


## 生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	皮膚減少生物污垢 (Skin Reduces Biofouling)
生物系統 LIVING SYSTEM	鯊魚 (Sharks)
功能類別 FUNCTIONS	#保護免受動物侵害 #保護免受植物侵害 #防止微生物侵害 #Protect From Animals #Protect From Plants #Protect From Microbes
作用機制標題	鯊魚皮的鱗片可能透過形狀和表面形貌影響污垢微生物的附著。 (The scales of shark skin may influence attachment of fouling microorganisms via shape and surface topography.)
生物系統/作用機制示意圖 (確認版權、註明出處； 畫質)	 <p><a href="https://unsplash.com/photos/grey-and-white-shark-underwater-pflfMYwrEgg">https://unsplash.com/photos/grey-and-white-shark-underwater-pflfMYwrEgg</a></p>
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
<p>鯊魚皮膚由微觀鱗片組成，鱗片呈三角形，長度通常為 200-500 微米，具有沿體軸排列的細小規則間隔（30-100 微米）脊。先前的研究表明，鱗片可以改變最靠近皮膚的水流，並可能減少對身體的阻力（更多資訊請參見此處）。同樣的機制可以幫助防止生物污垢，因為皮膚表面附近快速流動的水會減少微生物在表面沉積的時間，並有助於沖走任何沉積的微生物。另一個假設是，鯊魚鱗片的微觀形狀和表面地形阻止了微生物的定居。這個想法尚未在真正的鯊魚皮上進行實驗測試，但基於對鯊魚皮複製品和簡單模型的研究，這些模型表明某些微生物更喜歡在特定的凹槽寬度和深度上定居。需要更多的實驗研究來確定鯊魚鱗片如何影響微生物附著。</p> <p>Shark skin is made up of microscopic scales that are triangular in shape and generally 200-500 <math>\mu\text{m}</math> long, with fine regularly spaced (30–100 <math>\mu\text{m}</math>) ridges aligned along the body axis. Previous studies have demonstrated that the scales can alter the flow of water closest to the skin and potentially reduce drag on the body (more info here). The same mechanism could help prevent biofouling since fast flowing water near the skin's surface would reduce the time microorganisms have to settle on the surface as well as help wash away any that do settle. Another hypothesis is that the shark scale's microscopic shape and surface topography deter the settlement of microorganisms. This idea has yet to be experimentally tested on real shark skin, but is based on studies of shark skin replicas and simple models that show certain microorganisms prefer colonizing particular groove widths and depths.</p>	

文獻引用 (REFERENCES)
<p>「較低的阻力還可以使皮膚附近的水層移動得更快，從而減少微生物的沉降時間並有助於將它們沖走[34,99,116,117]。除了低阻力之外，鯊魚皮的微觀紋理還可以阻止某些微生物，因為它們更喜歡特定的凹槽寬度和深度進行沉降。由於這些機制，微生物難以黏附和定植於鯊魚皮上[31-34]」（Bixler 和 Bhushan 2012：2399-2400）</p> <p>“Lower drag also allows the water layer next to the skin to move faster, which reduces micro-organism settlement time and helps wash them away [34,99,116,117]. In addition to low drag, shark skin microtexture deters certain micro-organisms, as they prefer particular groove widths and depths for settlement. As a result of these mechanisms, micro-organisms have difficulty adhering to and colonizing shark skin [31–34]” (Bixler and Bhushan 2012: 2399-2400)</p>
參考文獻清單與連結 (REFERENCE LIST) <b>Harvard 或 APA 格式</b>
<p><b>Biofouling: lessons from nature</b> <i>Philosophical Transactions of the Royal Society A</i>   28/05/2012   Bixler, G.D. &amp; Bhushan, B. <a href="https://royalsocietypublishing.org/doi/10.1098/rsta.2011.0502">https://royalsocietypublishing.org/doi/10.1098/rsta.2011.0502</a></p>
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生物系統延伸資訊連結 (LEARN MORE ABOUT THE LIVING SYSTEM/S)
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黃家薰翻譯 (2024/04/01)；陳柏宇編修 (2024/12/03)
AskNature 原文連結
<a href="https://asknature.org/strategy/skin-reduces-biofouling/">https://asknature.org/strategy/skin-reduces-biofouling/</a>

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