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Article Title: The permanence of friction ridge skin and persistence of friction ridge skin and impressions: A comprehensive review and new results

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Article's Subject Matter:

- This study addresses the permanence and persistence of friction ridges and the persistence of impressions made from these friction ridges over months and years. All 3 levels of detail were evaluated for permanence and persistence in the short term (1 to 4 months and long term (period of more than 8 years). Level 1 detail was permanent and persistent. Level 2 detail was persistent, but not permanent. Certain aspects of level 3 detail (pores and ridge edges) were neither permanent nor persistent. Ridge width was permanent and persistent.

Key Points in Article

- Until recently most fingerprint examiners testified that fingerprints (including impressions and the friction ridge skin) were unique and permanent
- Permanence was defined as the unchanging presence and appearance of friction ridge arrangements and their attributes between observations of the skin.
- Persistence connotes a reliable two-dimensional representation of the threedimensional details in the friction skin.
- Hypothesis 1 (H1). The three levels of detail on the skin are permanent.
- Hypothesis 2 (H2). The three levels of detail remain persistent on friction ridge skin and impressions.
- Methods & materials
 - Inked/ live scan impressions
 - Photographs of friction skin
 - Holographic images
- Level 1 observations over a short term (1 to 4 months)
 - Ridge flow was permanent and persistent



- Level 1 observations over a long term (period of more than 8 years)
 - 77 % had creases that appeared or disappeared
 - Level 1 detail is both permanent and persistent
- Level 2 observations over a short term
 - Permanent and persistent in photographs
 - Level 2 detail is both permanent and persistent in the short term
- Level 2 observations over a long term
 - Level 2 details were persistent, but not permanent
 - A few subtle variations in appearance were observed, but were all within operational tolerance of changes associated with age
 - 12 of 32 fingers photographed had changes in the appearance of level 2 features
 - None of the variations in appearance were sufficient to alter identification decisions
 - No minutiae were observed to appear or disappear
- Level 3 observations over a short term
 - Not all level 3 details were permanent or persistent over a short term period
 - Ridge widths were permanent and persistent over the short term
 - The size, shape, and location of pores were neither permanent nor persistent
 - Incipient ridges were neither permanent nor persistent
- Level 3 observations over a long term
 - Edge shape was neither permanent nor persistent
 - Of 32 fingers examined over a long term, seven had incipient ridges, one of which differed in appearance
 - Level 3 details were neither permanent nor persistent

Fallacies and or Issues

- Many of the observed variations in appearance of all 3 levels of detail could possibly be attributed to capture methods.
 - Varying amounts of deposition pressure



- Photos are a poor substitute for assessing variations of the features of the skin itself
 - Without having access to the original photographs, it is difficult to assess the variations in appearance. Some photos were taken with a Nikon D1H (2.6 megapixels), while others were taken with a Nikon D2H (4.2 megapixels). Slight changes in lighting angles, has the potential to change the appearance of the features.
 - An example is fig. 8 that purports to show differences, but look the same and any interpretation of “differences” is likely due to lighting issues.
- On page 115 it states “incipient ridges many continue to develop and manifest themselves over the lifetime of an individual”
- This based on the research paper; Stucker et al – Interpapillary lines. The variable part of the human fingerprint. Journal of Forensic Science 2001;46(4):857-861
 - The Stucker study noted that 14% of children under the age 11 had incipient ridges. 34% of adolescents (11 – 20) had incipient ridges. 52.8% of those over the age of 60 had incipient ridges. *“Therefore, one can surmise that incipient ridges many continue to develop and manifest themselves”*
- It is unclear what is meant by develop and manifest, particularly the “develop” part.
- Though it is stated that level 3 is neither permanent nor persistent, they also report that ridges width, an aspect of level 3 detail, is both permanent and persistent. Ridge width, and in particular varying ridge width along a friction is the most reliable level 3 detail.
- The most important take away from this study is that none of the perceived differences in either the long term or short term would have affected an identification decision.
- No level 2 features appeared or disappeared.
- Level 3 detail (pores, ridge edges) is not as reliable as level 1 and level 2.
- Level 3 ridge width and variations in width along a ridge are reliable.