


# 生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	持續從空氣中收集水分的網 (Web continuously collects water from air)
生物系統 LIVING SYSTEM	草間蠃蛛 <i>Uloborus walckenaerius</i>
功能類別 FUNCTIONS	#獲得、吸收、或過濾液體 #Capture, absorb, or filter liquids
作用機制標題	篩疣類蜘蛛特殊絲線的結構持續地從空氣中汲取和運送水分 (The structure of special silk from cribellate spiders continuously pulls and transports water from the air.)
生物系統/作用機制 示意圖	
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
<p>隨著氣溫下降，空氣中的水氣會聚集在某些表面上，例如草和蜘蛛網上。但並非所有材質都會如此，例如，人類的毛髮會吸收水分，而不是將其聚集在表面上。</p> <p>某些蜘蛛的網，例如篩疣類蜘蛛 (cribellate spiders)，特別擅長從空氣中收集水分。篩疣類蜘蛛使用腿上梳子狀的結構，來使牠們的絲線膨化成球狀的纏結 (tangle)。然後，牠們將這些纏結與筆直、光滑的薄絲線段交替編織成蜘蛛網，製成一種絲線與纏結交替的串珠狀項鏈結構。</p> <p>水氣會在蜘蛛網的所有部分上凝結，但不會均勻分佈在整張網上。相反的，一旦凝結，水珠便迅速開始從細絲線移向纏結。會發生這種現象的原因是，蜘蛛網的纏結部分具有較大的面積讓水分附著，最終致使其從具有較小水附著面積的細絲線來吸取水。纏結的彎曲形狀也有助於導引水流。結果就是水分被收集並儲存在纏結中，形成越來越大的水滴。這種水分移動的方式還能在蜘蛛網上產生新的、外露的、以及相對乾燥的絲線段，使得空氣中有更多的水氣被收集到絲線上。</p> <p>結果是這些蜘蛛網結構能夠捕獲、傳輸、以及儲存空氣中的大量水分。這些結構及其運作方式可以為創造新型集水裝置提供靈感，特別是運用在降雨量少的地區。</p>	

As air temperatures drop, water vapor in the air collects on certain surfaces, such as grass and spider webs. Not all materials do this, for example human hair absorbs water rather than letting it collect on the surface.

The webs of certain spiders, such as cribellate spiders, are particularly good at collecting water from the air. Cribellate spiders use a comb-like structure on their legs to puff up their silk into a ball-like tangle. They then weave webs that alternate these tangles with straight, smooth, thin sections of silk (threads), making a sort of beaded necklace structure that alternates the tangles separated by threads.

Water vapor condenses on all parts of the web, but it doesn't stay equally spread throughout. Instead, once it condenses the water quickly starts to move, migrating from the thin threads towards the tangles. This happens because the tangled parts of the web have more area for the water to stick to, which ends up pulling the water from the threads, which are thinner and have less area for water to stick to. The curved shape of the tangles also helps channel water. The result is that water collects and gets stored in the tangles, creating larger and larger water drops. This movement of the water also creates new, exposed, relatively dry silk along the threads again, to which more water vapor from the air collects, in a continuous process.

The result is that these spider web structures can capture, transport, and store a large amount of water from the air. These structures, and how they work, could provide inspiration for creating new water-harvesting devices, especially in areas with low rainfall.

#### 文獻引用 (REFERENCES)

#### 參考文獻清單與連結 (REFERENCE LIST)

Zheng, Y., H. Bai, Z. Huang, X. Tian, F. Nie, Y. Zhao, J. Zhai, and L. Jiang. (2010). Directional water collection on wetted spider silk. *Nature* 463: 640-643.  
(<https://www.nature.com/articles/nature08729>)

#### 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/uloborus\\_walckenaerius](https://en.wikipedia.org/wiki/uloborus_walckenaerius)  
[https://www.onezoom.org/life/@uloborus\\_walckenaerius](https://www.onezoom.org/life/@uloborus_walckenaerius)  
<https://eol.org/pages/1186197>

#### 撰寫/翻譯/編修者與日期

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#### AskNature 原文連結

<https://asknature.org/strategy/web-continuously-collects-water-from-air/>