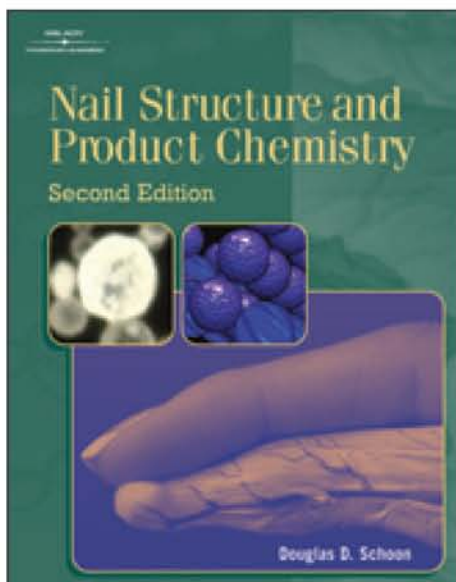
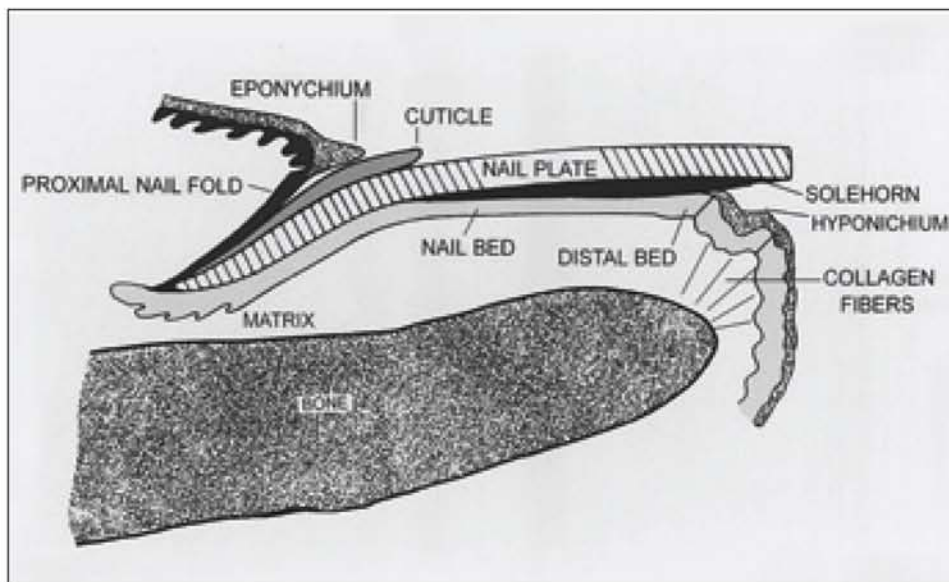


# SIX-PART SERIES EXCERPTED

## NAIL STRUCTURE & PRODUCT CHEMISTRY



SECOND EDITION



CROSS SECTION OF THE MAJOR PARTS OF THE NAIL PLATE – FIGURE 1.2

### NAIL FOLDS – THE GUARDIANS OF YOUR NAILS

Examine the area on your finger where the skin touches the nail plate. The skin does not end where it meets the plate. Instead, the skin makes a U-turn and folds back underneath itself. This fold of skin pushes up against the nail plate creating a tight seal that prevents bacteria and chemicals from getting underneath. There are four of these 'seals' surrounding the nail plate from all sides. Their function is to protect the underlying nail bed from infection and injury. They are the 'Guardians' of the natural nail. When one of these guardian seals is broken, infection can result. These important seals protect the nail bed and matrix area from the outside world. In this article we will learn how important it is for nail professionals to protect these seals and keep them healthy. Bacteria, fungi or viruses can attack and create an infection if even one of these folds are damaged or broken.

Examine the base of your nail at the point where the skin meets the emerging nail plate. This skin actually folds underneath itself and the underside rests on top of the unexposed nail plate. The eponychium, covers the newly forming natural nail with a roof of living skin. The area where the skin actually 'folds' is called the proximal nail fold. It is the actual bend where the skin of the eponychium makes a U-turn and folds back under itself. Proximal is a medical term for 'nearest attached end', so you can see where this skin fold gets its name. On each side of the plate, two more folds form tight seals along the sidewalls. These sidewall seals are called the lateral nail folds. The two lateral nail folds are important guardian seals. In this case, 'lateral' means "to the side". We will learn about the other seals in a moment. But first, let's focus our attention on the base of the nail plate.

### EPONYCHIUM AND CUTICLE

Living skin covers approximately 20% of the nail plate. The skin that lies directly on top of the newly developing nail plate is called the eponychium. Normally the uppermost, visible part of the eponychium has the appearance of smooth, healthy skin. Cuts, nicks, bruises, irritating substances or other injuries to the eponychium can cause permanently lost or damaged nail plates. Clearly, this is an important part of the nail unit. Not surprisingly, the tissue that sits upon the nail plate is very different from visible eponychium.

The underside of the eponychium nail fold has a strange, sticky texture.

The word 'cuticle' is loosely and often incorrectly used. Ask a client to point to their cuticle and they'll most likely point vaguely to the skin at the base of the nail plate – the visible part of the living eponychium – instead of the non-living tissue on the nail plate.

How did this name misconception get started? Surprisingly, it probably started because of some medical text. These few references often simply state that the cuticle is the eponychium, without explaining to the reader that the cuticle sheds from the underside of the eponychium. But, the 'cuticle' is only a part of the eponychium. In fact, it is found on the underside of the eponychium where the tissue sits against the newly forming nail plate. This tissue sticks very tightly to the freshly made nail plate. The tissue binds so tightly that the growing nail plate pulls off a thin layer and drags it along. In other words, the detached tissue 'rides' on the nail plate, seeming to grow from under the edge of the nail fold. This thin layer of colorless tissue is the cuticle (see Figure 1.3). The underside of the eponychium is constantly shedding thin layers of this colourless tissue. As this shed skin emerges with the nail plate it creates the most important of the four nail plate guardian seals.

This thin layer of colorless tissue is the cuticle (see Figure 1.3). The underside of the eponychium is constantly shedding thin layers of this colourless tissue. As this shed skin emerges with the nail plate it creates the most important of the four nail plate guardian seals.

### WHAT'S IN A NAME?

Over the years, much confusion has been caused by a misunderstanding of nail anatomy. Some government regulations tell students they can't cut the cuticles, when really they mean the 'living tissue' of the eponychium. Cutting the fold can break the seal and lead to infection.

These regulations aren't meant to prevent you from cleaning the non-living tissue (cuticle) from the nail plate.

Clearly, the confusion can be avoided if we teach clients about the anatomy of the natural nail. While they are marveling at your knowledge, you will be helping eliminate the confusion. And you'll be making a positive contribution to our industry.



THE CUTICLE IS THE DEAD TISSUE ON THE NAIL PLATE, NOT THE LIVING TISSUE THAT SURROUNDS THE NAIL PLATE. IN THIS CROSS-SECTION THE CUTICLE CAN BE SEEN SEPARATING FROM THE UNDERSIDE OF THE EPONYCHIUM – FIGURE 1.3



# FROM THE SECOND EDITION OF BY DOUG SCHOON

During a properly performed manicure, the eponychium is gently pushed back to expose the true cuticle. The cuticle must be carefully removed. Improperly performed, this part of the manicure can cause problems for clients. For example, applying artificial nail products over this thin layer of skin will prevent proper adhesion, causing the artificial nail to separate and lift from the surface of the natural nail plate. Many wasted hours of valuable time are lost to repairs caused by careless removal of the cuticle. Not only can improperly removing the cuticle contribute to artificial nail service breakdown, it can also lead to infection or nail deformities. This is why it is very important to avoid removing cuticle from underneath the nail fold. It is fine to push back the eponychium first, but do not place any instrument underneath the nail fold itself. This can lead to injury and infection.

## TRUE OR FALSE... OR REGULAR?

Sometimes the term 'true cuticle' is used instead of 'cuticle'. This incorrectly suggests there are two types of cuticle, 'regular' and 'true'. This is false! There is only one cuticle on the fingernail and it seals the space between the eponychium and the nail plate to prevent infections of the matrix.

Sharp instruments can inflict serious injury, so avoid them during manicures. Finally, follow manufacturer's directions, using cuticle removers exactly as directed. It will make your job easier, if you use the product correctly. These products can be potentially irritating and may cause skin and nail damage if not used properly. Always remember, it is important for nail professionals to respect the cuticle. It is an important part of the seal that guards and protects the nail matrix.

## THE MATRIX

Directly below the eponychium is a small area of living tissue called the matrix. This small, glistening white patch of tissue is the very most important part of the entire nail unit. Why? The matrix produces a super tough protein called keratin. These keratin cells are the building blocks of the nail plate. You will soon see that keratin cells create the 'layers' of the nail plate. This makes the matrix the official birthplace of the nail plate. The matrix is an opaque, bluish-white looking, almost rectangular area of highly specialised cells. These special cells are designed to take the nutrients that we eat and turn them into an amazingly tough and durable substance called keratin. If the matrix becomes damaged the effects are usually seen in the nail plate as splits, ridges, white spots and other deformities of the natural nail plate. If damage to the matrix is severe, it could lead to permanent deformity. Interestingly, the size and shape of the matrix

determines thickness, width and curvature of the nail plate. It is a fact that, 'a wider matrix creates a wider nail plate'. The thumbs therefore must have a wider matrix than the other fingers. Also, longer matrixes make thicker nail plates. Also, you'll discover that people with naturally thin nail plates must have short matrix areas.

## THE NAIL PLATE

The nail plate is mostly made of a substance called keratin, the same chemical substance that hair is made from. Keratin is a special protein that creates the bulk of the nail plate. In nature, there are over 30 different types of keratin ranging from very soft Hungarian goose-down feathers to extremely hard desert turtle shells or even a rigid porcupine quill. Keratin is a very tough and flexible material well suited to withstand the rigours of the environment. Ancient peoples relied on their natural nails as tools, as well as for protection, so their nails had to be tough and durable. Collagen and keratin serve similar functions, but for differing parts of the body. Collagen is the building or structural protein for skin, keratin is the structural protein for nails. Like all proteins, keratin is made of long chains or strands of amino acids, joined together like pearls on a microscopic necklace. A typical keratin strand contains between 300-500 amino acids linked into a long chain. These single chains prefer to exist as loosely coiled strands. Almost two-thirds of the keratin found inside nail cells exist as extremely tiny, coiled strands. Dozens of these single coiled strands stack neatly into tight bundles to create tiny fibres or fibrils of keratin. These fibrils can only be seen under the most powerful electron microscopes. At these extremely high magnifications (15,000x) they look like tiny whiskers embedded in a semi-solid gel. All of this is encased in a clear sack to create a nail cell. These fibrous filaments are so narrow that a bundle of 2000 would only be as thick as a single human hair. But even so, each fibril contains approximately half a million amino acids and each nail plate contains hundreds of millions of fibrils. That's a lot of amino acid in each nail!

To be continued next month...

## Credits:

Figure 1.2 is courtesy Paul Rollins, Laguna Hills, California  
Figure 1.3, "Nails: Therapy, Diagnosis, Surgery", Scher & Daniels, pg. 53, 1990, WB Saunders Co., Harcourt Brace Jovanovich, Inc.  
Doug Schoon portrait – courtesy Paul Rollins, Laguna Hills, California



## DOUG SCHOON, M.S.

Doug Schoon has over 30 years of scientific experience, a Master's degree in Organic Chemistry and is considered to be the leading research scientist in his field. His unique expertise focuses on the science of both the natural and artificial nail. He is a well-known and respected author, as well as an internationally renowned lecturer and educator. Mr Schoon is a strong advocate for salon safety. As co-chair of the Nail Manufacturers Council, he frequently represents the entire nail industry on scientific and technical issues in Europe, Canada and the USA and is often called to serve as an expert witness in legal cases involving cosmetic safety and health. Additionally, dermatologists frequently call Mr Schoon to assist in writing books and scientific papers concerning fingernails. For the last 16 years he has led the scientific research team for Creative Nail Design, Inc. and presently serves as its vice president of Science and Technology. He currently resides in Dana Point, California.

Excerpts from Chapter 1, Fingernail Anatomy, 'Nail Structure & Product Chemistry', second edition, by Doug Schoon M.S.,  
To be published March, 2005 by Delmar/Thompson Learning  
*Nail Structure & Product Chemistry*  
2nd edition  
ISBN: 140 186 709X  
Price: \$37.95  
Mailorder on the web at [www.milady.com](http://www.milady.com)