

DISTRIBUTION OF SPERMATOPHYTES, GORPES (24) AND  
GONIMES (25) IN THE QUINIA MOUNTAIN REGION

1958

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Pengarang Wong Siew Hooi		No. Panggilan 4p 19 FST 15 2004	
Judul Distribution of free-living . f . .			
Tarikh	Waktu Pemulangan	Nombor Ahli	Tanda tangan
23/2/06	5-30 p.m.	10576	*



**DISTRIBUTION OF FREE-LIVING AMOEBA, COPPER (Cu) AND  
CADMIUM (Cd) AT THE SUNGAI TERENGGANU ESTUARY**

**By**

**Wong Siew Hooi**

**Research Report submitted in partial fulfilment of  
the requirements for the degree of  
Bachelor of Applied Science (Biodiversity Conservation and Management)**

**Department of Biological Sciences  
Faculty of Science and Technology  
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA  
2004**



JABATAN SAINS BIOLOGI  
FAKULTI SAINS DAN TEKNOLOGI  
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA

PENGAKUAN DAN PENGESAHAN LAPORAN  
PROJEK PENYELIDIKAN I DAN II

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:

*Distribution of Free-Living Amoeba, Copper (Cu) and Cadmium (Cd)*  
*at the Sungai Terengganu Estuary*

oleh *Wong Siew Hooi*, No. Matrik *UK539D*

telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini  
dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan  
memperolehi *Ijazah Bk. of Appl. Sc. Conservation and Biodiversity Management*,  
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## ACKNOWLEDGEMENTS

Firstly, I would like to extend my gratitude and appreciation to my supervisor, Associate Prof. Dr. Nakisah Mat Amin and Prof. Dr. Noor Azhar Mohd Shazili for their invaluable comments, guidance, patience and time throughout my project.

I would also like to express my deepest gratitude and thanks to Encik Sulaiman and the staffs of Oceanography Laboratory for their co-operation and patience in helping me to complete my laboratory work. Special thanks to all the laboratory assistants from General Biology, Biochemistry, Biodiversity, and Microbiology Laboratories, and Abang Man from Chemistry Laboratory for lending me the apparatus and equipments to complete my laboratory work. Thanks also to all staffs of net loft and others for providing the transportation during sampling, thank you.

I am truly indebted to Prof. Noor's research assistant, Benny for assisting me to run the heavy metals analysis. Without her assistance, this project would not be completed. Very special thanks to Dr. Nakisah's research assistant, Faezah and Nurul for teaching me the techniques I needed for my laboratory work.

Words are not enough to express my heartfelt feelings to my beloved parents and elder sisters for their care, moral and financial support during my three years in the university.

Last but not least, special thanks to all my housemates, especially Siew Leng for sharing my burden and support me spiritually. And to those who I not mention, my special thanks to all of you.

S.H.WONG  
2004

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## LIST OF ABBREVIATION

APDC	Ammonia pyrrolidine dithiocarbonate
APHA	American Public Health Association
ATP	Adenisine triphosphate
BOD	Biochemical Oxygen Demand
CaCl <sub>2</sub>	Calcium chloride
Cd	Cadmium
cm	centimeter
Cu	Copper
DO	Dissolve Oxygen
Fe	Ferum
g	gram
GAE	Granulomatos Amebic Encephalitis
GFAAS	Graphite furnace atomic absorption spectroscopy
GPS	Global Positioning System
H <sub>2</sub> O	water
Hg	Mercury
KH <sub>2</sub> PO <sub>4</sub>	Potassium phosphate monobasic
L	litre
m	meter
M	molar
mg/L	milligram per litre

MgSO <sub>4</sub>	Magnesium sulphate
MIBK	Methyl iso-buthyl ketone
mL	millilitre
mm	millimeter
Mn	Manganese
NA	nutrient agar
NaCl	Sodium chloride
Na <sub>2</sub> HPO <sub>4</sub>	Sodium phosphate
NH <sub>3</sub>	ammonia
NNA	non-nutrien agar
PAS	Page's Amoeba Saline
PAM	Primary Amebic Meningoencephalitis
Pb	Lead
ppb	part per billion
ppt	part per thousand
rpm	radius per minute
<i>sp.</i>	species
TSS	Total Suspended Solid
°C	degree Celsius
µm	micrometer
µg/L	microgram per litre



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## ABSTRACT

A minimum of five species of amoebae were found at Sungai Terengganu estuary; that is *Vannella sp.*, *Platyamoeba sp.*, *Hartmannella sp.*, *Acanthamoeba sp.*, and Species A. *Vannella sp.*, and *Platyamoeba sp.* were the most frequently encountered species since they were found at all sampling locations in this study. Physico-chemical parameters of water were measured both during high and low tides in order to determine their effects on the distribution of these amoeba species. During high tides, the range for water quality measured were temperature (28.53-29.94°C), pH (6.33-8.12), salinity (0.27-26.48ppt), Dissolved Oxygen (DO) (4.40-4.98 mg/L), Biochemical Oxygen Demand (BOD) (0.26-1.00mg/L) and Total Suspended Solid (TSS) (3.3-13.3mg/L). The range for physico-chemical parameters of water during low tides were temperature (29.03-29.72°C), pH (6.10-6.78), salinity (0.14-2.88ppt), Dissolved Oxygen (DO) (4.30-4.96mg/L), Biochemical Oxygen Demand (BOD) (0.07-0.18mg/L) and Total Suspended Solid (TSS) (4.0- 158.7mg/L). The concentration of Cu measured during high and low tides were in the range of 0.050-0.117µg/L, and 0.011-3.511µg/L, respectively. The concentration of Cd measured during high and low tides were in the range between 0.006-0.644µg/L and 0.009-0.172µg/L, respectively. Results in this study indicated that the distribution of amoeba was influenced by water quality. Since both Cu and Cd were present at low concentration at all sampling sites, their influence on amoeba distribution cannot be confirmed.

## ABSTRAK

Sekurang-kurangnya lima spesis ameba dikenalpasti di muara Sungai Terengganu, iaitu *Vannella sp.*, *Platyamoeba sp.*, *Hartmannella sp.*, *Acanthamoeba sp.*, dan Species A. *Vannella sp.*, dan *Platyamoeba sp.* merupakan spesis yang paling kerap ditemui di dalam kajian ini kerana ameba ini dijumpai pada semua kawasan persampelan. Parameter fizikal kimia diukur semasa air pasang dan air surut untuk mengetahui parameter ini mempengaruhi taburan ameba ini. Semasa air pasang, julat parameter fizikal kimia ialah;- suhu (28.53-29.94°C), pH (6.33-8.12), saliniti (0.27-26.48ppt), Oksigen terlarut (DO) (4.40-4.98 mg/L), Keperluan Oksigen Bio-kimia (BOD) (0.26-1.00mg/L) dan Jumlah Pepejal Terampai (TSS) (3.3-13.3mg/L). Julat untuk parameter fizikal kimia semasa air surut ialah;- suhu (29.03-29.72°C), pH (6.10-6.78), saliniti (0.14-2.88ppt), Oksigen terlarut (DO) (4.30-4.96mg/L), Keperluan Oksigen Bio-kimia (BOD) (0.07-0.18mg/L) dan Jumlah Pepejal Terampai (TSS) (4.0- 158.7mg/L). Kepekatan Cu diukur semasa air pasang dan semasa air surut berjalat antara 0.050-0.117µg/L dan 0.011-3.511µg/L masing-masing. Kepekatan Cd semasa air pasang dan semasa air surut berjalat antara 0.006-0.644µg/L dan 0.009-0.172µg/L masing-masing. Keputusan di dalam kajian ini menunjukkan taburan ameba dipengaruhi oleh kualiti air. Kedua-dua Cu dan Cd hadir dalam kepekatan yang rendah di semua kawasan persampelan, maka pengaruhnya terhadap taburan ameba tidak dapat diperhatikan.