# 生物策略表

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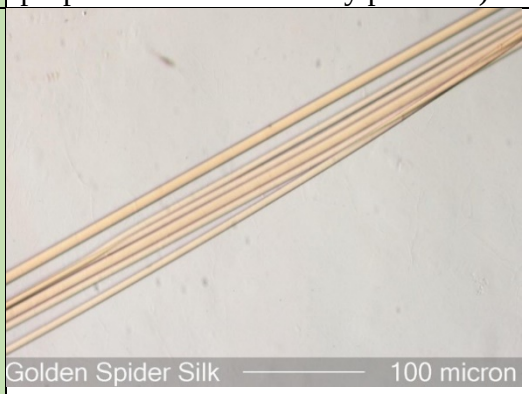
| **類別** | 生物策略 (Strategy) |
| **生物策略**<br>STRATEGY | 絲線用作多重功能<br>(Silk used for various functions) |
| **生物系統**<br>LIVING SYSTEM | 蜘蛛<br>(Spider) |
| **功能類別**<br>FUNCTIONS | #獲取、吸收、及過濾生物 #應付張力<br>#改變材料特性 #儲存能量<br>#Capture, absorb, or filter organism #Manage tension<br>#Modify material characteristics #Store energy |
| **作用機制標題** | 同一隻蜘蛛個體可以透過改變所製造出的蜘蛛絲特性，使用不同的絲來解決不同的任務。<br>(Individual spiders are able to use silk for a variety of tasks by varying the properties of the silks they produce.) |
| **生物系統/作用機制示意圖** |  |

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

「顯然地這裡列出來的材料之中，最不平凡的材料是蜘蛛絲（蠶蛾的材料遠沒有這麼特殊）。這種材料擁有最大的拉伸強度、令人驚豔的延展性，以及目前為止最卓越的應變能貯存能力...蜘蛛絲的性能差異甚大，很明顯地被自然選擇所調整以適應其特殊的任務…一隻圓蛛科蜘蛛會使用骨架絲 (frame silk) 作為其圓網的主要結構，黏絲 (viscid silk) 則用於捕獲獵物的螺旋線，繭絲 (cocoon silk) 用於包裹獵物，如此類推。其他種類的蜘蛛會為了不同的任務，而生產出不同的種類的絲線…蜘蛛絲確實擁有不凡的組合特性。但以我所知並沒有證據顯示只透過特定胺基酸序列的異質聚合物 (heteropolymer) 就能實現這些特性（如果有需求的話），這不太可能得以廉價生產。」(Vogel 2003: 344-345)

"Certainly the most extraordinary material among those tabulated here is spider silk (that of silkworm moths is substantially less extreme)--it has the greatest tensile strength, astonishing extensibility, and by far the greatest strain energy storage…silks vary considerably in their properties, quite clearly tuned by natural selection to their particular tasks…A single araneid spider makes frame silk for the main members of its orb, viscid silk for the spiral threads that catch prey, cocoon silk, prey-wrapping silk, and so forth. Other kinds of spiders make other kinds of silks for other tasks…Spider silks do have an unusual combination of properties. But I know of no evidence

that these can be achieved (if one wants them) only by a sequence-specific heteropolymer of amino acids, something unlikely to lend itself to cheap manufacture." (Vogel 2003: 344-345)

**文獻引用** (REFERENCES)

**參考文獻清單與連結** (REFERENCE LIST)

Vogel, S. (2013). *Comparative biomechanics: life's physical world*. Princeton University Press.

**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/Spider
https://www.onezoom.org/life/@araneae
https://eol.org/pages/166

**撰寫/翻譯/編修者與日期**

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**AskNature 原文連結**

https://asknature.org/strategy/silk-used-for-various-functions/