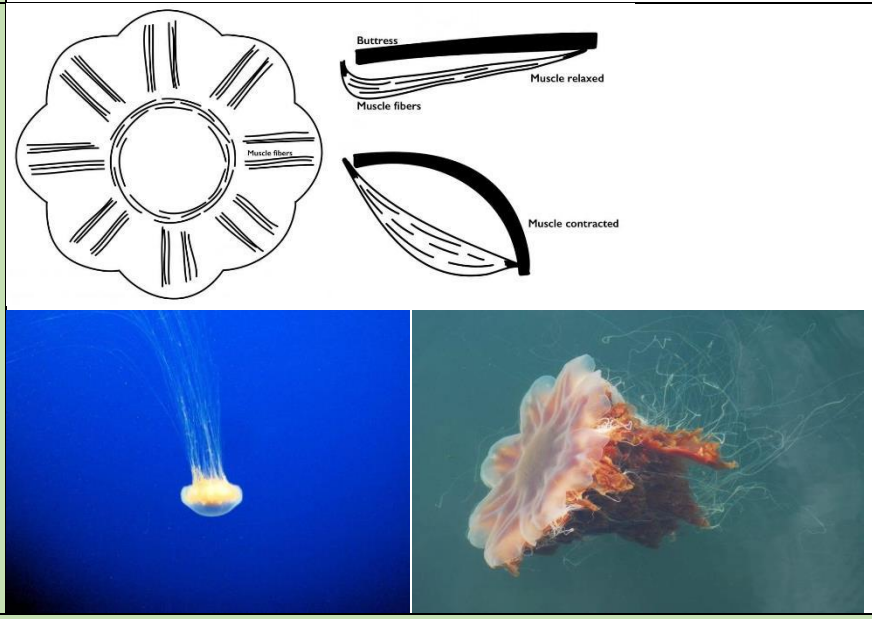
生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	環狀肌肉收縮推動身體前進 (Contracting Ring of Muscle Propels Body Forward)
生物系統 LIVING SYSTEM	獅鬃水母 *Cyanea capillata* (Lion's mane jellyfish)
功能類別 FUNCTIONS	#在液體中/上移動 #Move in/on liquids
作用機制標題	獅鬃水母的鐘狀體以波浪狀收縮，製造噴射水流以推動本體前進 (The bell of lion's mane jellyfish contracts in waves causing a jet of water to propel the jellyfish forward.)
生物系統/作用機制示意圖	

作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)

獅鬃水母 (lion's mane jellyfish, *Cyanea capillata*) 鐘狀體的直徑可生長至 2.3 公尺（7 英尺），使其成為世界上最大的水母。

獅鬃水母藉由噴射推進方式來游泳。當鐘狀體 (bell) 收縮時，水分被擠出，使得水母往反方向射出。放鬆時，新的海水回流至鐘狀體內，藉此達到有效率地覓食。

鐘狀體由八片緣辦 (lobe) 構成。接近中心的周圍處有一圈肌肉纖維 (muscle fiber) 環繞，16 條肌肉從環狀延伸至鐘狀體邊緣，每片緣瓣上有兩條肌肉。這些放射狀的肌肉纖維連接在堅挺的內壁 (buttress)，而鐘狀體組織堅韌且富有彈性。

水母的游泳分成數個階段。第一步，鐘狀體變得平坦甚至是翻轉 (inverted) 的狀態。第二步，環狀肌肉 (ring of muscle) 收縮，將變成盤狀的鐘狀體邊緣往下及往內拉，並噴出水流。第三步，放射狀肌肉纖維 (radiating muscle fiber) 同時收縮，拉動內壁並使鐘狀體邊緣由水平變成 90 度。最後，肌肉放鬆，具有彈性的上壁 (upper layer) 將整個鐘狀體

往上拉回扁平狀。水母的神經系統會確保所有的肌肉纖維在正確的時間收縮，並藉由不均勻地收縮肌肉纖維來控制自身游動方向。

The lion's mane jellyfish (*Cyanea capillata*) grows to up to 2.3 meters (7 ft) across its bell, making it the largest jellyfish in the world.

Lion's mane jellyfish swim by jet propulsion. When the bell contracts, water is squeezed out, jetting the jellyfish in the opposite direction. On relaxing, fresh water flows back into the bell, enabling efficient feeding.

The bell is formed of eight lobes. There is a ring of muscle fibers near the center with 16 muscle rays that extend from the ring to the edge of the bell, two in each lobe. The radiating muscle fibers are attached to stiff buttresses, while the bell tissue is tough and elastic.

The jellyfish swims in several phases. First, the bell is flat or even inverted. Second, the ring of muscle contracts, pulling the edges of the disc down and in and ejecting a jet of water. Third, the radiating muscle fibers contract simultaneously, pulling against the buttresses and bringing the edge of the bell down to as much as 90 degrees from horizontal. Finally, the muscles relax and the elastic upper layer pulls the entire bell up and back to its original flat shape. The jellyfish has a nervous system that ensures all the muscle fibers contract at the right time, and it can control its swimming direction by contracting the radiating muscle fibers unequally.

文獻引用 (REFERENCES)

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延伸閱讀:

North Carolina State University. (2020). Soft Robot Inspired by Jellyfish. AskNature. Retrieved from: https://asknature.org/innovation/soft-robot-inspired-by-jellyfish/

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

https://oceana.org/marine-life/corals-and-other-invertebrates/lions-mane-jellyfish

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AskNature 原文連結

https://asknature.org/strategy/jellyfish-bell-propels/