MANUAL OF

FINGERPRINT DEVELOPMENT TECHNIQUES

A GUIDE TO THE SELECTION AND USE OF PROCESSES FOR THE DEVELOPMENT OF LATENT FINGERPRINTS

SECOND EDITION
1998
(REVISED JANUARY 2001)

HOME OFFICE

POLICE SCIENTIFIC DEVELOPMENT BRANCH

SANDRIDGE

Reactive Surfaces Ltd. LLP

SECOND EDITION 1998

FIRST PUBLISHED 1986

NEW IMPRESSIONS WITH CORRECTIONS 1987

UPDATED 1987 and 1992

FOLLOWING UPDATES ISSUED TO REGISTERED HOLDERS

DFO & NINHYDRIN 2001

ISBN 1 85893 972 0

The illustration on the front cover is an interference micrograph at approximately 300 times magnification of a latent fingerprint on a glass slide. It shows ridges which consist of a series of droplets of various sizes together with cruciform shaped salt crystals. There is usually a background thin film of fats but this may only be a few molecules thick and is not normally visible optically. The deposit and glass substrate are colourless; the colours being generated by the 'Interphako' interferometric technique within the microscope.

Printed in England for the Home Office by White Crescent Press Ltd. Luton

Chapter 1

LATENT FINGERPRINTS

LATENT FINGERPRINTS

1.1 INTRODUCTION TO THIS MANUAL

This manual provides information on the selection and use of processes for the development of latent fingerprints. The information has, where possible, been presented in a step by step manner. If followed carefully the instructions will result in successful implementation of the processes.

Throughout this manual the term 'fingerprint' is used to describe a latent fingerprint found at a scene of crime or such a fingerprint after treatment with a development process, these are often referred to elsewhere as 'latents', 'latent prints', 'prints' or 'marks'.

Fingerprints contain many chemicals and vary widely in composition both from one individual to another and with one individual from day to day and minute to minute. Since generally the investigator knows nothing about the condition of the suspect's hands at the time of the crime it is impossible to predict the most effective process in specific cases. The investigator should therefore use the process with the best overall performance determined from previous, documented comparisons.

Whilst many comparative trials have been carried out on fingerprints deposited in laboratory conditions, the recommendations here are based principally on subsequent experience using substantial quantities of operational material. If in this manual a process is not recommended for a particular surface this does not imply that the process will not detect any fingerprints. The implication is that the reagents or processes recommended will give, on average, better results.

In important cases the use of two or more processes sequentially should be considered. This may dramatically improve the chance of success. When possible processes should be used in the best sequence as shown by the charts in Chapter 3.

LABORATORY FACILITIES *(Chapter 2, Section 2.1)* and **HEALTH AND SAFETY** *(Chapter 2, Section 2.3)* must be read by all those involved in the use of fingerprint development processes.

INTERFERENCE BETWEEN FINGERPRINT AND FORENSIC EXAMINATIONS *(Chapter 2, Section 2.4)* should be read by all those involved in selection and examination of articles.

SEQUENTIAL PROCESSING AND THE USE OF THE CHARTS *(Chapter 3, Section 3.1)* should be read before deciding on the most appropriate process for a particular article.

PROCESS INSTRUCTIONS *(Chapter 4)* provides comprehensive guidance on the most effective use of every recommended technique for detecting fingerprints.

1.2 LATENT FINGERPRINTS

1.2.1 Introduction

Latent fingerprints usually consist of a mixture of natural secretions from various glands in the skin but may often be contaminated with other materials present in the environment and picked up on the skin of the individual concerned. Some fingerprints may actually consist solely or principally of a contaminant.

It is normally impossible from simple visual examination to determine the major constituents of a fingerprint, except when it is obviously made in a contaminant such as blood, grease, ink or dust.

Fingerprints may also be left as impressions in soft surfaces such as putty, in which case the shape of the surface rather than the deposit itself may provide the fingerprint image which is required.

Several researchers have determined the distribution of the major constituents of the secretions of the sweat glands. Others have examined the actual distribution in latent fingerprints. Wide variations from one donor to another have been found and with the same donor large variations occur from day to day and even minute to minute.

1.2.2 Secretions of sweat glands

The main constituents of the secretions of the 3 types of sweat gland found on the human body are listed below. In addition there is a considerable amount of water secreted by the eccrine glands.

SOURCE	INORGANIC CONSTITUENTS	ORGANIC CONSTITUENTS
Eccrine glands	Chlorides Metal ions Ammonia Sulphate Phosphate	Amino acids Urea Lactic acids Sugars Creatinine Choline Uric acid
Sebaceous glands		Fatty acids Glycerides Hydrocarbons Alcohols
Apocrine glands	Iron	Proteins Carbohydrates Cholesterol

Most natural fingerprints consist of a mixture of sebaceous and eccrine sweat. Some of these chemicals persist for long periods of time in latent fingerprints whilst others may decompose, evaporate or diffuse.

The presence of a specific chemical in a fingerprint depends on the constituents of the original fingerprint, the nature of the surface, the time elapsed since deposition and the storage conditions. Factors such as temperature, exposure to light and water and the relative humidity change the chemical and physical nature of a fingerprint.

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