COLOR-SENSITIVE PHOTOGRAPHIC PLATES.

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The subject of color-sensitive photographic plates has received a great deal of attention during the past year or two, but there has been and is still a great diversity of opinion in regard to the capabilities of the various color-sensitizers. In illustration of this fact, I will mention that Becquerel, who first tried chlorophyl, stated that with it he made plates from one-fifth to one-tenth as sensitive to the red of the spectrum as to the blue or violet; Dr. Vogel estimated that eosine-stained plates were eight times more sensitive to the yellow-green of the spectrum than to the blue; I myself stated that plates stained with myrtle-chlorophyl, according to my published method, required even less exposure through a yellow glass than eosine plates. Capt. Abney stated that, according to his experience, stained plates were always many times more sensitive to blue and violet than to any other color, and many persons have believed that the color-sensitizers acted more by reducing the blue and violet sensitiveness than by actually increasing the sensitiveness to other colors.

For the purpose of proving the capabilities of chlorophyl and eosine, I have made four photographs of the lime-light spectrum, one on a plain emulsion plate, one on a chlorophyl-stained plate, one on an eosine-stained plate, and one on a plate stained with both chlorophyl and eosine. The spectrum was projected by means of an optical lantern, and a flint glass prism, with a slit measuring one-fiftieth of an inch. It will be understood that the different colors have not exactly the same relative intensity in this spectrum that they have in the solar spectrum, but the difference is insignificant. Short wires were placed so as to cast shadows on the sensitive plate, to aid in the comparison of results; some of these wires, which I have marked, occupy the position of Fraunhofer lines in the solar spectrum. All plates were prepared with the same collodion bromide emulsion, and received the same exposure and development.

The plain emulsion plate shows very little action, except in the blue, violet and ultra-violet; the maximum of sensitiveness is in

the middle of the violet. (It should be noted here that with gelatine bromide dry plates, the maximum of sensitiveness is in the indigo blue, about *G*, and they are also relatively more sensitive to green and yellow.)

The chlorophyl plate shows a very strong action all through the visible spectrum, strongest in the red, orange and dark green; weaker in the blue and violet, and weakest in the yellow-green.

[Owing to the negatives being too intense to reproduce perfectly by the photo-typographic process, the strongest action in the color-sensitive plates appears relatively less in the illustration than it does in the original negative.]

In the red, below *C*, the plate shows about five times as much sensitiveness as in any part of the violet; in the orange-red, twice as much; in the yellow-green, one-half as much; and in the dark-green, one and one-half times as much. The violet sensitiveness appears to be slightly reduced near *H*. This experiment proves that my chlorophyl plates are remarkably sensitive to all colors, as

I have many times asserted that they were, and that they are twenty-five to fifty times more color-sensitive than those which Becquerel employed in his experiments. They are probably 400 or 500 times more sensitive to red than the same plates without chlorophyl.

The eosine plate shows no action in the red and orange, very little in the yellow, a great deal in the yellow-green, and considerable in the dark-green. The action of eosine is strongest exactly when the action of chlorophyl is weakest; it gives about the same degree of sensitiveness to yellow-green that chlorophyl gives to red, but in a broader band. The violet sensitiveness appears to be exactly the same as in an unstained plate.

The chlorophyl-eosine plate shows by far the most remarkable result of all. Neither sensitizer appears to have retarded the action of the other, but rather to have aided it, so that *the weakest portion of this photograph below F is stronger than the strongest portion in the blue and violet!* Nearly a year ago I recommended that chlorophyl and eosine be used together in practical isochromatic photography, and this experiment proves that the combination possesses the advantages which I claimed for it.

I have found that in order to secure the best results with the chlorophyl-eosine process, fresh, strong blue-myrtle chlorophyl solution must be used, and the amount of eosine must be strictly limited; otherwise, the plate will not be so sensitive to yellow and to blue-green. I now prefer to apply the eosine by simply tinting with it water in which the plate is to be washed after applying a plain solution of chlorophyl. I have an over-exposed negative of a bright chromo-card which I made on one of these chlorophyl-eosine plates, with an exposure of one minute in the light of a coal oil lamp, having a single small argand burner and nickel reflector. No color-screen was used, but, owing to the yellowness of the coal oil flame, all the colors have photographed correctly.

An unstained plate (same collodion emulsion), with same exposure and development, showed only the high lights of the picture, very faintly.

A SPRING NEAR GABÈS.—Commander Landas, who has succeeded Col. Roudaire in the region of the *Chotts*, has found a powerful subterranean sheet of water at the depth of ninety-one metres, which yields not less than 8,000 cubic metres per minute.—*Cosmos*, Aug. 10, 1885.