-cage and filled it with sulphur, the result would have been different. *Quien sabe?* Who knows? The sulphur would be just as likely to rise into the leaves on this plan as on Mr. Tucker's plan. Ask any botanist if it is not so. For the sap can only take up such substances as are soluble in water; and sulphur, as any one can easily prove by trying it, will not dissolve in water.

The Grain Plant-louse.

BY BENJ. D. WALSH, M. A.

It is not at all improbable that the Plant-louse, which infested small grain a few years ago in the Northern States, has now travelled south into Georgia. At all events the wheat in certain sections of Georgia is now attacked by a small insect, which the natives had never seen before; though, as usual, there is no description whatever given of it, further than that it is "small," which may mean half an inch or the hundredth part of an inch long. The *New York Tribune*, from which the following extract from the *Atlanta Intelligencer* is copied, facetiously remarks that "this enemy of the wheat-growers, *judging from the description*, is unlike any of the Northern pests." Where the "description" comes in, I cannot discover. For anything that the Southern newspaper says to the contrary, the new insect may be a beetle, or a four-winged fly, or a two-winged fly, or a small moth, or a bug. But let the article speak for itself; and as the Yankees

are good at guessing, they will probably guess what species of insect is referred to by the writer. My guess is "Plant-louse;" but then unfortunately I am no Yankee—only a Western man.

"A new destroyer of wheat has made its appearance in the wheat fields in the shape of a small insect, which appears on the blade, varying from one to four in number, and which is producing sad havoc. The attention of Mr. Embry was first called to the appearance of the insect and its destructive powers by another old farmer of the same county, Mr. Henry Summerlin. The two together have watched the progress of this insect, and what with the present appearance of the wheat crop in this vicinity, and the de tructive powers of the insect itself, have come to the conclusion that great damage will be done to the wheat crop in Carroll County if it be not totally destroyed. The insect, Mr. Embry states, has never before made its appearance in that county."—(*N. Y. Sem. Tribune*, June 15, 1866.)

Popular names for Insects.

BY BENJ. D. WALSH, M. A.

There is nothing more puzzling to an Entomologist than the use of mere names, without any description of form, size, texture or color, in recording the ravages of Noxious Insects. One farmer says that the weevil is taking his wheat in the granary; another says that the weevil is taking his wheat in the field. One would naturally suppose that both were speaking of the same insect; whereas the first refers to what is really a true weevil or snout-beetle, belonging to the same great group as the common "Curculio;" and the second refers to what is not a Weevil at all, nor even a Beetle, but a two-winged fly belonging to the same Order as the Musketoes, House-flies, Horse-flies, &c., namely the Wheat-midge. In some parts of the country, indeed, this last insect is called, by way of distinction, "the Red Weevil," precisely as a miserable bony kind of fish is called a "Red Horse" in the Valley of the Mississippi, to distinguish it from the animals that draw our buggies. But just as often as not this two-winged fly is called purely and simply "the weevil;" which is much as if a Western fisherman were to say that he had got half a hundred "Horses" in his wagon-bed.

If, however, we are puzzled sometimes by the popular names given to insects on this side of the Rocky Mountains, where we are tolerably familiar with the different species that afflict the farmer, how must it be with the Noxious Insects of the Pacific Coast, almost all of which are unknown to science, at least so far as their habits and transformations are concerned? Probably more than one half of the insects of California, &c. belong to species which do not occur in Eastern America. Yet when farmers emigrated thither from the East, they very naturally gave to native Californian insects the same popular names, as they had been in the habit of giving to Eastern species; just as the first English settlers in America called an American species of thrush a "Robin," after the European Robin, which is not a thrush but a warbler. Here, then, we have error heaped upon error and confusion worse confounded.

I have been led into the above remarks from seeing the following article in the *California Farmer* of May 10, 1866:

ARMY WORM.—We hear that large numbers of the fly which produces the army worm passed through and over the city last Monday afternoon. Vegetation in California presents just now delicious repasts for the hungry, ravenous creatures.—*Sacramento Bee of April 25th.*

Our Eastern Army worm is produced, not by a fly but by a brown moth or miller; and besides, the great bulk of these moths appear, not in the spring (April) but in the summer, varying according to the latitude from June to September. There can be little doubt that the so-called Californian Army-worm is altogether distinct from our Army-worm; just as in the Southern States a moth that infests the Cotton-plant in the larva state (the *Noctua xylina* of Say) is often called the Army-worm, though it is quite different from our Army-worm, (the *Leucania unipuncta* of Haworth.) But what is this Californian species? "Aye, there's the rub." And what are its habits? How does it operate? What plants does it feed on? Is the larva legless, or if it has legs how many has it got? Is the perfect insect a Moth, or a Saw-fly, or a Plant-feeding Beetle, or a Bug? Will not some kind Californian enlighten us all upon these and a host of other such particulars? And above all, will he not send us specimens of the perfect insect, as well as the history of its life? You cannot be too precise or too circumstantial in stating all that you know about it. Points apparently quite trivial in its Natural History may lead the way to some effective method of counterworking it, which may eventually save millions of dollars to your State.

Scientific Names.

BY BENJ. D. WALSH, M. A.

We continually hear people object to what they call the long crack-jaw names, used by Scientific men to designate different species of insects or of birds or of mammals; and much misconception and some ignorance prevails on the subject in the popular mind. It is commonly supposed, for example, that the first discoverer of a new species invents out of his own head two purely arbitrary names for it, the first of which is called the generic name and the second the specific name. In reality this supposition is one half of it almost entirely incorrect, and the other half of it only partially correct. The specific name is indeed fixed by the arbitrary discretion of the first person that *describes* (not the first person that *discovers*) a hitherto undescribed species, but in nine cases out of ten the generic name was established long ago by some other writer, who laid down certain characters in which a certain more or less extensive group of species all agree, which group receives a fixed name from him and is called in scientific language a genus. For instance under the old genus Oak (scientifically *Quercus*) are comprehended many species described by various Botanists, the White Oak, the Black Oak, the Burr Oak, &c.; under the old genus Duck (scientifically *Anas*) are comprehended many species described by various Ornithologists, the

Mallard Duck, the Black Duck &c.; and under the old genus Ladybird (a genus of Beetles called in scientific language *Coccinella*) are comprehended many species described by various Entomologists, the 12-spotted Ladybird, the 9-spotted Ladybird, the 2-dotted Ladybird, &c. To refer a newly-discovered species to its proper genus is often a work of great labor, and it is continually the case that mistakes are made on this point, and the generic name has to be subsequently changed by the same writer or by succeeding writers. But, by scientific etiquette, the specific name always remains the same. The great Linnæus about a hundred years ago described hundreds of our N. A. insects. In every case his specific names are retained in use to the present day; but in very numerous cases his generic names are not retained, because the old Linnæan genera have since his time been very generally split up each into a great number of modern genera. Perhaps in these modern days this propensity has by certain writers been carried to an undue excess; but in the scientific world, as in the moral or in the political world, we are often obliged to accept a state of things not because it is the best possible, but because it is the best that we can obtain short of turning the whole world upside down.

"But," it will be said, "why require all scientific names to be in the Latin language? Why not say 'White oak' instead of 'Quercus alba,' 'Wood Duck' instead of 'Anas (or Aix) sponsa,' and 'Nine-spotted Ladybird' instead of 'Coccinella novemnotata?'" The reason is, that scientific names are intended for the use of Naturalists of all nations, the Russian as well as the Swede, the German as well as the Hollander, the Frenchman as well as the Englishman or the American. Now what could we do in America with a scientific name in the Swedish or in the Russian language? And what could a Swede or a Russian do with one in the English language? Clearly such names would often be unintelligible, and give rise to numerous mistakes and misapprehensions; and if they were translated from the Swedish or Russian into English, or from the English into Swedish or Russian, some writers would translate them one way, some another; which would again give rise to error and confusion. Whereas in the scientific world the Latin is a kind of universal language, understood more or less perfectly by every one; and it was therefore very properly laid down as a universal rule by Linnæus, that all scientific names should be Latin.

"But," it will be again objected, "why select such intolerably long crack-jaw names? Why not, for instance, confine naturalists to words of two syllables and such as are easily pronounced?" The answer is that it is physically impossible to do any such thing. There are now at least a hundred thousand different genera in Animated Nature, including of course both the Vegetable and Animal Kingdoms, each of which has to be designated by a distinct name. How can you ever obtain, by any reasonable combination of consonants and vowels, a hundred thousand different and distinct words all of not more than two syllables? In the richest languages there are only one or two thousand words of one or two syllables each, and all the rest are several syllables long. Frequently, too, even in the popular mouth, long words are used in preference to short ones, and instead of "a school-teacher getting pay for his work," it is "the Professor in an Academy that receives compensation for his services." There are, I believe, somewhere about a thousand distinct ropes in the rigging of a ship, each of which is designated by a distinct name. Yet, instead of all the thousand ropes receiving names of one or two syllables apiece, one rope is called the "Main-topgallant-sail-halyard" another the "Mizen-royal-clewline," &c. &c. Surely the licence which is conceded to the Sailor, with his one thousand ropes, ought not to be grudged to the Naturalist, with his one hundred thousand genera. Nevertheless I freely confess, that some few Naturalists have gone beyond all reasonable bounds, in this matter of coining barbarous and ungrammatical and unpronounceable names, not having the fear of Linnæus before their eyes, who laid it down as a rule, that "Names which are a foot an a half long, or difficult of pronunciation, or offensive to the ear should be avoided.*

"But," some thoughtless reader may suggest, "why give fixed and definite names at all to the different species of animals and plants? Why not let every man, who has got anything to say about a particular animal or plant, explain for himself which species he refers to?" It is precisely this ignorance or neglect of system, which renders the labors of many otherwise good observers utterly valueless. A farmer finds a particular Noxious Insect infesting his crops; he ascertains that by a particular mode of treatment he can subdue it; but as he cannot explain to the world what particular insect he refers to, the world is none the wiser or the richer for his discovery. Whereas if he had been able himself to specify the name of the Noxious Insect, or had been careful enough to send specimens to some reliable Entomologist who might do it for him, his discovery might be put on record for all future time. It is true, he may go to work and draw up what he considers as a description of his Insect Foe; but in ninety-nine cases out of a hundred, as I know by experience, he will dwell upon points of no systematic importance whatever, and omit everything that is essential towards determining the true name of his species. Besides, what a waste of time to describe the same species over and over again! Only think for a moment how such a system would work on shipboard! At present every rope in a ship has its name, and if, for example, the Captain wants the Main topsail lowered for reefing he cries out "Man the main-topsail-halyards." But suppose neither this nor any other rope, sail or mast in a ship had a fixed and definite name, and the Captain had to describe to the Sailors the particular rope he wished them to take hold of, every time he gave an order, in some such language as this:—"Man that rope the use of which

*Nomina sesquipedalia, enunciatu difficilia, et nauseabunda, fugienda sunt.

is either to hoist up or to lower upon the top the second sail, counting from the deck, on the second mast counting from the stem of the vessel." Perhaps, before he got to the end of his long-winded order, the sail would be blown to flinders or the good ship capsize and go to the bottom.

In quoting the scientific name of any plant or animal, an Insect for example, it is usual to give not only the generic and specific names, but the name of the author who first described the species; for instance "*Conotrachelus nenuphar*, Herbst" is the full scientific designation of the common "Curculio." The use of this custom is obvious. If any one is in doubt whether a species which he has before him is the true "Curculio" or not, the scientific designation directs him to turn to the works of the German Entomologist Herbst, and he finds there a reference to the author who first established the genus *Conotrachelus* and a full description of the species called *nenuphar* by Herbst, which he can compare with the specimens in his hands, and see whether or not it agrees exactly, after he has first ascertained that his specimens really belong to the genus called *Conotrachelus* by the French Entomologist Latreille. Some few writers indeed, in quoting the scientific name of a species, add the name, not of the writer who first described the species, but of the writer who first referred it to the right genus. But this plan is practically inconvenient—whatever may be said in behalf of its theoretical justice—and it is to be hoped will never be generally adopted.

Owing to the grammatical peculiarities of the Latin language, the generic name, which is a noun, always precedes the specific name, which is usually an adjective, as is generally the case also in the French language. In English, on the contrary, the adjective precedes the noun and we say "White Oak" instead of the Latin "Quercus alba" (Oak white) or the French "Chêne blanc" (Oak white). But a little practice soon reconciles one to this deviation from the usages of our mother tongue.

In addition to the Species and the Genus, there are other more extensive groups in the Animal Kingdom, namely the Family, the Order, the Class and the Sub-kingdom or Type or Branch, each gradually more extensive and comprehensive than the one which precedes it in the list, besides several subordinate groups such as Tribes, Subfamilies, Suborders, &c., which are used in various senses by various authors. The whole scheme of arrangement may be aptly compared to the organization of a modern army. The Animal Kingdom corresponds to the Army, the Sub-kingdom to an Army Corps, the Class to a Division, the Order to a Brigade, the Family to a Regiment, the Genus to a Company, and the Species to the individual Soldier. Now any military man would laugh outright, if a civilian talked of the 116th Division of Illinois Infantry or the 99th Brigade of Pennsylvania Cavalry. And so do scientific men sometimes smile, when, as is continually the case, scientific charlatans talk of the Family (not Class) of Birds or the Order (not Family) of the Crickets. It is very true that the Scientific Army has been from time to time reorganized and remodeled, so that, so to speak, the number of Divisions, Brigades, &c., is changed from time to time by successive commanders, and sometimes even by the same commander. Still the great fundamental principle of its organization remains always the same; and it is well worth while to become familiar with it, if it were only because it affords a sure earmark to distinguish the pretentious quack from the scientific naturalist.

In one remarkable respect the Scientific is a little more perfect than the Military organization. To designate any particular animal or plant, all that is absolutely necessary is to name the species and genus to which it belongs; while to designate any particular soldier in an Army to whom, for example, we wish to forward a letter, we have to state not only the soldier's name (John Jones) and the company to which he belongs (Company D), but also the particular regiment of which his company forms a part, and probably the particular Army Corps of which that regiment forms a part; whereas in scientific parlance we usually name only the genus and the species. But if the number of genera in the Scientific army continues to increase at the same fearful rate, at which it has been increasing for many years back, it will be impossible for any human memory to retain the names of them all; and it will then become necessary to add the Family or Regimental name to the generic and specific names, so that we may comprehend the more readily where the particular species which is referred to belongs. Some few entomological writers have already adopted this system, writing for instance, *Buprestis* (*chrysobothris*) *femorata* Fabricius, instead of *Chrysobothris femorata* Fabricius, which is the more usual designation of our common western Apple-tree Borer.

ANSWERS TO CORRESPONDENTS.

BY B. D. WALSH, M. A.—Associate Editor.

C. S. Jackson, Ky.—The chestnut-colored beetle covered with very short white hairs and fully a quarter of an inch long, which you say is making great destruction in your vineyards this year, is an undescribed species of *Fidia*. This genus is allied *Pachnephorus*, which contains several described species, and it belongs to the same great *Chrysomela* family as the common striped Cucumber-bug (*Diabrotica vittata*), the blue Flea-beetle of the Grape-vine (*Haltica chalybea*), several species of small Flea-beetles which infest young cabbage and radish-plants and also, as I have observed, young egg-plants, and our newly-imported Potato-bug (*Doryphora 10-lineata*), besides two species of Tortoise-beetle which infest the Sweet Potato (*Cassida vittata* and *pallida*.) I have taken your beetle on the wild grape vine in small numbers both in North and South Illinois, but this is the first instance on record of its swarming as it does with you. Its falling from the leaf and feigning death is a habit that it has in common with all the members of the family to which it belongs, and the "Curculio" family do the very same thing.

You say it commences about the middle of June with you, 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 larvæ of all beetles are altogether

unlike the perfect insect, you may not have recognized their identity. The larva of this species will be an elongate grub, with a hard shelly head, a soft body, no wings of course, six legs in front and a single "pro-leg" or short fleshy stump which it uses as a leg at its tail; and the color will probably be some obscure shade of pale drab or brown. 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 you should use every exertion to destroy them. 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 this species is many-brooded, i. e. that there are several generations of them in one year.

The minute insect, which you say "appears about May 1st and clusters in thousands upon the ends of the branches of the grape vine, apparently doing but little damage, though the leaves upon which they are found curl up and cease to act a good part," is a Plant-louse and probably the European species *Aphis vitis*. There are hundreds of cannibal and parasitic insects preying upon plant-lice; otherwise they would soon increase so enormously as to destroy every green thing on this earth. In the small parcel you sent, I counted between two and three dozen specimens of an *Aphidius*—a minute 4-winged Fly belonging to the great *Ichneumon* family, the larva of which lives inside the body of a plant-louse and finally destroys it. Of course they bred from the plant-lice during the eight days they were on the road. As to the Ants, they neither produce nor destroy plant-lice, but simply attend them for the sake of the rich honey-dew, which they cause them to disgorge from the honey-tubes on their back. "The ants," said Linnæus one hundred years ago, "ascend the trees that they may milk their cows, the *aphides*." If you do not believe Linnæus, you may see the whole operation any day with your own eyes.

T. T. Southwick, N. Y.—The Cherry-twig borers that you sent were five days on the road, and were dead and dried up to nothing by the time I got them. If the twigs had been corked up in a quill or a small glass vial or enclosed in any small tight tin vessel, they would have travelled much better. I know of no insect working on cherry twigs as they do; but until I can see good specimens, I cannot even tell what Order they belong to.

A. D. Chesebro, Mich.—You say you have a cornfield infested with wireworms; that last year you tried ashes and lime as remedies without any perceivable good result; and that this year you put a handful of salt around each hill and about two inches from it, which killed the corn but not the wireworms. As you wish to sow your field with wheat next autumn, I should recommend you to plow it continually through the summer, so as not to allow either weeds or anything else to grow on it. The wireworm lives exclusively on roots, and he is just like one of us Christians in this respect, that he cannot live without eating. But if you allow nothing to grow in your field, there will be no roots for him to feed on; consequently he must necessarily be starved out. In Europe this process is called "Summer fallowing" and is used extensively to destroy weeds and Noxious Insects.

Thos. M'Graw, Wisc.—Your insects arrived in miserable order. Of course if you pack eight glass vials loose in a box, without even wrapping up each in a separate paper, some of them will get broken on the road. Besides, some of your numbers, being marked with pencil on the corks of the vials, I cannot read with any certainty. Here follow the names of your insects, so far as I can name them, many being out of the vials and mashed up with broken glass. No. 1, a kind of Spindle-worm, but not the Eastern *Gortyna zea*. No. 2 is the larva of some moth. No. 5, *Arrhenodes septentrionis*. No. 6 is the chrysalis of some moth. No. 8, *Nyctobates pensylvanicus*. No. 10, (in a box) a species of *Iulus*, or hundred-legged worm, not a true insect, but belonging to the Class *Myriapoda*. No. 10, (in vial) *Lytta cinerea*, our common northern potato-bug or blister-beetle. No. 12, *Capsus 4-vittatus*, a true Bug. No. 13, *Megachile brevis*, male, a leaf-cutting bee. No. 14, *Amara basillaris*. No. 15, *Pæcilus lucublandus*. No. 16, *Podabrus modestus*. No. 17, *Lucidota atra*. No. 18, *Neatus tenebrioides*. No. 20, *Scsia diffinis*, but too ragged and torn to name with certainty.—Nos. 11, 15, 16 and 17 are cannibals. Nos. 1, 2, 10 (in vial) and 12 are injurious, and 20 in the larva state eats honeysuckle. Nos. 5, 8, 10 (in box) and 18 feed on rotten wood and are harmless, and No. 13 is also harmless.—I cannot tell what insect you call the "common garden grub." It may be some larva that is very common with you and very rare with me.

L. E. Harmon, N. Y.—The little greenish, flat-oval scales, about ⅛ inch long, attached to oleander leaves are a foreign species of bark-louse often found on greenhouse plants. Their history is nearly the same as that of the common Bark-louse of the Apple tree. When the female gets her full growth she attaches herself to the plant she lives on, and having first laid a number of eggs under her own body, finally loses all traces of organization and dies. In the common Apple-tree Bark-louse these eggs remain unhatched till the following summer, but in this exotic species those laid earliest in the summer hatch the same season, so that the insect is many-brooded. In the specimens you sent I found many of the eggs already hatched into small but very vigorous and active young lice, which had apparently been feeding on the body of their mother, but would no doubt soon go forth on their own hook into the botanical world. With greenhouse plants the best remedy is tobacco-smoke applied in a tight place, washing the leaves afterwards with a syringe; but probably kerosene diluted with about ½ or ¾ water and syringed on to the whole plant would kill them.

C. K. Yant, Ohio.—The flat turtle-shaped beetles, about one-fifth inch long, infesting your sweet potato vines are a common species of tortoise-beetle (*Cassida*), the *pallida* of Herbst. There is another species with five conspicuous black stripes placed lengthways on its back (the *bivittata* of Say) which I found myself in large numbers on the sweet potato in South Illinois. There is still another species (the *atripes* of LeConte, unless my memory fails me) which is a great pest on the common Morning Glory and is called "Gold-bug" by the ladies. This, as well as your species, changes color when alive from clay-yellow to burnished gold, and the golden color is always lost in the dried specimen. The larvæ of all of them have the singular habit of hoisting an umbrella over their bodies composed of their own excrement, for which purpose Nature has given them a long two-forked tail which they have the power of bending over their backs, having first loaded the fork with a suitable forkful. No doubt they find this useful, not only to keep off the sun, but to protect them from birds and cannibal insects.

J. Bird, Penna.—The chestnut-brown shining scales about the size and shape of the half of a pea, adhering to the twig of the grape-vine, are the dead bodies of the Barklouse of the vine—*Lecanium vitis* of Linnæus—an imported insect like the apple-tree Barklouse. Underneath these scales were very numerous white eggs and young lice just hatched out. If abundant on your vines, they will do great injury, unless some kind Ladybird takes to killing them. On the general Subject of Barklice, see the Answer to L. E. Harmon in this number of the PRACTICAL ENTOMOLOGIST.

O. B. Douglas, Vermont.—I am now able to say, the eggs having hatched out, that the chestnut-brown shining scales, about the size and shape of the half of a pea, which you found on plum-tree twigs are a species of Barklouse. They closely resemble the Barklouse of the Vine but are probably distinct, the eggs being pink now that they are hatching out, although three weeks ago they were pure white. No such species has hitherto, so far as I know, been found on the Plum in this country; but Dr. Fitch describes an allied species, *Lecanium cerasifex*, as found on the wild black cherry.

L. D. Morse, Sec. Missouri State Agr. Soc.—The "eggs very curiously and regularly deposited along the edge of an oak leaf," and between its upper and lower surfaces, are probably those of some Sawfly, many of which inhabit the oak in the larva state and feed on its leaves, like ordinary caterpillars. These larvæ are often mistaken by the inexperienced for caterpillars or the larvæ of moths (*Lepidoptera*), but may usually be distinguished by having a greater number of legs than 10—i. e. 18, 20 or 22. As in the case of the eggs of the *Cicada* (popularly called *Locust*), the eggs of the Saw-fly derive nourishment from the sap and grow thereby; which is the reason why the mother-insect lays them *inside* the leaf and not on its surface. Subscriptions for the PRACTICAL ENTOMOLOGIST are receivable by the Secretary at Philadelphia.

R. F., New Jersey.—The heads of wheat you send are infested—not very badly, however—with the orange-colored larvæ of the common Wheat-midge, (*Cecidomyia Tritici,*) an insect which was introduced into this country some twenty or thirty years ago from Europe, and which, according to returns from the different counties of the State of New York, which were thoroughly sifted and footed up by the Secretary of their State Agricultural Society, destroyed in one single year in that single State the enormous amount of *fifteen million dollars' worth of wheat.* In England the largest amount of wheat it was ever known to destroy in one single year was one-twentieth of the entire crop. Such a small percentage as that, American farmers would not think worth talking about; but here the Wheat-midge often takes over half of the entire crop. The reason is simple. In England there are no less than three parasitic insects preying upon the Wheat-midge; in this country there is not one, because it wisely emigrated here without its parasites. One would think that common sense would indicate to our Government the good policy, as a matter of dollars and cents, of importing the parasites, particularly as the whole operation need not cost more than a few thousand dollars. But no. Although this plan was long ago recommended by some of the best entomologists in the country, Dr. Fitch for example, it has never been adopted, and probably never will be. Why? Because our Legislatures think that insects are such very minute objects, that they are unworthy their notice; forgetting that the plague of flies, the plague of lice and the plague of locusts were three of the worst plagues that God in his wrath sent to afflict the rebellious land of Egypt.

The Wheat-midge itself in its perfect or winged form is a small two-winged fly, shaped much like a musketo, but considerably smaller, and with an orange-colored abdomen. It comes out in June from under the ground, where it has lain all winter, the time varying a little according to the latitude, and lays its eggs upon the ears of wheat when they are in blossom. These quickly hatch out into the orange-colored little maggots which do all the mischief, sucking out the life-blood of the future kernel so that it shrinks up to nothing. When full-fed they mostly go underground and construct a very filmy cocoon which adheres strongly to the surrounding earth, and inside which they transform next spring into the pupa state. But a few remain in the ear and construct their cocoon there, which fits so closely to their bodies, that it is only visible where it projects a little at each end, the cocoon itself being transparent and finer and more filmy than the most delicate gold-beaters' skin. I found two such specimens in the few ears you sent. European authors long ago noticed these facts, as to a certain percentage of the larvæ remaining permanently in the ear, but strangely enough they have been overlooked and misunderstood both by Dr. Harris and by Dr. Fitch. The practical inference to be drawn therefrom, is that when farmers are cleaning up wheat, which is infested or suspected of being infested by the Wheat-midge, they ought always to burn up or otherwise destroy the "tailings." For these "tailings" will doubtless contain many of the larvæ that have staid in the ear, which, if not destroyed, might hatch out next season into the perfect fly and propagate the breed. (See on this matter my Paper in the *Proceedings,* &c., IV. pp. 563—9.)

As you say that your "Pedigree wheat," imported from the Isle of Wight for seed, has for two years past been badly infested by this insect, while the rest of your field, which was sown with another kind of wheat, was uninjured by insects, I should recommend you to give up growing "Pedigree wheat." Doubtless this variety is peculiarly agreeable to the mother-fly, so that she gathers upon it from all the other parts of the field to lay her eggs thereon. Possibly, however, it might answer to grow it by way of trap to concentrate all the Wheat-midges upon one spot; but of this you must be the best judge.

M. H. Boye, Penna.—The ears of wheat and rye that you send are infested by the larva of the common Wheat-midge, which is often popularly called the Red Weevil. You will find the information you want in the answer to "R. F., New Jersey" in this number of the PRACTICAL ENTOMOLOGIST. I found two specimens of the larvæ in your rye that had already made their cocoons, just as I did in the wheat sent by R. F. This is a curious fact, because both Harris and Fitch ignored the possibility of any larvæ passing to the pupa state in the ear and coming out as winged flies the same season. Yet, from these two examples, it seems to be comparatively a common thing. The same insect attacks indifferently both wheat and rye. Farmers should always be careful to burn their "tailings," when they clean up small grain known or suspected to be attacked by the Wheat-midge; because they will thus destroy many of the larvæ that are now proved to stay in the ear, instead of going under ground as most of them do. I think it not at all improbable that many of these larvæ that stay in the ear will not come out into the fly state till the following June, though the fact is not noticed by English writers, who were well aware that a certain percentage of the larvæ staid in the ear. I infer this from the analogy of other species of the same genus.

J. H. Foster, Jr., Penna.—The elongate-conical, brown bodies about one-fourth inch long, growing from the leaf of the Isabella grape-vine like so many thorns on a thorn-bush, are galls made by some species of *Cecidomyia* or Gall-gnat. I know two other kinds of galls made by gall-gnats on the grape-vine, which are quite distinct from these of yours. The larvæ of all Gall-gnats are readily distinguishable by what is technically called the "breast-bone," which is a dark-colored horny process, generally Y-shaped or clove-shaped, which is situated on the lower part of the first joint behind the head, and the use of which I believe to be to abrade the internal surface of the gall so as to cause an unnatural flow of sap to the part, upon which sap the larva lives. Most of these larvæ are blood-colored, orange-colored or yellow, with peculiar bowel-like, curdy, white markings; but a few are entirely pale semi-transparent whitish. The number of different galls made by Gall-gnats on different plants is enormous, but the perfect fly has been bred from but very few of them, as they are peculiarly hard to rear to maturity. For example, Baron Osten Sacken describes eight different gall made by Gall-gnats on the leaves of different kinds of Hickory, but he only bred the perfect fly from a single one of the eight.

Marion Hobart, Illinois.—The oval bunch of eggs about three-fourth inch long, surrounding a twig of the cherry tree and shining with a certain glutinous substance which protects them from the weather, is nothing but the eggs of the common web-caterpillar of the Apple-tree, *Clisiocampa americana.* This larva commonly feeds not only on the apple-tree, but on cherries and plums both wild and tame, and also on the birch, the willow, &c., and on all which trees the eggs are commonly found. It is remarkable that these eggs should stand all the heat of the summer's sun and all the cold of the winter's winds, without losing their vitality. But there they swing aloft, blown to and fro by every breeze, scorched by the heat and parched by the cold, till the earliest spring leaves put forth, when out of every egg that has not been preyed upon by a minute parasitic *Platygaster* issues forth a tiny worm, to gorge itself with leaves and grow and grow, till it finally becomes a pale reddish brown winged moth. There is another web-caterpillar—*Hyphantria textor*, Harris—which I find sometimes on the apple tree and other trees, but much more commonly on the Pignut Hickory—which produces a white, not a pale reddish brown, moth. This, however, may be readily distinguished from the other by its wanting the beautiful sky-blue stripes and being much smaller and appearing much later in the season.

M. S. Hill, Ohio.—The clay-colored beetle nearly an inch long and with six black spots on its back is *Pelidnota punctata,* a well known enemy to the foliage of the grape-vine in its perfect state, though its larva to my knowledge feeds on very rotten wood. The smaller beetle not quite one-half inch long and varying in color from almost entirely clay-yellow to almost entirely black is *Anomala lucicola,* and is likewise well known to attack the leaves of the grape-vine. Its larva probably feeds underground on the roots of plants. Both are figured in Harris's book.

The caterpillar you sent which infested the raspberry bushes, "feeding with great voracity upon both the leaves and the berries," spun its cocoon on the road, and I can therefore say nothing about it. I hope to breed the perfect moth from it, when I will advise you further. The insects were all well packed and reached me in first rate order.

Rev. Jas. B. Fisher, N. Y.—You send about a dozen blackish maggots, ½ inch long and with the head end tapered to a point, which you say were found attached by their mouths to the body of a half-fledged young swallow, most of them to the head of the bird, much as a tick is attached to the body of a sheep, but not so firmly but what you could pull them off. They arrived in excellent order and form now a very interesting and valuable addition to my collection.

I have carefully examined these larvæ and they belong, I think, undoubtedly to the *Œstrus* family—a family of two-winged flies which includes the fly that produces the Head-maggot of the sheep—the fly which makes what are called "wormals" (worm-holes) in the hides of Cattle—another fly as large as a large Humble-bee and very like one, which lays two or three eggs on the neck of the rabbit, whence proceed maggots nearly as large as a man's thumb burrowing in the flesh and causing a large tumor on the affected part, from which maggots I have myself bred the perfect fly (*Cuterebra cuniculi*)—another fly nearly as large, (the *Cuterebra emasculator* of Fitch) which lays its eggs in the scrotum of squirrels, so that the larva hatching out therefrom finally mutilates them and produces the phenomenon of emasculation in a state of nature, which imaginative hunters had accounted for by supposing that the old male squirrels mutilated the young ones—and finally the well-known Bot-fly of the Horse. Nay, even the sacred body of man is not free from the attacks of these insects; for there is authentic evidence that a species exists in South America which makes "wormals" in the human flesh. But in all these cases, and also in the case of all other known insects belonging to the *Œstrus* family, the larva resides somewhere inside the body of the infested animal and that animal is always a mammal, or properly speaking a Quadruped; whereas in the remarkable case recorded by you the larva is attached externally to the body of the infested animal, and that animal is, not a mammal, but a bird.

All larvæ belonging to this family, as soon as they are full-fed, extricate themselves from the animal they infest and go underground to pass into the pupa state, not emerging into the perfect fly state till the following season. It would be very desirable, in case you meet with another swallow infested by these larvæ, to attempt to breed the perfect fly from them. For this purpose the bird should be placed in a large jar half full of moist earth and kept alive by feeding it with flies. After the parasites have retired underground, the earth in the jar should be kept moist by covering it with damp moss or damp dead leaves, moistened afresh every few weeks; and in the following spring the mouth of the jar should be covered with musketo-bar to prevent the flies escaping uncaught. Most probably these flies will belong to a new and hitherto undescribed genus, which, if you should succeed in rearing them, will be very appropriately named "Fisheria." If you send some to me, I think I can promise you that much.

You observe upon the strangeness of so large a parasite infesting so small an animal. There is a small wingless parasite, about the size of the head of an ordinary pin, which infests many kinds of beetles, especially dung-beetles, and of which I once counted no less than seven all gathered upon the body of a single small fungus-beetle, not much over ⅛ inch long—the *Triplax thoracica* of Say. This is as if a grown man had seven lice crawling over his person, each louse as large as a full-grown turkey.

James Barratt, Mass.—The oval, pale brown, smooth, silken cocoons, about one-fourth inch long, which you send, were spun by the larvæ or worms, which, as you say, were found by thousands upon two American Black Spruce trees, eating all the leaves off them. They will produce four-winged Flies belonging to the Family of Saw-flies (*Tenthredinidæ*), so called from the females having a pair of saws at the tip of her abdomen, which she uses to cut slits in the leaves wherein to deposit her eggs. Most probably your species is the *Lophyrus abietis* of Harris, which has long been known to operate upon fir-trees in Massachusetts in the manner you describe. The male fly is black and the female pale brown, so that you would scarcely think they belonged to the same species. You will find figures of each in Harris's book on Injurious Insects, Plate viii, figs. 3 and 5. The best way to get rid of them is to shake the larvæ or worms off the tree upon a sheet, and then either burn or scald them or feed them out to chickens, turkeys or hogs. Of course if they are allowed to increase and multiply without check either from man or from some cannibal or parasitic insect, they will destroy the trees upon which they feed.

And now, Mr. Barratt, let me give you a scolding. You sent indeed great plenty of cocoons, and for that I thank you; but you sent them loose in your letter, so that almost all of them were squeezed as flat as a pancake before they reached me. Now in this region we have no *Lophyrus*, because we have scarcely any pines and firs; and I therefore should have been glad to rear specimens of the perfect fly from your cocoons, which now I shall probably be unable to do. Another time always enclose specimens in a little pasteboard box, filling up any vacant space with cotton-wool or some such matter.

Arthur O. Brickman, Maryland.—It is quite impossible to tell what insect it was that stung you. The symptoms in your case were certainly very severe and unusual, but I believe that this was owing to some peculiarities in your habit of body at the time, rather than to any peculiarity in the nature of the insect—if it was an insect and not a spider—that stung you. The sting of a honey-bee is ordinarily not very severe in its effects: but I know of cases where persons stung by honey-bees have died in consequence. When I was a boy I was often stung by bees and humble-bees without suffering much therefrom: but on one particular occasion, being stung in the lip by a humble-bee, my whole body was in five minutes covered by lumps like a violent nettle-rash, and in an hour's time my face swelled up so that I could not see out of my eyes. I recollect well that this attack lasted for three days and was finally subdued—after trying various other remedies—by poultices of an English herb called "feverfew." I am generally stung now two or three times every year, as I catch many stinging insects fearlessly with my bare fingers; but I always find, that if I suck the wounded part for ten or fifteen minutes, the consequences pass off in a short time.

Geo. E. Brackett, Maine.—The shining mahogany-colored bunches, of an irregularly hemispherical shape and about one-fourth inch in diameter, attached in masses to blackberry stems and each of them when lifted up disclosing an enormous number of minute pale pinkish eggs, are the dead bodies of a bark-louse. A species which cannot be distinguished from this, so far as the dead body of the mother bark-louse is concerned, infests the grape-vine, and was named by Dr. Fitch *Leccanium vitis* and supposed to be identical with a species that infests the grape-vine in Europe. I also received from O. B. Douglas of Vermont exactly similar specimens found on the plum, as noticed in the "Answers" in No. 9, p. 89. I had thought at first that the species found on the plum might be distinguished from that found on the grape-vine by the color of the eggs; but it seems probable that the immature eggs are always white, and that as they approach the time when the included young bark-louse is almost ready for hatching, its pinkish or reddish color shows through the delicate shell of the egg. Still it is not improbable, that when the males of all these bark-lice are bred, they may prove to be distinct species. This has not yet been done with any of our N. A. *Lecanium*. Great numbers of your eggs hatched out on the road, and there were also in the box two minute Chalcidians, which had no doubt been parasitic in one of the eggs, remarkable for having a bright yellow scutel. I know but one other Chalcidian that has such a yellow scutel.

Dr. Wm. Manlius Smith, N. Y.—The "elongated eggs" you find in the pith of dead sumach twigs I know to be those of some species of the Catydid family, probably belonging to the genus *Orchelimum* or *Xiphidium*. See on this matter my Papers in the *Proceedings* III, pp. 232—3 and 581. There was no living thing in the specimens sent except these eggs.

The *Practical Entomologist*, now near the close of its first year of publication, desires to know if its friends will sustain it another year to the extent of 5000 subscribers at 50 cents each. It ought to have 500,000, even at a dollar. There is not a farmer in the United States who could not derive great benefit from reading it. Some single hint on the destruction of some troublesome insect might save the subscriber many times the cost of the paper.—*Weekly New Hampshire Advertiser.*

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