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PHOTOGRAPHY IN CRIMINAL INVESTIGATIONS

CHARLES CALVIN SCOTT†

Modern criminal investigators are dependent in many ways upon chemistry and optics. Applications of these sciences have produced, among other things, the photographic process—an indispensable aid to the twentieth century criminologist. The preparation of photographs for use in criminal investigations is generally handled by skilled photographers, but every judge, prosecuting attorney, defense lawyer and police officer should know enough about photography to distinguish between good and bad photographs. A single picture may convince a jury of the guilt or innocence of an accused. After a photograph has been admitted in evidence and shown to the jury, the opposing lawyer can waste thousands of words without convincing the jury that the facts are not properly portrayed in the picture. Jurors are average men and as such they usually think that photographs are always true representations of the objects pictured. Few other common fallacies are so productive of serious consequences. Of course the camera itself is not endowed with the unique human ability to falsify. The camera always portrays accurately whatever a trained photographer wishes it to show. Hence, by the expert manipulation of his equipment a skilled photographer can create a false or misleading photograph, and likewise, the bungling tyro may snap a picture that presents the subject in such a way as to mislead judge and jury. It is important, therefore, that the capacities and limitations of the photographic process should be understood by all who use it in establishing the guilt or innocence of those accused of crime.

†Member of the Kansas City, Missouri Bar.

PROPER USES OF LENSES

In its most simple form a camera is merely a light-tight box at one end of which is a pin hole or a lens and at the other a place to insert a sensitized film or plate. While a pin hole has certain unique advantages,¹ its small aperture passes very little light, necessitating time exposures even in bright sunlight, and it is not capable of producing critical definition. Consequently, in practical photography lenses made of fine optical glass are used instead of the pin hole. The single element meniscus lenses commonly fitted to the simple and very inexpensive box cameras can be manufactured with an aperture large enough to permit snapshots in good daylight, but because of inherent defects are incapable of producing images that are "needle sharp." Little better for legal purposes is the two element photographic objective known as the rapid rectilinear or aplanat. It is more highly corrected than the meniscus but it is not corrected for astigmatic aberrations.

The technical defects of the meniscus and rapid rectilinear lenses will not ordinarily produce photographs that will mislead a jury. The point is that these lenses will not produce critically sharp photographs. When gathering photographs to support a case one should not make the mistake of trusting their preparation to an inexperienced beginner with a cheap lens. It may happen, however, that a photograph taken with a simple lens is one that can never be retaken, and in such circumstances, it will have to suffice. Such would be true, for example, should some bystander happen to be taking a picture of a scene just as a crime were being committed within the field of his camera. In such cases a photograph made with the cheapest lens would be very useful.²

¹ See "Pinhole Photography" (Photo Miniature No. 208, Tennant & Ward, 1935).

² The *Amateur Photographer* once published an item describing how a man was proved innocent of a crime by just using a casual photograph. Accused and deceased were known to have quarreled. Later the two went sailing in the harbor of Rio de Janeiro in a small boat. Accused returned with the body of deceased and firmly asserted that he had met his death accidentally by falling from the masthead to the deck. Unfortunately for the accused an oar was missing and doctors testified that an oar could have been the weapon used. Things looked black until a passenger on a steamer made public some startling evidence. He had happened to snap a picture of the harbor with a little box camera, and when several days later he had developed it, he had noticed a dark spot upon the sail of one of the small craft included in the view. Upon enlargement, the craft was shown to be the boat owned by deceased, and the spot proved to be the image of a man falling from the mast, thus aiding in proving the accused's innocence.

The high grade lenses produced for general photographic work are known as "anastigmats."³ This type of lens will yield critical definition with freedom from distortion or error in the rendition of straight lines. It can be manufactured with a very large aperture, thereby permitting snapshots at night by ordinary artificial light when supersensitive film is used.⁴ Considering their capabilities, the modern high-speed anastigmat lenses are inexpensive. There are many good formulae for the construction of lenses corrected for astigmatic aberrations. Any good anastigmat made by a reputable manufacturer will be satisfactory for legal work and it would be unfair to suggest that any certain lens was better than the others. The development of high-speed anastigmat lenses has made it possible to use miniature cameras in criminal cases. If fine grain film is used in the camera and both camera and projection apparatus are equipped with good anastigmat lenses, small negatives may be enlarged without difficulty to a size of 8" x 10", which is quite suitable for presentation in court. The mere fact that a photograph is an enlargement does not render it inadmissible in evidence.⁵ No decisions to the contrary have been found.

Every lens, regardless of its type, has a definite focal length which may be defined roughly as the distance from a certain fixed point in or near the lens (depending upon its construction) to the point where the rays converge after refraction when the lens is focused on infinity. Less technically, focal length may be said to be approximately the distance from the center of the lens to the film or plate when the lens is focused on a distant object. By common usage a lens is said to be of normal focal length when its focal length is about equal to a line drawn diagonally through two corners of the film size being used. If the focal length is much greater than the length of a line drawn diagonally through the film area, the lens is generally called a long focus or telephoto lens,⁶ while a lens with a focal length that is much shorter than a line

³ A more highly corrected objective, termed "apochromatic," is used chiefly in the photo-engraving industry.

⁴ Anastigmats for still photography are made with apertures as large as f. 1.5. This admits about 28 times as much light as the f. 8 aperture of the rapid rectilinear and about 112 times as much as the f. 16 aperture of the meniscus.

⁵ *Duree v. United States*, 297 Fed. 70 (C. C. A. 8th, 1924); *State v. Reding*, 13 P. (2d) 253 (Idaho, 1932); *People v. McDonald*, 365 Ill. 233, 6 N. E. (2d) 182 (1936); *Puckett v. Commonwealth*, 200 Ky. 509, 255 S. W. 125 (1923); *State v. Hause*, 82 N. H. 133, 130 Atl. 743 (1925); *State v. Clark*, 99 Ore. 629, 196 P. 360 (1921); *State v. Gaines*, 144 Wash. 446, 258 P. 508 (1927).

⁶ In this article the words "telephoto lens" are used to signify any lens of extremely long focal length for a given picture area.

drawn diagonally through the film area is called a short focus or wide angle lens.⁷ Note that whether a lens is of long, normal, or short focal length depends upon the film size with which it is being used. A six-inch wide-angle lens intended for use on an eight-by-ten inch view camera might serve for a telephoto or long focus lens when used on a miniature camera.⁸ Following is a list of some common film sizes with suitable short, normal, and long focal length lenses for each:⁹

<i>Film Size</i>	<i>Focal Length of Wide Angle Lens</i>	<i>Focal Length of Normal Angle Lens</i>	<i>Focal Length of Telephoto Lens</i>
1" x1½"	1⅞"	2"	6"
2¼" x3¼"	2⅞"	4⅞"	12"
4" x5"	3½"	6"	18"
8" x10"	6"	12"	28"

Every camera intended for use in criminal cases should be equipped with interchangeable wide angle, normal angle, and telephoto lenses, but for general work the normal angle lens should be used whenever this is possible. In criminal photography the distances between various objects in a picture are often of great importance. The distances between the objects may *appear* too great if the camera is placed very close to the nearest object included in the view, while it may *appear* too short if the camera is too far from the nearest object. A wide angle lens will tend to cause the photographer to approach too near to his subjects in order to make them fill the picture area. This will cause the distances between near and far objects to appear greater than they are in fact. Use of a lens of normal focal length will have a tendency to cause the photographer to place his camera at the proper distance from the nearest object. If a telephoto lens is used, it will be impossible to place the camera near enough to the closest object, and as a consequence the distances between near and far objects will appear shorter than they are in reality. Attention should be directed to the fact that it is the viewpoint or position of the camera that is important and not any inherent

⁷ In this article "wide angle lens" is used to mean any lens with great covering power which may be used as a wide angle lens—hence, any lens of short focal length for a given picture size.

⁸ A lens may always be used as a long focus lens on a camera smaller than the one for which it was made, but a lens cannot be used as a wide angle lens on a camera larger than the one for which it was intended.

⁹ These focal lengths will vary slightly with different makes of cameras.

differences in wide angle, normal angle, and telephoto lenses. When used at the same camera position all lenses will yield pictures in which the distances between near and far objects appear the same. Telephoto and wide angle lenses are to be used with caution only because they tend to cause the photographer to place his camera too far or too near the closest object that must be included in the picture. The following explanation of Figures 1 to 4 will aid in an understanding of the importance of choosing a lens of normal focal length whenever the distances between objects are important:

Two men stood in exactly the same positions when Figures 1 to 4 were made. Assuming that the man with the gun, accused of shooting the man with the ax, plead self-defense, the distance between the two men at the time the shot was fired would be very important. In Figure 1 both men were approximately the same distance from the camera. Consequently, the distance between a near and a far object was not involved. In making a picture to show the distance between two objects, whenever possible the camera should be so placed that the two objects are the same distance from the camera. If this is done, it will not matter whether a wide angle lens is used and the camera placed very close to the objects, or whether the other extreme condition is caused by the use of a telephoto lens and receding from the objects.

Quite frequently it is not possible to have the camera the same distance from two objects. From the nature of the surrounding territory, often one object must be much nearer the camera than the other. In this situation the choice of a lens becomes very important. Figures 2 to 4 illustrate this fact. In these illustrations the men stood in exactly the same positions as when Figure 1 was made. In making Figure 2, however, the camera was placed so close to the nearer man that a wide angle lens was necessary, because from this camera position a normal lens for the picture size used would make it possible to include only about a half length picture of the nearer man and a telephoto lens from this camera position would show only the head and shoulders of the nearer man. From the close viewpoint used in Figure 2 the perspective appears forced, although it is absolutely correct, and the average person is led to believe that the two men were standing a greater distance apart than they were in fact. Whenever circumstances require that the camera be placed very close to the nearest subject and a wide angle lens used, the fact that distances between near and



FIGURE 1
Photograph Taken
With Camera at
Equal Distance
From Both Objects
(Correct Method).



FIGURE 2
Wide Angle Lens Used in Making
This, Picture (Incorrect)



FIGURE 3
Picture Made With Normal Lens
(Correct)

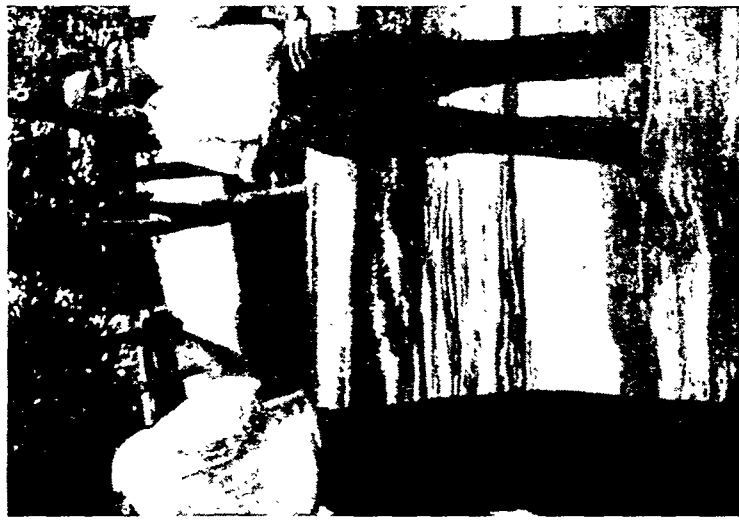


FIGURE 4
Picture Made With Telephoto Lens
(Incorrect)

far objects appear unnaturally great should be explained in court.

In taking Figure 3 the camera was moved back until it was about twice as far from the nearer man as it was when Figure 2 was made, and a normal lens was used. From this camera position a normal angle lens yielded an image of the nearer man that was just large enough so that he could be included in the picture area. A photographer will unconsciously assume a position that will enable him to include the desired subject and no more, and the normal lens will tend to insure that this position is one that will make the distances between near and far objects appear natural. From the same camera position any lens, regardless of focal length, would yield satisfactory results, but the wide angle lens would include much more of the surrounding territory, while the telephoto lens would not make it possible to include more than a half-length picture of the nearer man. Comparison of Figure 3 with Figure 1 will prove that Figure 3 makes the distance between the two men appear normal.

When Figure 4 was taken the camera was moved back until it was about six times as far from the nearer man as it was when Figure 2 was made and about three times as far as when Figure 3 was made, and a telephoto lens was used on the camera in order to make the image of the nearer man the same size as in Figures 2 and 3. In Figure 4 both men are so far away from the camera that the distance between them appears much less than it was in fact. This tendency of two distant objects to appear too close together is known as the telephoto effect. Any lens would produce the same effect as long as the camera remained the same distance from the nearer man, but in all probability a wide angle lens would not be used for it would include so much of the surrounding territory that neither men would show up well and the same would be true to a certain extent of the normal lens.

Only by the use of a wide angle lens can one approach very near to a subject and still include all of it within the picture area, but with any lens, regardless of focal length, the telephoto effect may be achieved by choosing the required camera station and then enlarging from the desired portion of the negative. It is easy to see that Figures 2 and 4 might be used to deceive. Both might affect a jury's decision upon the question of whether the man with the ax was close enough to the man with the gun to justify the latter's use of the self-defense doctrine, since Figure 2 exaggerates the distance between the two men while Figure 4 makes it appear

that they were very close together. Use of a lens of normal focal length will make it less probable that an incorrect camera position is assumed, and for this reason all pictures showing the *locus in quo* should be made with a normal lens whenever possible. If circumstances make it necessary that either a wide angle or telephoto lens be used, the fact that distances between objects near and far appear unnatural should be made clear to every one. A wide angle lens may be indispensable in taking a picture in a small room, while a telephoto lens may be equally necessary where it is not possible to approach very near the subject.

Portraiture is an exceptional circumstance which alters the general rule that a lens of normal focal length should be used. In portraiture it is necessary to approach within close range of the subject in order to insure a large head and shoulder picture. Even a lens of normal focal length for a given picture size will cause the camera to be placed too near the subject. In portraiture one deals not with the distances between various objects, but with the distances between various points on the surface of the same object. In making identification pictures and other portraits, the camera should never be placed closer than about five feet from the subject.¹⁰ In order to secure a large head and shoulder picture at this or a greater distance, it will be necessary to employ a long focus lens. Of course, a wide angle or normal lens may be used as long as the camera is not placed closer than five feet from the subject, and enlargements made from the desired portion of the negative that will yield a head and shoulder picture. If the camera is placed closer than about five feet from the subject, in a full face view the nose will appear too large while the ears will appear too small, and in a profile view the visible ear will appear too large while the nose and other adjacent features will appear too small. The distortion is oftentimes so great that it is difficult if not impossible to identify the subject.

Depth of focus is also important in criminal photography. By depth of focus is meant the extent to which objects at different distances from the camera are sharp when the camera is focused on a given distance. Camera lenses are equipped with expanding and contracting diaphragms which permit the photographer to regulate the amount of light passing through the lens and the depth of focus. Expanding the diaphragm increases the speed of the lens

¹⁰ This is the absolute minimum. From six to eight feet will not be too great a distance between camera and subject for a head and shoulder picture.

but decreases the depth of focus, while contracting the diaphragm decreases the speed and increases the depth of focus. Assume a camera is focused on an object eight feet away. If the camera is equipped with a fast lens and it be used wide open, objects much closer or much farther away than eight feet will be out of focus, but as the diaphragm is closed near and far objects become sharper and it is said that the depth of focus has been increased.

In criminal photography the lens should always be used at the smallest practical diaphragm in order to secure the greatest possible depth of focus. In making pictures of moving objects under poor light conditions it may be necessary to employ the lens wide open, but whenever possible the diaphragm should be set at its smallest opening even though it be necessary to place the camera on a tripod and give a time exposure. This is just as essential when using a miniature camera as when using a large view camera, for if the tiny negatives are to look sharp when greatly enlarged, a small opening will be required.

It is true that attention can be centered upon an object by focusing upon it and using a large lens opening, thereby throwing background and foreground out of focus. This should never be attempted deliberately in legal work. It is preferable to show emphasis by marking the print (never the negative) instead of employing selective focusing. An unmarked print should also be prepared in order to forestall trouble should the marked photograph be rejected by the trial judge. The practice of using the smallest convenient stop will pay in the end. Many months after the picture is taken, when it is too late to take it again, it may be discovered that certain objects which are hopelessly out of focus are of vital importance.

FILMS

In black and white photography as a general rule the image produced upon the film should reproduce in monochrome exactly the same image that would be formed upon the retina of the eye in colors. In other words, in addition to the color sensation there is a luminosity sensation, and the accurate photograph must reproduce in black and white the luminosity of the various colors as the normal eye sees them.¹¹ This result cannot be obtained with all films and from the standpoint of the criminal investigator it is

¹¹ See "The Photography of Colored Objects," Eastman Kodak Company (14th Ed., 1935) Chapter II.

important to know what types do produce such a result and when films of inaccurate color sensitivity may be used. It is convenient to divide available films into four types as follows: First, color-blind film, or film which will not reproduce in monochrome *all* colors exactly in the luminosity they appear to the normal eye; second, film sensitive to all colors and capable of accurately reproducing them in monochrome when the proper filter is employed; third, film capable of reproducing objects in their natural colors; and fourth, special purpose film having a high sensitivity to certain rays invisible to the eye, known as infra-red rays.

A vast number of photographs are still made on color-blind film. The silver salts used as the light sensitive agents in the manufacture of all modern films are not sensitive to red, orange or yellow light at all and are but slightly sensitive to green, their sensitivity being confined to blue, blue-violet and ultra-violet. By adding various dyes to the emulsion its sensitivity in a particular range can be increased or controlled. Certain dyes will render a film sensitive to yellow and green, others will in addition make it sensitive to red, while still others will sensitize it to the infra-red rays in the invisible portions of the spectrum. The so-called "orthochromatic" films are sensitized for yellow and green but they are totally insensitive to red, and it will be seen that the proper rendition of red is often of the greatest importance. Therefore, all orthochromatic films should be considered in the class of film which is color-blind. Films of this class are sometimes sold under brand names of "Polychrome," "Verichrome," "Plenachrome," etc., according to the whim of the manufacturer, but these misleading names must not lead one to believe they are sensitive to all colors.

Because color-blind films, including the orthochromatic kind, render red as black, they should never be employed when it is important to portray a subject in monochrome exactly as it appears in color to the normal eye. But on occasion color-blind film will be found very useful in criminal work. It will make traces of red visible which the human eye might overlook. Blood stains washed from wearing apparel or the *locus in quo* of a homicide, and almost invisible, may appear quite plainly when photographed on color-blind film. Instances have occurred where such photographs have proved quite valuable. When pressure is brought to bear on the skin, the breaking or inflaming of the small veins under the skin may cause redness. Often this is so faint that it cannot be detected by the naked eye, and it is then that color-blind film is of assistance.

In all cases of suspicious death, both the corpse and the suspected assailant should be photographed with ordinary film or with panchromatic film and a blue filter.¹² The room in which the body is found should likewise be photographed with such material. In one French case, the Paris police made pictures of the interior of a room which was suspected to have been the scene of the homicide. A thorough search had revealed no bloodstains, but when the photographs were developed, a large washed stain on the carpet, invisible to the eye, was revealed. In another case, a photograph of a suspect in a stabbing affray made it appear that there was a large stain on the man's shirt, although such a stain was not visible to the eye. Tests proved that the man's shirt retained traces of a bloodstain which he had attempted to wash away. When this was called to the attention of the suspected man, he made a complete confession.

The second classification of film is generally known as "panchromatic," because of the fact that its sensitivity to all colors enables it to render them in their proper monochrome equivalents if a light filter of the proper color (varying with different types of panchromatic film) is placed in front of the lens when the picture is made. It is not possible at the present time to make a film of exactly the same color sensitivity as the normal human eye. But panchromatic film will render colors in their proper monochrome equivalents if the proper filter is used to balance the sensitivity of the emulsion with the sensitivity of the normal eye. Since the sensitivity of panchromatic film of different types is not the same, each requires a different filter. Then, too, with each type a different filter is required for each kind of light. For example, sunlight and incandescent light each requires a special filter before colors may be rendered in their proper luminosity. And when mercury vapor or ultra-violet lamps are employed alone as light sources, it is impossible to obtain proper color values even with panchromatic material.

Panchromatic film will do more harm than good in criminal work if the photographer is not thoroughly trained in its use. In addition to the proper filter to reproduce colors in their true monochrome equivalents, light filters of every color may be placed in front of the camera lens when panchromatic film is employed and

¹² See discussion *infra* of panchromatic film where it is pointed out that panchromatic film will give the same effect as ordinary film when used with blue filter.

each filter will yield a different effect. Any pure color¹³ may be made to appear white or black according to the desire of the skilled photographer. This is valuable information if the photographer knows when and why he should exercise this power, but the indiscriminate use of panchromatic film and light filters by the inexperienced is to be condemned.

Figure 5 (A, B, C) illustrates three very different results which may be obtained by the use of color blind film, panchromatic film plus orthochromatic filter,¹⁴ and panchromatic film plus red filter respectively. Figure 5-A was made on Eastman Par Speed Portrait Film, a color-blind emulsion. Since the film was not sensitive to red, the lesion appears much blacker and more unsightly than it was in fact. This picture also shows many skin blemishes which could not be noticed with the naked eye. Photographs of this type are sometimes subject to the objection in court that they exaggerate the extent of the injury and tend to incite the passion and prejudice of the jury. In criminal cases, however, at least one photograph should be made in this manner. In a criminal case a photograph is admissible in evidence even though it may tend to incite the passion and prejudice of the jury if it will enable the prosecution to prove a fact which cannot be proved in any other manner.¹⁵

Figure 5-B was made with Eastman Supersensitive Panchromatic Film in conjunction with a Wratten X-2 filter. All other factors remained the same as in Figure 5-A. Since the X-2 filter

¹³ Violet, indigo, blue, green, yellow, orange and red. To render a color as black it must be photographed in its absorption band by light which is of sufficient wave length that it is completely absorbed by the color. A subject will be rendered white if photographed through a filter that matches the color of the subject. See *Photography of Colored Objects*, *op. cit. supra*, note 11, Chapter V.

¹⁴ The word is used in its proper sense and not in the popular sense in which it is used when speaking of "orthochromatic" films. In a technical sense an orthochromatic filter is one which will enable panchromatic film to record all colors in the luminosity they present to the normal human eye.

¹⁵ *State v. McDaniel*, 80 S. W. (2d) 185 (Mo., 1935). "Such evidence should not be excluded merely because it is likely to stir the emotions of the jurors unless the same showing can be equally well made by the state in some other way. In the instant case it is clear that the photographs helped the state's case and that the same showing could not be made without them." *Ibid.*, 193. See also *Young v. State*, 299 P. 682 (Ariz., 1931); *People v. Shaver*, 61 P. (2d) 1170 (Calif., 1936); *People v. Santos*, 26 P. (2d) 522 (1933, Calif. App.); *Pope v. Commonwealth*, 247 Ky. 208, 56 S. W. (2d) 972 (1933); *Commonwealth v. Osman*, 188 N. E. 226 (1933); *State v. Stuart*, 167 Atl. 550 (Me., 1933); *State v. Mannion*, 82 N. H. 518, 136 Atl. 358 (1927); *State v. Burrell*, 112 N. J. Law 330, 170 Atl. 843 (1934); *State v. Fine*, 110 N. J. Law 67, 165 Atl. 433 (1933); *Commonwealth v. Ferry*, 191 Atl. 130 (Pa., 1937); *State v. Miller*, 161 Atl. 222 (R. I., 1932).

A



B



C



FIGURE 5

is the filter designated by the manufacturer as the proper filter to use with this film under Photoflood illumination (light source used for A, B, and C) where the rendition of all colors in their monochrome equivalents is required, Figure 5-B is an accurate reproduction. Note the lesion is not as unsightly as in 5-A, and that most of the skin blemishes which show up in 5-A are not visible in 5-B and hence, must not have been visible to the naked eye, for 5-B reproduces the face just as it would appear to the normal eye. In homicide cases, at least one photograph should be made of the victim with panchromatic film and the filter designated by the manufacturer as proper to reproduce all colors in their monochrome equivalents.

Figure 5-C was made with Eastman Supersensitive Panchromatic Film and a red Wratten F filter was employed. Although the same subject was used and it was taken at the same time as 5-A and 5-B, the lesions are almost invisible. This illustration is not retouched or "doctored" in any way. It is a straight print and an accurate portrayal of the effect of a red filter. If 5-C were introduced in court, one might be led to believe that the person involved had not been injured. While this interpretation of 5-C illustrates an improper use of filters, it must not be assumed that the various filters cannot be used for legitimate purposes. Photographs made with a red filter, for example, may help in identifying a homicide victim before reconstruction of the normal state can be attempted by an undertaker. The red filter by concealing scratches, cuts and blood stains may enable one familiar with the victim to identify him from the photograph. Of course, the red filter will be of no help where the forms of the features of a victim's face have been destroyed.

No police photographer should be without the filter test chart supplied by most filter manufacturers. Such charts usually consist of small squares of tinted celluloid through which the observer looks at his subject and sees it exactly as it will appear in monochrome when photographed with each filter included on the test chart. Such a chart will aid materially in determining which filter to use to bring out different colors, and the following list of Wratten contrast filters with some suggested uses may also be of assistance:

<i>Color of Filter</i>	<i>Manufacturer's Description</i>	<i>Use</i>
Blue	C5	Enables the photographer to obtain similar results with panchromatic film as those produced with color-blind film. Useful in making traces of blood visible, and in making stained mahogany appear very dark.
Blue-Green	P	For copying typewriting.
Green	B	Will make green appear light.
Strong Green	N	Will make green appear white.
Yellow	G	Useful in telephotography for elimination of haze; will make oak and other similar woods appear light.
Red	A	Useful in making mahogany and similar woods appear light.
Strong Red	F	Will aid in identifying homicide victims where face is badly cut but the features are not destroyed. Will bring out bruises more strongly.

There are many other filters that will be useful at times, but the above should be carried at all times and in addition the criminal investigator should always carry the filter designated by the manufacturer of the panchromatic film he uses as the proper filter to use when it is desired to render all colors in their monochrome equivalents. One photograph of the subject should always be made with this filter in order to forestall misfortune should the photographs made with one or more of the above contrast filters be rejected by the trial court. If the purpose for which such photographs were made is explained and it is legitimate, they will generally be admissible even though they do not portray all colors in their natural luminosities. It will be noted that the above listed blue C5 filter will enable the criminal photographer to standardize on panchromatic film for general use, for the blue filter will make it possible to bring out anything that could be shown with ordinary film.

The prosecuting or defense lawyer who in a particular instance has a legitimate reason for insisting that a photograph portray all colors in their proper luminosity, should remember that panchromatic film may or may not produce this result, depending upon whether or not the proper filter was used. If non-panchromatic

or color-blind film was used in making a photograph, however, it can always be assumed that the photograph does not reproduce all colors as the normal eye sees them.

The third type of film is capable of reproducing a scene in its natural colors. At the present time the principal natural color processes are as follows: Technicolor (used only in motion picture work), Agfa Colorplate, Lumiere Autochrome, Eastman Kodachrome, Finlay Color Plate and Dufaycolor. Although such films have been employed by the medical profession for a number of years in photographing surgical operations, they have not been utilized to any extent in legal work. This is to be regretted, for when skillfully made, natural color photographs may be very accurate and should prove valuable whenever it is necessary to show an object or scene exactly as it appears to the eye. Of course, the portrayal of the correct luminosity of the various colors is more important, and this can be done in monochrome with panchromatic film as pointed out above.

If improper filters are used in front of the lens when natural color photographs are made, the colors will not appear in their natural values, and, therefore, such photographs should not be accepted as accurate merely because they were made by one of the natural color processes. Much depends upon the knowledge and skill of the photographer and he may use his training to deceive in natural color work just as he may do so when using panchromatic or ordinary color-blind film.

No reported case has been found on the admissibility of natural color photographs, although there is one civil case that holds that a photograph tinted by an artist long before the controversy arose and before it was intended that the photograph should be used in court, was not rendered inadmissible by the fact that it was tinted or colored.¹⁶ Alert defense counsel in a criminal case would undoubtedly object to a natural color photograph of a murder victim on the ground that it was calculated to prejudice or inflame the minds of the jury. In the light of the rulings in the cases passing upon the admissibility of black and white photographs of homicide victims objected to on this ground it would seem that natural color photographs should be admissible.¹⁷ It would be wise, however, for the prosecution to have a black and white photograph of the

¹⁶ *Harris v. Walker*, 134 So. 897 (Ala., 1931).

¹⁷ See cases *supra* note 15.

same subject ready in case the natural color photograph should be rejected by the trial judge.

Film sensitive to infra-red rays forms the fourth type important in criminal photography. Infra-red is neither a color nor any kind of red; infra-red rays are essentially invisible rays.¹⁸ Infra-red is that part of the spectrum immediately adjoining the visible red. Infra-red photography is in its infancy and is a fertile field for experimentation. However, there are many known purposes for which infra-red film may be used in criminal photography. Most of the uses are based upon the fundamental fact that different substances which look alike to the naked eye but are of different chemical compositions may have varying ability to reflect infra-red rays, and hence, may not appear alike when photographed by infra-red rays.

For example, if an altered instrument be photographed by infra-red rays, the ink used by the forger may appear of a different shade than the ink used by the original maker. Clever crimes hithertofore difficult to discover may thus be exposed. There is nothing complicated about the way such photographs are made. An infra-red sensitive film is merely substituted for ordinary film and all visible light rays are excluded by using an infra-red filter over the lens or over the light source. Slight adjustments must be made in the focus because of the fact that the infra-red rays do not focus on the same plane as visible rays, and filmholders that are impervious to infra-red radiations must be used. In other respects the operation is the same as in normal photography.

Dr. L. Bendikson of the Huntington Library in California has been a pioneer in the discovery of new uses for infra-red film. His discoveries can be applied to criminal photography. He has demonstrated its usefulness, for example, in the revelation of what was written in lines scratched out of documents. His particular experiments have been with ancient documents from which passages were deleted by medieval censors, and the results he has obtained are remarkable. The texts of documents seriously charred by fire have also been successfully deciphered by Dr. Bendikson by means of infra-red rays. Papers which in past years were considered burned beyond identification now should be preserved carefully and photographed by infra-red rays.

Infra-red photography can always be employed as a negative

¹⁸ See Helwich, *Infra Red Photography* (The Fountain Press, London, 1935).

test in determining that two substances which look alike are of different composition. Suppose, for example, it is desired to determine whether a piece of cloth found clutched in the hands of a murder victim is of the same material as a suit worn by a suspected person. Samples of the two materials may look exactly alike and yet not be the same, but if they are photographed side by side by means of infra-red sensitive film and infra-red rays and are found to photograph in different shades, it can be said (ordinarily) that they are not the same material. On the other hand, if they look the same in an infra-red photograph one would not be justified in saying positively that they were the same material, and hence, this test will only be trustworthy when the materials appear of different shades in the infra-red photograph. The test need not be limited to fabrics for it may be tried on any substances appearing alike to the naked eye, but which are suspected to be of different chemical compositions.

When photographed by infra-red rays parts of a subject that appeared blue to the eye will be rendered as black. This fact can be applied to criminal investigation. Slight bruises indicating that a victim of a homicide did not die without a struggle, may thus be brought out by infra-red photography. Similar but less pronounced results may be achieved by using panchromatic film and a red filter. Infra-red rays also have the power of penetrating the epidermis and showing the subcutaneous network of veins. A blow might not cause visible contusion and yet infra-red photography would prove of great value by showing the injury to subcutaneous veins. Ultra-violet rays may also be useful in detecting forgeries, etc. No special film is required for ultra-violet photography, however, since ordinary film is highly sensitive to this region of the spectrum.

CAMERA ANGLES

It has been shown that with a given picture size, lenses of either extremely short or extremely long focal length may cause the camera to be placed too near or too far from a subject, resulting in pictures that appear to falsify the distances between near and far objects. While use of a lens of normal focal length will help prevent this type of inaccuracy, it will not forestall many other errors which may result from the deliberate or unintentional placing of the camera at an improper position in relation to the subject.

In criminal cases the camera must be placed in such a position

as to include all parts of the subject which should be shown if the whole truth is to be told. Just as a witness may lie in effect by telling a part of the facts and concealing others, so a photograph may foster deception by not including all important objects. For example, in a manslaughter case arising out of an automobile collision at an intersection, the failure to include enough of the surroundings in a photograph may cause it to appear that the accident occurred at a blind intersection when this is not the case. In Figure 6-A it appears that the view of the intersection would be obstructed by the building at the right. Figure 6-B shows that the

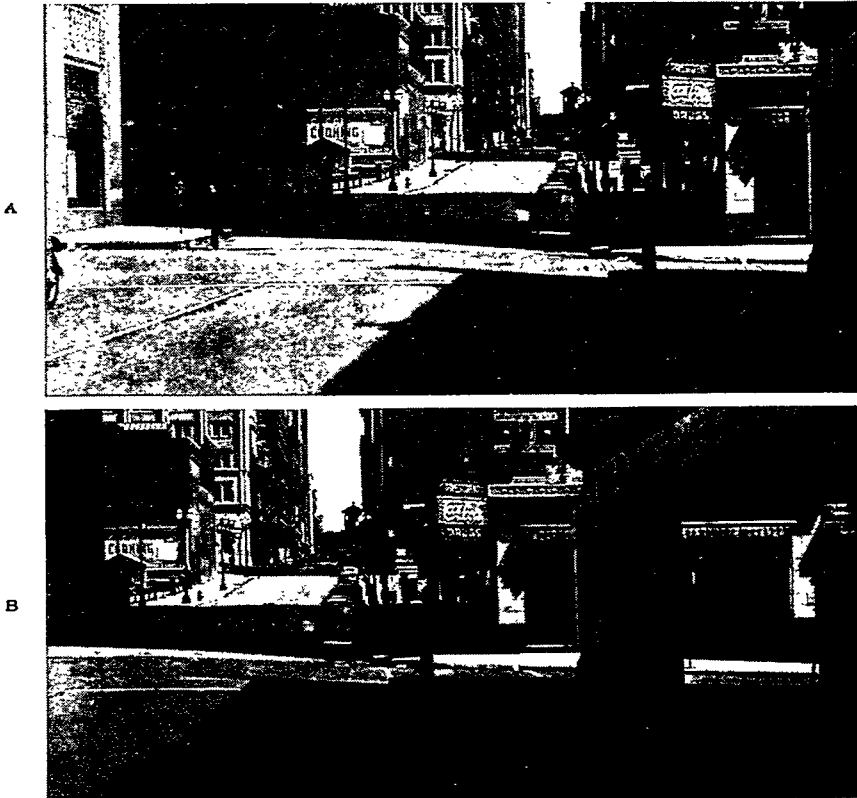


FIGURE 6

False Impression Created by Not Placing Camera in Position to Include All Pertinent Objects

- (A) Building at right gives the impression of blind intersection.
- (B) True impression, indicating the absence of blind intersection.

building at the right does not completely obstruct the view because of its unique construction. Should Figure 6-A be shown to a jury, it would have a harmful effect, even though oral testimony of witnesses might be introduced to show that the building in question was not a serious obstruction, but Figure 6-B would tell the whole truth and would not create a false impression.

Often a picture which does include all important objects is misleading because the camera was so placed as to create a false impression of the relative positions of the objects. Figure 7-A makes it appear that the man is standing in the street car safety zone bordered by the metal buttons to the right. In reality when



FIGURE 7

False Impression Due to Improper Camera Angle.
(A) Man appears to be standing in safety zone.
(B) Actual position of subject, outside safety zone.

Figure 7-A was made the man was standing in exactly the same spot as in Figure 7-B. Figure 7-B was taken from the proper camera position and indicates clearly that the man was not standing in the safety zone. In a manslaughter case, whether or not a pedestrian were standing in a safety zone at the time he was struck by a car might be an all important question.

When a photograph is intended to show something as seen by a certain person involved in a case, or as seen by a witness, the camera should be placed in the same position and at approximately the eye level of such witness or party if an accurate photograph is to be produced. In instances of this type a variation of a foot or two in the position of the camera may make a material difference. Figure 8-A, B, C, illustrates the importance of this matter. Assume that two cars, driven by A and B respectively, collide at the top of a hill while A's car is being operated on the wrong side of the road in an attempt to pass a third car, and that B is killed. In a subsequent manslaughter prosecution based upon criminal negligence arising out of his driving the car at excessive speed and attempting to pass another on a hill, A contends that the hill was not steep enough to obstruct his view and that he saw B's car approaching him, but that the collision was caused by B's failure to swerve his car after he saw, or with the exercise of reasonable care, could have seen that A could not pass the third car in time to avoid colliding with B's car. In a case of this kind, photographs could be made to distort the situation to the prejudice of either prosecution or defense. As pictures were made at various heights, the scene would assume conflicting aspects, fluctuating about as follows:

(1) If the camera were placed two and one-half feet above the highway in the path of A's car and thirty-five feet from the apex of the hill, the resulting photograph would make it appear that the hill was very steep and that one would not be able to see a car coming from the opposite direction until it was very near. This is illustrated by Figure 8-A, in which one can see only the upper third of a car that is approaching the top of the hill from the other direction.

(2) If the position of the camera were not altered except to raise it to about four and a half feet from road level (the distance from the road to the eye level of a man sitting in the driver's seat of an ordinary automobile) the resulting photograph would show that the hill was not steep enough to completely obstruct A's view.

A



B



C



FIGURE 8

Figure 8-B portrays this situation. This photograph is accurate because it portrays the view A would have of B's car as he approached the top of the hill.

(3) If the position of the camera as outlined above were not changed except to raise it to eight feet above the road, the resulting photograph, Figure 8-C, would make it appear that the ground was almost level. This photograph would thereby create a false impression, for even though a hill were not steep, a man would be required to use more care in endeavoring to pass another car on it than would be required on level ground.

It is not always necessary or desirable that a legal photograph portray a scene as it appeared to a witness, for sometimes a photograph is desired simply as a type of map or diagram. For example, in a murder case a photograph might be desired to show the position of various pieces of furniture and other objects in a room. Obviously the best plan would be to place the camera very high in order to prevent objects in a foreground from concealing objects in the background. Similarly, if a picture were desired of an intersection merely to be used as a rough sketch of the scene to show the approximate course of colliding cars, a very high viewpoint would serve the purpose better than an eye level position, and it would be entirely proper to use such a print as a diagram of the intersection.

LIGHTING TECHNIQUE

Although the proper lens and film have been used, and the camera has been placed correctly in relation to the subject, we cannot assume that a photograph is a proper one for criminal purposes, because a technically perfect photograph may be rendered undesirable from a legal standpoint by the simplest conditions of all—light and shade.¹⁹ He who doubts that the play of light upon a subject can produce radically different results may be convinced by a simple experiment suggested by a great landscape photographer.²⁰ Let the doubter place a camera—the simplest box outfit will do—in a given position and snap pictures of a scene an hour apart, beginning at sunrise and ending at sunset. A comparison of the several photographs thus obtained will show that as the light moved, different shadows were formed and the appearance of

¹⁹ See Luckiesh, *Light and Shade and Their Applications* (D. Van Nostrand Co., New York, 1916) 190-215.

²⁰ Misonne, p. 7 of the 1935 *American Annual of Photography* (American Photographic Publishing Company, Boston).

the scene was altered. It will be found that the size, shape and general aspect of the objects in the view varied as the position of the light caused different shadows to be cast. Things visible in some of the photographs may be almost invisible in others, because the light varies in each case.

The proper rendition of shadows is of utmost importance in legal photography. For the purpose of analysis it is desirable to distinguish between shadows and cast shadows. The shadow is generally said to be that portion of the surface of an object which receives distinctly less light than the other portions. The cast shadow is assumed to be the shade cast by one object upon another by intercepting the direct light which would otherwise reach the latter. Normal lighting may be said to be lighting in which the shadows upon the surface of an object are just dark enough to aid in forming a conception of the contour of the object but not so dark that detail in the shadow portion is not clear. Harsh lighting may be said to be that in which the shadows are so black that all detail therein is obscured. When there is little or no shadow and the entire picture is in high key, the picture may be said to have been made by flat lighting.

As a general rule normal lighting should be employed in criminal work. Shadows can be used to deceive as easily as they can be used to tell the truth. Assume a case in which a photograph is desired of an injury—a deep scar, for example. While flat lighting of such a subject would tend to make it appear less prominent than it was in fact, one might go to the opposite extreme and place a battery of powerful lights in such a way that abnormally large and black shadows would be formed on the skin surface adjacent to the scar. Such a photograph would be grossly inaccurate and misleading for we do not ordinarily view people under such intense illumination. In this type of case there is a happy medium. One should not employ flat lighting, since it tends to underrate the extent of the injury, while harsh lighting is equally objectionable because of its tendency to exaggerate the injury. Such subjects should be photographed under normal lighting in order to produce just enough shadow to create an impression of the general contour of the lesion.

Shadows cast by objects upon other objects are also of importance. The shadow cast by an object helps create an impression of its size. As a general rule, one viewing a photograph judges the size of strange objects therein to a certain extent by the length of

the cast shadows. Long cast shadows tend to make an object appear larger than it really is, while short cast shadows tend to make an object appear smaller. This is especially true when the photograph depicts an isolated object and no familiar objects are included within the photograph for comparison.

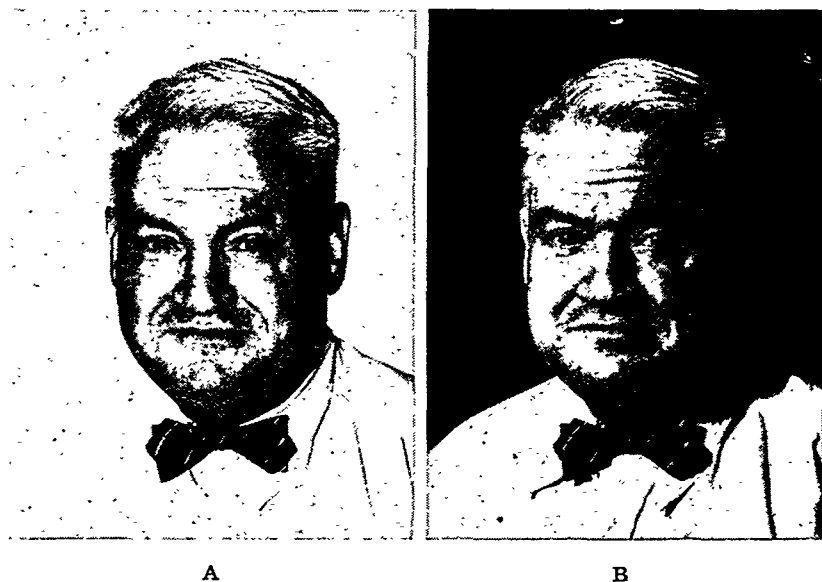


FIGURE 9

Results of Proper and Improper Lighting Technique.
(A) A good identification picture.
(B) A poor identification picture.
(Posed by model.)

Of course, abnormal lighting, flat or harsh, may always be employed for legitimate purposes. At times the skillful photographer will find either harsh or soft lighting helpful in bringing out fingerprints, scratches on wood or metal surfaces, footprints, skid marks, tire patterns, etc. But lighting should never be used to deceive.

Identification pictures call for flat lighting. Oddly enough, the procedure suggested by Mr. William Mortensen in his *Pictorial Lighting*²¹ is admirably suitable for identification pictures. Briefly, Mortensen suggests that two 500 watt T-20 projection globes in six inch reflectors be used as the sole sources of illumination in portraiture. A white background should be used and one lamp should be used behind the subject merely to throw more light on the back-

²¹ Camera Craft Publishing Company, San Francisco, 1937.

ground. The other lamp should be placed as near the camera lens as possible. Figure 9-A was made in this manner. Note that this method of lighting eliminates all heavy shadows and insures that every important detail for identification will show up clearly in the photograph. Figure 9-B was made with the type of lighting employed by most portrait photographers. Note that the subject's left ear and adjacent features are in heavy shadow. A scar in this area would not be shown clearly. Consequently, it can be seen that the flat lighting of Figure 9-A is preferable for identification pictures.

One should never disregard light and shade when preparing photographs for use in the courtroom. The effect upon the value of photographs of these conditions may not be as obvious as the effect of other factors in the picture-making process, but nevertheless light and shade play very important parts.

EXPOSURE, DEVELOPMENT AND FINISHING OF PHOTOGRAPHS

Exposure is one of the most important factors in the making of a successful picture. Faulty exposure may injure the truth-bearing qualities of a photograph, and, therefore, some knowledge of the effect of over and underexposure is desirable.

Photo-electric meters are now available for measuring light conditions in photography. Because such meters almost eliminate the human factor in the calculation of exposure, they should be employed frequently in criminal investigations.

Approximately the correct exposure must be given a negative if a gradation of tones in the original subject is to be reproduced accurately. Of course, the proper rendition of tones is not always essential from a legal standpoint, but there are cases in which the matter may be vitally important. Let us use again the example of a photograph of a lesion. The use of panchromatic film in conjunction with the proper filter is essential to the accurate reproduction of the appearance of a wound or other lesion, but even panchromatic film will fail to reproduce tonal values correctly unless it is exposed to the light for the proper interval. If, instead of giving a required exposure of one second, the photographer gives an exposure of a quarter of a second, the film will be greatly underexposed. The shadows and other dark portions of the picture will be lacking in detail, while the highlights and brighter portions will not suffer so greatly. A print made from such a negative will reproduce the tones of the subject falsely. Now suppose another

picture of the same subject is made, the exposure being nine seconds instead of the required exposure of one. In this case a condition of pronounced overexposure exists. Upon development one will find that the negative is very dense, and prints made from it will appear flat and false in tone even though the error be partially corrected by the use of a contrast paper. Since no amount of after-treatment will correct fully an error in exposure that is material, in legal photography one should make every effort to obtain properly exposed negatives.

The first problem in the darkroom is to render visible the latent image formed upon the film during exposure. Much may be done to destroy the accuracy of a photograph during the various finishing processes, and a knowledge of the ways and means photographs may thus be rendered untruthful is therefore important to the criminal investigator. Assume that the proper conditions have prevailed during the picture-taking operations connected with the photographs to be discussed in the remainder of this section. When the exposed film reaches the darkroom it is placed in a developing solution which renders the latent image formed during exposure visible. The developed film is called a negative. When dry it is used to prepare positives or finished photographs. Prints are made either by placing the negative in contact with the sensitized paper or by projecting an enlarged image upon the sensitized paper.

The perfect negative from the legal or any other standpoint should reproduce as faithfully as possible the shape and tones of the original object. Not only must a film be used which will reproduce the original tones accurately, but also the chemical solutions used to develop the latent image must be capable of performing the operation of chemical reduction in such a way that the original faithful record made on the film is not altered. The developed negative is an image of a subject in inverted tonal gradations; the lightest parts of the subject forming the darkest portions of the negative image. When the negative is developed properly, the opacities of its gradations are proportional to those parts of the subject which they represent. There are many substances that will act as reducing or developing agents, but many will not preserve faithfully the tonal gradations of the subject as recorded on the film under any conditions, while even the developers capable of doing this will not do so unless properly used.

Improper development results in inaccuracies similar to those created by over or underexposure, but the skilled photographer can

distinguish between these various conditions. Going back to the example in which a photograph is desired to reproduce the correct tones in an injury, assume that panchromatic film in conjunction with the proper filter is employed and that the proper exposure is given. The latent image thus created will be capable of reproducing in monochrome the tones of the wound but the tonal accuracy of the latent image might be affected during development of the negative, as follows:

(1) The film might be developed fully in a solution compounded to minimize contrasts.²² Such a solution, commonly called a "soft developer," would cause the contrasts between the light and shade of the original subject to be diminished.

(2) The film might be developed for too short an interval in any of the common developing solutions. Regardless of the developer used, the stopping of the process before the negative is fully developed results in a diminishing of the apparent contrasts of the original subject to an even greater extent than does full development in a soft developer.

(3) The film might be developed fully in a normal developing solution. By a normal developer is meant one designed to produce correct tonal gradations.²³ The result in this case would be a perfect negative reproducing accurately the tonal values of the original subject.

(4) The film might be developed fully in a solution compounded to exaggerate the contrasts of the original subject. Such developers are called "contrast developers."²⁴ This will produce a negative of such excessive contrast that it may be impossible to make a print from it that will reproduce faithfully the tones of the original subject.

(5) The film might be overdeveloped in any developer. Up to a certain point, this would increase contrast, but if carried too far, the negative would be fogged.

The above information is given to enable the criminal investigator to see that there is a field for manipulation and falsification of a photograph in the process of developing the negative. It should be said, however, that improper development does not always preclude the possibility that the error in contrast may be cor-

²² Metol is commonly used as the sole reducing agent in this type of developer.

²³ A combination of metol and hydroquinone forms a common normal reducing agent.

²⁴ Hydroquinone is usually employed as the sole reducing agent in developers of this class.

rected. Underdevelopment may be corrected to a certain extent by intensification, while overdevelopment, if not carried to an extreme, may be helped by reduction. Then, too, in making prints the photographer has a choice of papers of various contrasts. Deviations from the normal in development are fatal only when carried to the extreme.

When the criminal photographer has a legitimate reason for producing false tonal values, the use of soft or contrast developers or the methods of over or underdevelopment will be permissible. For example, in bringing out fingerprints it is proper to employ contrast films and contrast developers when this is necessary.

In commercial photography, negatives are seldom considered ready for use in printing until they have undergone a certain amount of retouching or hand alteration. While retouching is permissible in general photography, it should never be allowed in legal photography. Skillful artists can so alter a negative by retouching that while the result of their artistry is unnoticeable in the finished print, the accuracy of the photograph is totally destroyed. Retouching of the negative is one of the most vicious means of deceiving judge and jury that could be employed. Retouching of the print is not apt to deceive, for retouching, however skillfully it may be accomplished, always leaves its marks, and should a print be retouched the marks of the crayon, pencil or brush, or the scratches of the etching knife will certainly be apparent upon very close observation.

There is only one way to protect one's self against deception by retouching and that is the examination of the original negative. Since skillful retouching of the original negative would not be apparent in a finished print, no other means of proving the fact of retouching would exist. It does not take a skilled photographer to tell whether or not a negative has been retouched. Just as in the case of prints, when retouching is done upon the negative, unmistakable marks of the artist's work are always visible. An examination of the emulsion side of the retouched negative will reveal delicate penciling, fine etching and perhaps the skilled air-brush work of the artist.

Sometimes the original negative is retouched and a print made therefrom. The print, which shows no evidence of the retouching, is placed in front of the camera and a copy negative is made. This copy negative is merely a reproduction of the deceptive print, and hence bears no marks of the retouching. It can be substituted for

the original negative to the deception of all but the trained photographer. It is difficult to describe in words the difference between an original and a copy negative. It would be as hard to describe this difference as to describe the distinction between a genuine and an imitation diamond, and just as the experienced jeweler can detect an imitation stone, so the skilled photographer can detect a copy negative.

The possibilities of being deceived by skillful retouching are so numerous that too much warning cannot be given. Windows may be eliminated from buildings; trees, telephone poles and other objects from landscapes and scars or wounds from flesh. Likewise, the skillful retoucher may add details that do not exist if he so desires, or he may make a physical injury or property damage appear much greater than they are by the deft use of his instruments.

Reversed prints are sometimes employed to deceive. If one examines a negative with the emulsion side toward him, he will notice that the position of objects is reversed as regarding left and right. When a negative is printed, the emulsion side is supposed to be placed in contact with the sensitized surface of the printing paper in the contact process, and facing the paper in the enlarging process. This results in a print corresponding to the original subject as far as right and left positions are concerned, assuming, of course, that the negative was used in the camera with the emulsion side toward the lens. The position of objects to the right and to the left in the picture may be transposed by turning the emulsion side of the negative away from the paper when making the print. The illusion thus created is exactly the same as is created by a mirror. In Figure 10-A, note that the gun appears near the right hand of the subject. Figure 10-B is a reverse print of the same negative. Note that 10-B makes it appear that the gun is near a left hand.

Double or combination printing is another method of faking. There are two general methods of producing combination prints—the copying method and the masking method. By the copying method parts of one print are pasted on another and then a photographic copy is made of the composite print. The copy negative, named the original by the deceiver, is used in making a print for presentation in court. The masking method of combination printing is more direct in that it does not involve the copying of a composite print. By this procedure, the final composite print is made

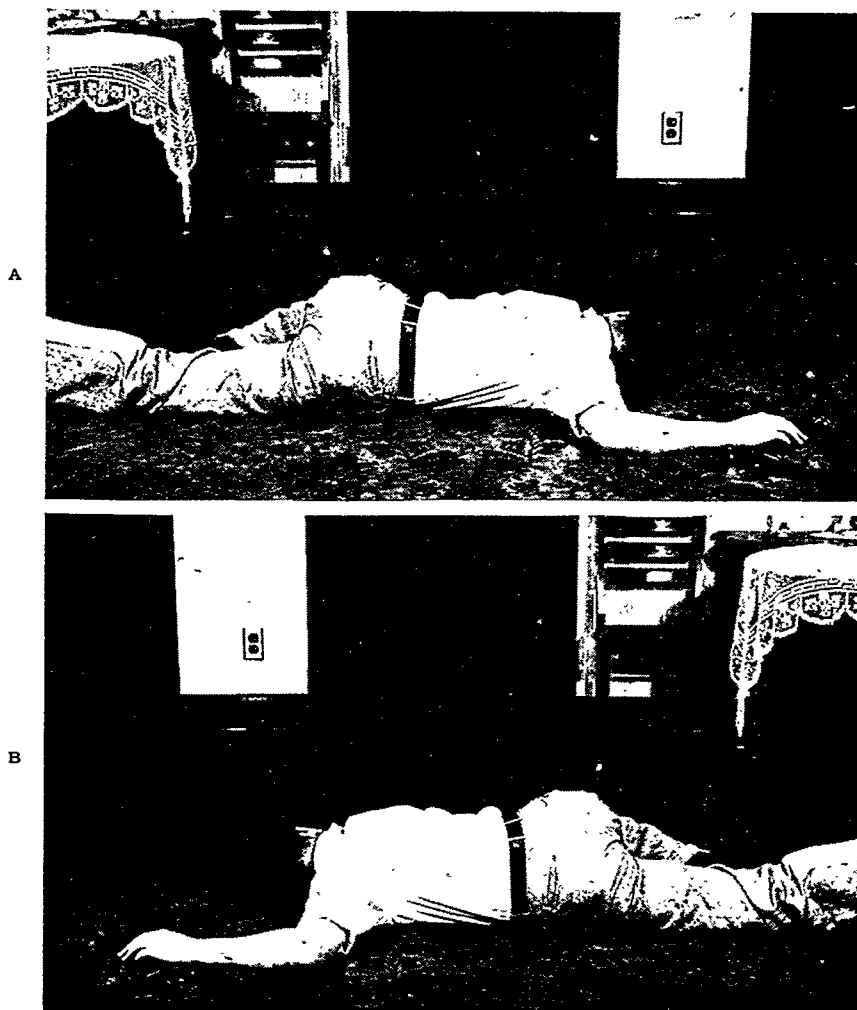


FIGURE 10

Effect of Proper and Improper Printing from Same Negative.
(A) Emulsion side of negative facing the sensitized paper.
(B) Emulsion side of negative away from the paper.

by printing from the various negatives directly upon the final sheet of paper. Masks are constructed to keep one negative from registering on certain parts of the print, and the final result, if skillfully done, is a print that shows no indication it is composed of parts of several different negatives. Combination prints made by the mask-

ing method are more easily proved fraudulent than prints made by the copying method, because, in the case of prints made by the masking method, the party producing the fraud will be unable to introduce any negative that shows all of the objects which appeared in the final print except, of course, by copying the final print itself, as previously discussed.

An example from fiction illustrates the possibilities for deception in combination printing. The villain of the story was charged with murder and his defense was an alibi. The judge permitted introduction in evidence of a photograph of a public meeting that was being conducted exactly at the hour the murder was committed. The defendant villain's face appeared among the crowd at the public meeting, and his alibi was thus strengthened. It developed, however, that the photograph was fraudulent, the defendant having obtained a print of the public meeting and procured an unscrupulous photographer to cut out a picture of the defendant from another photograph, paste it on the photograph of the public meeting, and then make a photograph of the composite picture.

Composite photography may be employed in connection with reverse printing. It is not always so easy to create a plausible fake by reverse printing as in Figure 10. Should reading matter appear in the print it would be reversed and if the man were on his back it could be seen that his shirt pocket was on the wrong side. These discrepancies could be changed by cutting out portions of a correct print such as Figure 10-A, pasting them on the reverse print and then making a copy negative.

As pointed out above, most frauds involving retouching, reversed and combination printing can be exposed if one makes a careful comparison of the print submitted with the original negative. But one must be sure he is examining the original negative and not a clever copy made to hide-trick photography.

MOTION PICTURES IN CRIMINAL INVESTIGATIONS

When President McKinley made his tragic visit to the Buffalo Exhibition, the crude motion picture cameras of the day were trained upon him constantly. All of his actions before the assassin's bullet ended his brilliant career are preserved faithfully on the film. These motion pictures were rushed to the Edison laboratory and examined by officers of the Criminal Investigation Department. The pictures the officers saw in the projection room of the lab-

oratory are described by Gross in his *Criminal Investigation*²⁵ as follows:

"Among the closely packed multitude surging around McKinley, one face and figure stood out with striking distinctness—it was Czolgosz. The first pictures of the series show the President as he steps on the platform and begins his speech. A man is next seen making his way with difficulty through the crowd. Various people whom he pushes recklessly aside turn round on him with angry looks. Unperturbed, however, he forges ahead and seems to succeed in making his way through the living wall. Then he stands still for a second and turns his face unsuspectingly towards the camera. Desperate resolution can be seen in his eyes. Then he goes on further, pushing and thrusting, until he is almost immediately before the President. Again he faces the camera. At this moment he seems agitated and excited. Now his hat is knocked over his eyes and hastily he puts it back. He then looks wildly around, and appears as if waiting for someone in the multitude and expecting a signal. Thousands of people are in the picture with him, but most of them stand with their backs to the camera. The features of all who turned round are clear enough to make them recognizable in the photograph. From these films, drawings were taken for the secret police service, with the object of discovering by their help some clue to the confederates of the murderer."

Motion pictures have attained a place of importance in the modern courtroom. Time and again they have aided in the conviction of criminals just as they aided in the early *Czolgosz Case*. Leon Blum, the French statesman, was assaulted in a pre-election riot, and his antagonists were convicted largely on the evidence of a newsreel photographer who had been taking pictures of the disturbance from the roof of a building a block away. He used a telephoto lens and the faces of the trio were shown clearly. Only a few years ago, however, many judges were skeptical about motion pictures. It has taken years to overcome the popular fallacy that motion pictures are valuable chiefly as a source of amusement.

All the fundamental principles of legal photography set forth previously in this article apply to motion pictures. It is well known that a motion picture is simply a large number of still pictures presented to the eye in very rapid succession and producing, because of the persistency of vision, the optical effect of a continuous picture

²⁵ Sweet & Maxwell, Ltd., London (3rd Ed., 1935).

in which the objects move. It is therefore apparent that all that has been said concerning lenses, films, camera angles, lighting, exposure and finishing can be applied to motion pictures. In addition it should be remembered that the speed at which the objects in a motion picture appear to move depends upon the relation of the speed at which the projection machine is run to the speed at which the camera was operated. For example, if the motion picture camera records pictures at the rate of twenty-four per second, the projection machine must be operated at the speed of twenty-four pictures per second if objects are to appear to be moving at normal speed. Motion picture cameras are often equipped to run at various speeds, and as the speed of the projection machine is generally maintained at a fixed position, the effect of fast or slow motion is produced normally by manipulation of the camera. When the camera is operated at a frame-per-second speed much slower than the frame-per-second speed of the projector, the effect of fast motion is created, and when the camera is operated at a speed greatly in excess of the speed of the projector, the effect of slow motion appears.

Since it is sometimes essential that the motion in a moving picture intended for courtroom use appear normal, it is best to use a camera that will operate only at normal speed. In a recent civil case²⁶ a motion picture was rejected largely because the camera used in making the picture was equipped with variable speeds and the operator could not remember at which speed the camera was operated.

A motion picture camera of any film size will be satisfactory for criminal work, but the small cameras designed originally for the use of amateurs will offer several advantages. Amateur film is manufactured in several widths, the common American sizes being eight and sixteen millimeter. At the present time sound pictures can be made only on sixteen and the professional thirty-five millimeter film; hence for the sound recording of confessions a camera using one of these films must be used. For silent pictures the eight millimeter size perhaps is preferable. Although the individual pictures on eight-millimeter film are only about a quarter of an inch wide, the image may be projected successfully on a screen six feet wide. This is amply large for courtroom use. Since the eight millimeter film is small, cameras utilizing this size can be

²⁶ *Pacific Mutual Life Ins. Co. of California v. Marks*, 230 Ala. 417, 161 So. 543 (1935).

made very compact, and in criminal work an inconspicuous movie camera is a great asset, for oftentimes it must be concealed. The eight millimeter camera is also the most economical to use.

A proper foundation must be laid for the introduction of motion pictures in evidence. The following procedure is suggested in that it will obviate the possibility of a motion picture being rejected because not properly authenticated. In the first place, if the motion picture is to be made by a photographer-detective it is advisable that he rent a one-speed camera from a reliable dealer instead of using his own. The film should be purchased from the same dealer and should be returned to him after exposure for delivery to the processing station. Before he releases the developed film the dealer should be asked to view it by projection. Then, on the stand he will be able to testify that he rented the camera and knows that it operates only at normal speed, and that he sold the film, received it for delivery to the processing station, viewed it before releasing it and that it has not been altered since it left his hands.

Never attempt to edit a film intended for courtroom use. The film should be one continuous strip of celluloid with no splices whatsoever. If splices are made, opposing counsel may be able to create the impression that the attorney offering the picture has had parts deleted that were unfavorable to his case.

We cannot visualize the many ways in which motion pictures may be utilized by legal workers in the future. Already they have been used for unusual purposes. A municipal court judge in New York City has used motion pictures as a cure for careless drivers. The judge had a film presenting in stark realism some of the results of thoughtless driving, and every man who was arrested for a violation of the traffic laws was forced to witness this film.

Looking into the future, it seems plausible that sound motion pictures may eventually take the place of depositions. The chief obstacle in the way at the present time is the high cost of sound on motion picture film. When sound eight millimeter cameras are made, it will be possible to record sound pictures at a cost (retail) of fifty cents per minute. And increased use of the eight millimeter film may cause a great reduction in its price within the next few years. Where the value of testimony is of great value, lawyers would not find the cost of eight millimeter sound pictures prohibitive. Of course, sound motion pictures could not be substituted for depositions unless statutes were enacted authorizing such sub-

stitution, but it does seem that the possibility at least offers material for serious thought.

The substitution of a sound motion picture record of a trial for the present stenographic record, or the use of sound pictures as a supplement to such record, may be witnessed in a few years. The imaginative mind will see that science may thus step in and radically change our judicial procedures. What would happen if the appellate courts could project a sound motion picture of the testimony of a particular witness, or of any other part of a trial it desired to see re-enacted? Would the traditional rule that the jury's findings of facts ordinarily will not be disturbed on appeal remain unchanged? Of course, such a use of motion pictures could not now be made, even though statutory regulations permitted it, but the time may come when motion picture film will be as cheap as stenographic notebooks.

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