

生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	具稜的結構提供支撐 (Ribbed structure provides support)
生物系統 LIVING SYSTEM	亞馬遜王蓮 (有誤已更正) (Amazon water-lilies)
功能類別 FUNCTIONS	#防止皺屈 #Prevent buckling
作用機制標題	亞馬遜王蓮具稜的葉片背面提供結構支撐，讓葉片浮起並承受小型負載 (The ribbed underside of the Amazon water lily provides structural support to keep the leaf afloat and sustain small loads.)
生物系統/作用機制 示意圖	
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
<p>許多生長在河岸的植物會將葉片浮在水面上、讓種子被帶到下游，以及把花粉傳播到其它地區。為了確保長遠的生命旅程，能夠浮在水面上的葉片保證可以吸收到最多的陽光以進行光合作用。越大片的葉子，有越大的表面積可以曝露在陽光下進行光合作用，且在與其它葉片爭奪水面上的空間時也更具有競爭力。其中一個最極端的例子是亞馬遜王蓮的葉片，它們浮在亞馬遜河流域的水面上，能夠生長至數公尺寬。巨大的表面積讓葉片曝露在陽光下的表面積達到最大，但卻讓它難以維持浮著，同時也讓它容易被利用葉片渡河的動物所破壞。為了應付這個問題，亞馬遜王蓮葉片的背面有一個成效顯著的支撐系統，讓葉片可以承受 70 磅的重量，同時還可以保持浮著。</p> <p>每一片葉子的底下都是具有稜紋的樑狀支撐構造，這些構造可以幫助葉片支撐小型負重，同時維持堅固的形狀，讓光合作用的表面積達到最大。這種構造包含了通過葉片</p>	

中心的主脈，以及從中心放射且沿著葉片逐漸分叉的側脈。這些稜是扁平、像牆一樣的構造，稜的厚度在接近邊緣時會變薄。所有的稜都充滿了空氣，有助於減少結構的總重量，同時可以幫助葉片浮在水面。相鄰的脈之間以放射網狀的方式互相連接，從葉片中心形成鬆散的同心圓。這種網脈提供了額外的結構支撐而不會增加過多的重量。

Many plants that grow near the banks of rivers will float their leaves on the surface, to allow their seeds to be carried downstream and pollinate other areas. In order to ensure a long trip, leaves that are able to float on the surface can ensure maximum sun absorption for photosynthesis. The larger a leaf is, the more surface area it can expose for photosynthesis, and the more aggressively it can compete with other leaves for space on the surface of the water. One of the most extreme examples of this is the leaves of the Amazon water lily, which float on the water of the Amazon river basin and grow up to several meters across. Its massive surface area allows it to maximize sun exposure, but also makes it more difficult to keep afloat and makes it susceptible to damage from animals that use the leaves as a means to get across the river. To cope with this, the Amazon water lily has a significant support system on the underside of its leaves, which allow it to sustain weights up to 70 pounds, while still remaining afloat.

Underneath each leaf is a ribbed, girder-like support structure that helps the leaf support small loads and hold a rigid shape, in order to maximize surface area exposure for photosynthesis. The structure consists of a main rib that runs along the center of the leaf, with additional ribs that radiate from the center and incrementally fork along the leaf. The ribs themselves are flat, wall-shaped structures, and the thickness of the ribs decreases towards the edge of the leaf. All of the ribs are filled with air, which helps to reduce the total weight of the structure and also helps keep the leaf afloat. Neighboring ribs are connected to each other by a pattern of radial webbing forming loose concentric circles that emanate from the center of the leaf. This webbing provides additional structural support without adding excess weight.

文獻引用 (REFERENCES)

參考文獻清單與連結 (REFERENCE LIST)

Attenborough, D. (1995). *The Private Life of Plants*. BBC Books.

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/Victoria_\(plant\)](https://en.wikipedia.org/wiki/Victoria_(plant))

<https://eol.org/pages/47105685>

https://www.onezoom.org/life/@Magnoliopsida=99252?img=best_any&anim=flight#x181,y1005,w1.3178

撰寫/翻譯/編修者與日期

譚國銓翻譯 (2021/03/22)；洪麗分編修 (2021/04/10)

AskNature 原文連結

<https://asknature.org/strategy/ribbed-structure-provides-support/>