THE PHYLLOXERA PICTURED AND DESCRIBED.

Our engravings on this page show the ill-omened vineyard destroyer—the phylloxera in its varied forms: the figures showing the insect as it appears when highly magnified. The engravings are from drawings by Prof. C. V. Riley, U. S. Entomologist, who would be eminent for his studies of this foe of the grape grower, even if his many other invaluable contributions to economic entomology had never been made. This is the insect which has occasioned such great loss to the French vine growers during the last 10 years.

The genus *Phylloxera* comes under the wider classification *Aphidide* and is assigned by the entomologists a position midway between the plant louse or aphis and the more degraded bark louse or cocus. There are 16 described species of *phylloxera*, but because of its prominence through vine-destroying the species *Phylloxera vastatrix* has assumed the name of the genus and is commonly regarded as *the* phylloxera. In describing this insect in its various forms, we shall follow, more or less closely, Prof. Riley's article in "Johnson's Universal Cyclopedia."

Fig. 1.

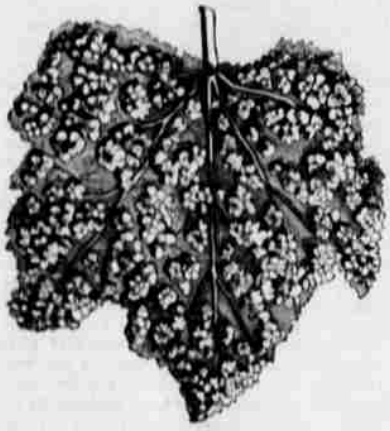


Fig. 4.

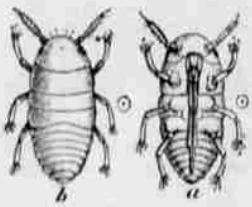


Fig. 7.

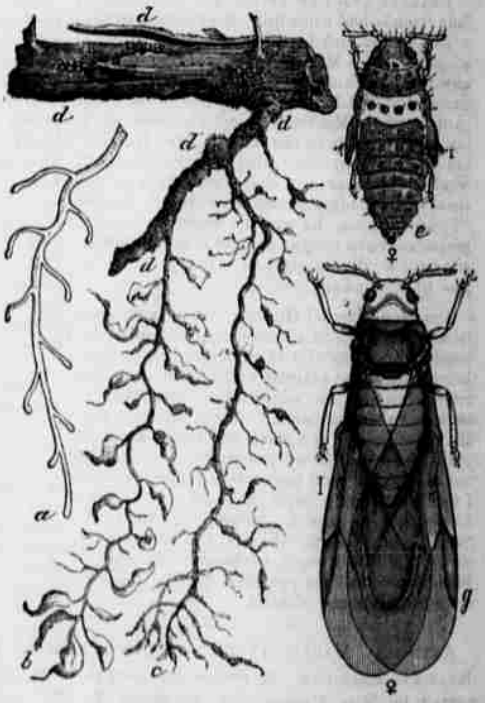


Fig. 5.

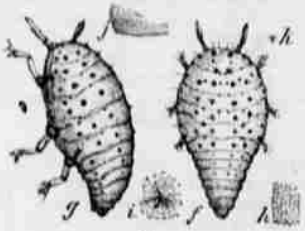


Fig. 2.

Fig. 3.

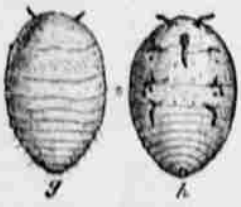
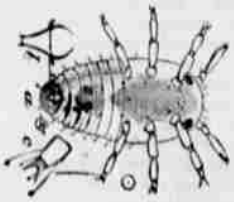


Fig. 6.



THE NATURAL HISTORY OF THE GRAPE-VINE LOUSE.—Phylloxera Vastatrix. Planchon.

The *Phylloxera vastatrix* presents itself in two types, or classes of forms, one found on the leaf of the vine, inhabiting excrescences or galls, and called "gallicola;" the other developing on the roots, and called "radicicola." We shall begin with the insect as found on the leaf. Fig. 1 shows a vine leaf thickly covered with the galls, and Fig. 2 is a cross-section of the gall, showing its interior as seen with the microscope. On carefully opening one of these galls we find the mother louse as pictured in Fig. 3, *h* being the front and *g* the back views of the insect. If the gall is opened with care she will be seen diligently at work surrounding herself with pale yellow eggs, one of which is shown at *c*, Fig. 2, the natural size being the dot within the circle. These eggs are scarcely one-hundredth part of an inch long and not quite half as thick. The mother insect (Fig. 3) is about one-twenty-fifth of an inch long, of a dull orange color, and looks not unlike an immature seed of the common purslane or "pusley," the garden weed of the East. The eggs begin to hatch when six or eight days old into active little beings, which differ from their mother in their brighter color and more perfect legs. These young lice are shown at Fig. 4, front and back views; natural size within the circle. Issuing from the mouth of the gall (Fig. 2) these young lice scatter over the vine, most of them finding their way to the tender terminal leaves. Here they commence pumping up and appropriating the sap, forming galls and depositing eggs, as their immediate parent has done before. This process continues during the summer until the fifth or sixth generation. Every egg brings forth a fertile female, which soon becomes wonderfully prolific. By the end of September (at the East) the galls are mostly deserted, and those which are left are usually infected with mildew and eventually turn brown and decay. The young lice attach themselves to the leaves and thus hibernate. It is an important fact that the gall-inhabiting insect occurs only in female and wingless form. There is no male: the young being produced by what naturalists call parthenogenesis. It is but a transient summer state, not at all necessary to the perpetuation of the species and does, compared to the other, or root-inhabiting form, but little damage. It flourishes only on that class of vines known as the *riparia*, and is of uncertain appearance even on these. In some seasons it is even difficult to find a few galls on the very vines on which they were abundant the year before. This is Prof. Riley's observation at the East. In this State we have not yet seen the gall form, although others may have done so. The most important is the root form.

The root form, or radicicola, presents more forms and more interesting biological traits than the leaf form. The newly hatched lice are precisely like those which hatch in the galls, but as they develop, rows of tubercles appear on the back where only minute hairs were seen before. These root forms are shown at Fig. 5, which represents a wingless mother root louse, back and side views; the natural size being shown in the mark at the left. During the winter are found, somewhat dulled in color, adhering closely to the roots. As vegetation starts in the spring they become active, rapidly enlarge and soon begin laying unimpregnated eggs, for there are at that time no males. These eggs bring forth the females which in their turn develop and lay unimpregnated eggs, and this virginal reproduction continues for five or six generations, the development increasing in rapidity with the heat, but the prolificacy, or number of eggs, decreasing. In July some of the individuals show little wing pads at the sides and begin to issue from the ground and to acquire wings. These winged individuals become very numerous in August (at the East) and continue to appear in diminishing numbers thereafter until the leaves have all fallen. They are all females and carry in the abdomen from three to eight eggs of two sizes, the largest about two hundredths of an inch long and half as wide; the smaller three-fourths as long. These eggs are also unimpregnated, and are laid by preference on the under side of the more tender leaves, attached by one end amid the natural down of the leaf. They increase somewhat in size, and give birth in about ten days to the true sexual individuals, the larger producing the females, the smaller the males. Anomalous as it may seem, these individuals are born perfect though without mouth, and with none other than the reproductive function. Fig. 6 shows one of these peculiar mouthless females; the other forms being furnished with the long proboscis-like mouth or tube extending, when at rest, over the abdomen as shown at *a*, Fig. 4. These mouthless individuals pair soon after hatching, and the female is delivered on the third or fourth day of a solitary egg and then perishes. This egg is never laid on the leaf, but always on the wood, either under the bark, or in sheltered situations above ground, or on the roots underground. The young hatching from it is the normal virgin mother, which, with increased vigor and fertility, lays a large number of eggs and commences again the virginal reproduction with which we first described, and thus is completed the round of the species life. The impregnated eggs laid early in the season doubtless hatch the same year, though some of the later-deposited ones may pass the winter before hatching.

The engraving, Fig. 7, gives a good idea of the appearance of the root-forms of the insect: *a* is the healthy root; *b* is a root infested with phylloxera, showing the knots and swellings caused by their puncturers; *c* is a root deserted by them, on which the rootlets have begun to decay; *d*, *d*, *d*, *d*, are the lice on the roots, natural size; *e* is the female pupa, back view; and *f* is