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FORMIC ACID IN THE DEVELOPER.

MR. MAXWELL LYTE calls our attention to the fact that we have, unintentionally, done him some injustice in the ignoring his claim to priority in the use of formic acid in the developer. We recently referred its first use to the Rev. J. Lawson Sisson, whose communication on the subject was published in the journal of the Photographic Society, in December, 1853. It was from seeing Mr. Sisson's communication that we first used formic acid ourselves, and we were under the impression that his was the first publication. We find, however, that three months prior to Mr. Sisson's communication Mr. M. Lyte had pointed out the advantages possessed by this acid in the developer. In the *Notes and Queries* of September 10th, 1853, a communication from Mr. Lyte appeared, from which the following is an extract:—

My developing agent is made as follows:—Take
 Distilled water 10 ounces
 Pyrogalllic acid 6 grains
 Formic acid 1 ounce

The latter is not to be the concentrated acid but merely the commercial strength. These when mixed form so powerful a developing agent that the picture is brought out in its full intensity almost instantly, while at the same time all the deep shades are quite unaffected and the half-tones come out with a brilliancy I have never seen before.

Another excellent developing agent is composed as follows:—Take
 Distilled water 10 ounces
 Sulphuric acid 3 drops
 Protosulphate of iron 1/4 ounce
 Formic acid 1 "

The formic acid is also a most capital addition to the protosulphate of iron, and either this or the former liquid produce most brilliant positives, leaving a fine coating of dead white silver.

A similar communication, dated August 19th, appeared in the *Photographic Journal* published on September the 21st, 1863.

We have much pleasure in making this rectification, the more so, that, whilst many valuable contributions to the progress of our art have been made by Mr. Lyte, this is not the first time his claims to priority in processes to which he has given origin have been unfairly overlooked. So far as the use of formic acid is concerned, we are glad to be able to rectify the matter at once.

Writing at the present time on the subject Mr. Lyte adds:—

The only reason which induced me to abandon the use of formic acid possessing as it does most manifest advantages, especially as a developer in *dry processes* or where light is deficient, was the variable strength and impurity of the commercial product of that day, and indeed the difficulty of obtaining it at all. Then pure acid being then only known as a curiosity in the laboratory. Now, however, with the improved methods of manufacture, I have no hesitation in recommending its use as being decidedly advantageous and it is even possible that if

made on a large scale, it might be found cheaper than acetic as well as being superior to it in other respects.

We fear that the difficulty to which Mr. Lyte refers is still largely in existence. Formic acid is, unfortunately, as sold commercially at the present time, a very uncertain and indefinite preparation, in many instances abounding with impurities, and, when pure, of uncertain strength. One eminent manufacturing chemist with whom we had some conversation on the subject, expressed a conviction that it was to the presence of some of the impurities generally present that much of its value as an accelerator was due, and that pure formic acid would be very similar in its action, when added to the developer, to sulphuric acid applied in the same way. Another chemist who has been experimenting in this direction, expresses his conviction that it is to the pure acid the advantage must be attributed. A sample, stated to be quite pure, gave, in Mr. Claudet's hands, excellent results, when used in much less proportion than he commonly employed.

But the term pure is unsatisfactory, unless we have at the same time some information as to the true proportion of acid contained. With a pure sample of acid of a definite strength, it would be merely a question of careful experiment, pursuing the exhaustive process, to establish a definite formula, which might be relied upon as uniform in its action.

The *rationale* of the alleged action is plausible. Formic acid is, in itself, at once a reducing agent and an acid retarding reduction. This anomalous combination of qualities is thus explained. On those portions of the plate upon which the light has acted it aids reduction; whilst on the shadows, upon which light has not acted, it exerts its acid action, retarding the reduction of the free silver, and preserving them perfectly clean. This latter is a quality especially apparent, the perfect cleanliness of the shadows, even when the development is considerably pushed. That it is an accelerator, when the proper conditions are secured, there can be little doubt. We have not yet had opportunity of preparing everything *de novo* for a series of satisfactory comparative experiments; but such additional experiments as we have been able to make have been unquestionably in its favour. The exposure in our hands continues to be about the same as for iron development, but yielding an especially clean, brilliant, and delicate negative with fine half-tone, dense lights, and in the deepest shadows no more deposit than bare glass. The colour of the negatives by reflected light is unusual, the image showing as a positive having lights of a bluish or steely grey. The collodion which has given us best results, contains about equal parts of the iodides of cadmium and potassium and bromide of lithium. With simply iodized collodion the time of exposure is about the same, but the negative is not so clean, occasional small spots and comets being apparent. With some other samples of bromo-iodized collodion, the exposure is similar, but the image is thinner than with iron. We tried it with one sample of collodion