

生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	藉由喘氣來冷卻血液 (Panting Cools Blood)
生物系統 LIVING SYSTEM	馴鹿 (Reindeer)
功能類別 FUNCTIONS	#維持體內平衡 #Maintain Homeostasis
作用機制標題	馴鹿或北美馴鹿的舌頭具有高度血管化，可以在脅迫下冷卻流向大腦的血液。 (The tongue of the reindeer or caribou cools blood heading to the brain under duress by being high vascularized.)
生物系統/作用機制示意圖 (確認版權、註明出處； 畫質)	 <p>https://unsplash.com/photos/white-and-brown-deer-on-snow-covered-ground-Jh8jYYra3o</p>
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
<p>馴鹿 (<i>Rangifer tarandus</i>) 是一種適應極端氣候的北極動物，它在秋季長出優良隔熱價值的毛皮，以應對翌年春季的脫落，使其能夠適應環境溫度每年高達 80°C 的變化。這與血管變化引起的表面溫度降低 (Johnsen 等人, 1985b)，以及高效的鼻腔熱交換機制 (Blix 和 Johnsen, 1983) 相結合，使得其從夏季到冬季的低臨界溫度降低了 30°C (Nilssen 等人, 1984a)。這種能夠抵禦寒冷的動物在冬季因此具有少量的散熱途徑，在運動時代謝產熱隨著奔跑速度的迅速上升時，容易發生過熱現象 (Nilssen 等人, 1984b) ...。我們觀察到受輕度熱壓力的馴鹿會開始喘氣，一開始是口閉的方式，但在嚴重的熱壓力下，它們會採取張口喘氣 (open-mouth panting, OMP) 來從其大而豐富的血管化舌頭散熱...，馴鹿在高溫負載下通過喘氣調節身體和尤其是大腦溫度，一開始通過鼻子進行喘氣，但當</p>	

熱負載和每分鐘需氧量由於運動而增加時，主要通過嘴巴，最終通過選擇性大腦冷卻。
(Blix 等，2011:3850,3855)

“The reindeer (*Rangifer tarandus*) is an Arctic animal that has adapted to annual changes of 80°C in ambient temperature by growing a fur of excellent insulation value in the autumn to be shed in the following spring. That together with a reduction of surface temperature caused by vascular changes (Johnsen et al., 1985b) and an efficient nasal heat exchange mechanism (Blix and Johnsen, 1983) result in a 30°C reduction in lower critical temperature from summer to winter (Nilssen et al., 1984a). The animal, so equipped to withstand cold, consequently has few avenues of heat loss in winter and runs the risk of hyperthermia during exercise when metabolic heat production rises rapidly with running speed (Nilssen et al., 1984b)... We have observed that moderately heat-stressed reindeer pant, first with the mouth closed, but, under severe heat stress, they resort to open-mouth panting (OMP) to dissipate heat from their big and richly vascularized tongue... We propose that reindeer regulate body and, particularly, brain temperature under heavy heat loads by a combination of panting, at first through the nose, but later, when the heat load and the minute volume requirements increase due to exercise, primarily through the mouth and that they eventually resort to selective brain cooling.” (Blix et al. 2011:3850,3855)

文獻引用 (REFERENCES)

Regulation of brain temperature in winter-acclimatized reindeer under heat stress

參考文獻清單與連結 (REFERENCE LIST) **Harvard 或 APA 格式**

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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

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