**整合種內差異來定義珊瑚的生態策略**

**Toward an integration of intraspecific variability in the definition of coral ecological strategies**

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**Abstract:**

Intraspecific variability offers a ground for natural selection to operate and species to adapt. It represents a key factor for species survival. In corals, four adaptive strategies were previously defined on the base of average trait values, which overlooked intraspecific variability in their response to different environmental conditions. Here, we used a trait-based approach to characterize intraspecific variation and identify the main drivers of this differentiation under contrasting light and temperature conditions. Eight physiological traits characterizing the input and output of energy were examined in six coral species sampled in four habitats at two seasons. In total, 235 individuals were compared for their trait similarity using Gower distance and visualized into a functional space using a Principal Coordinates Analysis. Each species was characterized by the volume of the convex hull delineating all individuals. Species divergence was further examined by the position of species centroid and tested by permutational multivariate analysis of variance. Our results showed distinctive patterns where some species can occupy a large proportion of our functional space while others do not. We further concluded on the possible existence of generalists and specialists in scleractinians. The later may further be divided in several strategies that remain to identify. Overall, this study constitutes a first step toward an integration of intraspecific variation and species niche into a re-evaluation of coral ecological strategies.

**神經壞死病毒於石斑腎臟細胞的感染與蛋白的交互關係**

**Infection and proteins interaction of Nervous Necrosis Virus in Grouper Kidney cells**

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**摘要 (Abstract):**

病毒生活史中，藉由辨識寄主細胞膜上面的受體來侵入細胞，具有宿主的專一性，即便表面受體能夠被辨識，仍需要在特定組織中才能繁衍。神經壞死病毒也不例外，只會在石斑的眼睛、中樞神經大腦與脊髓的部分才能明顯觀察出壞死的部分，在神經細胞中才能夠進行新生病毒組裝以及釋出。病毒在入侵細胞後，會在細胞中生產病毒的殼蛋白、核酸以及所需要的酵素，而這些轉譯出來的蛋白可能會影響細胞本身蛋白的轉譯，透過共免疫沉澱的方式，可以了解到病毒的蛋白會與細胞中的一些特定蛋白有相互影響，本研究利用前人免疫沉澱的結果發現，NNV與GB細胞的EF1A有共免疫沉澱的現象，因此要尋找此蛋白在神經壞死病毒感染途徑扮演著什麼樣的角色。首先，為了瞭解NNVCP是否有與EF1A有相互鍵結，利用 Thermo Scientific AminoLink Plus Resin將Virus Like Particle(VLP)鍵結於瓊脂醣樹脂上，接著再通以目標細胞的萃取液蛋白來與管柱中的類病毒顆粒產生親和性，並透過不同條件的溶液進行沖提，隨後將洗滌液做SDS-PAGE電泳分別進行Commasive blue staining、銀染及VOPBA等分析，最後進行LC/MS/MS蛋白質分析。在西方點墨法中發現，以含0.2%的SDS buffer沖提出的蛋白液中含有EF1A的存在。接著將表現EF1A的質體轉入E. coli中，進行全長以及不同片段區域的重組蛋白表現，並以VOPBA進行辨識，來推測該蛋白是哪個片段會與病毒有親和性。未來會以基因靜默以及免疫螢光染色的方式去分析EF1A在NNV感染過程扮演的角色，並且比較腎臟細胞以及腦細胞的感染至死亡過程的型態，並且透過比較GK以及GB在通過VLP管柱分離下，兩者所含蛋白有何不同，進而篩選出組織專一性差異的候選蛋白。