

up to the present time its use has been greatly restricted by the necessity for preparing the plate and completing the whole of the manipulatory details within a comparatively short space of time, thus rendering this beautiful process practically inapplicable in all cases where the conveniences of a photographic laboratory are not at hand.

For some time past we have been investigating the causes which operate to prevent the excited plate retaining its efficiency for more than a few hours. It seemed highly probable that the permanent sensitiveness of the film was principally dependent on the retention of a moist surface; and if by any artificial means this end could be secured, the original sensitiveness of the film would be, for at least a reasonable time, preserved unimpaired.

The only attempts up to the present time to effect this object are, we believe, that of M. Giroud*, who proposes to enclose the sensitive collodion film between two plates of glass, with only so much of the exciting silver solution as might be retained by capillary attraction; and thus by retarding the evaporation of the water, to keep the surface moist, and consequently sensitive for a longer period; and secondly that of M. Gaudin†, who suggests the use of perfectly air-tight dark frames or boxes, in which a number of the wet plates could be arranged in a horizontal position, and there kept until required. Besides these two methods, it is well known that the plate will remain excited for a considerable time if kept immersed in a solution of nitrate of silver; in fact, a glass bath in the camera has been often used in cases where the length of exposure was likely to be too prolonged to admit of the plate being placed in the ordinary slide.

Instead, however of having recourse to a mechanical means for preventing the evaporation from the surface, we have endeavoured to avail ourselves of a chemical process, by the employment in the bath of substances having a powerful affinity for water; in the choice of these, however, we are necessarily limited to such as are neutral in constitution, and do not form insoluble compounds with silver. The nitrates and acetates, especially the former, seemed most convenient for our purpose on account of their general deliquescent nature, and for our first experiments we selected the nitrates of lime, magnesia, and zinc, as most promising of success. These agents were at first tried in the above-mentioned order; but from a few preliminary trials we were inclined to give the preference to the zinc salt, and having obtained such satisfactory results with its use, are induced to communicate them at once rather than withhold them until our investigation of the other compounds shall have been completed. At first we endeavoured to add the nitrate of zinc direct to the exciting bath, but the quantity required to prevent so large an amount of nitrate of silver from crystalizing out on the plate rendered the solution too dense to work with.

The following process can be recommended as having proved perfectly successful in our hands; we do not doubt that with more general use it may be considerably modified and improved, but at present we have rather contented ourselves with establishing the broad principle with such details only as will suffice to ensure good results, and to leave to a future period the consideration of those minor points which only a long experience can develop.

The plate coated with collodion (that which we employ contains iodide, bromide, and chloride of ammonium, in about equal proportions,) is made sensitive by immersion in the ordinary

solution of nitrate of silver (30 grains to the ounce), and after remaining there for the usual time is transferred to a second solution of the following composition:—

Nitrate of zinc (fused)	2 ounces.
Nitrate of silver.	35 grains.
Water	6 ounces.

The plate must be left in this bath until the zinc solution has thoroughly penetrated the film (we have found five minutes amply sufficient for this purpose, although a much longer time is of no consequence); it should then be taken out, allowed to drain upright on blotting-paper until all the surface moisture has been absorbed (about half an hour), and then put by until required. The nitrate of zinc, which is still retained on the plate is sufficient to keep it moist for any length of time, and we see no theoretical or practical reason why its sensitiveness should not be retained as long; experiments on this point are in progress; at present, however, we have only subjected them to the trial of about a week; although at the end of that period they were hardly deteriorated in any appreciable degree. It is not necessary that the exposure in the camera should be immediately followed by the development, as this latter process can be deferred to any convenient opportunity provided it be within the week. Previous to development, the plate should be allowed to remain for a few seconds in the original 30 grain silver-bath, then removed and developed with either pyrogallie acid or a protosalt of iron, and afterwards fixed, &c. in the usual manner.

The advantages of this process can scarcely be overrated.— Besides the facility it affords of working in the open air without any cumbrous apparatus, photography may now be applied in cases where it would have been hitherto impracticable, owing to the feebleness of the light *e.g.* badly illuminated interiors, natural caverns, &c.; if necessary, the exposure could be protracted for a week, or possibly much longer, and the deficiency of daylight compensated for by the employment of the electric or other artificial light. It will also be found useful where the plate must be kept ready excited, but the exact moment of exposure may depend upon possible contingencies rather than on the will of the operator, or in cases where it would be impracticable to prepare the plate just before exposure; for these reasons it might prove a valuable adjunct on the eve of a naval or military engagement, for accurately recording the positions of the forces.

A small proportion of nitrate of zinc added to the ordinary nitrate of silver bath in no way interferes with its action, and might obviate the inconvenience sometimes felt during hot weather in photographic rooms, of the film becoming partially dry before exposure. If added in a still smaller proportion to the silver solution used for exciting the ordinary Talbotype paper (without the employment of gallic acid), it is very probable that its sensitiveness may be preserved during a much longer period than is generally possible. As far as our experiments have gone, they tend to confirm this supposition; but at present we can hardly speak more confidently on this point, as it is still under investigation.

There are, no doubt, many other substances which might equally well answer the purpose of nitrate of zinc; besides those already mentioned, the nitrates of cadmium, manganese, and perhaps also those of copper, nickel, and cobalt might be found serviceable. Glycerine at first seemed to promise very good results, but the principal difficulty was the necessary impurity of the commercial product, in consequence of its being obtained from the exhausted leys of the soap boilers.

*Journal Phil. Soc. No. 9.

†Ibid. No. 10.