

A note about this file

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Alfred Maskell was instrumental in the founding of the Linked Ring Brotherhood in 1892, a group dedicated to the promotion of photography as fine art and often associated with the Pictorialist movement.

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ARTISTIC FOCUS AND THE SUPPRESSION OF THE LENS.

I HAVE been led to bring before the readers of the PHOTOGRAPHIC QUARTERLY the subject which forms a title to this paper—first, because it is one of high interest to photographic art; and next, because I am persuaded that, notwithstanding the undoubted importance, it is one upon which very little is at present known by the public generally. It is surprising how few people are aware of the fact that a photographic picture can be made with the simplest form of *camera obscura*; that is to say, without the aid of any glass lens, and by means only of an aperture of very small dimensions through which the rays of light are allowed to fall upon and impress the sensitive plate. And this ignorance is not confined to those who do not themselves practise photography. Amongst the hundreds of thousands of amateur photographers, who at the present day more or less dabble in the art, the great majority have the vaguest notion of the possibility even of the process; few have any idea of the beautiful results which may be produced by this means; and fewer still have endeavoured to make a practical use of a branch of photography at once the most simple as regards appliances, and of very high value from the artistic standpoint. The object of this paper is, therefore, to endeavour to attract general interest to a subject which has of late been steadily making progress amongst a certain section of photographers—viz., the claims to artistic recognition of pictures which, instead of showing the intense definition characteristic of a photograph as generally understood, have, on the contrary, that definition, or sharpness of focus, more or less modified. A very prominent and, in the present condition of optical apparatus, in my opinion the best method of producing this result is that in which the lens

is entirely suppressed, and a simple aperture of more or less minute diameter used in its stead. I do not, however, propose to confine myself to the consideration of this method alone, but as occasion arises to include in a general way also the consideration of diffused focus as applied to pictures produced by means of lenses and other methods used in conjunction with them.

It is incontestable that within the last few years the current of feeling in the artistic world of photography has been steadily inclined towards the production of pictures in diffused rather than in concentrated and minute focus. The subject has been discussed over and over again, scientifically and artistically, at the meetings of the most prominent photographic societies; and the columns of the photographic papers have teemed with an argumentative correspondence, the warmth of which on both sides has expressed the earnestness of the writers and the importance of the bone of contention. At the same time, many of the most important pictures at the various exhibitions are clearly of the new school, and the number of disciples steadily, if slowly, increases.

It is impossible to ignore, nay, on the contrary, it is reasonable to accept with the greatest deference the criticism of artists—painters, engravers, etchers, and others—who are not photographers. What, then, is their attitude towards photography of the old, sharp school, and towards that which differs so essentially from it? It is a fact that, to speak generally, an artist, or one of artistic tastes, abhors a photograph. He will, at the best, treat them with a certain amount of condescension; allow that they are pretty, clever, charming even; but art—never! It is not my purpose here to discuss whether any system of photography, even the system which I desire to advocate, can rightly claim to be included amongst the fine arts; but I will maintain that pictures of the character alluded to come as a revelation to the artistic critic who views them for the first time. Much more than their curiosity is aroused; they are surprised. A picture which, although a photograph, is without the distinctive and to them objectionable features of photography, gives rise to an expression of wonder

that it has been produced by similar means. It is, in fact, the absence of those aggressive features, hitherto the cause of the antagonism raised in the artistic mind, which allows the picture to be treated with consideration, and a willingness to accept it as a work of art. One often, in fact, now hears such an expression as the following :—" Oh, I like that ; that is quite artistic, not a bit like a photograph." In a minor way the same feelings were aroused when first the garish obtrusiveness of the highly-polished surfaces hitherto employed in the printing of photographs gave place to the softness and simplicity of matt surface or roughened papers. So, also, with the softer harmony, where minuteness of detail is not so prominent. It is as the mellowness of age to the crude brilliancy of new varnish ; as the tone of ancient woodwork to the newly smoothed and polished carving ; or, again, as the rough and bold inaccuracy of the work of the Eastern handicraftsman to the mechanical precision more characteristic of the West.

It is evident that the more we dispense with the mechanical in photography, the more we rely on the simplest methods of procedure, the more, in fact, we eliminate what is distinctly photographic, and assimilate our work to the characteristics of brush and pencil, so much the more likely are we to obtain that freedom and originality, that capability of expression and thought, which alone can raise the productions of photography to the level of a picture.

Very much remains to be said with regard to the higher artistic merit of photographs in diffused focus produced by the simple aperture, or by means of lenses applied in various ways with the same object ; but the description of the first of these methods requires so much space that artistic considerations must give place for the present to the more practical side. Briefly, my desire is most strongly to bring forward one phase of what in photography is called artistic focussing, produced by the entire suppression of the lens, and the reduction of the means employed for the concentration of the rays of light on the

sensitive plate to the most elementary form of the *camera obscura*. At the same time, it is with no spirit of undue depreciation of the great merits of other descriptions of photography. On the contrary, I fully recognise their great and many beauties. Neither have I any ambition dogmatically to assert my own opinion, or to hold that it is the only true and real method of photography. The question is one which is now exciting so much attention that a practical consensus of opinion will before long be arrived at, and in that expectation I am, for the present, content to leave it.

Sooner or later, in the experience of many earnest workers in art photography, the result of their labours executed in the ordinary manner, the mere record of places and sights they have seen, will cease to have any pleasure or charm for them. Rightly enough, in their early student days they will occupy themselves with mastering the mechanical *technique* to be acquired by the conventional use of lens and dry plate. They will even be keen partisans of fine definition of focus, and warm antagonists of a school to which they will be too delighted to apply what they mean to be a derisive epithet. They are young in art, inexperienced and untrained. But their practice, such as it is, of art leads them to study and inquiry, and the time will come for those who persevere when they will recognise the folly of believing themselves to be capable of being masters to themselves, intolerant of teaching, and impatient of authority. Something more than the mere map like representation of nature, which is the limit of the pure photograph, will reveal itself to them as a thing to be desired in art, if it be only photographic art. In their search for something capable of rendering thought and expression they will find the thorn in the path, the stumbling-block and difficulty, to be the unyielding hardness of the lens; and, failing success in the endeavour of opticians to render it more pliable for their purpose, the alternative, by its total suppression and the substitution of the simple aperture, will, by the results it gives, afford at least a partial satisfaction. That these results will long be *caviare* to the multitude is certain; but

the taste for *caviare*, like every other acquired or cultivated taste, is one that grows the more it is indulged, and never palls. It is the same with all the arts, which are, indeed, but acquired or cultivated tastes. In poetry, in music, painting, sculpture, just as in matters which affect the palate only, the tinkling verse, the claptrap song, or the gaudy picture tickle easily at first the uneducated eye or ear, but their fascination fades as quickly; whereas that which requires training and reiterated practice to understand seems to be endless in its claims on the appreciation of the senses.

The space at my disposal does not, however, permit me to enter more at length into this view of my subject. I will, therefore, proceed at once to the more practical consideration of photography without a lens, or what has been known to some extent hitherto as *pinhole* photography. With regard to the latter term, besides its suspicion of vulgarity, it cannot be said to be quite accurate. The expression "about as large as a lump of chalk" is almost as definite; and, as I shall presently show, the aperture has by no means necessarily much relation to a pinhole, for it may vary from, say, $\frac{1}{100}$ th of an inch in diameter to (under extreme circumstances) half an inch or more. Whether or no the suppression in a photograph of the distinctive features of photography, as commonly understood, be a matter for condemnation, or even ridicule, I am not concerned to inquire. It is certain that the result is to give increased pleasure to many minds; and it is to be remembered that it is still photography, although not lens photography. It is the lens and its imperfections which are suppressed.

I shall endeavour, in the treatment of my subject, to avoid as much as possible scientific details, and to use them, when obliged, in the plainest manner. From an optician's point of view the lens and its functions have been elsewhere exhaustively treated; from an artistic point, questions such as how quickly and in what manner the eye accommodates itself to several planes successively have been discussed *ad nauseam*, and, I think, also uselessly. They can be made to prove too much.

It is said to have been a favourite thesis amongst theologians to debate upon the number of angels which could assemble on the point of a needle. Doubtless they would have been struck with the idea that the images of the entire angelic choir could pass upon one ray of light through an aperture as fine as the point of the finest needle could puncture, and form a pictorial representation in natural colours on a screen on the opposite side of almost unlimited dimensions. Yet that is, reverently speaking, what the *camera obscura* is enabled to do; and it is a similar process which we apply to photography in picture making without a lens. As an example I venture to present an illustration, ably etched in photogravure, by Mr. Walter Colls. My regret is, that I have been unable to avail myself of far more artistic negatives by more skilled photographers. So far as I am aware it is, however, the first that has been published, and I must allow it to stand, as an example, at least, of the technical side of the subject.

Broadly speaking, the rays proceeding from an object and passing through a lens form an image in strict focus when received on a screen placed at a certain fixed distance only from the optical centre of the lens. It is not possible for quite near and distant objects to be at the same time absolutely clear, or in sharp focus as it is called. The less the focal distance the greater is the field embraced, but while a short focus lens possesses scientific advantages, the form of the lens tends to distortion; and violent perspective, which, although capable of correction to a certain extent, is always present. The angle included cannot easily, with a lens, be made to extend beyond an angle of about sixty degrees. The rays of light also, passing through a denser medium than the air, are refracted on their entrance and exit, and cause a distortion more appreciable at the edges of the lens than approaching and at the centre. To form an image a concentration of rays is required, and, by the laws of diffraction, this occurs also when a bundle or cone of rays comes across the edge of an orifice, such as the aperture which we substitute for the lens. As with the lens so with the simple aperture

there are certain limits of position of the screen or sensitive medium, for which, with a given diameter of opening, the image is formed with the greatest degree of sharpness; in this case, however, much greater latitude is permissible without in any appreciable degree altering this sharpness. There being no change of density there is no deviation of the axis of each cone of rays on passing through the opening; the image, therefore, is formed with geometrical precision.

The simplest form of camera, and the only apparatus absolutely required is a light tight box, in the centre of one side of which the aperture is punctured. Facing this, on the opposite side of the interior of the box, is the arrangement for holding the sensitive plate or film required to be exposed. In order to economise space I shall now proceed to give practical details, as briefly as possible, of the best form of apparatus, and general axioms on the principles involved.

Apparatus.—An ordinary camera, made to extend to twelve inches (for the larger sizes of plates to twenty-four or thirty-six inches) with dark slides, glass plates, films or a roll holder. Or a film may be fastened with pins facing the aperture; there is no necessity that it should lie perfectly flat. A large hole in the front (which should be a sliding front) may be covered with black paper, and the aperture punctured with a fine needle; or the lenses may be removed from a lens-mount, and the apertures of different diameters adapted to the holes in a rotating diaphragm; or a slip of metal pierced with the necessary openings, may be made to pass in front of the centre of the larger aperture; or they may be pierced in the circumference of a circular plate of metal which is made to revolve as required. Other methods will easily suggest themselves, on which it is unnecessary to enlarge.

Diameters of the apertures.—The diameters of apertures vary according to their distance from the sensitive plate. The results of experiments show that for a distance of between three and five inches the most suitable opening is one of $\frac{1}{100}$ th of an inch. Other convenient diameters are $\frac{1}{70}$, $\frac{1}{80}$, $\frac{1}{40}$, $\frac{1}{30}$, $\frac{1}{25}$ and $\frac{1}{20}$ th of an inch. The

metal plate should be about $\frac{1}{100}$ th in. in thickness, the hole pierced a wide cone shape and without any blur at the edges.

Focussing and view-finding.—The question of focus naturally does not enter into our practice; it is absolute and fixed. It is necessary, however, to know what extent of field will be included on the sensitive plate. There are several practical methods of doing this. Amongst them are the following:—An aperture of $\frac{1}{8}$ th of an inch will give a sufficiently distinct image, in a bright light, on the ground glass screen. Or, it may be taken that a simple aperture at a certain distance from the plate, will include the same angle and give the same field of view as a lens of the same focal distance with the same size of plate. Or ordinary finders adapted to the different focal lengths may be used. Or, again, the camera being swung round, and the eye applied close to the aperture, the field of view will be included within the limits occupied by the (previously removed) ground glass screen. There are other methods to which, however, it is scarcely necessary to devote space.

Exposure.—The question of the length of exposure required to be given is, of course, important. At the same time, so many factors enter into the consideration that it would not be possible fully to discuss it here. The experience of the operator and a few trials will prove of equally good service. As a guide, it may be said that the exposure required naturally increases according to the size of the plate and the distance from the aperture. The intensity of light is in inverse proportion to the square of the distance. George Davison, in a communication on the subject to *Photography*, says, that “the relation between the squares of the diameter of the pinhole to that of a lens of given focus gives inversely the relative exposure. Thus, with a $\frac{1}{4}$ -plate camera with a 6-inch focus lens and a stop $\frac{1}{4}$ -inch diameter, and a pinhole $\frac{1}{8}$ th inch with same focal length, the amount of light let through will be as $\frac{1}{16}$ to $\frac{1}{3600}$, or as 225 to 1; that is 200 or 300 times as much exposure would be required.” Much also depends on the method of development, and in regard to this the same precautions

and methods of manipulation with respect, for instance, to contrasts, require to be taken. The exposure of the negative from which the illustration was taken is given on the fly-leaf with the other details.

Remarks on general principles.—It is best to use a narrow angle ; 8 to 10 in. for $\frac{1}{4}$ -plate, 12 to 15 in. for $\frac{1}{2}$ -plate, and so on. There is practically equal definition in any plane, whatever the length from plate to pinhole. With a short focus images overlap more, and are less clear than with a longer one (*Davison*).

The angle included may equal, and even exceed, 100° . It is however, advisable to take an angle of 90° as the maximum with which good results are obtained, and for pictures the angle should not exceed 45° . Movement of trees and vegetation, if not too great, is not materially important. Objects, however, in movement which do not return to the same positions will not be imaged ; for instance, the interior of an exhibition in which crowds are moving about would show the building empty of people, with its stalls and exhibits only.

The depth of focus is unlimited. Spherical or chromatic aberration, distortion or curvature, astigmatism, and other disabilities of the lens are absent. Images are formed with absolute precision, and in mathematically true perspective. There is with each distance of aperture from plate a definite size of opening with which the maximum of sharpness is produced, beyond which, either smaller or larger, it falls off. The size of objects is proportionate to their distance from the aperture, and the distance of the aperture from the plate. The following proportion may be established :—The distance of the object : the size of the object :: the focal distance : x (size of image). Conversely to find the actual size of any object imaged on the plate—The focal distance : the distance of the object :: the size of the image : x (natural height or size of object). I give here a table containing practical details, which may be found of value as a guide in working. Bromide papers may be used in the production of the negative, the exposure being increased, say ten times that required for a 60-times plate.

Size of Plate.*	Diameter of Aperture.	Distance of Plate from Aperture.	Exposure.	
Quarter Plate.	$\frac{1}{8}$ th of an inch.	9 inches.	See previous remarks under this head. It may be added that the intensity of light being in inverse proportion to the square of the distance will regulate the exposure for different focal lengths, and the amount of light transmitted being proportional to the square of the diameter of the aperture, will regulate the exposure required in this respect.	
Half Plate.	$\frac{1}{4}$ " "	13 " "		
Whole Plate.	$\frac{1}{2}$ " "	16 " "		
10 x 8.	$\frac{3}{4}$ " "	20 " "		
15 x 12.	$\frac{1}{2}$ " "	30 " "		
Over the above sizes.	$\frac{3}{8}$ " "	36 " "		
For copying engravings or pictures.	—	—	Distance of object to be copied.	In ordinary good studio light.
Copying same size.	$\frac{1}{8}$ th of an inch.	18 inches.	18 inches.	15 minutes.
" $\frac{1}{2}$ "	" "	12 " "	24 " "	7 " "
" $\frac{1}{4}$ "	" "	10 " "	30 " "	
" $\frac{1}{2}$ "	" "	10 " "	40 " "	
" Twice the size.	" "	24 " "	12 " "	30 " "
				The above applies to black and white engravings. For paintings, double at least.

Other means to produce effects similar to those of the simple aperture have been suggested, and are still being tried. Amongst them are the use of a diffraction grating in the place of a stop, printing from the wrong side of a negative, with a ground glass or film interposed, or on very rough paper, or by using a very large aperture or stop. A very excellent method is the racking out of the lens from its position of fine focus, in conjunction with a small stop, say $f/64$, or smaller. With this, exposure is not inconveniently prolonged.

The subject of photography without a lens appears to have attracted more general attention abroad than here. In France

* The figures given above are intended to apply to artistic work only. The camera with simple aperture is, however, of service also in other ways; for instance, in topographical surveys, where in conjunction with the instrument known as a cylindrograph it is of especial value. Smaller apertures and wider angles may therefore require to be used.

M. Colson, Captain of Engineers, has written an exhaustive monograph on the subject; and I have to express my indebtedness to him for much information. Captain Abney goes very fully into the theories involved in the June number (1890) of the proceedings of the Camera Club. He says that "artist painters cannot as a rule make anything sharp; but if we look at pictures like Alma Tadema's we are bound to confess that there is a sharpness about them which nearly rivals a photograph. He puts nothing out of focus." Without discussing the question whether artists can or cannot paint microscopically sharp, it may be conceded that there have been great painters whose minuteness of detail exceeds the typical one cited. Still, it is open to question whether the microscopic sharpness characteristic of a photograph has ever been given in painting. Certainly it would be difficult to point to examples by great masters in pure landscape, or of buildings other than architectural plans. Even Canaletto cannot be instanced as a case to the point. Let us not forget, also, that a photograph does not necessarily imply a work of small dimensions. What might be appropriate to De Blaramberg's minute execution on snuff-boxes, for instance, does not apply to large canvases. It must not be lost sight of, either, that the very material upon which pictures are made is against harsh minuteness of detail. No amount of varnishing would produce the effect of an image kept entirely on the surface of albumenised or highly glazed paper. Consider, too, the case of the exquisite paintings on Sèvres-porcelain, which owe much of their charm to the soft diffusion of the images in the porous body of the china, protected afterwards by the glaze, but differing from the harshness of those executed over the glaze itself. Captain Abney holds that it is waste of time to use a pinhole, when the same effects can be produced by putting a lens out of focus, or using one uncorrected for spherical aberration. So far, at least, I am not satisfied that such is quite the case. Undoubtedly what we require, as Davison has said, is a lens with which spherical aberration can be regulated at will. Failing this, the simple aperture which gives uniform definition

throughout the picture is a compromise which is far from being unsatisfactory.

A great drawback, in the opinion of many, is the length of time required for exposure; but, after all, in many cases, this may be reduced to seconds. Again, the restless hurry of the present age, the ceaseless struggle to save time, is not in art a question worthy of consideration. To me there is much more charm in the evident deliberation. Supposing the aim of the artist be to produce pictures on a large scale, say fifteen-twelve or twenty-fifteen. He does not sally forth prepared to take whatever may turn up. On the contrary, he carefully and with deliberate thought chooses his subjects long beforehand; he has time to study effects of atmosphere, of skies and clouds; he thinks out all details, as a true artist should; and if, after all, he does not always succeed in interpreting to his entire satisfaction what his imagination has pictured, surely the time has not been altogether wasted.

The natural phenomenon of a picture formed in a dark chamber by the rays of sunlight has probably occurred accidentally in many people's experience. A chink or tiny hole in the shutters of an otherwise dark room and a whitewashed wall are the only requisites. It can scarcely, then, be doubted that, long before the *camera obscura* was named and described—far back in the days of old Egypt, perhaps—the occurrence was known, and purposely made use of, possibly, in ancient mysteries and incantations. It is scarcely credible, in fact, that it should have escaped notice. Yet we seem to have no certain description of the *camera obscura* before the middle of the sixteenth century, if we accept as apocryphal the attribution of the discovery in the thirteenth century to the English monk, Roger Bacon. Though somewhat vague, the references in a commentary on Vitruvius, published by Cesarino at Como in 1521, undoubtedly refer to it; and there appears also to be some mention of an instrument of the kind in the unpublished MSS. of Leonardo da Vinci, in which he ascribes the discovery to a Benedictine, Dom Panuce. Erasmus Rheinhold, too, is said to have used the *camera obscura* in 1540, during his

observations of an eclipse of the sun. The Neapolitan, Giovanni Baptista Porta, however, is generally credited with the invention ; and if not the first discoverer (indeed, as I have previously remarked, this is hardly likely), he at least describes it more minutely and practically in his "*Magia Naturalis*," wherein he says that, "having closed all the shutters of a room, a hole about as big as the little finger is made in one of them, opposite which is a white wall or stretched white paper. In this manner the representation of everything passing in the street, due to the rays of light passing through the hole, and the people passing up and down, is produced by an inverted image." Porta also applied the use of lenses and concave mirrors to the *camera obscura* ; and Canaletto took advantage of this instrument in the production of his pictures. As an exhibition, a well-known instance has existed for many years on the downs at Clifton, in a small, observatory-like building, which, from its commanding position, gives many beautiful pictures of the surrounding country.

The application of the simple *camera obscura* to photography naturally excited the attention of the early workers in this art ; but the sensitive mediums then known were too slow to lead to practical results. The use of such a camera without a lens can hardly be said to date back many years, although Professor Eder, in the *Photographische Correspondenz*, names Berry, in 1855, as having produced a landscape with a simple aperture of $\frac{1}{8}$ th inch. Lord Rayleigh, in the *Philosophical Magazine* for 1880, contributes an article on the subject ; and a most interesting note by the same authority will be found in the *Photographic News* of September 20th, 1889. I regret that space will not permit me to quote the whole of it. He deduces, however, I may say, that with an aperture equal to that of the pupil of the eye, and a focal distance of 66 feet, the image formed without a lens would be at least as well defined as that retained on the retina. Finally, Captain Abney's name is, of course, prominent as an observer, and as probably the first who used a lensless camera in the studio and in the field. Those who know the admirable work in other methods of George Davison,

and that he is a strong upholder of the artistic merits of the "pin-hole," will not be surprised that he has produced equally admirable pictures, some on a very large scale, by this means. An exhibition of such, and similar, work would prove, I think, of high interest, and is very desirable.

My paper has spun itself out to, perhaps, an unreasonable length; but there still remains much to be said, which must for the present be deferred. By abandoning, as we undoubtedly do in the processes I have indicated, whether with or without a lens, the distinctive features of photography as generally understood, we do so with the intention of assimilating the art more closely to those methods of pictorial representation which we feel to be truest and best. It is because I am deeply impressed with the conviction that one side of photography at least is capable, if freed from fetters, of emulating the best examples of art in monochrome, that I have ventured to press the claims of a method of working for which a distinctive name is certainly required, and which, for the want of a better at present, I am obliged to characterise as Lensless Photography. I have already said that I do not contend that it is the only one worthy of consideration; neither do I say that it is perfect or without drawbacks. To attain our end we are justified in using any description of focussing—any means which racking in or out, special lenses, and lenses stopped down or opened out, can give us. But the great desideratum is a perfect and pliable lens, and until that has been achieved I, for one, am content to rest satisfied with its total suppression.

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