SPINY DOGFISH SHARK SECRETION OPENINGS FOR FLUORAPATITE, FLUORIDE CONTENT IN THE ENAMELOID OF THEIR TEETH

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Abstract: In June, 2012 a recent paper the teeth of two different species of sharks the first one known as the Shortfin Mako Shark and the second known as the Tiger Shark teeth were studied and a new discovery was made about the anatomy of their teeth. Part of the new discovery was that a geological fluorapatite single crystal were structurally and chemically characterized. It was also discovered these two shark species had the capability within their gums and teeth had a film on these shark's teeth which consisted of fluorapatite with a fluoride content. Scanning Electron Microscope (SEM) micrographs further presented and demonstrated evidence that the crystals in enameloid were much harder than both kinds of teeth due to the absence of an organic matrix. Although the 2012 paper presented a remarkable discovery what was not addressed in this paper is exactly where did these shark's capability come from to be able to essentially provide a fluoride emission of fluid that not only protects and hardens these shark's teeth, but also acts as a lubricant on their teeth keeping them in perfect condition for attacking their prey.

Key words: Shark, Shark Teeth, Spiny Dogfish Shark, *Squalus acanthias*, Shark Fluoride.

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1 The Spiny Dogfish Shark (*Squalus acanthias*)

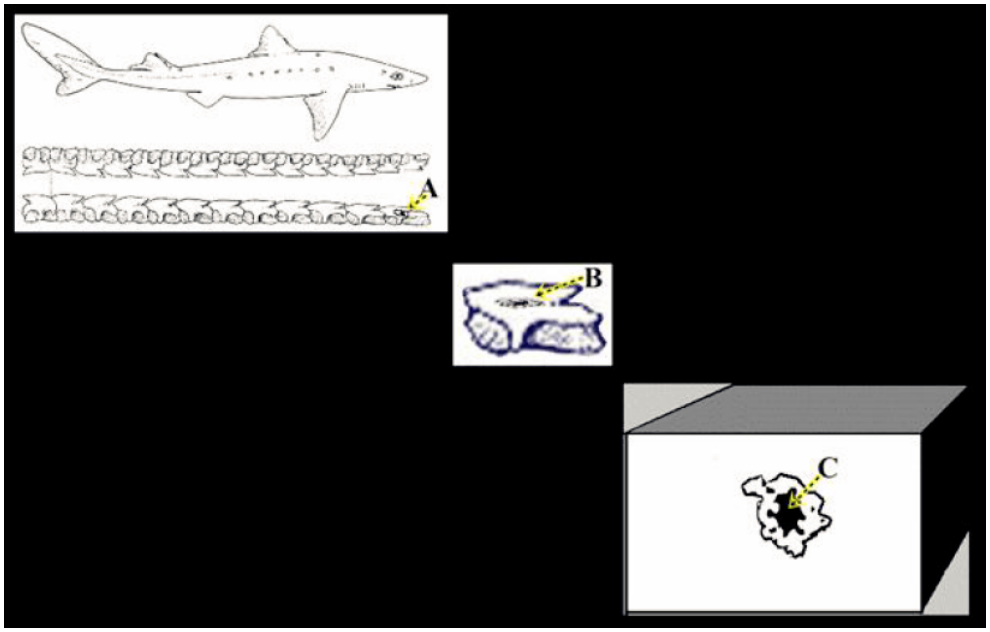

Figure 1: **In the upper top image is of the shark species known as Spiny Dogfish Shark (*Squalus acanthias*). This image was originally presented in the paper of Bigelow and Schroeder [1]. That shows the upper and lower jaw teeth as depicted in (A). Where the yellow arrow points away from (A) to an example tooth of Spiny Dogfish Shark. Where as a horizontal artist rendition is presented and depicted in (B), which is depicted and projected in a larger side view (3D) box, as seen in (C). Which B and C are used as visual aids present and demonstrate how these sporadic secretion openings for the fluroapatitie fluoride content to seep out of on to the shark's teeth. Providing not only a fluoride-like film on their teeth protecting them, but which also provides a lubricant on the sharks teeth as well. The above illustration marked (A) first appeared in Garman [4]. (Source: Author, [1], [4])**

Enax [3] and his team presents the significant discovery in their paper as aforementioned in the abstract of this paper that the Shortfin Mako Shark (*Isurus oxyrinchus*) and the Tiger Shark (*Galeocerdo cuvier*) teeth were studied in 2012. The new anatomical discovery on these two species of shark

characterized that a single geological fluorapatite crystal was structurally and chemically responsible for producing a film on these shark's teeth which consisted of fluorapatite with a fluoride content. The evidence provided in this paper and study were SEM micrographs, which gave evidence that the crystals in enameloid were much harder than both kinds of teeth in both shark species, because of the absence of an organic matrix. However, we have discovered where the fluoride like secreted film comes from. That there are special openings in the Spiny Dogfish Shark (*Squalus acanthias*) teeth where this secretion originates from.

2 Secretion Openings For The Diet of Spiny Dogfish Shark (*Squalus acanthias*)

The authors of this paper also propose that it is not just the Spiny Dogfish Shark species that has these secretion openings in its teeth. We further propose by our study of the aforementioned shark species that the previous shark species Shortfin Mako Shark and the Tiger Shark, have these fluoride-like secretion openings sporadically located in certain teeth within their upper and lower jaw teeth in like manner just like the Spiny Dogfish Shark as discussed and presented in this paper. This is essentially how Enax [3] and his team were able to discover the "Resulting fluoride-like secreted film" on the Shortfin Mako and the Tiger Sharks species teeth. However, we contend having discovered the "cause" from where where this secretion originates. It was further found that for the Shortfin Mako and the Tiger Sharks species film was indigenous diet, as it is with the Spiny Dogfish Shark.

3 Conclusion

By being able to study the Spiny Dogfish Shark (*Squalus acanthias*), it has enabled the author of this paper to make a connection between the fluoride like secretion discovered by Enax [3]) and his team. It has also provided a deeper understanding to the data and sources of additional reference to Steve Kemper studies of different shark species at the Smithsonian Institution. Which also include the studies conducted by Clark [2], Kenney [5], Lemonick [6] and facts and details of sharks history, characteristics, senses, behavior, feeding and sex online references as well.

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