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THE PARAFFIN GAUNTLET: A NEW TECHNIQUE FOR THE DERMO-NITRATE TEST

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For a number of years the National Bureau of Identification, Cuba, has used the so-called Paraffin or Dermo-Nitrate Test for systematic investigations in determining whether or not a suspected person had fired a short-barreled firearm or whether a particular hand had come in contact with the gunpowder residues resulting from the discharge of a revolver or pistol. Since a number of inquiries have been received inquiring as to the way of preparing paraffin gauntlets and the material required in their preparation, the method used at this Bureau to recover such nitrate products is herein outlined. Because of the common use put to this investigative aid the technical methods which have been employed at this Laboratory in preparing these paraffin gauntlets should be of interest to all persons who may be called upon to make this test.¹

EQUIPMENT

In preparing paraffin gauntlets for recovering and testing products derived from the combustion of gunpowder, the following equipment (see Figure 1) is required and is applied in the manner described.

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¹ [Editor's Note. Certain limitations imposed by this test should be pointed out to the reader. Contaminating substances, containing either nitrates or nitrites, have been found to account for the presence of particles which give a re-

1. The Vilbiss Theromer atomizer (No. 113), or some similar device for applying paraffin, is used for melting and applying the pure paraffin.

2. Pure paraffin (melting point 42°-44° C.) is sprayed directly on the dorsal or volar surfaces of the hand. Consequently, this paraffin must not contain any nitrous admixtures which might bias, adulterate, or compromise the findings of the reaction.

3. Hard, commercial, and current paraffin is used to give the gauntlets



Figure 1.

EQUIPMENT USED FOR PREPARING THE PARAFFIN GAUNTLET

1. The Vilbiss Theromer atomizer (No. 113); 2. Spatula; 3. One and one-half inch brush; 4. Hard, commercial paraffin; 5. Pure paraffin (melting point 42°-44°C.); and 6. One and one-half inch gauze strips.

action with reagents used for this test. Therefore, it is advisable to interpret the results with caution, paying particular attention to the location, size, and form of the particles which produce a reaction on these paraffin casts. The advisability of making casts of both hands is also suggested, since, if the handling of foreign materials by the suspect accounts for the positive reactions obtained, a reasonably good control test is thereby provided for this contingency.]

the thickness, solidity, and consistency necessary for taking them off the hand and manipulating them without breaking.

4. A brush, the width of which is one and one-half inches, is used to apply and spread the melted paraffin.

5. One-inch dressings or gauze strips are destined to reinforce the paraffin layer, rendering it firm and stable.

6. The spatula is employed for taking off or lifting the paraffin gauntlet from the hand without deforming or cracking it.

TECHNIQUE

The Vilbiss atomizer, used to produce a fine paraffin spray, is filled up to one-third with the pure paraffin. It is then heated in the atomizer to a temperature slightly higher than its melting point. Thereupon, the rubber bulb of the apparatus is squeezed for inflating the atomizer and supplying air pressure necessary for atomizing melted paraffin.

When making gauntlets on a single subject, the rubber bulb of the apparatus is usually satisfactory for providing the necessary air. However, if several subjects are to be investigated, since continual use of the hand-pump would tire out the operator, a compressed air tank permitting a pressure of 50 pounds and provided with a regulator for the spray,² such as is used at this Bureau, is advisable.

The hand is laid, with the fingers slightly spread, palm downward on some clean surface, and the dorsal region of the hand is first sprayed with

the hot paraffin, taking care not to scald the individual. The layer of pure paraffin must be evenly spread and attain a thickness of at least two millimeters. After so covering the hand, the bandage or gauze strips one-inch in width are applied to strengthen the cast, as the paraffin alone would be insufficiently firm, particularly in hot weather. On these gauze strips, arranged like trabeculae on the substratum of pure atomized paraffin, melted paraffin is applied with the brush in order to make the gauntlet more solid. This results in a rigid, white mail coat, the inner aspect of which represents a true mold of the hand.

On the top layer of paraffin it is well to attach a paper label or adhesive strap bearing the name of the person, together with the hand and surface produced in the gauntlet. Thus the cast having been completed is allowed to cool and the operator detaches and lifts the gauntlet from the surface of the hand (see Figure 2).



Figure 2.

THE FINISHED PARAFFIN GAUNTLET

After the gauntlet from the dorsal region of the first hand is completed

² [Editor's Note. At the Chicago Police Scientific Crime Detection Laboratory a similar atomizer (S. S. White) has been used, but it has been found that 50 pounds pressure is too

high. Instead compressed air is fed to the atomizer through a pressure reducer and regulator which maintains the pressure supplied to the atomizer at approximately 10 pounds.]

the same procedure is carried out on the palmar surface. It is preferable to make first the gauntlet of one hand and then that of the other, and not both dorsal casts first and then both palmar halves afterwards, as such a procedure may lead to confusion.

When finished, the gauntlets are laid with the contact surfaces upward, that is to say, with their posterior surfaces on clean white paper, in which they are ultimately to be wrapped. Finally, having been separately wrapped, they are laid unstacked in boxes so that they will not adhere too fast to the wrapping paper or become disfigured or flattened. During the whole process of making the gauntlets it must be borne in mind that they have been molded not only to recover the nitrous particles of powder combustion, but also to locate their position on the hand of the suspect for forensic and criminalistic investigation in such instances is both micro-chemical and topographical.

For this reason, when giving a re-

port, a sketch of the volar and palmar surfaces of the hand should accompany it, as is systematically done in the National Bureau of Identification, and should indicate the approximate area of hand or figures wherein nitrate products have been located.

It is the opinion of the authors that these technical directions are more accurate, complete, and detailed than any published heretofore and will be of aid to other experts in making such paraffin gauntlets. It must be admitted by all that the Paraffin Test itself depends on a satisfactory molding of these gauntlets, which must represent a true mold of the hand and not a shapeless mass of wax. Without a true reproduction of the shape of the hand, even though the nitrous products of powder combustion are recovered and demonstrated by proper reagents, forensic investigation is not capable of deducing, indicating, or stating that they correspond to the hand that fired the shot or to that which tried to divert it in self-defense.