HISTORICAL NOTES

Daguerre’s Research of the Latent Image

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In his search for a way to fix the image of the camera obscura, Louis-Jacques-Mandé Daguerre (III. 1) considered it essential to reduce the exposure time of the sensitized plates, in order to achieve what he called “immediacy”, a concept that we now tend to refer to as the “instantaneous”. Thus, in his written correspondence with his partner Nicéphore Niépce, Daguerre repeatedly refers to the need for a greater “immediacy” of the process. The inventor makes statements such as: “this has led me to a very interesting process as it leads to greater immediacy”¹ (letter of February 26th 1830); “we have not been able to achieve any step toward immediacy, and it is impossible to operate without this”² (letter of October 9th 1830); “I am delighted to know that you have managed to increase immediacy, but I hope that we will achieve some progress in that direction”³ (letter of August 23rd 1832).

It is evident that for Daguerre reducing exposure times was the essential condition upon which the functionality of the photographic process depended. However, it seems that Niépce did not consider the low sensitivity of bitumen of Judea to be a very great disadvantage of his own “heliographic” process.

So what were the reasons for Daguerre’s obsession with “immediacy”? The photography historian André Gunthert offers two complementary explanations⁴: firstly that Daguerre was seeking to reduce the exposure times so as to produce images in which the light and shade were evenly distributed, due to his aim of creating a very realistic representation of reality. In his report addressed to the Chambre de députés, François Arago used the same argument to defend the daguerreotype: “Even the weakest rays alter the substance of the daguerreotype. The effect is produced before the shadows cast by the sun have time to move appreciably”⁵.

The second reason proposed is based on Daguerre’s business acumen, as he thought that the use of process would not be economically viable if the exposure times were too long. This is evident from a letter he sent to Niépce’s son Isidore in 1834: “At the point where we are now, we must agree that reproduction is still limited because it still takes three or four hours. It would not be the same if we had a more immediacy and success would not be doubtful.”⁶

After the death of Nicéphore Niépce in 1833, the Traité Provisoire, his contract of association with Daguerre, passed to his heir, his son Isidore. However, Isidore did not continue his father’s research and Daguerre had to continue with his investigations alone. Little is known about the development of his experiments during the following years. Already in 1831 he had apparently begun using a new photo-sensitive substance, silver iodide, which he obtained by subjecting silver plates to iodine vapour. Daguerre was basically using the same substance, iodine vapour, that Niépce used in the last stage of his heliographic process in order to “blacken the plate” and thanks to this sensitizing agent he was thus able to obtain images of a higher quality in the new photographic process of the daguerreotype.

Sensitizing the silvered plates with iodine vapour and exposing them in the camera obscura was not enough to ensure a successful result, but then, in 1835, Daguerre found that after sensitizing the plates and exposing them in the camera obscura, subjecting them to...
mercury vapour once more allowed the longed-for images to gradually appear in all their splendour: Daguerre had finally discovered the amazing principle of the latent image.

Daguerre had no scientific training and so his methods were purely empirical. It was probably this that led to various apocryphal tales about the random nature of his discoveries.

Thus, for example, the photography historian Georges Potonniée reports an unreliable legend that contradicts the memoirs of Charles Chevalier and various other sources, which relates how Daguerre got the idea of fixing the image of the camera obscura and investigating the photosensitivity of iodine compounds. Supposedly the silhouette of a tree was projected, through a small hole in a window, onto one of Daguerre’s diorama canvasses.

The next day Daguerre saw that the image of the tree had been marked upon the canvas. Daguerre remembered he had used iodine in the paint and he therefore began to investigate this compound.

Marc-Antoine Gaudin also recounts a similar anecdote, according to which someone accidentally left a spoon on a plate that Daguerre had blackened with iodine vapour. The light in the room then left the silhouette of the spoon marked upon the plate. (Ill. 2) This accident made Daguerre aware of the photosensitivity of silver iodide, and so he began researching the photosensitive properties of this new compound.

Another classic photography legend, recounted by Helmut Gernsheim, explains how Daguerre...
discovered the effects of mercury vapour. According to this story the inventor left a silver plate that had been exposed in the camera obscura apparently without any success, in a closet along with various chemicals that he used in his experiments. He was intending to polish and reuse this plate, but the next day, when he opened the closet he noted with astonishment that a faint image had appeared on the plate. When he tried to identify the chemicals that had produced this miracle, he discovered that it was due to vaporized mercury leaking from a broken thermometer. (Ill. 3)

This legend does not even remotely resemble what really happened, considering Daguerre's own statements on the matter, published in a Paris newspaper soon after the public disclosure of the invention. In fact, after one of the demonstrations of the process he made in early September 1839, in response to a question from a member of the Société d'Encouragement he said that he did not suddenly discover the possibility of revealing the image by means of mercury vapours one day, but only after making countless unsuccessful trials and experiments with numerous substances:

When this person said to him [Daguerre] that he must have felt very pleased on the day that he first witnessed the wonderful effect of mercury vapors, Mr. Daguerre responded with rather melancholy air that he had made this discovery only after having spent fourteen years of testing, trial and error, fatigue and weariness, to which a despair was gradually added that sometimes acted on him like poison. He said he had progressed one step at a time, initially experimenting with the corrosive effect of acid, which marked the images a little, but that made the surface of the plates lumpy and rough. He then had tried with liquid mercury and calomel [a drug], and this worked better so that from that day on his hopes were strengthened and his determination increased. The use of metal vapours were only another step forward, and Daguerre says that his good genius showed him how to proceed from there.

While making some wide-ranging reflections on the origins of photography the historian Louis Figuier mentions the vital contribution of enthusiastic amateurs to the progress of science and technology, and claims that the discoveries that they have made throughout history are very significant. According to Figuier, amateurs have often achieved much more important results than scientists themselves. He believes that this is due to their very lack of theoretical knowledge as regards the difficulties inherent in certain technical and scientific problems, which gave them the almost reckless courage to rise to the challenge and to sometimes achieve truly extraordinary results. In his own words:

Amateurs or the uneducated sometimes make unexpected discoveries. Precisely because they are unable to predict the infinite aspects of a scientific problem they throw themselves into resolving the most difficult problems, intrepidly dealing with the highest and most serious questions, like a carefree and curious child who touches, in play, the springs of an enormous machine. Sometimes they attain extraordinary results and prodigious inventions, which leave the real scientists confused with admiration and surprise.

The use of mercury vapour as a developing agent allowed for a dramatic reduction in the exposure time of plates in the camera obscura. Thanks to mercury vapor in 1835 Daguerre only needed to expose plates for from 20 to 90 minutes, a very short time when compared to the heliographic process which required at least eight hours.

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