

生物策略格式

KJC, 2019/10/21

類別	生物策略 (Strategy)
生物策略 STRATEGY	翅膀鱗片協助體溫調節 (Wing scales aid thermoregulation)
生物系統 LIVING SYSTEM	綠鳥翼鳳蝶 <i>Ornithoptera priamus</i>
功能類別 FUNCTIONS	#維持體內平衡 #改變光線/顏色 #Maintain homeostasis #Modify light/color
作用機制標題	綠鳥翼鳳蝶的翅膀鱗片以蜂窩狀結構來加強翅膀內的黑色素，而幫助調節體溫 (The wing scales of a green birdwing butterfly help regulate body heat by using a honeycomb structure to enhance black pigments found in the wings.)
生物系統/作用機制示意圖	
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
文獻引用 (REFERENCES)	
<p>「另一個極端是蝴蝶，例如綠鳥翼鳳蝶 (<i>Ornithoptera priamus</i>)，Peter Vukusic 稱之為「超級黑」 (ultrablack) 蝴蝶。同樣的，關鍵在於結構。它的蜂窩狀翅膀鱗片比光滑表面吸收更多光線，因此黑色素看起來仍然更黑。色調有助於調節體溫，並使得其他翅膀顏色在交配展示中更加醒目。」 (Holland 2007: 30)</p> <p>「在我們之前的研究中，我們已經發現結構輔助的黑色程度是黑蝴蝶翅膀中的常見現象，在者也是改善黑色程度的理想結構。與其他蝴蝶類型的多孔結構相比，<i>Ornithoptera goliath</i> 蝴蝶的黑翅之覆蓋鱗片結構，主要由相鄰的倒 V 型稜脊組成，可有效減少反射，同</p>	

時維持極低程度的傳導。然而，由於天然幾丁質/黑色素複合物的光學性質之限制，該結構在產生黑色物質的效果並未得到充分利用。」(Zhao et al.2010: 877)

“At the other extreme are butterflies like *Ornithoptera priamus* – ‘ultrablack’, [Peter] Vukusic calls it. Again, structure is key. Its honeycombed wing scales absorb more light than would a smooth surface, so the black pigment looks blacker still. The hue helps regulate body heat and makes other wing colors stand out in mating displays.” (Holland 2007:30)

“In our previous studies, we have already discovered that structurally assisted blackness is a common phenomenon in black butterfly wings and furthermore an ideal structure for improving the blackness. Compared with the porous structures in other species of butterflies, the structure in the cover scales of the black wings of butterfly *Ornithoptera goliath* is mainly comprised of adjacent inverse V-type ridges, which can effectively reduce reflection, while at the same time keep transmission at a relatively low level. However, limited by the optical properties of the natural chitin/melanin composite, the effect of the structure in producing black materials is far from fully exploited.” (Zhao et al. 2010: 877)

參考文獻清單與連結 (REFERENCE LIST)

Zhao, Q., T. Fan, J. Ding, D. Zhang, Q. Guo, and M. Kamada. (2011). Super black and ultrathin amorphous carbon film inspired by anti-reflection architecture in butterfly wing. *Carbon* 49: 877-883. (<https://doi.org/10.1016/j.carbon.2010.10.048>)

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/Ornithoptera_priamus

文章貢獻/編修者與日期:

徐嘉慧翻譯 (2019/04/25) ; 朱天愛編修 (2019/12/19) ; 吳皓編修 (2020/01/04) ; 譚國銜編修 (2020/05/26) ; 紀凱容編修 (2020/11/26) ; 施習德編修 (2020/12/15)

AskNature 原文連結

<https://asknature.org/strategy/wing-scales-aid-thermoregulation/>