IMPORTED INSECTS AND NATIVE AMERICAN INSECTS.

[From the Report of Charles V. Riley, State Entomologist of Missouri].

If we examine into the history of the imported currant worm and the native currant worm, we shall find a very curious state of things. These two insects both produce sawflies, which are so closely allied to each other, that although they are referred to distinct genera by entomologists, it may be doubted whether the genus (*Pristiphora*) under which the native species is classified be not a mere subgenus of that under which the imported species is classified. Reasoning *a priori*, therefore, we should expect to find a very great similarity in the destructive powers of these two worms, especially as each of them infests the leaves both of the red currant and of the gooseberry. But what are the actual facts? On the one hand we see a native American species—which must have existed here from time immemorial, feeding on our wild gooseberries and perhaps on our wild red currant, and which yet has troubled our tame gooseberries and tame red currants so very slightly, that it cannot be proved with absolute certainty to have ever done so at all, except in Rock Island County, Ill., and in Scott county, Iowa.

On the other hand we see a species, only introduced into this country, from Europe, some twelve years ago, which has already almost put a stop to the cultivation of the gooseberry and red currant throughout a large part of the State of New York, the northern borders of Pennsylvania, and the whole of Canada West, and is slowly but surely extending itself in all directions from the point where it was originally imported. What can be the reason of such a wide difference in the noxious powers of two such closely allied insects, feeding on exactly the same plants, but one of them indigenous to America and the other imported into America from Europe? Nor is this the only case of the kind. We can point out at least three other such cases. The imported onion-fly (*Anthomyia ceparum*), is a terrible pest to the onion-grower in the East, though it has not yet made its way out West. On the other hand, the native American onion-fly (*Ortalis arcuata*, Walker), which is a closely allied species and has almost exactly the same habits, has only been heard of in one or two circumscribed localities in the West, and even there does comparatively but little damage. Again, the imported oyster-shell bark-louse (*Aspidiotus conchiformis*) is a far worse foe to the apple and certain other fruit trees than our indigenous Harris' bark-louse, (*Asp. Harrisii*), though each of them infests the same species. Finally, the imported meal-worm beetle (*Tenebrio molitor*) swarms throughout the whole United States, and is a great pest; while the native American species (*Tenebrio obscurus*), which has almost exactly the same habits, belongs to the same genus, and is of very nearly the same size, shape, and color, is comparatively quite rare among us, and is scarcely known to our millers and flour-dealers.

On a careful and close examination, it will be found that almost all our worst insect foes have been imported among us from the other side of the Atlantic. The Hessian fly was imported almost ninety years ago; the wheat midge about half as long ago; the bee moth at the beginning of the present century; the codling moth, the cabbage tinea, the borer of the red currant, the oyster-shell bark-louse, the grain plant-louse, the cabbage plant-louse, the currant plant-louse, the apple-tree plant-louse, the pear-tree flea-louse, the cheese-maggot, the common meal-worm, the grain weevil, the house fly, the leaf-beetle of the elm, the cockroach, the croton bug, and the different carpet, clothes, and fur moths, at periods which cannot be definitely fixed. Even within the last few years the asparagus beetle has become naturalized in New York and New Jersey, whence it will no doubt spread gradually westward through the whole United States, while the rape butterfly was introduced about a dozen years ago, and is rapidly spreading over some of the Eastern States. And only a year ago the larva of a certain owlet-moth (*Hypogymna dispar*), which is a great pest in Europe, both to fruit trees and forest trees, was accidentally introduced by a Massachusetts entomologist into New England, where it is spreading with great rapidity. It is just the same thing with plants as with insects. We have looked carefully through Gray's *Manual of Botany*, and we find that—excluding from consideration all cryptogams, and all doubtful cases, and all cases where the same plant is supposed to be indigenous on both sides of the Atlantic—no less than *two hundred and thirty-three* distinct species of plants have been imported among us from the Old World, all of which have now run wild here, and many of which are the worst and most pernicious weeds that we have to contend against. In the United States *Agricultural Report* for 1865 (pp. 510-519) will be found a list of ninety-nine of the principal "Weeds of American Agriculture," by the late Dr. Wm. Darlington. Of this whole number no less than forty-three, or nearly one-half, are species that have been introduced among us from the Old World. Among these we may enumerate here, as the best known and the most pernicious, butter-cups (two species), shepherd's purse, St. John's wort, cow-cockle, May-weed or dog-fennel, ox-eye daisy, common thistle, Canada thistle, burdock, plantain, mullein, toad-flax, bind-weed, Jamestown (Jimson) weed, lamb's quarter, smart-weed, field garlic, fox-tail, grass, and the notorious cheat or chess. And to these we may add the common purslane, which, through some strange oversight, has been omitted in Dr. Darlington's catalogue.

It will be supposed, perhaps, since there are about as many voyages made from America to Europe as from Europe to America, that we have fully reciprocated to our transatlantic brethren the favors which they have conferred upon us, in the way of noxious insects and noxious weeds. It is no such thing. There are but very few American insects that have become naturalized in Europe, and even these do not appear for the most part to do any serious amount of damage there. For example, on one or two occasions single specimens of our army-worm moth (*Leucania unipuncta*) have been captured in England; but the insect has never spread and become ruinously common there, as it continually, in particular seasons, does in America. Our destructive pea-bug (*Bruchus pisi*) has also found its way to Europe; but although it is met with in England, and according to Curtis has become naturalized in the warmer departments of France, Kirby and Spence expressly state that it does not occur in England "to any very injurious extent," and Curtis seems to doubt the fact of its being naturalized in England at all. Again, the only species of white ant that exists within the limits of the United States, (*Termes frontalis*), has been known for a long time to be the guest at the plant-houses of Schönbrunn, in Germany; but is not recorded to have ever as yet spread into the surrounding country. As to our American meal-worm (*Tenebrio obscurus*), Curtis states that it has been introduced into England along with American flour, and that it is sometimes abundant in London and the provinces; but Kirby and Spence say not one word about it, and it seems to be confined to the English seaports, and the places where American flour is stored, without spreading into the adjacent districts.

A very minute yellow ant, however, (*Myrmica molesta*), which is often very troublesome with us in houses, has, according to Frederick Smith, "become generally distributed and naturalized" in houses in England; and Kirby and Spence state more specifically, that "it has become a great pest in many houses in Brighton, London, and Liverpool, in some cases to so great an extent as to cause the occupants to leave them." As to our chinch bug, our curculio, our plum gouger, our two principal apple-tree borers, our canker-worm, our apple-tree tent-caterpillar, our fall web-worm, our peach-tree borer, and our other indigenous pests among the great army of bad bugs, nobody ever yet found a single one of them alive and kicking on the other side of the Atlantic. And with regard to plants, the only two American plants that we know to have become so firmly established in Europe as to be a nuisance there, are an American aquatic plant, the common water-weed (*Anacharis canadensis*), which has choked up many of the canals in England, and our common horse-weed, or mare's tail as it is called in the West (*Erigeron canadense*), which has spread from America nearly over the whole world.

Since then, it can be demonstrated by hard, dry facts, that American plants and insects do not become naturalized in the Old World with anything like the facility with which the plants and insects of the Old World are every day being naturalized in America, there must be some cause or other for this singular state of things. What is that cause? It is, as we believe, a simple fact which is pretty generally recognized now as true by modern naturalists, namely, that the plants and animals of America belong, as a general rule, to an old-fashioned creation, not so highly improved and developed as the more modernized creation which exists in Europe. In other words, although this is popularly known as the New World, it is in reality a much older world than that which we are accustomed to call the Old World. Consequently, our plants and animals can no more stand their ground against European competitors imported from abroad, than the red Indian has been able to stand his ground against the white Caucasian race. On the other hand, if by chance an American plant or an American animal finds its way into Europe, it can, as a general rule, no more stand its ground there against its European competitors, than a colony of Red Indians could stand their ground in England, even if you gave them a whole county of land and an ample supply of stock, tools, and provisions to begin with. For throughout animated nature, as has been conclusively shown by Charles Darwin, there is a continual struggle for existence, the stronger and more favorably organized species overpowering and starving out from time to time their less vigorous and less favorably organized competitors. Hence, it is as hopeless a task for a poor puny, old-fashioned American bug to contend against a strong, energetic, highly-developed, European bug, as it would be for a fleet of old-fashioned wooden ships to fight against a fleet of our modern iron-clads.

Let not "Young America," however, be altogether discouraged and disgusted at hearing, that our animal and vegetable creation is more old-fashioned than that of what is commonly known as the Old World. The oldest geological formations, in which the remains of mammals occur, contain the remains of such mammals exclusively (*Marsupialea*) as bring forth their young only partially developed, and carry those young about with them in a pouch, till the day of complete development and physical "second birth" arrives. In America we have a single genus—the opossums—that belongs to this antediluvian type. In the three ancient continents they have absolutely none at all. But if in this respect America is more old-fashioned than Europe, Australia is still more old-fashioned than America; for there almost all their mammals possess this remarkable peculiarity; so that if the American creation is somewhat old-fogyish, that of Australia is the very concentrated essence of old-fogyism itself. Consequently, if Europe crows over us as altogether "behind the times," "Young America" can take its revenge by crowing over Australia, as the land of the kangaroo and the wombat and other such exploded absurdities of the Mesozoic epoch.

Professor Seely on Ammonium Amalgam.

The *Mechanics' Magazine* contains the following criticism on Professor Seely's recent papers upon this subject: "We referred so many times to Mr. Graham's experiments on the absorption of hydrogen by palladium, and his views on the metallic nature of hydrogen, that we may give a passing notice of the latest objections to Mr. Graham's theory. Professor Seely, of New York, has made some experiments with the so-called ammonium amalgam, and has come to the conclusion that it is no amalgam at all in the ordinary acceptation of that term, but merely a froth produced by the entanglement with the mercury of the mixture of ammonia and hydrogen set free on the decomposition of chloride of ammonium. The strongest evidence in favor of the correctness of this view is to be found in the fact, that when the so-called amalgam is subjected to pressure, its volume changes apparently in accordance with Marriotte's law of gaseous volume. Thus, at all events, it must be considered as proved, that admitting the existence of ammonium in the amalgam, it is neither a solid nor a liquid, but a gas. Professor Seely contends that the expansion of palladium on the absorption of hydrogen is analogous to the swelling of the mercury on the absorption of the two gases named; and that if the particles of palladium were as free to move as those of mercury, a palladic froth would be produced. There may be something in this objection, which does not, however, touch Mr. Graham's strongest point. In another sentence the American Professor goes decidedly wrong when he asserts that oxygen is more readily absorbed by metals than hydrogen, and yet no one has a theory of oxygenium. Mr. Graham found that oxygen was less readily absorbed; and he distinctly announced his belief in the existence of the metal oxygenium.

Transformation of Cast Iron.

"Transformation of Cast Iron, Wrought Iron, and Steel by means of the Vapors of Alkaline Metals." Such is the title of a patent taken in France by MM. Charles Girard and Jules Poulain (date 17th August, 1869, No. 86,784), the particulars of which we extract from our excellent cotemporary, the *Moniteur Scientifique:*

"In order to cause the vapors of sodium and potassium to act on cast iron in fusion, we heat one of the former metals in an iron retort to 392° or 482° under a pressure of five or six atmospheres. When this heat is reached we direct the vapor thus obtained into the heart of the iron in fusion; the mass swells, and an alloy of the iron is the result. These alloys, although very hard, are malleable, and may be forged and welded. They oxidize rapidly in air or water, and are easily decomposed if a current of air, steam, or carbonic oxide is injected into them when in fusion. By these compound effects of the vapor of sodium and of air, for example, the whole of the metalloids in the iron are attacked, and the final result is pure wrought iron that can be hammered and welded with ease. Under certain circumstances the metal resulting from the operation may present the properties of steel. Finally, to facilitate the production of the metallic vapors carburets rich in hydrogen may be added to the sodium or potassium in the retort.

"In place of sodium or potassium an alloy of the two may be used, as, for instance, one composed of four parts of potassium (melting at 122°) and 2·5 parts of sodium (melting at 194°). This mixture, which has the appearance and consistency of mercury, has its point of solidification at 47·4°, and is consequently liquid at ordinary temperatures. It is prepared under naphtha

"It has been remarked that, besides the direct transformation of cast into wrought iron or steel, by means of the metals, their action produces other advantages; they allow of the employment of cast iron, which, although containing manganese, are reputed as bad, and cannot be converted by the Bessemer process, on account of the quantity of carbon, sulphur, or phosphorus which they contain. It is, in fact, now proved that the Bessemer process, far from eliminating the sulphur and phosphorus, tends rather to augment the proportion of these metalloids.

"The cast irons known as *chaudes*, and which contain silicium and magnesium, owe a part of their superiority to the calorific power of the silicium (7800), the produce of the oxidation of which, silica, requires but little heat to disengage it, so that the liquefaction becomes more complete. On the other hand, carbon, under the same conditions, gives rise to the disengagement of masses of sparks produced by the gases carbonic acid and carbonic oxide, which traverse the mass; these take from the molten matter a considerable quantity of caloric, and are thus unfavorable to liquefaction.

"In our process this latter inconvenience is partly dispelled, for the gases produced by the combustion of the carbon, sulphur, and phosphorus, combine with the soda or potash are mechanically carried through the mass of metal by the oxidation of the sodium of potassium. The direct action of the sodium or potassium, in the form of vapor, on the melted iron, may be replaced by adding to the mixture of ore, fuel, and flux, either chloride of sodium, carbonate of soda, a corresponding salt of potash, or a mixture of these.

"Acting thus on any given ore, and using coke or coal as fuel, a result analogous to that obtained with charcoal under the ordinary system is obtained. We must add, however, that in the former case the current of hot or cold air should be longer maintained than when charcoal is used; this prolonged application of hot or cold air in the blast furnace may present inconvenience, which may be avoided by directing the alloys of cast iron with sodium or potassium into a converter, in which they may undergo the final action of the current of air; with this process the working of the blast furnace is the same as in ordinary cases.

"We arrive practically at an assimilation of the coke or coal with alkaline salts corresponding to those furnished by wood charcoal, either by watering the fuel with the alkaline solutions above-mentioned, and then allowing it to dry in sheds by introducing the salts into the mass of molten iron, or, lastly, by pouring a concentrated solution of the various salts on the fuel or the ore at the moment of charging the furnace. "We intend to continue our experiments on the alloys and combinations of sodium and potassium with most of the other metals."