



## Horn Structures

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### The Hoof Capsule

is made up of the wall and bars, the sole, the frog, the periople and the bulbs of the heels. The hoof capsule forms a coherent, resilient boot and therefore protects the inner structures from mechanical forces.

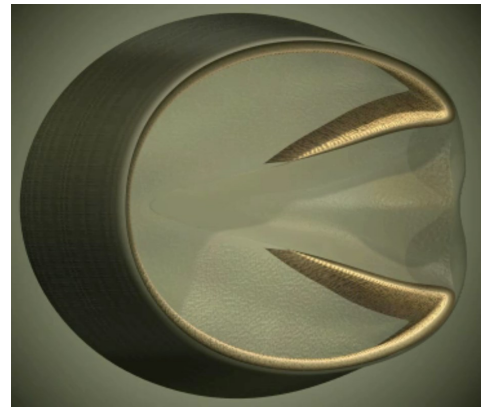
The hoof capsule gives us numerous markers about the health of the hoof. We can see many things that have happened in the past few months with this horse. Understanding how the hoof capsule grows, is essential to understanding many of the trim aids we are going to teach you.





## The Hoof Wall

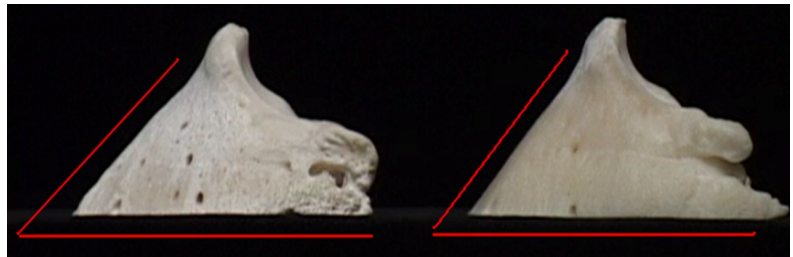
grows down from the coronary corium to the ground and forms a truncated, incomplete cone that is folded in on itself on each side at the heels. It is the thickest at the toe (dorsal surface) of the hoof and tapers off in thickness towards the heels.



In reality we will see many different hoof walls, but before we dive into looking at a lot of pathological hooves, let's first look at how a healthy hoof wall should look and why it should be that way.

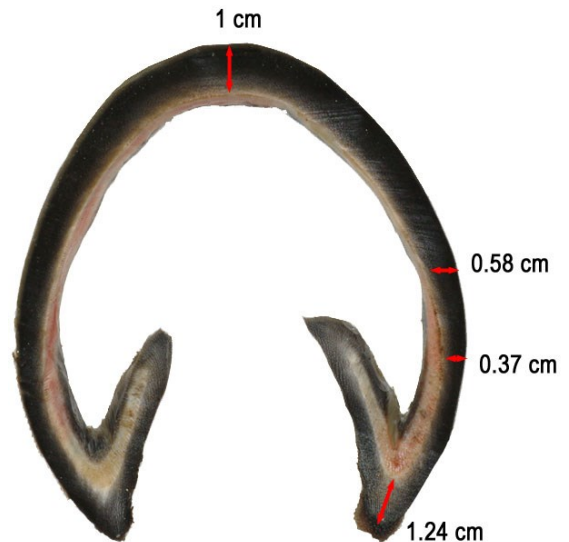
The hoof wall can be divided into the toe, the quarters, the heels and the bars.

In a healthy hoof the angle that the hoof wall makes with the ground at the toe ranges between 45° and 50° in the front and 55° – 60° in the hind hooves. These angles are determined by the angles of the underlying coffin bones, which in turn determine the angles of the toe to the ground.



The wall thickness varies between the toe and heel regions. It is thickest dorsally (towards the toe), becomes thinner in the lateral and medial regions, then thickens again at the

heels where the bars turn back toward the toe. Thickness is fairly uniform between its proximal (higher up in the hoof wall) to distal (further down in the hoof wall) regions. Regional differences in wall thickness result largely from the variations in the geometry of the coronary groove and are important biomechanically as the ability of the wall to deform is affected by its relative thickness.



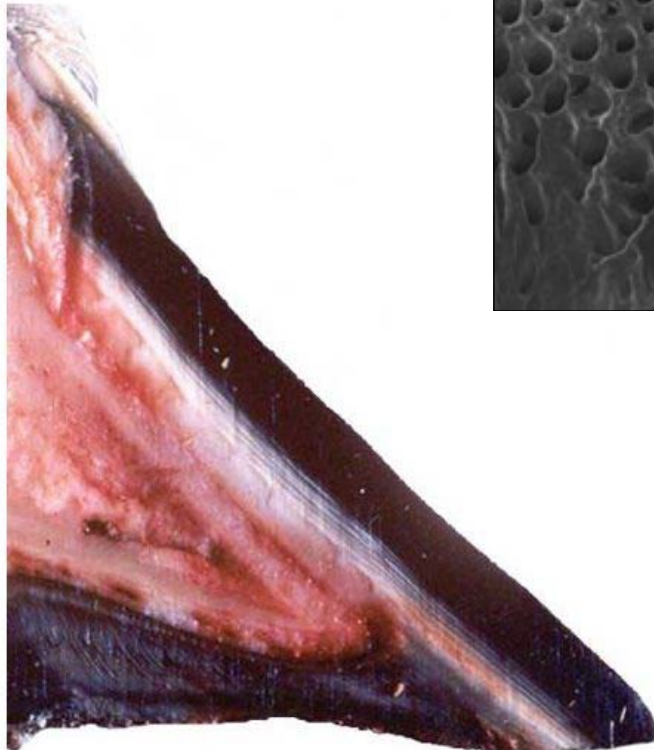
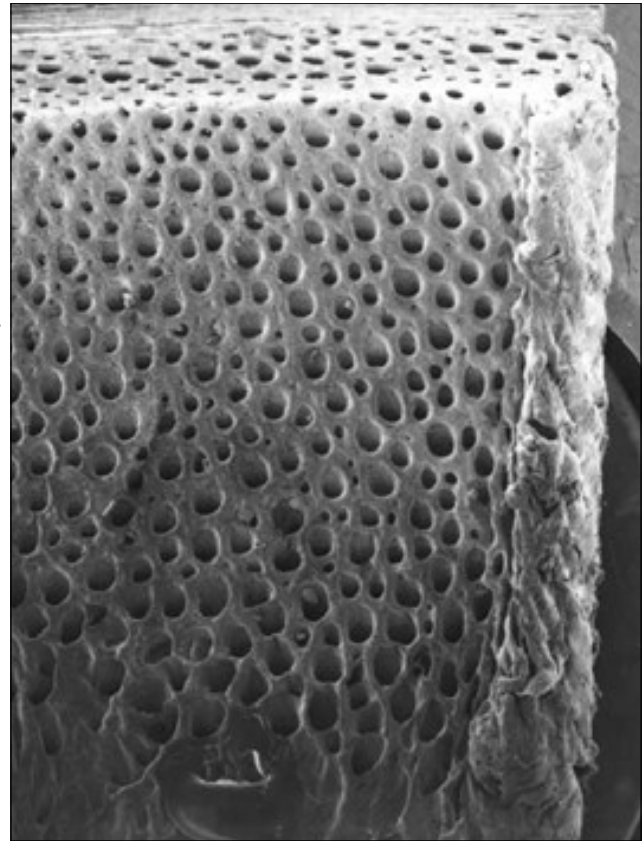
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The hoof wall is comprised of horn tubules\* (next page) and soft connective horn. The horn tubules are grown from the coronary corium and nourished by papillae. The horn tubules are "glued" together by soft, connective horn, which is also grown from the coronary corium. The hoof wall is further supplied by single horn tubules which are supplied by the laminar

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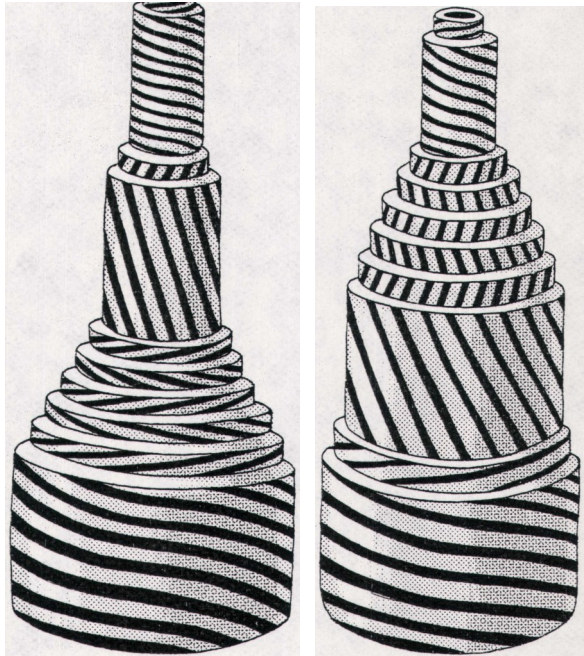


corium. As the coronary corium provides a bulge, the formation of the hoof wall follows that bulge.





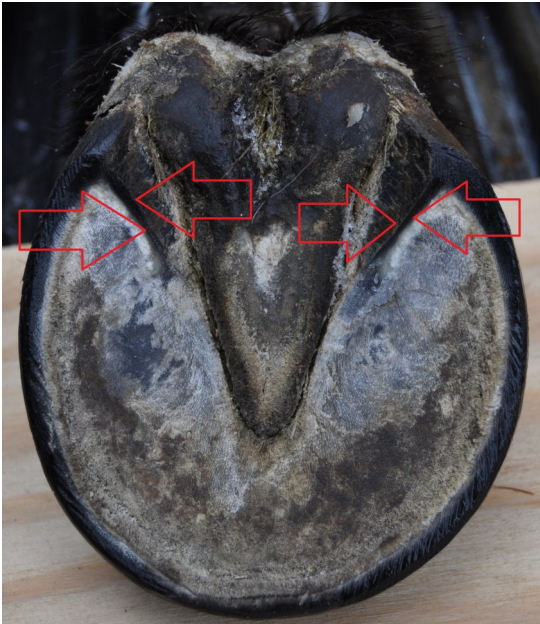
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Horn tubules are constructed in such a way that they are able to compress upon weight bearing, and therefore they contribute to shock absorption.

**The Bars** are a continuation of the wall. They contribute to the boundaries of a triangular space occupied by the frog. The bars blend with the sole as they converge towards the toe.

In old farrier texts bars are referred to as "braces". This may be a more descriptive term.

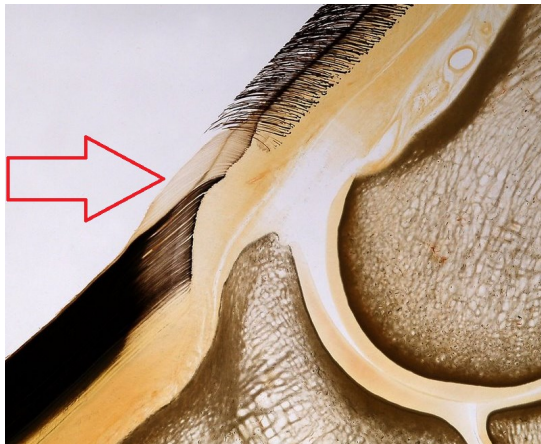
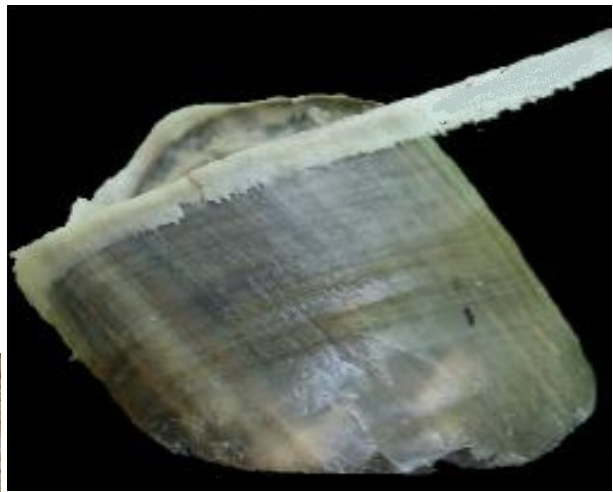


As can be seen here, the bars end at the middle of the frog. The bars are made out of hard horn tubules, connected with soft horn, just like the walls.





**The Periople** lies directly below the hair bearing skin, above the coronary band. This is a thin layer of horn that protects the coronary band and as it is also highly water containing it keeps the coronary band from drying out.

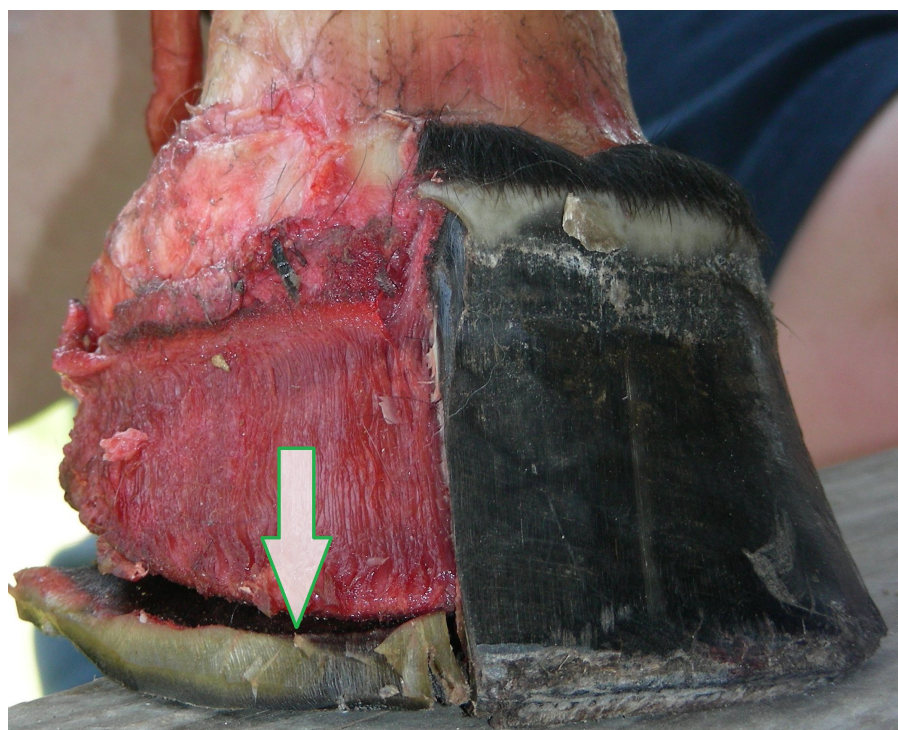


As the periople grows down the hoof wall, it becomes the glaze of the hoof wall.

In the heel region the periople becomes wider and forms a thicker layer. Here it surrounds the heels and merges with the frog/bulb.

In this picture you can just see how the periople covers the upper part of the hoof capsule horn.

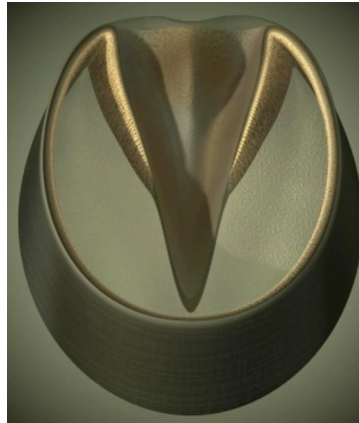
**The Sole** is a modified form of hard horn that covers the bottom of the hoof. Like the wall, it contains no nerves or blood. The sole provides a protective covering for the sensitive structures and tissues. The sole horn is also made up of horn tubules, which are nourished by papillae; however, as the sole horn tubules are less dense, the sole horn is not quite as hard as the wall horn.



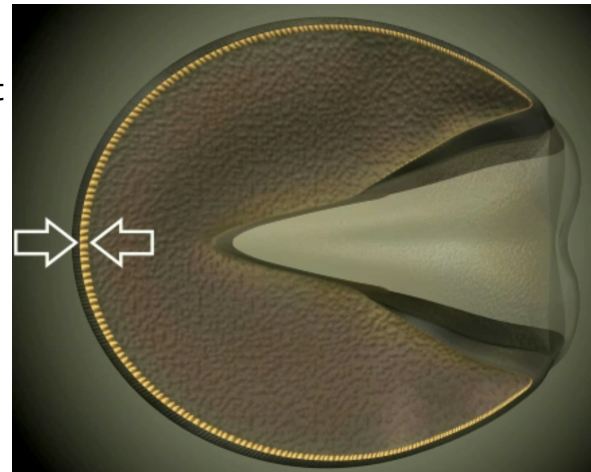
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**The Frog** is a roughly triangular, wedge-shaped mass of keratinized tissue. It has a forward pointing apex and a broad base caudally. There is a shallow central groove (central sulcus) that deepens caudally towards the base. The frog occupies the triangular space between the bars. On each side of the frog there is a deep groove (collateral groove) between the frog and the bars of the hoof. Like the central groove, these collateral grooves are deepest toward the back of the hoof. The base of the frog is at the back of the hoof capsule where it expands upward and sideways to blend with the bulbs of the heels, thus completing the back of the hoof capsule.



**The White Line** is visible on the ground surface of the hoof capsule. It is the ring of horn of a lighter color (mostly yellowish) and softer texture that indicates the boundary between the sole and the hoof wall. It connects the sole with the wall.



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Hoof capsules come in many different shapes, all of which pictured here are unhealthy.

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Below:  
Empty hoof capsule. This is how a hoof capsule looks after it has been boiled off the bone.



Pictures: The Glass Horse Equine Distal Limb—Dr. von Horst— HoofCareUn-  
Ltd.—Dr. Hiltrud Strasser—Cheryl Henderson  
Text: Claudia Garner