

ORIGIN OF THE NETWORK-LIKE STRUCTURE ON THE SHELL SURFACE
OF THE HORSESHOE CRAB

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Network-like structures on the shell surface of the horseshoe crab exhibit a difference in the pattern among the four species and even among individuals within a single species. In general, the structures are clear in adults and larvae at the late growth stages. However, they were hardly observed in specimens less than 10 cm in body length (including a telson). As far as I examined the network-like structures of the four species of the horseshoe crab, they were most remarkable in the adult females of Tachypleus gigas.

The size and shape of the mesh of the network-like structures were different in regions in an individual.

Patten (1912) examined the dermal skeleton of Limulus polyphemus and described this network-like structure as "surface ornamentation". He argued the similarity in the structure of the dermal skeleton between Limulus polyphemus and the Ostracodermi (the primitive vertebrates). However, he did not mention anything about the origin of the surface ornamentation.

We have observed wrinkles like those on the surface of the human brain on a newly formed carapace exoskeleton, which was exposed when we removed the carapace from the horseshoe crab that died immediately before the last larval molt. Therefore, it is obvious that the network-like structures are remnants of these wrinkles which are almost smoothed after a molt.

Reference

Patten, W. (1912) The evolution of the vertebrates and their kin. 486pp. P. Blakiston's Son and Co., Philadelphia.