

# The Photography Criticism CyberArchive

## Archive texts: History of Photography

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### *The Pencil of Nature* (1844-46)

by [William Henry Fox Talbot](#)

#### Part I (cont.): Brief Historical Sketch of the Invention of the Art.

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It may be proper to preface these specimens of a new Art by a brief account of the circumstances which preceded it and led to the discovery of it. And these were nearly as follows.

One of the first days of the month of October 1833, I was amusing myself on the lovely shores of the Lake of Como, in Italy, taking sketches with Wollaston's Camera Lucida, or rather I should say, attempting to take them: but with the smallest possible amount of success. For when the eye was removed from the prism -- in which all looked beautiful -- I found that the faithless pencil had left only traces on the paper melancholy to behold.

After various fruitless attempts, I laid aside the instrument and came to the conclusion, that its use required a previous knowledge of drawing, which unfortunately I did not possess.

I then thought of trying again a method which I had tried many years before. This method was, to take a Camera Obscura, and to throw the image of the objects on a piece of transparent tracing paper laid on a pane of glass in the focus of the instrument. On this paper the objects are distinctly seen, and can be traced on it with a pencil with some degree of accuracy, though not without much time and trouble.

I had tried this simple method during former visits to Italy in 1823 and 1824, but found it in practice somewhat difficult to manage, because the pressure of the hand and pencil upon the paper tends to shake and displace the instrument (insecurely fixed, in all probability, while taking a hasty sketch by a roadside, or out of an inn window); and if the instrument is once deranged, it is most difficult to get it back again, so as to point truly in its former direction.

Besides which, there is another objection, namely, that it baffles the skill and patience of the amateur to trace all the minute details visible on the paper; so that, in fact, he carries away with him little beyond a mere souvenir of the scene -- which, however, certainly has its value when looked back to, in long after years.

Such, then, was the method which I proposed to try again, and to endeavour, as before, to trace with my pencil the outlines of the scenery depicted on the paper. And this led me to reflect on the inimitable beauty of the pictures of nature's painting which the glass lens of the Camera throws upon the paper in its focus -- fairy pictures, creations of a moment, and destined as rapidly to fade away.

It was during these thoughts that the idea occurred to me . . . . how charming it would be if it were possible to cause these natural images to imprint themselves durably, and remain fixed upon the paper!

And why should it not be possible? I asked myself.

The picture, divested of the ideas which accompany it, and considered only in its ultimate nature, is but a succession or variety of stronger lights thrown upon one part of the paper, and of deeper shadows on another. Now Light, where it exists, can exert an action, and, in certain circumstances, does exert one sufficient to cause changes in material bodies. Suppose, then, such an action could be exerted on the paper; and suppose the paper could be visibly changed by it. In that case surely some effect must result having a general resemblance to the cause which produced it: so that the variegated scene of light and shade might leave its image or impression behind, stronger or weaker on different parts of the paper according to the strength or weakness of the light which had acted there.

Such was the idea that came into my mind. Whether it had ever occurred to me before amid floating philosophical visions, I know not, thought I rather think it must have done so, because on this occasion it struck me so forcibly. I was then a wanderer in classic Italy, and, of course, unable to commence an inquiry of so much difficulty: but, lest the thought should again escape me between that time and my return to England, I made a careful note of it in writing, and also of such experiments as I thought would be most likely to realize it, if it were possible.

And since, according to chemical writers, the nitrate of silver is a substance peculiarly sensitive to the action of light, I resolved to make a trial of it, in the first instance, whenever occasion permitted on my return to England.

But although I knew the fact from chemical books, that nitrate of silver was changed or decomposed by Light, still I had never seen the experiment tried, and therefore I had no idea whether the action was a rapid or slow one; a point, however, of the utmost importance, since if it were a slow one, my theory might prove but a philosophic dream.

Such were, as nearly as I can now remember, the reflections which led me to the invention of this theory, and which first impelled me to explore a path so deeply hidden among nature's secrets. And the numerous researches which were afterwards made -- whatever success may be thought to have attended them -- cannot, I think, admit of a comparison with the value of the first and original idea.

In January 1834, I returned to England from my continental tour, and soon afterwards I determined to put my theories and speculations to the test of experiment, and see whether they had any real foundation.

Accordingly I began by procuring a solution of nitrate of silver, and with a brush spread some of it upon a sheet of paper, which was afterwards dried. When this paper was exposed to the sunshine, I was disappointed to find that the effect was very slowly produced in comparison with what I had anticipated.

I then tried the chloride of silver, freshly precipitated and spread upon paper while moist. This was found no better than the other, turning slowly to a darkish violet colour when exposed to the sun.

Instead of taking the chloride already formed, and spreading it upon the paper, I then proceeded in the following way. The paper was first washed with a strong solution of salt, and when this was dry, it was washed again with nitrate of silver. Of course, chloride of silver was thus formed in the paper, but the result of this experiment was almost the same as before, the chloride not being apparently rendered more sensitive by being formed in this way.

Similar experiments were repeated at various times, in hopes of a better result, frequently changing the proportions employed, and sometimes using the nitrate of silver before the salt, &c. &c.

In the course of these experiments, which were often rapidly performed, it sometimes happened that the brush did not pass over the whole of the paper, and of course this produced irregularity in the results. On some occasions certain portions of the paper were observed to blacken in the sunshine much more rapidly than the rest. These more sensitive portions were generally situated near the edges or confines of the part

that had been washed over with the brush.

After much consideration as to the cause of this appearance, I conjectured that these bordering portions might have absorbed a lesser quantity of salt, and that, for some reason or other, this had made them more sensitive to the light. This idea was easily put to the test of experiment. A sheet of paper was moistened with a much weaker solution of salt than usual, and when dry, it was washed with nitrate of silver. This paper, when exposed to the sunshine, immediately manifested a far greater degree of sensitiveness than I had witnessed before, the whole of its surface turning black uniformly and rapidly: establishing at once and beyond all question the important fact, that a lesser quantity of salt produced a greater effect. And, as this circumstance was unexpected, it afforded a simple explanation of the cause why previous inquirers had missed this important result, in their experiments on chloride of silver, namely, because they had always operated with the wrong proportions of salt and silver, using plenty of salt in order to produce a perfect chloride, whereas what was required (it was now manifest) was, to have a deficiency of salt, in order to produce an imperfect chloride, or (perhaps it should be called) a *subchloride* of silver.

So far was a free use or abundance of salt from promoting the action of light on the paper, that on the contrary it greatly weakened and almost destroyed it: so much so, that a bath of salt water was used subsequently as a fixing process to prevent the further action of light upon sensitive paper.

This process, of the formation of a subchloride by the use of a very weak solution of salt, having been discovered in the spring of 1834, no difficulty was found in obtaining distinct and very pleasing images of such things as leaves, lace, and other flat objects of complicated forms and outlines, by exposing them to the light of the sun.

The paper being well dried, the leaves, &c. were spread upon it, and covered with a glass pressed down tightly, and then placed in the sunshine; and when the paper grew dark, the whole was carried into the shade, and the objects being removed from off the paper, were found to have left their images very perfectly and beautifully impressed or delineated upon it.

But when the sensitive paper was placed in the focus of a Camera Obscura and directed to any object, as a building for instance, during a moderate space of time, as an hour or two, the effect produced upon the paper was not strong enough to exhibit such a satisfactory picture of the building as had been hoped for. The outline of the roof and of the chimneys, &c. against the sky was marked enough: but the details of the architecture were feeble, and the parts in shade were left either blank or nearly so. The sensitiveness of the paper to light, considerable as it seemed in some respects, was therefore, as yet, evidently insufficient for the purpose of obtaining pictures with the Camera Obscura; and the course of experiments had to be again renewed in hopes of attaining to some more important result.

The next interval of leisure which I found for the prosecution of this inquiry, was during a residence at Geneva in the autumn of 1834. The experiments of the previous spring were then repeated and varied in many ways; and having been struck with a remark of Sir H. Davy's which I had casually met with -- that the *iodide* of silver was more sensitive to light than the *chloride*, I resolved to make trial of the iodide. Great was my surprise on making the experiment to find just the contrary of the fact alleged, and to see that the iodide was not only less sensitive than the chloride, but that it was not sensitive at all to light; indeed that it was absolutely insensible to the strongest sunshine: retaining its original tint (a pale straw colour) for any length of time unaltered in the sun. This fact showed me how little dependance was to be placed on the statements of chemical writers in regard to this particular subject, and how necessary it was to trust to nothing but actual experiment: for although there could be no doubt that Davy had observed what he described under certain circumstances -- yet it was clear also, that what he had observed was some exception to the rule, and not the rule itself. In fact, further inquiry showed me that Davy must have observed a sort of subiodide in which the iodine was deficient as compared with the silver: for, as in the case of the chloride and subchloride the former is much less sensitive, so between the iodide and the subiodide there is a similar contrast, but it is a much more marked and complete one.

However, the fact now discovered, proved of immediate utility; for, the iodide of silver being found to be insensible to light, and the chloride being easily converted into the iodide by immersion in iodide of potassium, it followed that a picture made with the chloride could be *fixed* by dipping it into a bath of the alkaline iodide.

This process of fixation was a simple one, and it was sometimes very successful. The disadvantages to which it was liable did not manifest themselves until a later period, and arose from a new and unexpected cause, namely, that when a picture is so treated, although it is permanently secured against the *darkening* effects of the solar rays, yet it is exposed to a contrary or *whitening* effect from them; so that after a lapse of some days the dark parts of the picture begin to fade, and gradually the whole picture becomes obliterated, and is reduced to the appearance of a uniform pale yellow sheet of paper.

A good many pictures, no doubt, escape this fate, but as they all seem liable to it, the fixing process by iodine must be considered as not sufficiently certain to be retained in use as a photographic process, except when employed with several careful precautions which it would be too long to speak of in this place.

During the brilliant summer of 1845 in England I made new attempts to obtain pictures of buildings with the Camera Obscura; and having devised a process which gave additional sensibility to the paper, viz. by giving it repeated alternate washes of salt and silver, and using it in a moist state, I succeeded in reducing the time necessary for obtaining an image with the Camera Obscura on a bright day to ten minutes. But these pictures, though very pretty, were very small, being quite miniatures. Some were obtained of a larger size, but they required much patience, nor did they seem so perfect as the smaller ones, for it was difficult to keep the instrument steady for a great length of time pointing at the same object, and the paper being used moist was often acted on irregularly.

During the three following years not much was added to previous knowledge. Want of sufficient leisure for experiments was a great obstacle and hindrance, and I almost resolved to publish some account of the Art in the imperfect state in which it then was.

However curious the results which I had met with, yet I felt convinced that much more important things must remain behind, and that the clue was still wanting to this labyrinth of facts. But as there seemed no immediate prospect of further success, I thought of drawing up a short account of what had been done, and presenting it to the Royal Society.

However, at the close of the year 1838, I discovered a remarkable fact of quite a new kind. Having spread a piece of silver leaf on a pane of glass, and thrown a particle of iodine upon it, I observed that coloured rings formed themselves around the central particle, especially if the glass was slightly warmed. The coloured rings I had no difficulty in attributing to the formation of infinitely thin layers or strata of iodide of silver; but a most unexpected phenomenon occurred when the silver plate was brought into the light by placing it near a window. For then the coloured rings shortly began to change their colours, and assumed other and quite unusual tints, such as are never seen in the "*the colours of thin plates*." For instance, the part of the silver plate which at first shone with a pale yellow colour, was changed to a dark olive green when brought into the daylight. This change was not very rapid: it was much less rapid than the changes of some of the sensitive papers which I had been in the habit of employing, and therefore, after having admired the beauty of this new phenomenon, I laid the specimens by, for a time, to see whether they would preserve the same appearance, or would undergo any further alteration.

Such was the progress which I had made in this inquiry at the close of the year 1838, when an event occurred in the scientific world, which in some degree frustrated the hope with which I had pursued, during nearly five years, this long and complicated, but interesting set of experiments -- the hope, namely, of being the first to announce to the world the existence of the New Art -- which has since been named Photography.

I allude, of course, to the publication in the month of January 1839, of the great discovery of M. Daguerre, of the photographic process which he has called the Daguerreotype. I need not speak of the sensation

created in all parts of the world by the first announcement of this splendid discover, or rather, of the fact of its having been made, (for the actual method made use of was kept secret for many months longer). This great and sudden celebrity was due to two causes: first, to the beauty of the discovery itself: secondly, to the zeal and enthusiasm of Arago, whose eloquence, animated by private friendship, delighted in extolling the inventor of this new art, sometimes to the assembled science of the French Academy, at other times to the less scientific judgment, but not less eager patriotism, of the Chamber of Deputies.

But, having brought this brief notice of the early days of the Photographic Art to the important epoch of the announcement of the Daguerreotype, I shall defer the subsequent history of the Art to a future number of this work.

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Some time previously to the period of which I have now been speaking, I met with an account of some researches on the action of Light, by Wedgwood and Sir H. Davy, which until then, I had never heard of. Their short memoir on this subject was published in 1802 in the first volume of the Journal of the Royal Institution. It is curious and interesting, and certainly establishes their claim as the first inventors of the Photographic Art, though the actual progress they made in it was small. They succeeded, indeed, in obtaining impressions from solar light of flat objects laid upon a sheet of prepared paper, but said they found it impossible to fix or preserve those pictures: all their numerous attempts to do so having failed.

And with respect to the principal branch of the Art, viz. the taking pictures of distant objects with a Camera Obscura, they attempted to do so, but obtained no result at all, however long the experiment lasted. While therefore due praise should be awarded to them for making the attempt, they have no claim to the actual discovery of any process by which such a picture can really be obtained.

It is remarkable that the failure in this respect appeared so complete, that the subject was soon after abandoned both by themselves and others, and as far as we can find, it was never resumed again. The thing fell into entire oblivion for more than thirty years: and therefore, though the Daguerreotype was not so entirely new a conception as M. Daguerre and the French Institute imagined, and though my own labours had been still more directly anticipated by Wedgwood, yet the improvements were so great in all respects, that I think the year 1839 may fairly be considered as the real date of the birth of the Photographic Art, that is to say, its first public disclosure to the world.

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There is a point to which I wish to advert, which respects the execution of the following specimens. As far as respects the design, the copies are almost facsimiles of each other, but there is some variety in the tint which they present. This arises from a twofold cause. In the first place, each picture is separately formed by the light of the sun, and in our climate the strength of the sun's rays is extremely variable even in serene weather. When clouds intervene, a longer time is of course allowed for the impression of a picture, but it is not possible to reduce this to a matter of strict and accurate calculation.

The other cause is the variable quality of the paper employed, even when furnished by the same manufacturers—some difference in the fabrication and in the *sizing* of the paper, known only to themselves, and perhaps secrets of the trade, have a considerable influence on the tone of colour which the picture ultimately assumes.

These tints, however, might undoubtedly be brought nearer to uniformity, if any great advantage appeared likely to result: but, several persons of taste having been consulted on the point, viz. which tints on the whole deserved a preference, it was found that their opinions offered nothing approaching to unanimity, and therefore, as the process presents us spontaneously with a variety of shades and colour, it was thought best to admit whichever appeared pleasing to the eye, without aiming at an uniformity which is hardly attainable. And with these brief observations I commend the pictures to the indulgence of the Gentle Reader.

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