

NEW PLASTIC COMPOUND.

By EDWARD WESTON, of Newark, N. J.

THE new product which forms the subject of my invention is a tough, flexible, and homogeneous substance exhibiting many of the physical characteristics of ordinary celluloid, but differing therefrom with respect to its chemical composition, and to qualities that render it non-explosive and even less inflammable than cellulose as ordinarily obtained. It is, in fact, cellulose so far as its chemical composition is concerned, but cellulose without fibrous or other definite structure. When properly prepared it is transparent or translucent, and in this condition it is capable of a great number of uses, both as a substitute for celluloid, and also for special purposes, to which the latter is not applicable.

Cellulose in the form in which I have described it may be prepared from cellulose as it ordinarily appears—that is to say, as cotton, cotton waste, linen, or paper—the complete process being substantially as follows: A quantity of any of the above mentioned materials—viz., cotton, linen, or paper—is immersed in a mixture of sulphuric and nitric acids, as in the usual preparation of pyroxyline, nitro-cellulose, or gun-cotton. The action of this mixture should be continued for twenty minutes, more or less, at the end of which time the cellulose has undergone a chemical change, becoming pyroxyline, its fibrous condition still remaining.

From the condition of pyroxyline, it is best converted into collodion or celluloid, according to the solvents employed. If, for instance, the pyroxyline, after being properly washed and dried, be dissolved by a mixture of ether and alcohol, the product usually termed "collodion" is produced. If, on the other hand, the pyroxyline be dissolved with naphtha, nitro-benzol, or camphor alone, or with other solvents, the resulting product is known commercially as "celluloid." Both of these substances and the processes of manufacturing them are well known, and a more detailed account of their production is therefore unnecessary. It is, however, to be observed that neither exhibits any definite structural characteristics, being practically homogeneous or amorphous, that their fluid or plastic condition renders them capable of being formed in sheets or other forms, and that both are highly inflammable and burn without leaving appreciable residues. From these substances I produce chemically pure cellulose in an amorphous condition by treating them with suitable reducing agents, which, for convenience, I term "deoxidizing agents," the effect of such treatment being to deprive the collodion or the celluloid of their vitreous properties and bring them back to their original chemical condition as cellulose. This treatment consists in immersing the sheets or other forms of collodion or celluloid in a bath of ammonium sulphide, protochloride of iron, sulphate of iron, or other chemically-equivalent agents that effect the necessary reactions, allowing them to remain in the bath until the mass of collodion or celluloid has been entirely reconverted or deoxidized. The resulting product is then to be washed and dried, after which it is in condition for use.

It will thus be seen that, apart from the well-known steps necessary to the production of collodion or celluloid which have been specified, my process consists in treating either pure collodion celluloid, or any other body that is pyroxyline without fiber by reducing agents that will reconvert them to the chemical condition of cellulose.

The article, when thus produced, being extremely dense, tenacious, and flexible, is applicable to the manufacture of belting and many other useful purposes. From its transparent qualities it may be used as a substitute for glass or mica in places where it is not likely to be exposed to abnormally high temperatures. As a substance from which to prepare the carbons of electric lamps it is particularly well adapted, owing to certain remarkable qualities in the carbon which it produces. I would, however, state that its use in this connection is not specifically claimed herein, as the same is made the subject of another application of even date herewith.

I desire, further, to state that the process of manufacture above described may be varied in some respects, which are clearly within the scope of the invention as disclosed.

I do not, for instance, restrict myself to the specific manner of treating the collodion or celluloid with the reducing agents—in other words, to the manner of applying these agents to the said substances for the removal of their vitreous principles.

In preparing articles of pure amorphous cellulose it is not essential that the cellulose be first produced and the articles then cut or shaped therefrom, as it is evident that the articles—such, for instance, as the blanks for incandescent carbon conductors—may be formed directly from the collodion or celluloid, and then immersed in one of the solutions named.

I am aware that heretofore soluble nitro-cellulose has been treated with ammoniacal salts for the purpose of rendering the same less explosive or inflammable. To this method or process, or to the product resulting therefrom, I do not lay claim.

DESTROYING INSECTS UNDER GLASS.

THE following method, says the *Revue Horticole*, has given most satisfactory results, and the inventor, M. Boizard, gardener to Baron Rothschild, at Paris, assures us that success is infallible—at least for three years during which he has been experimenting with it it has been so with him. He says: "Having procured two quarts of tobacco juice, I boil it over a slow fire on a furnace in the house. An hour and a half or two hours afterward, the liquid being reduced to about one-third its bulk, becomes viscous and almost solid, when, after having diluted it into one quart or 1½ quarts of water, I boil it more quickly until all get converted into vapor and fixed in the form of dew on every portion of the plants. I remarked no damage done, not even among the most tender plants, such as Adiantums, young plants of Blechnum braziliense, Coleus, etc. Some young friends of Adiantum alone suffered, but it should be added that they were on the stages." If danger were apprehended in the case of certain plants, they might be taken out or their safety assured by means of paper caps; and if it was a question of flowers or fruits, similar precautions might be taken to preserve them. M. Boizard assures us that no insects can resist this treatment, and that a greater portion of them do not appear again for six months. In the case of such as reappear quickly, it is easy to renew the operation, but then one quart of tobacco juice and one quart water will suffice. This method is as economical as any other, and M. Boizard says that it is possible to remain in the house during the operation without being inconvenienced thereby.

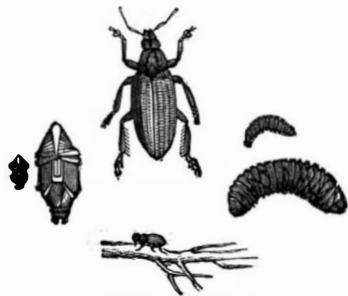
A FEW NOTES ON THE LARVAL STATE OF THE PEA-WEEVIL.

(Sitones Lineatus, Linn.)

By THOMAS H. HART.

FROM the time I began the study of entomology, the mystery attaching to the early stages of the pea-weevil has always been a source of attraction to me. Nor have there been wanting circumstances to keep it fresh in my mind. At one time my beans, at another my peas, have been attacked by it to my cost, and I have also attributed to a *Sitones* much of the damage done to my clover in some seasons; but all my efforts to discover the egg or larva were futile. Plants by the dozen were drawn from the infested crops and critically examined, as were innumerable growing plants, but neither leaf, stem, nor root disclosed anything. The old story was repeated last spring. *Sitones* threatened the complete destruction of six acres of gray peas. All the means at our disposal were unavailing to check its ravages, and but for a timely shower to reinvigorate the plants the crop must have been lost. Here, again, all my endeavors to detect the egg or larva were to no purpose, until one morning a letter arrived containing a reference to a clover root-feeding larva. This set me pondering once more, and in the evening I wandered aimlessly into the pea field, my brain busy with *Sitones*. I went to work, and the result was that before I left I had discovered a small white grub feeding at the root of the peas, which on examination proved to be curculionideus. Elate with my success, I sought and procured more of the grubs, dispatched specimens to the care of others interested in the subject, and placed a few in security for my own observation. This was on the 31st of May, and on the 4th of July I had the gratification of seeing the first perfect *Sitones lineatus* in the box where I had placed the pupæ. Thus, by digging up the plants bodily and carefully removing the earth from the roots, was the problem solved, whereas in all previous attempts I had drawn the plants after loosening the soil, and consequently had left behind that of which I was in search. Evidently John Curtis was very near the mark when he examined the bean roots for galls, as mentioned in "Farm Insects," p. 345; but probably it was too early in the year. Had he repeated his search at intervals throughout the season, there is now little doubt that he would have laid the matter bare some forty years ago.

Contrary to the usual order of things, the pea-weevil does comparatively little mischief in the larval state. True there were indications of the grubs having eaten channels along the main root, but the peculiar gall-like growths on the fibers appear to be their favorite food. It is just possible that they may have to do with certain portions of a crop dying away



SITONES LINEATUS.

prematurely in dry seasons by destroying the fibers or causing excrescences to grow on them, and thus diverting the flow of sap from its proper course; but with sufficient moisture, fair tilth and cultivation, there is reason to believe that the plant will survive at maturity notwithstanding the grubs. The fact that several of the larvæ had ensconced themselves within the above-mentioned galls, made me suspect their formation was due to the insect, but I could find nothing in those without a visible entrance to confirm my suspicion.

In its perfect state, however, the weevil more than compensates for the apparent harmlessness of the larva; its depredations are little noticed till the following spring, but no sooner do the peas and beans show above ground than we are painfully reminded of their presence. A succession of wet days, or prevalence of east wind, or other cause to check the plant, and the havoc committed in a short space of time is heartrending to witness. The leaves are scalloped round the edge into fantastic forms, the younger ones often being eaten to the midrib; the stems turn yellow; what remains of the leaves assumes a purplish tint, and, if the weather still continues unfavorable, the crop is lost. Yet the cause of all this mischief is invisible to the ordinary observer. The habit of the insect is to fold its legs and fall at the least alarm, and remain hidden among the clods during the day, coming out to feed at night. Should the soil in which it is secreted be disturbed it will roll about among the clods without giving any sign whatever of life; but press the ground for some half yard square firmly with the foot, go down on one knee, remain motionless, and in a few seconds the place will appear alive from the innumerable weevils that will push their way through to the surface. This gives us a clue to the remedy. If the weather admits of the free and repeated use of the roller, a great proportion of the beetles will be crushed or smothered by preventing them coming to the surface for air, and the plants—freed in a measure from their constant gnawing, and being assisted shortly afterward by the hoe—will make new and vigorous growth, and soon bid defiance to what are left of the insatiable little beings.

It would appear that the eggs are deposited beneath the surface of the ground at the time the beetles are devouring the plants, but in what manner still remains to be cleared up.

Appended is a short description of the different stages of the weevil in question:

The maggot-like larva is white, plump, and wrinkled, with brown horny head, and a pair of powerful projecting jaws. Each segment bears a few short hairs. Legs none; anal segment used as a foot. When full fed it forms an oval cell without lining, about two inches underground, and at once undergoes transformation.

The pupa is also white, but as it matures the eyes become black and the rostrum pitchy; rostrum bent down on to breast; legs folded under thorax; wings and elytra brought round so as to cover posterior pair of legs, not sealed down; each segment with a row of spurs, and anal one with a pair of long spines at apex.

The imago is at first creamy white, with head pitchy and

eyes black, soon, however, becoming entirely black (with exception of part of legs and antennæ, which are red), and clothed with silver-gray scales, three stripes along the thorax being of lighter shade than the rest. Specimens confined in a box attained their normal color in about forty-eight hours, but at large the beetles do not appear to leave their nidus for some time longer, probably to admit of their integuments becoming fully hardened before exposure.

Park Farm, Kingsnorth, Ashford, Kent, July 21, 1882.

Note.—With regard to the deposit of eggs, I am able to state that, somewhat earlier in the season than the date at which the larvæ of *S. lineatus* were observed by Mr. Hart among the pea roots, I have found that weevils taken from off the peas paired and laid eggs profusely in captivity. These small white eggs were laid indiscriminately on the glass and cork of the cage, or on any surface, there being no depth of earth wherein to bury themselves for oviposition, and all the eggs perished; but looking at the circumstance of the egg laying just preceding the time of the larvæ being found, and connecting this with the known habit of the pea-weevil burying itself in the earth, there seems to me, though we have no direct record as yet on the subject, to be little doubt that in April or May the females go down to oviposit a little below the surface of the ground among the pea roots. —E. A. Ormerod, in the *Entomologist*.

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