

生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	雄性透過合作來吸引伴侶 (Males cooperate to attract a mate)
生物系統 LIVING SYSTEM	尖尾侏儒鳥 <i>Chiroxiphia lanceolata</i> (Lance-tailed manakin)
功能類別 FUNCTIONS	#相同物種之間合作 #Cooperate within the same species
作用機制標題	雄性尖尾侏儒鳥透過合作求偶舞蹈來吸引雌性 (Male lance-tailed manakins attract a female by doing a cooperative courtship dance.)
生物系統/作用機制 示意圖	
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
<p>在巴拿馬的一個森林中，兩隻雄性的小鳥在光禿禿的樹枝上等待著。牠們已經透過移除鄰近植物的葉子，為了接下來的表演而清理出一個舞台。一隻雌鳥突然降落在枝條上，兩隻雄鳥馬上開始行動。在接下來的數分鐘內，這兩隻雄鳥以 11 種不同的動作，以及 9 種歌聲及鳴叫，獻上一段協調的求偶舞蹈 (courtship dance)。但是這兩隻小鳥並不是在競爭，而是合作。只有其中一隻鳥，稱為高位階鳥，會與雌鳥交配。高位階與低位階雄鳥可能會合作長達六年。最終，低位階鳥可能進而成為一隻高位階鳥。</p> <p>這些小鳥是尖尾侏儒鳥 (lance-tailed manakins)。有著黑色的身體、彩藍色的披肩，以及深紅色的帽子，使牠們在森林一片綠葉之中格外顯眼。與其他侏儒鳥物種類似，beta 雄鳥幫助高位階雄鳥獻上求偶表演。研究員嘗試去了解作為低位階鳥有什麼益處。並不是所有高位階鳥都會有一隻低位階助手，亦有些鳥跳過擔當低位階助手而直接成為高位階鳥。高位階及低位階鳥並沒有親戚關係，因此在基因遺傳上不會有明顯的得益。其中一個可能的益處是低位階鳥能夠獲得經驗，使牠們在未來能有更好的求偶表演。</p> <p>合作性求偶 (cooperative courtship) 是合作生殖 (cooperative breeding) 的一種類型，即一個物種的其他成員透過協助求偶或照顧幼小，幫助育幼者興旺發展。合作生殖在動物界中十分常見。這在大約 90 個物種中可以發現，大部分為鳥類、魚類，以及哺乳類。</p>	

這可能只是成功生育的其中一種方式，又或者只是科學者尚未找到益處。越來越多的科學家意識到相同物種內及不同物種之間的合作在大自然中起重大作用，從細小的微生物到巨大的鯨魚中都有。我們亦可以在人類中看到，人們會幫助他人遇到其未來的生活伴侶，在團體或是企業中尋找方法來共同合作及共享資源。

In a forest in Panama, two male birds wait on a bare branch. They've already cleared a stage for their upcoming performance by removing leaves from neighboring plants. Suddenly a female lands on the branch and the two males go into action. Over the next few minutes, these two males put on a coordinated courtship dance with 11 different moves and 9 types of songs and calls. But these two birds aren't competing, they're cooperating. Only one, the alpha, will get to mate with the female. The alpha and beta males may work together for up to six years. Eventually, the beta might move on to become an alpha.

These birds are lance-tailed manakins. With their black bodies, bright blue capes, and dark red cap, they are conspicuous among the greenery of the forest. Like other species of manakins, a beta male helps the alpha put on a courtship display. Researchers are trying to figure out what the advantages are to being a beta. Not all alpha birds have a beta helper and some birds skip being a beta helper and immediately become alphas. The alpha and beta birds are not related to one another, so there's no clear genetic advantage. One possible advantage is that the betas gain experience that makes them better at courtship displays later in life.

Cooperative courtship is one type of cooperative breeding, where other members of a species help the breeder to succeed, either through courtship or caring for young. Cooperative breeding is widespread in the animal world. It's found in almost 90 species, mostly birds, fish, and mammals. It may just be one route to successful breeding, or there may be advantages scientists haven't yet found. More and more, scientists are realizing that cooperation among and between species plays a big role in nature, from tiny microbes to giant whales. We also see it in humans, from people helping other people meet their future life partners to organizations and industries finding ways to work together and share resources.

文獻引用 (REFERENCES)

「會進行合作表演的尖尾侏儒鳥 (*Chiroxiphia lanceolata*) 提供了一個絕佳的機會來探討合作經驗對於成功作為繁殖鳥 (breeder) 的影響。雄性尖尾侏儒鳥會在求偶場系統 (lek mating system) 中對雌鳥進行表演，並形成長期的雄性-雄性合作關係來共同進行複雜的求偶表演。在這種合作關係中，主導的高位階繁殖鳥在歌唱及舞蹈表演中皆會有附屬的低位階助手進行輔助。以往對於這個系統的研究證實了雄性合作者並不是近親，以及除了極端罕有的案例之外，幾乎只有高位階雄鳥會交配...高位階雄鳥的父系平均生殖成功 (siring success) 會隨著擔當高位階鳥時間增加而增加，而這種效應與個體生殖年齡 (individual age on reproduction) 的獨立影響有所區別。作為高位階鳥的經驗對於生殖成功的正面影響，顯示作為非繁殖低位階鳥的合作行為可能提供了替代的方式來獲得經驗。

在較大的年齡中，從經驗增加所獲得的生殖得益會被父系生殖成功的老化 (senescence) 所抵消。雖然大部分高位階鳥都會有低位階合作夥伴，但不是所有雄鳥在成為高位階身分前都會作為低位階鳥。儘管以往的研究推測作為低位階鳥的經驗能增加雄鳥成為高位階鳥的成功率，但一旦成為高位階鳥之後，作為低位階鳥的經驗會否及如何作出影響仍然未明。(DuVal 2013: 885)」

「這項研究提供了首項證據證明作為低位階鳥的經驗並不會增加高位階角色的雄性成功率。反而在尖尾侏儒鳥中，作為低位階鳥是一種引致生殖成功的替代途徑，以及雄性不擔任合作夥伴而直接成為繁殖角色時，仍能獲得相同而適當的適應性。這裡呈現的數據證明了以非合作途徑來擔任繁殖角色是一個可行而廣泛被使用的策略，有接近一半的雄鳥在成為高位階鳥之前並沒有擔任過低位階鳥（雖然大部分高位階鳥都會有低位階鳥夥伴）。」

“The cooperatively displaying lance-tailed manakin *Chiroxiphia lanceolata* offers an excellent opportunity to investigate the role of cooperative experience in influencing success as a breeder. Male lance-tailed manakins display for females in a lek mating system, and form long-term male-male partnerships to cooperate in complex courtship displays. In these partnerships, dominant alpha breeders are assisted by subordinate beta helpers in both song and dance displays. Previous work in this system has shown that male partners are not close relatives and that, with extremely rare exceptions, only alpha males mate...Alpha males increase their average siring success with each year of alpha tenure, and this effect is distinct from an independent influence of individual age on reproduction. The positive influence of alpha experience on reproductive success suggests that cooperation as a non-breeding beta might provide an alternative way to gain such experience. At advanced ages, reproductive gains from increased experience are offset by senescence in siring success. Although most alphas have beta partners, not all males serve as betas before attaining alpha status. Though previous work has suggested that beta experience increases males' chances of becoming an alpha, it remains unclear whether and how beta experience affects success once males attain alpha status.” (DuVal 2013: 885)

“This study provides the first evidence that cooperative experience as a beta does not increase males' success in the alpha role. Instead, cooperation as a beta is an alternative route to reproductive success in lance-tailed manakins, and equivalent fitness benefits can be achieved by males that move directly into the breeding role without forming cooperative alliances. The data presented here demonstrate that the non-cooperative route to attaining breeding status is a viable and widespread strategy, with nearly half of males not serving as betas before becoming alphas (though most alphas have beta partners).” (DuVal 2013: 892)

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延伸閱讀

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

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