which we should have expected to be useless. It was a sample, prepared by Mr. Sutton at King's College about two years ago, simply iodized with iodide of sodium. The bottle was about half full and had become quite red. The ether having nearly all evaporated, we added about an equal bulk of simply iodized cadmium collodion to thin it. This mixture gave us, with formic acid, equally rapid results as with a comparatively new collodion. We believe that the subject is one which will repay careful experiment.

DR. KEMP'S DESCRIPTION OF CERTAIN DRY PROCESSES.*

THE true theory of the dry collodion processes, remains but very little understood. We are in the dark as to the precise channel into which effort for a perfect dry process should be directed. We are in the dark as to the exact cause of success in many of the processes which are found in practice more or less satisfactory. We are uncertain whether the action of the various preservatives in use is chemical or simply mechanical. "If we can but determine laws," Dr. Kemp observes, "the knowledge of the extent of their operation and the phenomena arising therefrom, becomes a mere question of *time and work*." But in the matter before us, the great difficulty is to determine laws. We have a large number of facts upon which to generalize, but they are not sufficiently specific in their bearing to lead to certain conclusions. Some excellent authorities have maintained that the presence of an organic salt of silver was necessary to success, and have therefore referred the value of the various preservatives applied, to this power to supply the necessary organic element. On the other hand, Dr. Hill Norris, unquestionably one of the ablest authorities on the subject, entirely ignores this theory, and states the value of the various preservative agents to depend upon their power to maintain certain mechanical or structural conditions of the film. Almost all the known facts on the subject may be used to confirm either theory. Again, rapidity in dry plates has been held by some to depend upon the preservation in the film of a certain portion of free nitrate of silver. Dr. Hill Norris on the other hand states that he has been able to eliminate from his extra sensitive plates every trace of free nitrate, without in any degree impairing their sensitiveness.

Dr. Kemp does not undertake in this pamphlet to enter into the theoretical department of the research to which it is devoted. His work is rather a record of experiments with certain practical deductions therefrom. He remarks, however, in his preface that the *rationale* of the dry processes will, he believes, be deprived of much obscurity by recognizing certain principles which he lays down. We will quote and leave them to the judgment of our readers :—

> Two classes of sensitive surfaces exist, to one or other of which we may refer all the processes which come under the domain of photography.
>
> 1. We have a surface so prepared that, having been exposed to the influence of light, the iodide of silver remains in a quiescent state, until stimulated into action by a developer; to this class belong the usual wet collodion and most of the dry processes.
>
> 2. In addition to such a surface, we introduce a substance which not only places the iodide of silver in a condition to be acted upon by a developer, but initiates the action during the exposure of the surface to light The Talbotype paper and dry tannin processes of Major Russell are instances of this latter class; and the methods proposed in the following chapters will illustrate both of these divisions.

We glean from Dr. Kemp's pamphlet that he is an ardent experimentalist, and in this little work his object is rather to make known certain modifications of existing processes, which have given him good results, and to suggest his view of the causes, than to propose anything essentially new. He describes four processes, each of which have their especial advantages and degrees of sensitiveness.

The first process is the malt process, with some slight modifications in detail. Plates prepared by this process, he finds, require an exposure, varying with the nature of the subject and state of light, of from a minute and a half to two minutes, with a stereoscopic single lens with quarter inch stop.

The second process consists in the use of a mixture of tannin and malt. The exposure for plates by this process, under the same conditions, he estimates at one minute.

We may remark upon this by the way that the author states he was not aware that any one else had tried such a mixture until he saw an allusion to its use by Mr. Fassett at a recent meeting of the Philadelphia Photographic Society. Its use had, however, been described nearly two years anterior to the allusion in question. In July, 1861, we received from Mr. Penny, of Cheltenham, a couple of very fine photographs, the negatives of which were produced upon plates prepared with tannin and malt, the details of which were published in our pages at the time. Since that time, we believe, Mr. Penny has used the process with great success.

The third process consists in the use of a mixture of tannin and glycerine. The exposure under the same conditions as the others is estimated at from thirty to forty seconds.

The fourth process consists in the use of tannin, glycerine, nitrate of silver, and formic acid. The time of exposure has not yet been satisfactorily determined, but it is estimated at from fifteen to twenty seconds.

In regard to the first—the malt process—the author states that on its first announcement he was predisposed in its favour, for the following considerations :—

> All the substances which play an important part in the production of the photographic image are either aggregate forms, the molecules of which are held together by very slight chemical affinity, or they are the derivatives of such; and it would be difficult to name a substance in which these two properties are more remarkably united than in the case of malt. We are aquainted, for instance, with a variety of substances, differing widely in their appearance as to physical characters, but all comprised between the limits of the formulæ, C12 H9 O9, and C12 H14 O14 differing, in fact in elementary composition only as the quantity of the elements of water which they contain; thus, dextrine, or British gum, C12 H10 O10, only differs from starch C12 H9 O9, in containg the elements of one equivalent of water; cane sugar C12 H11 O11, in containing the elements of two equivalents of water; crystallised sugar of milk, C12 H12 O12, in containing the elements of three equivalents of water; and so on to the sugar of fruits, C12 H14 O14, which contains the elements of five equivalents of water.
>
> Now malt contains, not only the radix of this series—*starch*—which is capable of being thus transformed, but it contains, in rich abundance, this radix actually transformed into some of the substances above alluded to, but pre-eminently disposed to still further disintegration, from the very circumstance of its containing within itself the catalytic body which, above all others, effects these changes with infinite rapidity, and, for that reason, called *diastase*, with such energy, moreover, that a single part of this substance is capable of converting 2000 parts of starch, first into dextrine, eventually into grape sugar. Certain conditions, indeed, are necessary, and these are generally supposed to be very simple, but are, in fact, mightily effective engines in all organic changes—*heat* and *moisture*. Nor will it escape observation that two of the substances above mentioned, gum and grape sugar, are familiar to us as agents employed from the earliest days of photography, grape sugar especially, as what was supposed to be an accelerator, and, at one time, much recommended in the wax paper process —an accelerator certainly in one sense, as the writer can testify, for it has a marvellous tendency, in slow development, to produce excessive action in the developer and to cause the silver to be deposited, not only on the points acted upon by light, but over the whole surface, thus destroying the purity of the whites and damaging, if not spoiling, the negative. Again, collodion itself is the derivative of a body, *cotton*, closely analogous in its chemical composition to starch, and coming within the series of compounds to which we have alluded : analogy, then, was not urged beyond its legitimate bounds in suggesting that the powerful catalytic body, *diastase*, might, even in collodion itself, effect a change highly conducive to initiating or accelerating changes in the iodide of silver under the influence of light.

The process, as described by its propounder (Mr. Macnair), did not, however, yield in Dr. Kemp's hands satisfactory negatives—they were thin and deficient in vigour. Still impressed with the theoretical considerations in its favour, which we have quoted, he proceeded to further experiments, and at length arrived at satisfactory results. We subjoin the details of what he distinguishes as the

First Process.

> Take two ounces of malt, crushed in a mill, and break it up still further by passing over it several times an ordinary roller, such as is used for making pastry; pale malt should be preferred, because in high-dried malt much of the starch is converted into British gum, and a very viscid infusion is produced, not adapted to the purpose contemplated. Place the malt, thus bruised, in an earthenware jug, or any other suitable vessel, and pour on it, by degrees, two fluid ounces of lukewarm water, with constant stirring, and

* A Description of Certain Dry Processes in Photography, especially adapted to the use of the Tourist, with Supplementary Notice of Plans useful to the Scientific Traveller and Missionary. By George Kemp, M.D., St. Peter's College, Cambridge. London : J. W. Davies.