

Summarize the formation of friction ridge skin essay sample

[Science](#), [Anatomy](#)



1. Summarize the formation of friction ridge skin and how it relates to the permanence of fingerprints.

The skin over most of our bodies is fairly smooth. 'Friction Ridges', however, are found on the digits, palms and soles. They are called 'friction' ridges because of their biological function that helps us grasp and hold onto objects. Sometimes compared to fine lines found in corduroy, unlike corduroy, ridges vary in length and width, branch off, end suddenly and, for the most part, flow with each other to form distinct patterns. The ridge path can sometimes be very fragmented. There are about 2,700 ridge "units" per square inch of friction skin. Each ridge "unit" corresponds to one primary epidermal ridge (glandular fold) formed directly under each pore opening. Pore openings exist along the surface of the friction ridges. They are pretty evenly spaced.

This is due to the fact that one pore opening along with one sweat gland exists for each ridge "unit". Friction ridges are in their definitive form on the fetus before birth. Once this blueprint has been established, in the stratum basale (generating layer) of the epidermis on the fetus prior to birth, it does not change except from injury, disease or decomposition occurring after death. Injury sustained by generating layer (Stratum basale) may affect the skin's ability to regenerate and scar tissue forms.

Location and size of pore ducts and pore openings along the surface of friction ridge skin are also definitive form before birth and will not change.

Cross-section of Friction Skin

Thick skin (which includes friction skin) contains two principle layers:

The Epidermis (E) is stratified (layered), squamous (flat) epithelial tissue 5 layers thick and... The Dermis is much thicker than the epidermis and consists of two layers - the Papillary layer (DPL) an area of loose connective tissue extending up into the epidermis as dermal pegs (DP) and the deeper reticular layer (DRL). Stratum corneum - consists of 25-30 layers of stratified (layered) squamous (flattened) dead keratinocytes (skin cells) that are constantly shed.

Stratum lucidum - is present only in thick skin (lips, soles of feet, and palms of hands). Little or no cell detail is visible. Stratum granulosum - 3-4 layers of cell thick consisting of flattened keratinocytes. At this level the cells are dying. Stratum spinosum - several layers thick, consisting mostly of keratinocytes. Together with the stratum basale it is sometimes referred to as the Malpighian layer (living layer). Stratum basale - a single layer of cells in contact with the basement membrane. These cells are mitotically active - they are alive and reproducing - the reason why it is often referred to as the generating layer. Four types of cells are present in this layer:

Keratinocytes (90%) - responsible for waterproofing and toughening the skin

Melanocytes (8%) - synthesize the pigment melanin which absorbs and disperses ultraviolet radiation

Tactile cells - very sparse and function in touch reception

Nonpigmented granular dendrocytes - cells that ingest bacteria and foreign debris.

The primary function of the dermis is to sustain and support the epidermis.

The papillary layer (DPL) is made up of connective tissue with fine elastic fibers. The surface area of this layer is increased by the

dermal papillae (DP). These fingerlike formations greatly increase the surface area for the exchange of oxygen, nutrients and waste products between the dermis and the epidermis.

Friction Skin - Epidermal Layers

Friction Skin - Epidermis/Dermis Junction

The boundary between the dermis and epidermis is a point of potential weakness where the two tissues may be separated from each other. The fingerlike formations (or interdigitation) also serve to strengthen the epidermis/dermis junction.

As we age the dermal papillae tend to flatten and may increase in numbers. In this situation, each papilla appears to develop into a group, staying at the same overall size but individually much smaller.

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Sweat glands, or eccrine glands, are found over the entire surface of the body except a few small areas. They are most concentrated in the palms and soles of the feet. The eccrine sweat glands in this skin section are well developed, and their ducts (dark staining) can be distinguished from the lighter staining secretory portions.

They are simple coiled tubular glands; they consist of a highly coiled secretory portion deep in the dermis, and a relatively straight duct conducts the secretions toward the surface of the epidermis. Each duct opens in the centre of the ridge " unit" (cristae cutis).

Eccrine sweat contains approximately 99% water and 1% solids. The solids are half inorganic salt (mostly sodium chloride) and organic compounds (amino acids, urea and peptides).

Friction Skin - Dermal Papillae

Understanding the various stages of friction skin growth during fetal development is of utmost importance to the friction ridge identification specialist. The task of explaining friction skin persistency and uniqueness would be a difficult one to say the least with no knowledge of this.

Scientific research has provided us with reasons as to why fingerprints are persistent and unique - the main premises of fingerprint identification.

References: Ridges and furrows. com homepage