Screening and characterisation of two strains of Pseudomonas aeruginosa from aquaculture and water environment
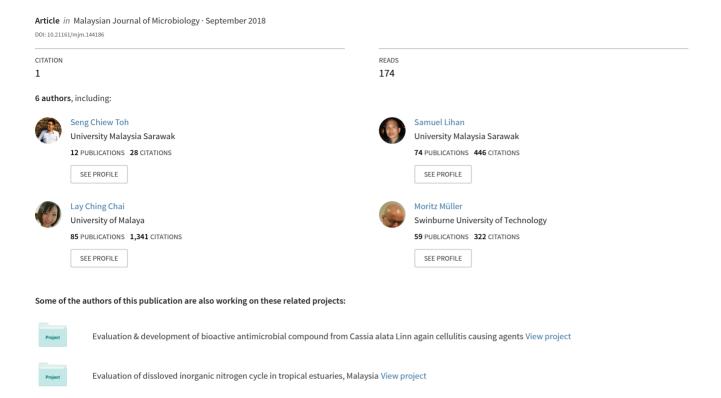
6 authors, including:

Seng Chiew Toh
University Malaysia Sarawak
12 PUBLICATIONS **28** CITATIONS

SEE PROFILE

Samuel Lihan
University Malaysia Sarawak
74 PUBLICATIONS **446** CITATIONS

SEE PROFILE

Lay Ching Chai
University of Malaya
85 PUBLICATIONS **1,341** CITATIONS

SEE PROFILE

Moritz Müller
Swinburne University of Technology
59 PUBLICATIONS **322** CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:

Project   Evaluation & development of bioactive antimicrobial compound from Cassia alata Linn again cellulitis causing agents View project

Project   Evaluation of dissloved inorganic nitrogen cycle in tropical estuaries, Malaysia View project

Malaysian Journal of Microbiology

Published by Malaysian Society for Microbiology

(In SCOPUS since 2011)

Screening and characterisation of two strains of *Pseudomonas aeruginosa* from aquaculture and water environment

Seng Chiew Toh[1*], Samuel Lihan[1], Khar Mun Soh[1], Natalia Uyub[1], Lay Ching Chai[2], Moritz Müller[3]

[1]Department of Molecular Biology, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia.
[2]Institute of Biological Sciences, Faculty of Science, Universiti Malaya, 50603 Kuala Lumpur, Malaysia.
[3]Faculty of Engineering, Computing and Science; Swinburne University of Technology, Jalan Simpang Tiga, 93300 Kuching, Sarawak, Malaysia.
Email: 15020196@siswa.unimas.my

ABSTRACT

Aims: *Pseudomonas* has been associated with diseases occurring in people with weakened or compromised immune system after exposure to contaminated water. The diseases are commonly treated with antibiotics. However, the bacteria had developed resistances to commonly used antibiotics making treatment a difficult task. Therefore, the continuous surveillance of susceptibility of *Pseudomonas* especially for the human pathogen *P. aeruginosa* to commonly clinical and aquaculture farming used antibiotics is important to ensure that serious infections remain susceptible to those antibiotics.

Methodology and results: In this study, the bacteria were screened from water, sediment and fish from rivers and aquaculture farms around Kuching, Sarawak. A total number of 38 presumptive *P. aeruginosa* were isolated using CHROMagar[TM] *Pseudomonas* and subjected to a series of biochemical tests. Out of all the isolates tested, only two isolates designated as AS-R10(S) and BK2-OLT2(S) fulfilled the biochemical characteristics of *P. aeruginosa*. 16S rRNA gene sequencing further confirmed these two isolates as *P. aeruginosa* based on their 100% similarity with *P. aeruginosa* strain GD1 and *P. aeruginosa* strain PA1201 in NCBI database. These two isolates were tested for their susceptibilities against nine common antibiotics used in both clinical and aquaculture farming nowadays: imipenem, piperacillin, meropenem, amikacin, gentamicin, ciprofloxacin, ceftazidime, tobramycin and norfloxacin according to CLSI standard using disk diffusion method.

Conclusion, significance and impact of study: The two isolates exhibited total susceptibility to all the antibiotics analysed, suggesting the effectiveness of the antimicrobial agents towards *P. aeruginosa* isolated from aquaculture and water environment in the study area.

Keywords: P. aeruginosa, antibiotic susceptibilities, 16S rRNA gene sequencing, aquaculture

INTRODUCTION

The aquaculture industry has been started in Malaysia since 1920 and nowadays, this sector has developed into one of the most important economic activities which contributed about 1.73% to Gross Domestic Product (GDP) of the country (Hashim, 2008). Despite the contribution of aquaculture industry in international trade and foreign exchange, it also functions to provide a significant source of animal protein (Hashim, 2008). However, the increase in demand for aquaculture related products and the failure of captured fisheries to produce sufficient fish products thus make aquaculture becoming a major focus industry nowadays (Ling *et al.*, 2011). The use of antibiotics in the aquaculture farming in Sarawak may pose potential risk that susceptibility to antimicrobial agents will decrease in the water as well as in cultured

organisms and surrounding environments including rivers through the waste disposal from the aquaculture activities.

Pseudomonas aeruginosa is a Gram-negative rod-shaped and non-fastidious bacillus that can cause disease in animal and human. Its simple nutritional requirement contributes to its high adaptability and survival in various environments including soil and water (Sylvia *et al.*, 1974, Mena and Gerba, 2009). It is an opportunistic human pathogen which has been associated with several diseases such as severe pneumonia with a high fatality rate in people with weakened immune status; in patients underlying with cystic fibrosis, it triggers persistent inflammation that leads to the problem of the respiratory system (Iglewski, 1996; Pier and Ramphal, 2004). Besides, the bacterium is highly resistant to many different drugs making the

---

*Corresponding author