THE NEW HELIOCHROMIC DISCOVERIES.*

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Recently considerable attention has been given to the communication of Professor Lippman to the Academy of Sciences in relation to the photography of colours. It may be interesting to the readers of *Wilson's Photographic Magazine* to be posted in regard to this discovery, and to have these details from an eye-witness of the results obtained. For this reason I dedicate to them this explanatory note made just after an interview with Professor Lippmann himself. He was good enough, in his laboratory at the Sorbonne, to show me his results, his appliances, and to explain thoroughly his method. The prints of the spectrum which he showed me have, for the most part, a brilliancy which has never been possessed by the colours of the spectrum reproduced by other methods (processes of Becquerel, &c.). In fact there is colour, brilliant colour.

M. Lippmann's experiments are based on interferences, consequently he acts with the aid of a sensitive film resting on a reflecting surface. The incident rays pass through the film until meeting with a metallic surface (this is mercury); they are then reflected and again pass through the sensitive film. From this meeting of the incident rays and the reflected rays is produced what is called interference. There is formed in the body itself of the sensitive film a succession of *maxima* corresponding to the phases of light, and of *minima* corresponding to the phases of obscurity. The length of a luminous ray is but a very small portion of a millimetre, and, admitting that the thickness of the film is one-twentieth of a millimetre, there is produced in this thickness considerable quantities, giving, on an average, from 150 to 200 white and black rays, and resulting from the development after the action of the light. This development blackens all the zones in which the *maxima* have been produced, whilst in the zones of the *minima*, obscurity having reigned, there has been no photographic action, and consequently the sensitive film remains unchanged. It follows that after development and fixing in the ordinary manner, we have a film divided into an infinity of black parallel laminæ, separated from each other by white spaces, and the intervals have exactly the length of the wave characterising each colour. In the present case we only refer to the spectrum, either for the primary colours isolated from each other, or mixed in definite relations.

If it were possible to cut through the film, and to count the laminæ in the portions corresponding to each of the seven colours, we would find unequal quantities of laminæ, and especially unequal distances between each lamina for each of the colours. But in reality no colour would exist, except the network having the faculty of causing the light to produce for the eye the sensation of colour. There would be no more colour than in soap-bubbles, although these appear to us most richly coloured. The phenomenon is also produced with laminæ of mica, so that, according to the thickness of these laminæ, we have any desired colour of the spectrum, although the mica lamina is absolutely colourless.

The analogy is striking between the results obtained by Professor Lippmann, and the examples given above. In order to obtain them he covers a glass plate with a coating, serving as a vehicle for a sensitive silver salt, but in such a manner that the film is continuous, and free from granulations. He applies the sensitive film direct to a mercury bath, and he causes the image of the spectrum to fall on the sensitive film through the glass. The exposure lasts from about one to two hours. Development and fixing as usual. With orthochromatic plates sensitive to the red, especially, the time of exposure would be much reduced. This method is somewhat analogous to that of storing sonorous vibrations in the phonograph. The sensitive film stores away luminous vibrations which will show themselves as soon as the surface comes in contact with the luminous rays. We may say with reason, therefore, that the colours are permanent, as they cannot disappear unless the physical condition of the film is modified to the point of destroying the laminæ by crushing them.

It is not possible yet to draw any practical conclusions from the interesting facts which have just been explained, but there must be a beginning to all things, and we find ourselves here in the presence of the most rational starting point, one the most likely to lead to the true solution of the difficult problem of the representation of the colours. There are, however, two serious objections to oppose to the easy practical use of this ingenious and seductive process. The first is based on the unequal sensitiveness of the plates for the different colours; the second, because the interferences are only produced in a regular manner with pure colours. In this case the *maxima* and *minima* are equidistant for rays having a given length of wave; but if the colours are complex or mixed with white light, the equidistance yields to some period from which results an irregularity in the arrangement of the films of reduced silver, which no longer give the sensation of the complex colour which has produced this particular disposition. It is this last objection, especially, which seems to us the most serious. We shall have to wait new experiments on mixed colours in order to exactly ascertain if the corresponding vibrations are produced in the midst of the profusion of waves of all lengths. We cannot yet say that this will not be, but it will be necessary to verify this discovery by experiment before being able to affirm its truth.

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He: "Do you think the photograph I mailed you the other day was like me?" She: "I hope not; when it came it was broke."

Grotesque Photographs.—It happens to all amateurs, and, alas! to professional photographers, to have failures in making their negatives. We think to please them by indicating a means of utilising what, in any less noble art than photography, we would designate as "botches." Here is the method:—Take the sacrificed negative—a portrait, for example—and, if dry, soak it for a moment in water; then expose it, the gelatine film on top, to a source of heat—in the sun, for example. The gelatine melting under the action of the heat makes it slide skilfully in any direction of the negative by giving it the proper inclination. You will now see the nose of the patient become longer or shorter at the will of the operator, and the rest of the face will take on very strange expressions. A practised hand will change a profile into a crescent, and a full face into a full moon. This artistic operation properly done, dry the negative and print in the ordinary manner. As is seen, the operation is ridiculously simple, and the result positively hideous. We will offer, however, a last recommendation to our readers. Before operating, make sure that you can obtain the assistance of two friends as seconds, in case the subject should happen to see your work.—Diafragme, in *Photo. Gazette.*