

## RESEARCH ARTICLE

# Environmental control of *Vibrio* spp. abundance and community structure in tropical waters

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**One sentence summary:** In tropical waters, *Vibrio* abundance is controlled by nutrients and by salinity when <20 ppt, whereas types of predominant *Vibrio* is dependent upon its growth rate and adaptation to nutrients.

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## ABSTRACT

We measured *Vibrio* spp. distribution and community profile in the tropical estuary of Port Klang and coastal water of Port Dickson, Malaysia. *Vibrio* spp. abundance ranged from 15 to 2395 colony forming units mL<sup>-1</sup>, and was driven by salinity and chlorophyll *a* (Chl *a*) concentration. However, the effect of salinity was pronounced only when salinity was <20 ppt. A total of 27 *Vibrio* spp. were identified, and the *Vibrio* spp. community at Port Dickson was more diverse ( $H' = 1.94 \pm 0.21$ ). However species composition between Port Dickson and Port Klang were similar. Two frequently occurring *Vibrio* spp. were *V. owensii* and *V. rotiferianus*, which exhibited relatively higher growth rates (ANCOVA:  $F > 4.338$ ,  $P < 0.05$ ). Co-culture experiments between fast- and slow-growing *Vibrio* spp. revealed that fast-growing *Vibrio* spp. (*r*-strategists) were overwhelmed by slower-growing *Vibrio* spp. (*K*-strategists) when nutrient conditions were set towards oligotrophy. In response to resource availability, the intrinsic growth strategy of each *Vibrio* spp. determined its occurrence and the development of *Vibrio* spp. community composition.

**Keywords:** *Vibrio* spp. abundance; growth rate; grazing loss rate; tropical coastal water; *r/K*-strategies; *Vibrio* spp. diversity

## INTRODUCTION

*Vibrio* spp. are Gram negative heterotrophic bacteria indigenous in estuaries and coastal waters (Thompson, Iida and Swings 2004a). There are at least 115 known *Vibrio* spp. and they hold critical roles in nutrient and dissolved organic matter cycling

(Thompson, Iida and Swings 2004a; Lin et al. 2018). Some *Vibrio* spp. (e.g. *V. cholera*, *V. parahaemolyticus*, *V. vulnificus*, *V. coralliilyticus*) are known to cause diseases in humans and marine organisms like fishes, shrimps and corals (Lightner and Redman 1998; Rosenberg and Falkovitz 2004; Thompson, Iida and Swings 2004a; Ang et al. 2010). Therefore, it is important to understand *Vibrio* spp. distribution in the environment.

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