


# 生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	法定蜂數決定新的蜂巢地點 (Quorum determines new hive site)
生物系統 LIVING SYSTEM	西方蜂 <i>Apis mellifera</i> (Western Honey bee)
功能類別 FUNCTIONS	#相同物種之間合作 #Cooperate within the same species
作用機制標題	蜂群中的蜜蜂透過法定蜂數來決定新的蜂巢地點 (Honey bees in a colony select a new hive location via quorum.)
生物系統/作用機制 示意圖	
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
<p>人類並不是唯一會在重要選舉中進行投票的物種。一個繁盛的蜂巢可以有數萬隻的蜜蜂，最終可能因為空間有限而變得過度擁擠。當這種情況發生時，整個族群會一分为二，其中一群蜜蜂會成群結隊地離開蜂巢，在外面集體行動，直到能找到新的居住地點。但如何讓數千隻蜜蜂同意在一個新的地點建立蜂巢的呢？這個決定相當重要，因為一旦贊成了，新的族群將會耗費所有能量讓新據點成功建立。</p> <p>為了尋找建立新蜂巢的地點，「偵察兵」蜜蜂會先調查可能適合築巢的場所。然後每隻偵察蜂回到蜂巢，會透過「搖擺舞蹈」向蜂群表達牠們偵察的場所有多理想。在搖擺舞蹈中，蜜蜂會搖動或震動並以波浪方式前進，然後再環行回到原地並重複這個過程。蜜蜂震動得越快，表示牠認為巡視的場所越理想。同時，蜜蜂移動的方向亦傳達了牠所建議的</p>	

新蜂巢方向，而蜜蜂在每次循環中搖擺的時間或是直線距離則表達與新蜂巢的距離。根據每隻蜜蜂舞蹈的相對活躍程度，其他偵察蜂就能依此定位，並評估出被強烈推薦的地點。

一旦提供推薦地點的偵察蜂數量達到約 15 隻，這群蜂就會回到蜂巢，以訊號傳遞最後決定的搬遷地點。最後，蜂群會再跟隨前往並在選定的地點建立新蜂巢。

學習蜜蜂以及其他物種如何做決定，可提供方向讓人類知道該如何做出更好的群體決策。

Humans aren't the only ones who vote in important elections. A successful honeybee hive can contain tens of thousands of bees and may eventually become overcrowded due to limited space. When this happens, the colony splits in two and one group of bees leaves the hive in a swarm, clustering together outside until the group can find a new place to live. How do thousands of bees agree on a new location for a hive? The decision is important, because once agreed upon, the new colony will invest all of its energy into making the new location a success.

To find a location for a new hive, "scout" bees investigate possible sites. Then each scout returns to the swarm and communicates how promising the site it visited is by performing a "waggle dance." In a waggle dance, a bee shakes or vibrates while walking forward in a wave pattern, then circles back and repeats the process. The faster a bee vibrates, the more promising it thinks the site it explored is. At the same time, the orientation of the bee's movements conveys the newly proposed hive's direction, and the time or linear distance over which the bee waggles in each cycle conveys the distance to the new hive. Based upon the relative vigor of each bee's dance, other scouts locate and assess the more strongly recommended locations.

As soon as the number of bees at any given potential site reaches about 15, this group returns to the swarm, spreading through it to signal a final decision to relocate to that site. As a result, the swarm follows and sets up its hive in this chosen location.

Studying how honeybees and other species make decisions could provide insights into how humans could make better group decisions too.

## 文獻引用 (REFERENCES)

## 參考文獻清單與連結 (REFERENCE LIST)

Biesmeijer J. C. and T. D. Seeley. (2005). The use of waggle dance information by honey bees throughout their foraging careers. *Behavioral Ecology and Sociobiology* 59: 133-142.

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## 延伸閱讀

AskNature Team. (19 February, 2020). Swarm Logic® technology reduces energy use. *AskNature*. Retrieved from:  
<https://asknature.org/idea/swarm-logic-technology-reduces-energy-use/>

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

[https://en.wikipedia.org/wiki/apis\\_mellifera](https://en.wikipedia.org/wiki/apis_mellifera)  
[https://www.onezoom.org/life/@apis\\_mellifera](https://www.onezoom.org/life/@apis_mellifera)  
<https://eol.org/pages/1045608>

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<https://asknature.org/strategy/quorum-determines-new-hive-site/>