生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	外骨骼排泄含氮廢物 (Exoskeletons excrete nitrogen waste)
生物系統 LIVING SYSTEM	等足蟲 Oniscidea (Woodlice)
功能類別 FUNCTIONS	#循環養分 #排出氣體 #維持體內平衡 #保護免受化學物質危害 #Cycle nutrients #Expel gases #maintain homeostasis #Protect from chemicals
作用機制標題	等足蟲的外骨骼藉由排泄氨氣以移除含氮廢物 (Exoskeletons of woodlice help them remove waste by excreting gaseous ammonia.)
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)

陸生性等足類（潮蟲亞目）每天排泄最多的含氮廢物為揮發性的氨氣，而氨負載動物會累積非必需胺基酸，這可能是夜間氮的主要儲備。這項研究探討兩個同域物種，分別是生活在潮濕環境 (hydric) 的 *Ligidium lapetum*（海蟑螂屬）以及生活在乾旱 (xeric) 並能吸收水蒸氣 (WVA) 能力的 *Armadillidium vulgare*（球鼠婦屬）之間氨氣的排泄、麩醯氨酸的儲存與運移和水分平衡的關係。在黃昏與黎明採集動物後，測量其氨氣的排放量（12 小時）、組織中麩醯氨酸的含量與含水量。在兩個物種中，氨氣的日間排放量是夜間排放量的四到五倍，而麩醯氨酸含量在夜間則增加了四到七倍。大多數的麩醯氨酸會累積在身體組織（體壁）。儘管資料支持麩醯氨酸在夜晚對於氮儲存的功用，從麩醯氨酸分解產生的氮移動勢能 (potential nitrogen mobilization) （球鼠婦中為 162 μmol g^{-1}），還是超過測量到的氨排放 (2.5 μmol g^{-1}) 超過 60 倍。如揮發的過程所見，這可能會產生較高的血淋巴中氨濃度 (和較高的 PNH_3)。根據這些發現，氨揮發產生的能量成本得以被討論。這兩個物種在黃昏與黎明的平均含水量很相似，這表示沒有發生耗水和補水的晝夜循環 (diel cycle)。(Wright and Peña-Peralta 2004: 67)

"Terrestrial isopods (suborder Oniscidea) excrete most nitrogen diurnally as volatile ammonia, and ammonia-loaded animals accumulate nonessential amino acids, which may constitute the major

nocturnal nitrogen pool. This study explored the relationship between ammonia excretion, glutamine storage/mobilization, and water balance, in two sympatric species *Ligidium lapetum* (section Diplocheta), a hygric species; and *Armadillidium vulgare* (Section Crinocheta), a xeric species capable of water-vapor absorption (WVA). Ammonia excretion (12-h), tissue glutamine levels, and water contents were measured following field collection of animals at dusk and dawn. In both species, diurnal ammonia excretion exceeded nocturnal excretion four- to fivefold while glutamine levels increased four- to sevenfold during the night. Most glutamine was accumulated in the somatic tissues ('body wall'). While data support the role of glutamine in nocturnal nitrogen storage, potential nitrogen mobilization from glutamine breakdown (162 µmol g^{-1} in *A. vulgare*) exceeds measured ammonia excretion (2.5 µmol g^{-1}) over 60-fold. This may serve to generate the high hemolymph ammonia concentrations (and high PNH_3) seen during volatilization. The energetic cost of ammonia volatilization is discussed in the light of these findings. Mean water contents were similar at dusk and dawn in both species, indicating that diel cycles of water depletion and replenishment were not occurring." (Wright and Peña-Peralta 2004: 67)

參考文獻清單與連結　(REFERENCE LIST)

Wright, J. C. and M. Pena-Peralta. (2005). Diel variation in ammonia excretion, glutamine levels, and hydration status in two species of terrestrial isopods. *Journal of Comparative Physiology B* 175: 67-75. (https://link.springer.com/article/10.1007/s00360-004-0463-z)

延伸閱讀

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

撰寫/翻譯/編修者與日期

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AskNature 原文連結

https://asknature.org/strategy/exoskeletons-excrete-nitrogen-waste/