

THE PERMANENT RECORDING OF SWEAT BY PLASTIC IMPRESSION*

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Aubert (1) was probably the first to attempt to print sweat on paper by iodine-starch reaction. In his technic, the paper containing starch was moistened with sweat droplets and exposed to iodine vapor to produce blue-black spots. Randall

and Dole (3) who made iodine diffuse in the bond paper by sublimation, instead of applying iodine solution to the skin. Recently, Papa and Kligman (4) succeeded in transferring sweat spots on the skin produced by the iodine-starch method of

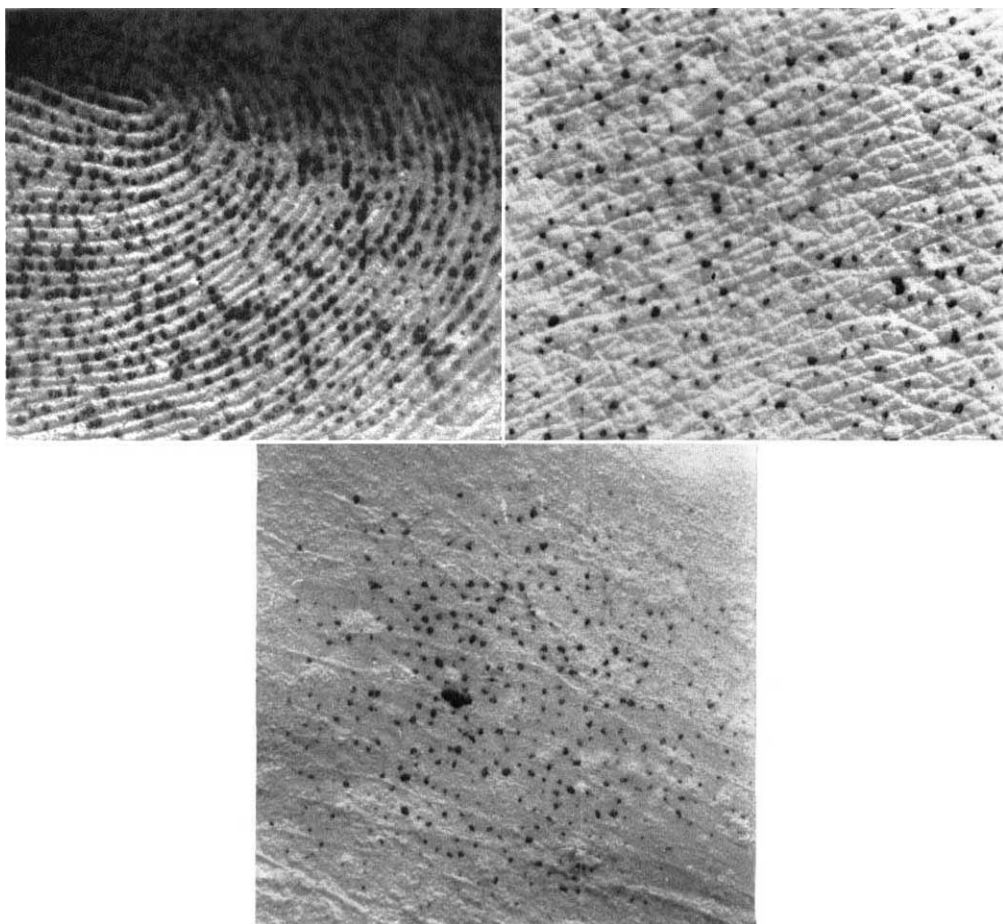


FIG. 1. Spontaneous sweating on the tip of the finger. Sweat is printed as black dots or ringlets on the plastic membrane. Not retouched. $\times 5$

FIG. 2. Sweat print of thermo-regulatory sweating on the ventral surface of the forearm. Not retouched. $\times 4$

FIG. 3. Sweating on the back of the hand produced by intradermal injection of 0.1 cc. of mecholyl in 10^{-5} . Sweat print was taken 30 min. after injection. A large black spot indicates the site of injection. Not retouched. $\times 3.5$

(2) devised a similar printing method: a starch-containing bond paper was pressed against the skin which had been painted with iodine solution. This method was modified by Thaysen, Schwartz

Wada and Takagaki (5, 6) to an absorbent paper towelling.

As pointed out by Papa and Kligman, the paper printing methods have a disadvantage in that it is difficult to contact the test paper tightly with the surface of the skin, especially that with irregular contours.

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The present paper deals with a method of plastic impression for permanently recording sweat delivered from individual sweat duct openings.

METHOD AND MATERIALS

Formvar (polyvinyl formal) in 0.5 g is dissolved in 10 cc. of ethylene dichloride containing butyl phthalate in 3 per cent. To this solution 4 g of corn starch is added and mixed thoroughly in a mortar. This mixture can be stocked in a bottle with a stopper, with care to prevent evaporation of the ethylene dichloride.

The skin area to be tested is cleaned with alcohol, and painted with a 5% iodine in absolute alcohol. Immediately after the skin has been completely dried, it is painted with a brush for oil-painting evenly and quickly with the mixture prepared, and is dried with a drier until a white plastic membrane is formed over the skin. Then, the plastic membrane is quickly peeled from the skin by the aid of cellotape. With some experience, all these procedures may be performed in a minute or less, and can be applied repeatedly to the same skin areas. Sweat delivered from individual sweat duct openings during a period from the painting of the mixture to the peeling of the plastic membrane is printed as blue-black dots or ringlets in the plastic relief produced by the contours of the skin. When the amount of sweat is large, the individual dots or ringlets coalesce. If a yellowish color of iodine appears diffusely on the plastic, it will fade with lapse of time. The usefulness of the method is shown in Figs. 1-3. It must be noted that the plastic membranes so obtained still retain an ability to absorb sweat droplets.

It is a matter of importance that the plastic membrane is peeled cleanly from the skin. If necessary, the plasticity of the membrane may be increased by further adding an appropriate amount of butyl phthalate. When fragments of the plastic cling to the skin, they can be removed very easily with alcohol.

For permanently preserving the sweat prints, it is desirable that the surface of the plastic relief is lightly sprayed with a colorless plastic aerosol.

Sutarman and Thomson (7) devised the method of plastic impression by which sweating from individual sweat glands is visualized as holes in a transparent plastic membrane. However, the present method possesses an advantage in that even tiny sweat droplets can easily be printed as blue-black spots against the white background of the plastic membrane.

SUMMARY

A method for permanently printing sweat delivered from individual sweat duct openings as blue-black spots on a white plastic membrane and its usefulness are described.

REFERENCES

1. AUBERT, P.: Des modifications subies par la sécrétion de la sueur dans les maladies de la peau. *Ann. dermat. et syph.*, **9**: 359-373, 1878.
2. RANDALL, W. C.: Quantitation and regional distribution of sweat glands in man. *J. Clin. Invest.*, **25**: 761-767, 1946.
3. THAYSEN, J. H., SCHWARTZ, I. L. AND DOLE, V. P.: Fatigue of the sweat glands. *Fed. Proc.*, **11**: 161-162, 1952.
4. PAPA, C. AND KLIIGMAN, A. M.: Modification of the Wada method for visualizing and recording eccrine sweating. *J. Invest. Derm.*, **36**: 167-168, 1961.
5. WADA, M. AND TAKAGAKI, T.: A simple and accurate method for detecting the secretion of sweat. *Tohoku J. Exp. Med.*, **49**: 284, 1948.
6. WADA, M.: Sudorific action of adrenalin on the human sweat glands and determination of their excitability. *Science*, **111**: 376-377, 1950.
7. SUTARMAN AND THOMSON, M. L.: A new technique for enumerating active sweat glands in man. *J. Physiol.*, **117**: 51-52P, 1952.