

國立臺灣海洋大學  
海洋環境與生態研究所 專題討論

題目 : Low Virus-to-Bacteria Ratios in the Subtropical Tamsui River Estuary

報告人：陳薇伊

指導教授：蔡安益 老師

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### Abstract

Viruses are dynamic and play an important role in the regulation of food web dynamics, carbon and nutrient fluxes, and bacterial diversity in aquatic ecosystems. As a measure of viral dynamic in aquatic ecosystems, virus-to-bacteria ratios (VBR) have been proposed and discussed as indicators of the importance of viruses in aquatic environments for more than 30 years, yet a generally accepted theory for understanding mechanisms controlling VBR is still limited. Furthermore, the VBR reflects the balance of viral production (VP) and viral decay rate (VD) in the study regions. In preliminary study in Tamsui river estuary in April, low VBR was detected with mean average 0.71. This value (0.71) is lower than the data over 210 articles and information on VBR were used in study of Parikka et al. (2017). We hypothesize that this low VBR value is largely due to high VD and low VP. In this study, we accomplished net VP and VD experiment in Tamsui estuary and riverine region during summer in July. All experiments were then incubated for 24 hours under natural light. In this study, we found that the VBR was about 0.5-1.5 and the abundance of virus in net VP experiment at both stations were remain stable with mean average  $0.5 \times 10^6$  viruses  $\text{ml}^{-1}$ , and overall non-significant net VP can be measured. Furthermore, VD is  $-0.0206 \sim 0.0214 \times 10^6$  viruses  $\text{ml}^{-1} \text{h}^{-1}$  in the experimental treatment. As for gross viral production (net VP+VD) in the Tamsui estuary is very low ( $0.021 \times 10^6$  viruses  $\text{ml}^{-1} \text{h}^{-1}$ ), was about 4% of in situ viral abundance increase per hour. In this study, we observed that experimental low gross VP resulted in the low VBR value. We suggest that nanoflagellate grazing can exert significant effects on bacterial mortality in Tamsui estuary and having more control on microbial composition than viral lysis in summer.

### Reference:

Parikka, K.J., Romancer, M.L., Wauters, N., Jacquet, S. (2017) Deciphering the virus-to-prokaryote ratio (VPR): insights into virus-host relationships in a variety of ecosystems. *Biol Rev*, 92, 1081–1100.