生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	有倒鉤的細絲幫助固定 (Barbed filaments anchor)
生物系統 LIVING SYSTEM	玻璃海綿/維納斯的花籃 *Euplectella aspergillum* (Venus's flower basket)
功能類別 FUNCTIONS	#永久性附著 #Attach permanently
作用機制標題	細絲的倒鉤尖端使海綿固定在鬆軟的沉積物 (Filaments anchor sponges in soft sediments using barbed tips)
生物系統/作用機制示意圖	

作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)

海綿是構造最簡單的動物之一。牠們的身體缺乏對稱性，而且沒有器官，並從水中獲取食物及氧氣。大部分海綿像煙囪一樣，從身體底部吸水，然後從頂部開口及身體裡的孔洞噴出。所有海綿都有骨架，而部分被稱為「玻璃海綿」的種類，牠們的骨架是由針狀的玻璃碎片所構成。

玻璃海綿生長在非常深的海底，在那裡牠們必須能夠保持固著在深海海床的鬆軟沉積物上。玻璃海綿 (*Euplectella aspergillum*)，又稱維納斯的花籃 (Venus's flower basket)，以大量的髮絲狀玻璃骨針 (spicules)固定自己，這些骨針長可達 10 公分。骨針聚集成束並附著在海綿身體上，形成密集的纜繩，但在另外一端它們單獨地散開成多根細長的絲線並穿過沉積物。這些細絲沿著每根骨針有著一系列的倒鉤，而且在末端是一

個倒鉤形成的棘冠，能像海底船錨般作用，將海綿牢牢固定在鬆軟而且容易快速變動的沙子和淤泥中。

如同很多大自然中的交互作用一樣，玻璃海綿利用大量相對脆弱的附著物，組合在一起時會形成強力的連結。在這種情況下，當底質本身非常脆弱而單一的強力連結無法生效的時候，這種方法尤其有效。

Sponges are some of the most simple of animals. They lack body symmetry and have no organs, getting their food and oxygen from the water. Most sponges work like chimneys, taking water in at the bottom and then ejecting it through the opening at the top and through the pores in their bodies. All sponges have skeletons and in some, the appropriately named “glass sponges”, the skeleton is made up of needle-like shards of glass.

Glass sponges live in very deep water where they must be capable of remaining anchored to the soft sediment of the deep ocean floor. *Euplectella aspergillum*, Venus’s flower basket, anchors itself with numerous hair-like glass skeletal elements called spicules, each up to 10 cm long. The spicules are bundled together where they attach to the sponge’s body, forming a thick cable, but they spread out singly into multiple tiny threads that run through the sediment. Each spicule has a series of barbs along its length and at the terminal end is a crown of barbs that works much like a sea anchor, holding the sponge steady in the soft shifting sand and silt.

Like many interactions in nature, Venus’s flower basket makes use of very large numbers of relatively weak attachments that when combined form a strong bond. In this instance, where the substrate itself is very weak and a single strong bond would not help, this method is particularly useful.

文獻引用 (REFERENCES)

參考文獻清單與連結 (REFERENCE LIST)

Monn, M. A., J. C. Weaver, T. Zhang, J. Aizenberg, and H. Kesari. (2015). New functional insights into the internal architecture of the laminated anchor spicules of *Euplectella aspergillum*. *PNAS* 112: 4976-4981. (https://doi.org/10.1073/pnas.1415502112)

延伸閱讀

生物系統延伸資訊連結 (LEARN MORE ABOUT THE LIVING SYSTEM/S)

https://en.wikipedia.org/wiki/euplectella_aspergillum
https://www.onezoom.org/life/@euplectella_aspergillum
https://eol.org/pages/1033413

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譚國鎏翻譯 (2021/03/22)；黃興倬編修 (2021/04/12)
AskNature 原文連結
https://asknature.org/strategy/barbed-filaments-anchor/