國 立 臺 灣 海 洋 大 學
海洋環境與生態研究所 專題討論#

英文題目：Driven factors of sexual reproduction in ***Noctiluca scintillans***

中文題目：何種因子驅使 ***Noctiluca scintillans*** 有性生殖?

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Abstract

Noctiluca scintillans is a larger size bioluminescence red-tide dinoflagellate (200-1000 μm) in diameter, which reproduces by sexual or asexual processes (binary fission). Its process of sexual reproduction is well known but the ecological role and the mechanism of shifting from asexual to sexual reproduction in ***Noctiluca scintillans*** is rarely understood. It is believed that the sexual reproduction may occur as facing environmental stress. In this study, we tried to find that what factors drives ***Noctiluca scintillans*** to undergo sexual reproduction and further hypothesize the ecology role of its sexual reproduction by cultivating ***Noctiluca scintillans*** with different variation of temperature, ***Noctiluca scintillans*** density, prey concentration, cultivation time, cultivation volume, light exposure time and physical vibration (simulated wave motion). We then observed that which condition ***Noctiluca scintillans*** had an increase sexual reproduction rate, by counting the gametocyte mother cells. The result indicated that the rise of sexual reproduction or gametocyte mother cells was only observed in the variation of prey concentration, typically occurred after the exponential phase of the population. Noticeable upsurge occurred when the prey was depleted, the gametocyte mother cells increased to near 10%, in which other conditions were only 1% or less, of the total ***Noctiluca scintillans*** population. This implies that the shift from trophont to gametocyte mother cells may be induced by the fluctuation of prey concentration over time. We suggest that the sexual reproduction may happen as a response to an after-bloom situation, the depletion of the local food source, to increase the diversity of the remaining population.

中文摘要

Noctiluca scintillans，俗稱:夜光蟲，是一種大型的雙鞭毛蟲(直徑 200-100 ㎛)，在受到應力時會發出生物冷光，是常見的赤潮種類。夜光蟲的繁殖方式可分為有性與無性生殖(二分裂)。其有性生殖的過程現今已了解透徹，但這種有性生殖的原理以及針對自己族群的意義還是個疑問。目前研究認為夜光蟲的有性生殖會在承受環境壓力時發生。所以此研究中，我們嘗試去尋找何種因子會驅使夜光蟲進行有性生殖以及推論這種行為對於夜光蟲的族群的意義。我們把夜光蟲培養在不同程度的溫度、餌料濃度、夜光蟲族群密度、培養時間、培養容積、光照時間以及搖晃頻率(模擬海水搖晃)，來觀察在何種培養條件下夜光蟲的有性生殖發生率

有提升，使用計數配子母細胞的產生來判斷。結果顯示，只有在調整餌料濃度的組別有性生殖或配子母細胞的數量有明顯上升，通常發生於夜光蟲族群進入指數成長期之後。最明顯的上升發生在餌料被消耗殆盡之後，配子母細胞佔整體夜光蟲數量比例上升至 10%。這可能代表者驅使夜光蟲從營養體轉換成配子母細胞，是在長時間下餌料濃度的變化。我們推論有性生殖可能是一種針對赤潮結束後的反應，藉由有性生殖來增加自己族群的多樣性，在面對已經減少的食物來源。

參考資料

Fukuda, Yasuhiro, and Hiroshi Endoh. "New Details from the Complete Life Cycle of the Red-Tide Dinoflagellate ***Noctiluca Scintillans*** (Ehrenberg) Mccartney." European journal of protistology 42, no. 3 (2006): 209-19.