生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	適應於調節溫度的毛皮 (Pelt is adapted for thermoregulation)
生物系統 LIVING SYSTEM	袋食蟻獸 *Myrmecobius fasciatus* (Numbat)
功能類別 FUNCTIONS	#獲取、吸收、或過濾能量 #儲存能量 #Capture, absorb, or filter energy #Store energy
作用機制標題	袋食蟻獸疏而短的毛有利於夏天時被動散失熱量，並在冬天時取得熱輻射 (Sparse and shallow pelt of the numbat favours passive heat loss in the hot summer and radiative heat gain in the cooler winter)
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)

「唯一在白天活動且食白蟻 (termitivorous) 的袋食蟻獸 (numbat)，是一種不尋常的有袋類 (marsupials)。比起其他有袋類，他們擁有稀疏（1921 根毛/cm^2）而短淺 (1.19 mm) 的毛皮。

與夜行性有袋類相比，袋食蟻獸毛皮的反射率較低 (19%)，但其吸收率與日行性的北美地松鼠 (North American ground squirrel) 相近 (72%)，這表示袋食蟻獸的毛皮可能更適合獲取太陽熱能。袋食蟻獸毛皮的熱阻率會隨著風速增加而顯著下降，從 45.9 s/m（風速 0.5 m/s）變成 29.8 s/m（風速 3 m/s）。

當風速達 0.5 公尺/秒及 3 公尺/秒之間時，豎起的毛髮會明顯提升毛皮深度 (6.5mm) 及阻力 (79.2-64.2 s/m)。袋食蟻獸的毛皮阻力遠比其他有袋類低；且相較於其他哺乳類，風速對其皮毛阻力有更大的影響，這反映了毛皮的低密度與低厚度。袋食蟻獸由毛皮至皮膚層的太陽熱能獲取率 (60-63%) 與其他哺乳類的最高測量值相近。然而袋食蟻獸與其他哺乳類一樣，高太陽熱能獲取率與毛皮阻力降低程度無關，表示其毛皮具有結構與光譜特性，能增強太陽熱能的獲取及內源性熱能的保存。在周遭溫度 15-32.5°C 下，估計袋食蟻

獸的最大太陽熱能獲取量為靜止代謝產熱量的 0.5-3.6 倍，因此輻射熱的獲取可能是野生袋食蟻獸調節體溫的一個重要方式。」(Cooper et al. 2003: 2771)

"Numbats are unusual marsupials in being exclusively diurnal and termitivorous. They have a sparse (1921·hairs/cm^2) and shallow (1.19·mm) pelt compared with other Marsupials.

Coat reflectivity is low (19%) for numbats compared with nocturnal marsupials, but absorptivity is similar to that of diurnal North American ground squirrels (72%), indicating that the coat of the numbat may be adapted for acquisition of solar heat. Numbat coat thermal resistance decreases significantly with wind speed from 45.9·s/m (at 0.5·m/s) to 29.8·s/m (at 3·m/s).

Erecting the fur significantly increases pelt depth (6.5·mm) and coat resistance (79.2-64.2·s/m) at wind speeds between 0.5·m/s and 3·m/s. Numbat coat resistance is much lower than that of other marsupials, and wind speed has a greater influence on coat resistance for numbats than for other mammals, reflecting the low pelt density and thickness. Solar heat gain by numbats through the pelt to the level of the skin (60-63%) is similar to the highest value measured for any mammal. However the numbat's high solar heat gain is not associated with the same degree of reduction in coat resistance as seen for other mammals, suggesting that its pelt has structural and spectral characteristics that enhance both solar heat acquisition and endogenous heat conservation. Maximum solar heat gain is estimated to be 0.5-3.6 times resting metabolic heat production for the numbat at ambient temperatures of 15-32.5°C, so radiative heat gain is probably an important aspect of thermoregulation for wild numbats." (Cooper et al. 2003: 2771)

參考文獻清單與連結 (REFERENCE LIST)

Cooper, C. E., G. E. Walsberg, and P. C. Withers. (2003). Biophysical properties of the pelt of a diurnal marsupial, the numbat (*Myrmecobius fasciatus*), and its role in thermoregulation. *Journal of Experimental Biology* 206: 2771-2777. (https://jeb.biologists.org/content/206/16/2771)

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/Numbat

撰寫/翻譯/編修者與日期

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AskNature 原文連結

https://asknature.org/strategy/pelt-is-adapted-for-thermoregulation/