

生物策略表

類別	生物策略 Strategy
生物策略 STRATEGY	牙齒會自行打磨銳利 (Teeth are self-sharpening)
生物系統 LIVING SYSTEM	美國河狸 <i>Castor canadensis</i> (American beaver)
功能類別 FUNCTIONS	#應付機械磨損 #改變材料特性 #改變大小/形狀/質量/體積 #Manage mechanical wear #Modify material characteristics #Modify size/shape/mass/volume
作用機制標題	河狸的牙齒會自行打磨銳利，因為牙齒內部的表面比外部的琺瑯質柔軟，可以更快速的磨損成鋒利的邊緣 (The teeth of beavers self-sharpen because their inner surface is softer than the outer enamel and wears away faster to create a sharp edge.)
生物系統/作用 機制示意圖	 <p>Source: https://upload.wikimedia.org/wikipedia/commons/6/6b/American_Beaver.jpg</p>
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
文獻引用 (REFERENCES)	
<p>「像所有齧齒目動物，河狸有可以自行打磨銳利且不會停止生長的門牙。門牙的外表面被堅硬的琺瑯質 (enamel) 保護著，但內部表面較柔軟，當在河狸咬食時磨損而產生鋒利的鑿形邊緣。」</p> <p>「草食動物必須擁有特別好的牙齒。不僅是因為牠們必須長期使用，而且牠們處理的材質通常非常堅硬。大鼠，像其他的齧齒動物 (松鼠、老鼠、河狸、豪豬)，運用維持它們前牙 (門牙 incisor) 的開放性牙根去應付這個問題，這樣他們就可以在動物的整個生命過程中持續生長，從而補償牙齒的磨損。牠們有一個簡單但非常有效率的自磨過程，保持牙齒鋒利，齧齒動物的門牙主體是由象牙質製成，但門牙的前表面被一層厚厚且通常色彩鮮艷的琺瑯質覆蓋著，琺瑯質比象牙質更硬。牙齒的前沿因此變得像鑿子一</p>	

樣的形狀。當門牙頂部磨擦下端的門牙時，牙質會磨損的更快速，這會使前部像刀片的琺瑯質露出來，而保持了鋒利的鑿子狀邊緣。」

“Like all rodents, beavers have self-sharpening incisor teeth that never stop growing. The outer surface is protected by tough enamel, but the inner surface is softer and wears away as the beaver gnaws, creating a sharp, chiseled edge.”

“Plant-eaters have to have particularly good teeth. Not only do they use them for very long periods but the material they have to deal with is often very tough. Rats, like other rodents—squirrels, mice, beavers, porcupines—cope with that problem by maintaining open roots to their front gnawing teeth, the incisors, so that they continue to grow throughout the animal’s life compensating for wear. They are kept sharp by a simple but very effective self-stropping process. The main body of the rodent incisor is made of dentine, but its front surface is covered by a thick and often brightly coloured layer of enamel which is even harder. The cutting edge of the tooth thus becomes shaped like a chisel. As the top incisors grind over the lower ones the dentine is worn away more quickly and this exposes the blade of enamel at the front keeping a sharp chisel edge.”

參考文獻清單與連結 (REFERENCE LIST)

Cooke, F., H. Dingle, S. Hutchinson, R. Schodde, N. Tait, R. C. Vogt, G. McKay, and H. W. Greene. (2004). *The encyclopedia of animals: a complete visual guide*. University of California Press.

Attenborough, D. (1981). *Life on earth: a natural history*. Little Brown & Co.

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/castor_canadensis

https://www.onezoom.org/life/@castor_canadensis

<https://eol.org/pages/328025>

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AskNature 原文連結

<https://asknature.org/strategy/teeth-are-self-sharpening/>