

MICROBIAL DIVERSITY OF FRESHWATER FISHES  
FROM POLLUTED ENVIRONMENT

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**MICROBIAL DIVERSITY OF FRESHWATER FISHES FROM POLLUTED  
ENVIRONMENT**

By

Humairah binti Mohd Nasir

A thesis submitted in partial fulfillment of  
the requirements for the award of the degree of  
Bachelor of Science (Biological Sciences)

**DEPARTMENT OF BIOLOGICAL SCIENCES  
FACULTY OF SCIENCE AND TECHNOLOGY  
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**JABATAN SAINS BIOLOGI  
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## **PENGAKUAN DAN PENGESAHAN LAPORAN PITA I DAN II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: **MICROBIAL DIVERSITY OF FRESHWATER FISHES FROM POLLUTED ENVIRONMENT** oleh **HUMAIRAH BINTI MOHD NASIR**, no. matric: **UK12178** telah diperiksa dan semua pembedaan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan memperoleh Ijazah **SARJANA MUDA SAINS (SAINS BIOLOGI)**, Fakulti Sains dan Teknologi, Universiti Malaysia Terengganu.

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## DECLARATION

I hereby declare that this thesis entitled Microbial Diversity of Freshwater Fishes from Polluted Environment is the result of my own research except as cited in the references.

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## ABSTRACT

Many recent studies were focusing on heavy metal pollution but a little attention on bacteria contamination. Since the freshwater fishes were taken in human diet, it is very important to know the diversity of the bacteria associated with the fishes either it is pathogenic or not. This study was conducted to investigate the microbial diversity from freshwater fishes from polluted environment. In this study, seven species of freshwater fishes were examined included *Ompok siluroides*, *Clarias meladerma*, *Labiobarbus leptocheilus*, *Osteocheilus hesselti*, *Oxygaster anomalura*, *Rasbora natura* and *Rasbora bankanensis*. The fishes were collected in August 2007 from Paya Sungai Udang, a swamp that believed polluted with leachate from groundwater since it is situated next to a landfill. The identification of the bacteria was done by using macro, micromorphology and biochemical tests. 23 bacteria genus were managed to be identified from the fishes. They were *Citrobacter* sp., *Enterobacter* sp., *Pseudomonas* sp., *Klebsiella* sp., *Megaspaera* sp., *Proteus* sp., *Aeromonas* sp., *Escherichia* sp., *Shigella* sp., *Bacillus* sp., *Corynebacterium* sp., *Staphylococcus* sp., *Moraxella* sp., *Serratia* sp., *Yersinia* sp., *Streptococcus* sp., *Micrococcus* sp., *Flavimonas* sp., *Aminobacter* sp., *Neisseria* sp., *Alcaligenes* sp., *Lactobacillus* sp. and *Veillonella* sp. The bacteria diversity was calculated using Shannon-Wiener Index (H') and Evenness Index (E) by software BIO-DAP (Biodiversity Data Analysis Package). The highest value for H' was 2.04 for *L. leptocheilus* which means that bacteria isolated from this fish was more diverse than other species of freshwater fishes studied. The higher Evenness Index value indicates that less variation in communities between the species. The Evenness Index value for *L. leptocheilus* was the highest which is 0.93 and the lowest value, 0.70 for *O. hesselti*. The results obtained indicated that bacteria isolated from *Labiobarbus leptocheilus* most abundance with Shannon-Wiener Index. The abundance of *Klebsiella* sp., *Escherichia* sp. and *Staphylococcus* sp. also indicated that Paya Sungai Udang was polluted with fecal.



## ABSTRAK

Kebanyakan kajian sekarang bertumpu kepada pencemaran logam berat tetapi hanya sedikit perhatian diberikan untuk pencemaran yang diakibatkan oleh bakteria. Memandangkan ikan air tawar diambil sebagai makanan oleh manusia maka adalah penting untuk mengkaji bakteria yang terdapat pada ikan samada ianya patogenik atau tidak. Kajian ini dijalankan untuk mengkaji kepelbagaian mikroorganisma pada ikan air tawar yang diambil dari persekitaran tercemar. Dalam kajian ini, tujuh spesies ikan air tawar yang dikaji termasuklah *Ompok siluroides*, *Clarias meladerma*, *Labiobarbus leptocheilus*, *Osteocheilus hesselti*, *Oxygaster anomalura*, *Rasbora natura* and *Rasbora bankanensis*. Ikan-ikan ini ditangkap pada Ogos 2007 dari Paya Sungai Udang, kawasan yang dipercayai tercemar dengan licit dari air bawah tanah memandangkan kedudukannya yang bersebelahan dengan pusat pelupusan sampah. Bakteria telah dikenalpasti sehingga ke tahap genus menggunakan makro, mikromorfologi dan ujian biokimia. 22 genus bakteria telah dikenalpasti termasuklah *Citrobacter* sp., *Enterobacter* sp., *Pseudomonas* sp., *Klebsiella* sp., *Megaspaera* sp., *Proteus* sp., *Aeromonas* sp., *Escherichia* sp., *Shigella* sp., *Bacillus* sp., *Corynebacterium* sp., *Staphylococcus* sp., *Moraxella* sp., *Serratia* sp., *Yersinia* sp., *Streptococcus* sp., *Micrococcus* sp., *Flavimonas* sp., *Aminobacter* sp., *Neisseria* sp., *Alcaligenes* sp. and *Lactobacillus* sp. Kepelbagaian bakteria dikaji menggunakan Indeks Shannon Wiener ( $H'$ ) dan Indeks Evenness (E). Perisian BIO-DAP (Biodiversity Data Analysis Package) telah digunakan. Nilai tertinggi bagi  $H'$  ialah 2.04 untuk *L. leptocheilus* yang menunjukkan bakteria dari ikan ini mempunyai kepelbagaian tertinggi berbanding spesies ikan lain yang dikaji. Indeks Evenness menunjukkan kurang variasi dalam komuniti antara spesies. Nilai E yang tertinggi ialah 0.93 untuk *L. leptocheilus*. *O. hesselti* menunjukkan nilai E terendah iaitu 0.70. Keputusan kajian menunjukkan bakteria dari *L. leptocheilus* mempunyai kepelbagaian yang paling tinggi dengan Shannon Wiener Index. Kehadiran *Klebsiella* sp., *Escherichia* sp. dan *Staphylococcus* sp. menunjukkan Paya Sungai Udang tercemar dengan bahan kumbahan.