

生物策略表

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| 類別 | 生物策略 (Strategy) | |
| 生物策略 STRATEGY | 反射光線的小板 (Platelets reflect light) | |
| 生物系統 LIVING SYSTEM | 耳烏賊目 Sepiolida (Bobtail squid) | |
| 功能類別 FUNCTIONS | #改變光線/顏色 #Modify light/colors | |
| 作用機制標題 | 耳烏賊色素細胞中的反射小板能反射光線，因為它們是由反射蛋白構成的奈米光子結構 (Reflector platelets within squid chromatophores reflect light because they are nanofabricated photonic structures composed of proteins called reflectins.) | |
| 生物系統/作用機制 示意圖 |  | |
| 作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS) | | |
| <p>「烏賊、章魚及魷魚毫無疑問的是偽裝使用者中的冠軍…牠們可以即時調整自身的色彩、濃淡、斑塊、斑駁度或斑點、透明度、色溫，以及甚至是生物發光、偏振光 (light-polarity)，或是虹彩現象 (iridescence)。」</p> <p>“The cuttlefish, octopus, and squid are the undisputed champions of camouflage... They can instantly modulate their color, shading, patchiness, mottling or stippling, transparency, heat, and even bioluminescence, light-polarity, or iridescence.”</p> | | |
| 文獻引用 (REFERENCES) | | |
| <p>對於反射蛋白 (reflectins) 鑑定與特性的研究，證實了雖然大部分的動物反射性組織 (reflective tissue) 都是由嘌呤小板 (purine platelets) 所構成，但頭足綱 (cephalopod) 的反射小板 (reflector platelets) 則是蛋白質。反射蛋白所屬的蛋白質家族有著歪斜的氨基酸 (skewed amino acid) 構成、重複域 (repeating domains)，以及局部沉積 (localized deposition)，因此只局限於頭足綱才擁有。這些動物作為天然奈米光子結構的一個突出例子。(Crookes et al. 2004: 237)</p> <p>一個家族的特殊蛋白質在夏威夷短尾烏賊 (<i>Euprymna scolopes</i>) 的反射性組織中沉積成扁平的結構小板。這些被命名為反射蛋白的蛋白質，至少由來自三個亞家族的六組基</p> | | |

因所編碼，這種同源基因在魷魚類 (squids) 之外並沒有被報導過。反射蛋白具有五個重複域，在相同家族的成員中為高度保留。反射蛋白有著非常特殊的組成，四個相對罕見的氨基酸（酪氨酸、甲硫氨酸、精氨酸及色氨酸）在這種蛋白質中佔了 57%，以及數種常見的氨基酸（丙氨酸、異白氨酸、白氨酸及離氨酸），這些其家族成員中皆沒有出現。在魷魚中由蛋白質構成的反射子，提供了動物系統中奈米製品的一個突出例子。
(Crookes et al. 2004: 235)

“The identification and characterization of the reflectins confirm that, although the majority of animal reflective tissues are composed of purine platelets, cephalopod reflector platelets are proteinaceous. Reflectins, a protein family with skewed amino acid compositions, repeating domains, and localized deposition, are thus far restricted to cephalopods. They represent a marked example of natural nanofabrication of photonic structures in these animals.”
(Crookes et al. 2004: 237)

“A family of unusual proteins is deposited in flat, structural platelets in reflective tissues of the squid *Euprymna scolopes*. These proteins, which we have named reflectins, are encoded by at least six genes in three subfamilies and have no reported homologs outside of squids. Reflectins possess five repeating domains, which are highly conserved among members of the family. The proteins have a very unusual composition, with four relatively rare residues (tyrosine, methionine, arginine, and tryptophan) comprising 57% of a reflectin, and several common residues (alanine, isoleucine, leucine, and lysine) occurring in none of the family members. These protein-based reflectors in squids provide a marked example of nanofabrication in animal systems.” (Crookes et al. 2004: 235)

參考文獻清單與連結 (REFERENCE LIST)

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延伸閱讀

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生物系統延伸資訊連結 (LEARN MORE ABOUT THE LIVING SYSTEM/S)

https://en.wikipedia.org/wiki/euprymna_scolopes
https://www.onezoom.org/life/@euprymna_scolopes

<https://eol.org/pages/491890>

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<https://asknature.org/strategy/platelets-reflect-light/>