A special device, involving an air blast, was used to force the poison into the parts of the plant most frequented by the adult weevils. In the experiments described the application was made in person by the junior author, Mr. Smith, or under his personal supervision. It is possible, and in fact is forcefully pointed out in the report, that such successful results as those obtained in some of the experimental work should not be expected under the practical conditions on plantations. The writers even point out that it is likely that nine out of ten planters will fail to obtain satisfactory results from the first work they do. Nevertheless, every consideration seems to indicate clearly that powdered arsenate of lead can be used very profitably as an important adjunct in connection with the system of control that has been in use heretofore.

It is not extreme to state that the work accomplished with powdered arsenate of lead by Messrs. Newell and Smith marks an important advance in our knowledge of the control of the boll weevil. It promises in a short time more than to compensate the state of Louisiana for all the money that has been expended in the operations of the Crop Pest Commission since its establishment.

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Special Articles

Double Images of an Object as Seen Through a Water Surface

In Science of November 29, 1901, the present writer discussed this subject as presented by Matthiessen.[1] It was there pointed out that Matthiessen's equations had all been deduced in a paper by the present writer, in 1881, in the *Transactions of the Academy of Science of St. Louis.*

Matthiessen urged that two images of an object are formed when it is viewed through a water surface. One lies upon the caustic of refraction, and is therefore above the level of the object, and nearer to the eye. The other is along the same line of sight, but on the normal through the object.

In my paper of 1881 the latter image was discussed as the one actually seen.

It is evident that all rays from a point on an object thus viewed, will when produced backwards, not only be tangent to the caustic but will also cut the normal. Every ray of the cone of rays whose base is the pupil of the eye will thus appear to pass through an area on the surface generated by revolving the caustic around the normal. They will also intersect between two limiting points on the normal. The image of the point will therefore appear as distorted into an area on the caustic surface, and as a short line on the normal. My idea has always been that the former image was too indistinct to be visible.

Recently, while deducing the equation of the caustic, it occurred to me that the image might be seen upon the caustic surface, if the head were inclined so that the eyes were in the same vertical plane. The axes of the two cones of rays make then with each other an angle lying in the vertical plane, and the eyes may be focused on their point of intersection. The images on the caustic will then be practically superposed, and the line images on the normal will be more widely displaced on each other. The experimental result is very striking, and may easily be obtained by observing a chain, or the water-plug and chain at one end of a bath tub filled with water.

When both eyes are used, the water plug with the vertical chain, to which it is attached, appears projected towards the observer by a foot or more, if the eyes are near the surface and at the opposite end of the bath tub. If one eye be now closed, the image recedes to the vertical line through the object, appearing along the same line of sight as before. It therefore appears at a lower level.

When both eyes are in the same horizontal plane, the image is seen on the normal through the object. The images on the caustic surface as seen by the two eyes are then displaced on each other, and those on the normal coincide. Opening and closing one eye then produces no change in the position of the image.

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[1] *Ann. der Physik*, 1901, No. 10, S. 347.