



VICTORIA POLICE

VICTORIA FORENSIC SCIENCE CENTRE

FINGERPRINT BRANCH

MODULE TEN

**DURATION
OF
LATENT IMPRESSIONS**

THE DURATION OF LATENT IMPRESSIONS

The reader is reminded of the three types of glands located in the dermis and the underlying fatty tissue, which excrete matter through ducts to the surface of the epidermis. They are the Eccrine, Sebaceous, and Apocrine glands.

Eccrine glands are present almost everywhere in the human skin and are the only skin glands on the palmar and plantar surfaces. Pure eccrine fluid in the gland is an alkaline aqueous solution of inorganic and organic (non-lipid) compounds. It is made up of about 99.5% water and about .5% solid matter, 1/2 of which is in-organic salts and the remainder organic substances.

Sebaceous glands are present everywhere on the human skin except on the palmar and plantar surfaces. They are most abundant on the scalp and face and invariably are found in association with the many types of hair structure. The Sebaceous glands produce a fatty greasy wax called "SEBUM". It is composed of very complex organic chemical compounds which, in the main, can be categorised as members of the diverse chemical family known as "lipids". Sebum is formed by bacteria decomposing keratin within the glands, and is fluid within the duct but solidifies at skin surface temperature.

Apocrine glands are usually sited in the duct of the Sebaceous gland. Their secretions are cellular granules which are produced in the glands and which are dissolved at the apex of the duct. The main constituents are proteins, carbohydrates, cholesterol, and iron. They primarily serve as scent glands and only become functional at puberty. Apocrine glands are located in the armpits, the anogenital region, the chest, the external

ear canal, eyelids and occasionally on the face, scalp and abdomen.

"A latent print is a chance contact impression of friction ridge skin".

In the late 1920's, the eminent French scientist, Professor LOCARD, propounded the following physics "Law of Contact".

"When two objects come into contact, there is always a transfer of material from each object to the other. Often this transfer is obvious, at least in direction, but even when the amount of material transferred, or its nature is such that nothing is visible, there is always a transfer".

This is the law of nature that applies to the leaving of latent prints.

The duration or life of a latent impression is the length of time during which it can be processed or developed to a point where it can still be identified.

Theoretically, the life of latent impressions can be quite considerable. The factors that influence their detectable life, using present day methods, are many and varied but can be grouped under these main headings.

- (a) the composition of the latent Impression;
- (b) the amount of matter deposited;
- (c) the physical properties and conditions of the receiving surface;
- (d) environmental conditions;
- (e) the position of the latent impression;
- (f) the time since the latent impression has been deposited.

As each one of the groupings are variables and are usually influenced by some or all of the others, a detailed account of each will improve the technician's understanding of the detectable life of latents. They are set out as follows: -

The Composition of the Latent Impression

With the exception of some visible, moulded, etched impressions or when chemical processes are used to develop the latent impression, it is usually not possible to determine exactly the composition of a latent.

True latent matter is animal waste and is composed of the residue of fatty oils, waxes, acids, and salts originating from uncontaminated ridged skin and experience has shown that a true latent impression's detectable life is limited to a few days. Animal waste is subject to drying out, chemical reaction, bacterial and fungal attack and the breakdown of matter by light.

However, a latent impression can be composed of any sticky matter that may be on the ridged skin at the time of contact with a surface. It may be sebum rich human waste or matter originating from other sources, the main ones being: -

- (a) body oils, waxes, mucus or matter from other parts of the body or other person's bodies;
- (b) artificial hair oils, skin lotions, or other cosmetics;
- (c) food oils or greases;
- (d) motor oils.

These contaminants are introduced to the skin by contact with other surfaces and act as a natural lubricant or shield against most conditions a latent is subjected to, and can last for an undetermined length of time.

The Amount of Matter Deposited

The skin glands function continuously even when the body is at rest, but many factors influence the availability of skin surface matter when leaving detectable latent impressions. These deposits are influenced by the following: -

- (a) The time elapsed since the skin surface matter was last removed or diminished by cleaning, removed by friction, or abrasive contact or absorption, eg. consecutive impressions;
- (b) The donor's sex. Males generally produce greater amounts of skin surface matter than females;
- (c) The donor's age. Generally, the body's functions are at their peak in young people and diminish with increasing age.
- (d) The body and mental health of the donor. Health disorders can increase or decrease the amount of skin surface matter available.
- (e) The donor's occupation or lifestyle. Continual handling of abrasive materials can damage the condition of the skin and reduce the glands' ability to produce surface matter. substances foreign to the donor can increase or decrease the quality of a latent deposit.
- (f) The donor's diet can influence the production of skin surface matter.
- (g) The activity of the body increases the production of surface matter.

(h) Mental stress, medical or drug stimulation or high environmental temperatures can increase surface matter.

(i) The body's metabolism has effect on the production of surface matter.

(j) Pressure and duration of contact. On contact, skin surface matter is sandwiched between the ridged skin and the receiving surface. Varying contact pressures can be exerted, with heavier pressures depositing noticeably more skin surface matter than low pressures.

The duration of contact is significant in leaving developable impressions on paper. Contact time of some duration enables a greater amount of the more fluid components of skin surface matter to enter the body of the paper, thereby producing better quality impressions upon development.

The Physical Properties and Conditions of the Receiving Surface

If a surface conforms to what is acknowledged as a suitable receiving surface, then the surface itself has no significant effect on the duration of the latent impression. These surfaces are generally categorised as being clean, smooth and non-absorbent and the usual development mediums are powders and super glue. Some receiving surfaces that do affect a latent impression are as follows: -

(a) If a surface is porous and its absorbent rate is slow, you may have an option of using the adhesive method of development instead of chemical development. Being able to ascertain the approximate time the deposits were made would influence the choice of development procedure.

(b) A film of grime, grease, sea spray, fluids, oxidation, or dust can almost immediately absorb a latent deposit, rendering it impossible to be developed by adhesive methods. On other occasions, the ridged skin may lift away the grime, etc., leaving a visible impression. A subsequent impression made immediately after grime, etc. adheres to the ridged skin and may also leave a visible impression.

(c) A surface warmer than skin surface temperature can cause the oily waxy compounds of latent matter to become more fluid and flow readily, creating a mass with no ridge detail. A much hotter surface can rapidly dry out a latent deposit leaving no trace whatsoever or an impression that some times can be seen with oblique lighting but cannot be further developed.

(d) With some soft metals (eg. brass, copper, zinc, silver), or some soft metal plated surfaces (eg. cadmium or zinc), the acidic nature of latent deposits expand themselves in reacting chemically with the metal and can only be developed within a short time of being deposited. At times, these impressions are eroded into the metal surface. They are then described as etched prints and can last for very long periods even under adverse conditions.

(e) Impressions on human skin are difficult to develop due to the continuous production of skin surface matter on the receiving skin of a living person that intermixes with the deposited matter. On cadavers, the deposited matter is absorbed by upper layers of the scale like dead cells of the pidermis. The time span between the depositing of matter and the commencement of an examination appears to be a major consideration, however, examination is warranted even though much research is still required.

Environmental Conditions

Temperatures, sun, wind, dew, rain and stationary water will have an effect on latent deposits and each should be dealt with separately. Scientific research shows that humidity has very little effect on the drying out of latent impressions, as there is little or no water present in them. However, humidity can diffuse the ridge detail of the deposits.

It is known that cold weather will constrict the skin gland ducts and reduce the glands' excretions resulting in less matter being available on the skin surface. Hot weather will produce the opposite effect. Cold weather will increase the viscosity of the skin surface matter and hot weather will reduce it. These factors can be reflected in the matter deposited and its development capabilities. The temperature of the receiving surface and air temperature surrounding the deposit are significant also. Heat will accelerate the chemical reaction of the components, increase the bacterial activity and cause rapid drying of the more volatile components of the deposit.

The higher the surrounding temperature, the shorter is the latent deposit's detectable life. In hot climates, an unprotected latent's detectable life can be reduced to a matter of hours.

The sun is a source of light and heat and direct hot sun causes latent impressions to dry out very rapidly and can create undevelopable impressions that are only visible in oblique light. These are thought to

be sebum rich deposits. Light is capable of breaking down matter (photo decay) and continued exposure to strong sunlight will contribute to the ageing process of latent impressions.

Wind or even a gentle air current will hasten the evaporation and drying out of the more volatile components of latent matter, thus reducing its detectable life.

If dew is present on a surface touched, it can prevent or reduce the amounts of skin surface matter adhering to the receiving surface. If the dew occurs after the impression is made, it can dissolve the latent matter, partially or totally. If a droplet of dew flows through an impression, it can wash away that portion of the impression. However, if the latent is sebum rich, it is water repellent and dew can have little or no apparent effect on it.

The effect of dew on latent matter also applies to rain. Again, if the surface is wet, the latent matter can be prevented from adhering to the surface if the amount of matter deposited is much reduced. Rain on existing deposits reduces its detectable life very rapidly as it has a flushing effect. Even though sebum rich deposits are water repellent, some components of sebum, e.g. the cholesterol, are water soluble and the flushing effect of continued rain will usually wash off all but the heaviest concentrations of sebum.

As dew and rain are water, the effects on latent impressions immersed in water can be expected to be the same. It is, however, possible to develop very heavy sebum rich deposits that have been immersed in stationary water. Water, rain, or dew, can have little or no effect on etched prints or visible prints composed of matter not soluble in water, e.g. motor grease, paint, etc., all of which are extremely durable.

The Position of the Latent Impression

The position or location of latent impressions can determine their life span. It is reasonable

to assume that latent impressions on door handles, steering wheels and other objects in constant use would eventually be obliterated or removed by subsequent and/or constant handling or cleaning.

The Time Since the Latent Impression was Deposited

As latent deposits are animal waste, their eventual complete destruction is inevitable. Even though scientific research shows they are capable of extensive life spans, experience has shown that crime scenes examined by using conventional adhesive development methods, produce best results if the examination is made within 48 hours of the latents being deposited. Results are reduced dramatically after 3 or 4 days and the chances of success after 3 or 4 weeks are remote.

In general, the age of a latent impression when developed by adhesive methods can be reflected in its appearance and the manner in which the developing powder adheres to it. Freshly made impressions usually respond to developing powders strongly and immediately.

This occurrence is probably a more reliable indication of the amount of matter available, as adhesive qualities are generally at their optimum in most latent deposits within 24 hours of being impressed. Heavy deposits or sebum rich deposits display these traits for longer periods.

The ageing processes and the influencing factors that a latent impression is subjected to, will have their effect and will reduce its adhesive quality.

If little matter is deposited or the deposit lacks sebum, even a freshly deposited impression can develop, appearing weak and ill defined.

A static environment such as a sealed container or similar can considerably prolong the detectable life of some latent impressions, particularly if they are heavy deposits or sebum rich.