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目的：驅動地中海兩個近岸貧營養系統微生物碳通量變動的因子
(Drivers of Microbial Carbon Fluxes Variability in Two Oligotrophic Mediterranean Coastal Systems)

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出處：SCIENTIFIC REPORTS , 2019 , 9:17669

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日期：01/05/2020

Abstract

The carbon fluxes between phytoplankton and heterotrophic bacterioplankton were studied in two coastal oligotrophic sites in the NW Mediterranean. Phytoplankton and bacterial production rates were measured under natural conditions using different methods. In the Bay of Villefranche, the temporal variability revealed net heterotrophy in July-October and net autotrophy in December-March. The spatial variability was studied in the Bay of Palma, showing net autotrophic areas in the west and heterotrophic areas in the east. On average bacterial respiration, represented 62% of the total community respiration. Bacterial growth efficiency (BGE) values were significantly higher in autotrophic conditions than in heterotrophic ones. During autotrophic periods, dissolved primary production (DPP) was enough to sustained bacterial metabolism, although it showed a positive correlation with organic carbon stock (DOC). Under heterotrophic conditions, DPP did not sustain bacterial metabolism but bacterial respiration correlated with DPP and bacterial production with DOC. Temperature affected positively, DOC, BGE, bacterial respiration and production when the trophic status was autotrophic. To summarize, the response of bacterial metabolism to temperature and carbon sources depends on the trophic status within these oligotrophic coastal systems.

摘要

本篇實驗在地中海西北部兩處近岸貧營養系統調查浮游植物和異營性細菌的碳通量。浮游植物和細菌生產力在自然條件下使用不同的方法測量。在自由城灣 (Bay of Villefranche) 的時間分布調查中顯示了7月至10月系統處於淨異營的狀態，而12月至3月系統則處於淨自營的狀態。此外，在帕爾馬灣 (Bay of Palma) 的空間分布調查中則顯示了西部屬於淨自

營系統而東部屬於異營系統。整體來說，細菌呼吸率佔群聚呼吸率的62%。細菌生長效率

(BGE) 在自營系統明顯高於異營系統。在自營系統中，溶解態初級生產力 (DPP) 足以維持細菌的新陳代謝，且與溶解態有機碳 (DOC) 濃度呈正相關。在異營系統中，溶解態初級生產力的供應不足以維持細菌的代謝，不過發現到細菌呼吸率與細菌生產力分別與 DPP 與 DOC 濃度呈現相關。另外在自營系統中，溫度分別與 DOC、BGE、細菌呼吸率與細菌生產力呈現正相關。簡而言之，在近岸貧養系統中細菌新陳代謝對溫度和碳源的反應取決於系統的營養狀態。