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HAND SENSITIZED PALLADIUM PAPER

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PALLADIUM is a metal belonging, chemically, to the same group as platinum, which it resembles to some extent in physical characteristics. About 1916, when the war made it impossible to get platinum for commercial use, the Platinotype Company, of London, introduced a paper sensitized with palladium, which gave prints practically identical with those made in platinum; and they continued to market this article until their retirement from business, less than a year ago. However, palladium paper never became very popular, at least in this country, partly, I believe, because the technique of processing advised by the makers was different from that used in the case of platinum, and partly because it was difficult to convince the users of the older paper that anything could rival their beloved platinum.

Recently, however, Dr. Karl Schumpelt has shown that palladium paper can be sensitized, printed, developed, cleared, and finished with a technique practically identical with that used for platinum, and, at current prices, at a cost less than half that involved when the more familiar metal is used. Concretely put, an 8 by 10 palladium print can be sensitized and processed for about twelve to fifteen cents; and when we consider that with this medium there is no reason for failure, and that the cost of developer and clearing bath is a small fraction of a cent, it will be seen that the expense of palladium printing is little if any beyond that of bromide or chlorobromide; indeed, there are on the market bromide papers which rival palladium in cost, and at least two which definitely exceed it in this respect.

Recently, through the courtesy of Dr. Schumpelt and of Baker & Company, I have had an opportunity of experimenting rather extensively with palladium, and I find that in ease of working, length of scale, and richness of blacks — in short, in print quality — it is in no degree inferior to platinum. In fact — I am quite well aware that this is rank heresy! — I cannot help feeling that it is a trifle superior to the other metal, though I would not say this positively without further experiments, and in any case the difference is slight. As to the durability of palladium prints, there is no reason to consider them inferior to platinum; given a good paper and proper clearing, they can be regarded as absolutely permanent, short of destruction by fire or by mechanical injury.

In palladium work, the technique described in my article on platinum printing, in the October, 1937, number of this magazine, can be followed almost exactly, though there

are a few slight differences to be noted. I wish to say, however, that I do not offer the conclusions set forth in the present article as necessarily final; they are the result of considerable experimenting and observation, and I believe them to be sound, but it is possible that further investigation might modify them to some extent, and I do not wish, at present, to state them as the last word on the subject.

In platinum work, the third solution is a solution of 219½ grains of potassium chloroplatinite (K_2PtCl_4) in 2⅜ ounces of distilled water. In palladium printing, either potassium chloropalladite (K_2PdCl_4) or sodium chloropalladite (Na_2PdCl_4) may be used. The solubility of the sodium salt is about ten times as great as that of the potassium salt, and more than twice that of the platinum salt, but there is no advantage in using a saturated solution. It is advised to use a solution containing the equivalent of the platinum salt, and this means 156 grains of sodium chloropalladite in 2⅜ ounces of water. I have not found any advantage in using a greater quantity of the salt than this; I do find, however, that increasing the total volume of sensitizing solution per unit area of paper gives richer blacks, though it does not give any longer scale of gradation.

It seems to be impossible, at least with any technique with which I am acquainted, to get cold tones with palladium; the result is always a slightly warm color, which, however, is in almost all cases decidedly pleasing; it is not warm enough to be objectionable even in marines or snow pictures. This tendency to warmth of color is very slight indeed when the normal developer (a saturated solution of potassium oxalate) is used, but it appears to be a trifle greater with the potassium than with the sodium salt, which is an additional reason for preferring the latter. As with any printing process, the warmth of the result depends to a considerable extent on the color of the stock chosen, a buff paper naturally giving a warmer tone than a white one.

In platinum printing, greater warmth of the image is secured either by the addition of mercuric chloride to the developer, or by using the developer warm. Palladium is much less sensitive, in this respect, to the use of mercury than is platinum, but it seems to be more sensitive to changes of temperature. Therefore, when a warmer color is desired, it seems better to obtain it by warming the developer rather than by the addition of mercuric chloride, though the latter method unquestionably has an effect.

Referring once more to my article on platinum printing, it will be seen that stock solutions I and II are identical except that the latter contains a small amount of potassium chlorate; and further, that increasing the amount of II with respect to I (that is, increasing the proportion of this salt in the sensitizer) increases the contrast in the finished print. Palladium is much less sensitive to the addition of potassium chlorate than is platinum, but it is quite possible, by other methods, such as long printing in a weak light, or by choosing a harder paper stock, to build up contrasts within very wide limits, and to do this with no loss of print quality.

By a "hard" paper is meant one which is relatively non-absorbent, and by "soft" of course the reverse. By selecting a suitable paper, it is possible to introduce very wide variations in effect, without going beyond the limits of what is satisfactory for sensitizing. This is due, I think, at least to some extent, to the fact that with a soft paper the sensitizer sinks in more rapidly and more completely, so that with a hard paper it is necessary to print deeper in order to keep the image from washing off in the developer. Like platinum, palladium paper should be used bone-dry, dampness tending to give degraded highlights, and this characteristic may sometimes be used to advantage to gain softness, though it is too tricky and uncertain to be generally sound technique.

One method for increasing contrast with platinum paper is not available when palla-

dium is used, namely, over-printing and adding potassium bichromate to the developer. If this is done with palladium the resulting chemical reaction causes the palladium image to be almost entirely bleached out as soon as the print is placed in the clearing bath, nor can it be restored. However, this method is chiefly useful for clearing up degraded lights on stale platinum paper, and since there is no reason to have stale paper when we are doing our own sensitizing, this characteristic of palladium is of little importance.

It should be noted that the metal palladium, unlike platinum, is slightly soluble in hydrochloric acid, so if palladium prints are cleared in the usual 1 to 50 hydrochloric acid bath, they may be slightly reduced. This reduction is by no means great, and can readily be allowed for in printing, but on the whole I find it more convenient to clear in three successive baths of a solution of 1 to 200 hydrochloric acid in water. This is amply strong to remove the iron salts which remain in the paper after development, and thus to insure permanence of the prints. It is well, however, to be liberal with the clearing bath; my own practice is to mix up 30 ounces of the 1 to 200 solution, divide this into three successive baths, and clear not more than two 8 by 10 prints in this quantity of solution. Washing in four or five changes of water completes the operation.

In conclusion, I may say that I am very much pleased indeed with palladium as a sensitizer. I find it fully equal to platinum, if not slightly superior; and, as I have said, less than half as expensive, whereby the chief objection to platinum printing — namely, the cost — is removed. For those who are interested in taking up the work, I might add that the necessary palladium salts can readily be obtained, either in crystal form or in solution, from Baker & Company, 54 Austin Street, Newark, New Jersey.

PRINT QUALITY AND DEVELOPMENT

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WE OFTEN hear the statement that a really good negative will give a good print on almost any kind of paper, but some prominent photographers claim this to be absolutely wrong. Personally, I did not believe that it could be true. Surely, papers of different contrasts give different prints. But I found later by experience that it is almost true that certain negatives will print well on most kinds of paper. Almost, but not quite true, the only difference being a comparatively slight increase or decrease of contrast in the whole print. How could it be so? How could a print made on contrasty paper be practically as good as another made under the same conditions on a soft paper? What is a good print anyhow? What is print quality? . . .

If you follow the salons of photography, you will see prints made on glossy papers, with dark blacks and brilliant highlights, and very contrasty. Then again, other prints, particularly those made on absolutely matt papers, look slightly gray, have not much snap or contrast, and yet, all are good. Why? The usually accepted answer to this question is that a good print, a pleasing print, is one which has good tone representation; the tones found in nature may (usually *must*) be compressed to fit the scale of the paper, but the relative values should be the same as those found in nature. If we accept this as true, we can see that a well-made, soft, negative which will yield a beautiful full-range print on normal paper will also give true proportional tone representation on a softer paper, although the full possibilities of the paper will not be used and the print may look somewhat gray. If, on the other hand, a short range (contrasty) paper is used, some of the