

生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	大西洋蠔子雙錨蠕動潛水 (The Atlantic Razor Clam's Double-Anchored Wriggle Dive)
生物系統 LIVING SYSTEM	大西洋蠔子 (Atlantic razor clam)
功能類別 FUNCTIONS	#修改材質特性 #臨時附加 #移入/移至固體上 #Modify Material Characteristics #Attach Temporarily #Move in/on Solids
作用機制標題	大西洋蠔子的瓣膜透過收縮使周圍土壤局部流化，從而減少阻力和到達洞穴深度所需的能量。 (The valves of the Atlantic razor clam reduce drag and the amount of energy required to reach burrow depth by contracting to locally fluidize the surrounding soil.)
生物系統/作用機制示意圖 (確認版權、註明出處； 畫質)	
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
<p>整個運動是一種雙錨蠕動。蠔子首先向下到達其足部，然後向上推動閥門。再利用瓣膜內部肌肉向內收縮，使其身體變窄。蠔殼瓣膜的收縮將血液推入足部。當血液充滿足部時，它會像氣球一樣膨脹，充當泥漿中的錨。一旦腳有了堅實的“立足點”，它就會收縮並將扁平的外殼拉向錨點，更深地進入沙子。此時，錨點反轉。瓣膜擴張，使外殼變寬，從而將其楔入沙中。在上方的外殼的支撐下，腳可以自由放鬆，並再次向下伸展以重新開始循環。每循環一次，蠔子就會往沙子表面下更遠的地方移動。</p> <p>The whole movement is a kind of double-anchored wriggle. A clam first reaches its foot downward, then pushes upward on the valves. Then the valves both contract inward using internal muscles to make its body narrower. The contraction of the shell's valves pushes blood into the foot. As blood engorges the foot, it inflates like a balloon to act as an anchor in the mud. Once the foot has solid "footing," it contracts and pulls the flattened shell towards the anchor point, deeper into the sand. At this point, the anchor point reverses. The valves expand, widening the shell so that it wedges it into the sand. Now bolstered by the shell above—the foot is free to relax and once again reach down to begin the cycle anew. With each cycle, it seesaws farther below the sand's surface.</p>	
文獻引用 (REFERENCES)	
<p>「許多生活在充滿孔隙液體的顆粒基質中的軟體生物使用雙錨系統進行挖掘：動物的一部分膨脹形成錨，而另一部分收縮並延伸以在洞穴中前進；一旦擴展用盡，每個部分的角色就會互換。」 (Dorgan et al., 2005)</p> <p>「大西洋蠔子透過雙錨法挖洞，利用其閥門的運動在其身體周圍形成一個流化基質袋，以減少阻力和挖洞能量消耗。」 (Winter 2012:2072)</p>	

<p>“Numerous soft-bodied organisms that live in particulate substrates saturated with a pore fluid use a two-anchor system to burrow: one section of the animal expands to form an anchor while another section contracts and extends to progress forward in the burrow; once extension is exhausted, the roles of each section are reversed.”</p> <p>“The Atlantic razor clam which burrows via the two-anchor method, uses motions of its valves to create a pocket of fluidized substrate around its body to reduce drag forces and burrowing energy expenditure.”</p>
<p>參考文獻清單與連結 (REFERENCE LIST) Harvard 或 APA 格式</p>
<p>(Dorgan et al., 2005; Fager, 1964; Holland and Dean, 1977; Jung, 2010b; Shin et al., 2002; Stanley, 1969; Trueman, 1966a; Trueman, 1966b; Trueman, 1967; Trueman, 1975) Localized fluidization burrowing mechanics of Ensis directus. https://journals.biologists.com/jeb/article/215/12/2072/10826/Localized-fluidization-burrowing-mechanics-of</p>
<p>延伸閱讀: Harvard 或 APA 格式 (取自 AskNature 原文; 若為翻譯者補充, 請註明)</p>
<p>生物系統延伸資訊連結 (LEARN MORE ABOUT THE LIVING SYSTEM/S)</p>
<p>撰寫/翻譯/編修者與日期</p>
<p>林義軒翻譯 (2024/3/13); 林義軒排版/文字調整 (2024/3/15); 陳柏宇編修 (2024/11/30)</p>
<p>AskNature 原文連結</p>
<p>https://asknature.org/strategy/valves-reduce-burrowing-drag/</p>

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