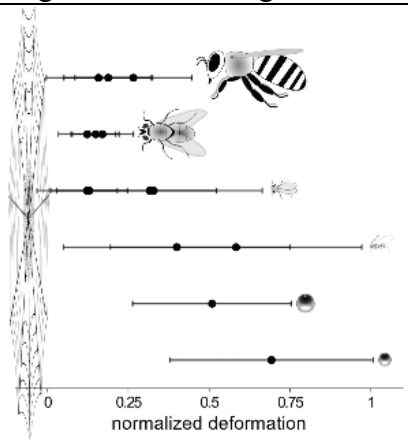


生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	蜘蛛網對帶電昆蟲的反應 (Webs React to Electrically Charged Insects)
生物系統 LIVING SYSTEM	十字園蛛 (Garden cross spider)
功能類別 FUNCTIONS	#應付撞擊 #捕獲、吸收或過濾液體 #捕獲、吸收或過濾生物體 #Manage Impact #Capture, Absorb, or Filter Liquids #Capture, Absorb, or Filter Organisms
作用機制標題	當帶正電的昆蟲透過靜電吸引進入中性或負場時，造成十字蜘蛛球網的線會發生變形。 (Threads that make up the orb-web of the cross spider experience deformation when a positively charged insect enters the neutral or negative field through electrostatic attraction.)
生物系統/作用機制示意圖 (確認版權、註明出處； 畫質)	 <p>https://www.nature.com/articles/srep02108</p>

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

十字蜘蛛，也被稱為歐洲花園蜘蛛，屬於一組以球網結構而聞名的蜘蛛。一個球網在中心穿過。據信，球網的絲線保持中性或略帶負電荷。當蜜蜂等昆蟲在空中飛行或與正離子濃度高的區域相互作用時可以收集正電荷。如果昆蟲產生正電荷並飛行或走過球網，相反的電荷會產生靜電，並立即產生吸引力。當帶正電的昆蟲經過時，觀察到十字蜘蛛的球網上的線會依其規則形狀變形。這樣的方式可以提供一個長期對環境傷害較小的方式，以捕獲我們花園中的害蟲，也許有一天可以運用在我們的農田（不使用有害殺蟲劑）。

Cross spiders, also known as European garden spiders, belong to a group of spiders that are known for constructing orb-webs. An orb-web experiences crossing in the center. It is believed that the silk threads of orb-webs remain at a neutral or slightly negative charge. Insects, such as honeybees, can collect positive charges when flying through the air or interacting with areas of high positive-ion concentration. If an insect develops a positive charge and flies or walks past an orb-web, the opposite charges interact electrostatically causing an immediate attraction. Threads on orb-webs of the cross spider have been observed to deform from their regular shape as a

positively charged insect passes by. This may provide insight in a more sustainable way to capture pests in our gardens and maybe someday even our farm fields (without the use of harmful pesticides).
文獻引用 (REFERENCES)
「蜘蛛網的成功捕獲與其微觀結構、裝飾和風引起的振動有關。間接證據顯示帶靜電的物體可以吸引絲線，但帶電昆蟲引起的絲網變形尚未被描述。在這裡，我們在實驗室條件下證明，帶靜電的蜜蜂、綠瓶蠅、果蠅、蚜蟲以及落在交叉蜘蛛（ <i>Araneus diadematus</i> ）網附近的水滴會引起絲線快速變形，從而增加身體接觸的可能性，從而增加獵物的可能性捕獲。」 (Victor Manuel Ortega-Jimenez & Robert Dudley 2013)
「蜘蛛球網是一種空中陷阱，專門用於捕捉不同大小的飛行昆蟲，有時甚至捕捉鳥類。蜘蛛網絲的機械特性可消散昆蟲撞擊期間產生的作用於網的動能和脈衝。」 (Victor Manuel Ortega-Jimenez & Robert Dudley 2013)
“Capture success of spider webs has been associated with their microstructure, ornamentation and wind-induced vibrations. Indirect evidence suggests that statically charged objects can attract silk thread, but web deformations induced by charged insects have not yet been described. Here, we show under laboratory conditions that electrostatically charged honeybees, green bottle flies, fruit flies, aphids and also water drops falling near webs of cross-spiders (<i>Araneus diadematus</i>) induce rapid thread deformation that enhances the likelihood of physical contact and thus of prey capture.” (Victor Manuel Ortega-Jimenez & Robert Dudley 2013)
“Spider-orb webs are aerial traps specialized to catch flying insects of different sizes and even occasionally birds. Mechanical properties of the web silk dissipate the kinetic energy and impulse acting to the web produced during insect impact.” (Victor Manuel Ortega-Jimenez & Robert Dudley 2013)
參考文獻清單與連結 (REFERENCE LIST) Harvard 或 APA 格式
Ortega-Jimenez, V., Dudley, R. Spiderweb deformation induced by electrostatically charged insects. <i>Sci Rep</i> 3, 2108 (2013). (https://doi.org/10.1038/srep02108)
延伸閱讀: Harvard 或 APA 格式 (取自 AskNature 原文；若為翻譯者補充，請註明)
生物系統延伸閱讀資訊連結 (LEARN MORE ABOUT THE LIVING SYSTEM/S)
撰寫/翻譯/編修者與日期
謝承歡翻譯 (2024/03/24)；陳柏宇編修 (2024/11/30)
AskNature 原文連結
https://asknature.org/strategy/webs-react-to-electrically-charged-insects/

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