ISOLATION

GROUNDWATER CONTAMINATED

Isolation and identification of free-living amoebae from groundwater contaminated with crude petroleum / Che Ku Dahlan Che Ku Daud.

Lihat sebelah

ISOLATION AND IDENTIFICATION OF FREE-LIVING AMOEBAE FROM GROUNDWATER CONTAMINATED WITH CRUDE PETROLEUM

CHE KU DAHLAN BIN CHE KU DAUD

FAKULTI SAINS DAN TEKNOLOGI
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA
2006

ISOLATION AND IDENTIFICATION OF FREE-LIVING AMOEBAE FROM GROUNDWATER CONTAMINATED WITH CRUDE PETROLEUM

By

Che Ku Dahlan Bin Che Ku Daud

Research Report submitted in partial fulfillment of
the requirement for the degree of
Bachelor of Science (Biological Sciences)

Department of Biological Sciences
Faculty of Science and Technology
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA
2006

This project should be cited as:

Che Ku Dahlan, C.K.D. 2006. Isolation and identification of free-living amoebae from groundwater contaminated with crude petroleum. Undergraduate thesis, Bachelor of Science in Biological Sciences, Faculty of Science and Technology, Kolej Universiti Sains dan Teknologi Malaysia, Terengganu. 68p

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: ISOLATION AND IDENTIFICATION OF FREE-LIVING AMOEBAE FROM GROUNDWATER CONTAMINATED WITH CRUDE PETROLEUM, oleh Che Ku Dahlan Bin Che Ku Daud, no. matrik: UK 8436 telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan memperolehi Ijazah Sarjana Muda Sains (Sains Biologi), Fakulti Sains dan Teknologi, Kolej Universiti Sains dan Teknologi Malaysia.

Disahkan oleh:

.....
Penyelia Utama
Nama: PROF. MADYA DR. NAKISAH BT. MAT AMIN
Pensyarah
Cop Rasmi: Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Kolej Universiti Sains dan Teknologi Malaysia
21030 Kuala Terengganu
Tarikh: 21/5/06

.....
Ketua Jabatan Sains Biologi
Nama: PROF. MADYA DR. NAKISAH BT. MAT AMIN
Ketua
Cop Rasmi: Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Kolej Universiti Sains dan Teknologi Malaysia
(KUSTEM)
21030 Kuala Terengganu.
Tarikh: 21/5/06

ACKNOWLEDGEMENTS

BISMILLAHI RAHMANI RAHIM,

In the name of Allah, Most Gracious, Most Merciful.

I would like to especially thank to my respective supervisor, Assoc. Prof Dr. Nakisah Mat Amin for her help, guidance, encouragement and patient, without whom, I would not be able to though my final year project successfully. Above all, thanks you so much for being so generous with ideas. To Mr. Munawir, who give a lot of help during sampling activities in sampling areas, thank you very much.

Special thanks to all staffs of Faculty Science and Technology, KUSTEM especially to Cik Azlina, Kak Che Ku Naiza, Kak Fatimah from Biochemistry Laboratory; Kak Ina and Kak Tie from Microbiology Laboratory; Puan Kartini from Biodiversity Laboratory, to all the staffs of Institute Oceanography KUSTEM (INOS), especially to Kak Suhaila, Kak Ati, Encik Nasir and Kak Ita from Electron Microscopy Preparation Laboratory and Assoc. Prof. Dr. Norhayati Mohd Tahir from Department of Chemical Science, I am truly grateful for the kindness and guidance from which I was able to complete my project work successfully.

Not forgetting, I gratefully acknowledge the following people for their times, advices and generous contribution for making this piece of work possible, students master in Biotechnology 3 Laboratory who shared working with me at INOS especially Kak Siti Faezah, Kak Fatimah, Kak Ida and Kak Eiffa; Kak Nori, Abang Faiz, Jee and Lina from Department of Chemical Sciences, KUSTEM. Last but not least to my fellow

group of final year project, Norfazliza Ishak (Gja). All above, thanks a zillion for sharing the work load of keeping the lab tidy with me.

To all my course mates or house mates Mior, Izani, Yoe, Firdaus, Elmi, JayB, Joe, Shafie, Mullem, Rasul and Zairul who always giving me support and encouragement. Your advices are always in my mind.

Special grateful also to my beloved mom, Puan Lijah Binti Ab. Rahman, my brother, Abang Man and his wife, Kak Tini; my aunties, my uncles and all my siblings who always giving me support and advices without felling, all the loved and support given each time have strengthened up my soul gave me confident to accomplish this study.

Lastly to all my course mates and persons, who did not mention here, thanks for helping and being supportive to me. May Allah bless all of you, thanks you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

°C	-	Degree celcius
µm	-	Micron meter
Ace	-	Acenapthene
Acy	-	Acenaphthylene
Anth	-	Anthracene
BaA	-	Benz(a)anthracena
Bap	-	Benzo(a)pyrene
Bbf	-	Benzo(b)fluoranthene
Bghip	-	Benzo(g,h,i)perylene
Bkf	-	Benzo(k)fluoranthene
Chry	-	Chrysene
DiahA	-	Dibenz(a, h)anthracene
Flt	-	Fluoranthene
Flu	-	Fluorene
GAE	-	Granulomatos Amebic Encephalitis
GC-FID	-	Gas Chromatography –Flame Ionization Detector
INPY	-	Indeno(1,2,3-cd)pyrene
mg/L	-	milligram per Liter
NA	-	Nutrient Agar
Naph	-	Napthalene
NNA	-	Non-Nutrient Agar
PAHs	-	Polycyclic Aromatic Hydrocarbons
PAM	-	Primary Amebic Meningoencephalitis

LIST OF APPENDICES

ABSTRACT

In this study, several species of amoebae were isolated and identified from contaminated and non-contaminated groundwater with crude petroleum. The identification of amoebae was done based on morphology of cyst and trophozoites and also its locomotion based on Key Page's (1988). Results from this study indicated that at least one amoeba species isolated and identified from contaminated water, that is *Vahlkampfia* sp. and in non-contaminated groundwater, at least two species of amoebae were counted, they are *Vahlkampfia* sp. and *Echinamoeba* sp. This study is an initial step to identify the amoebae species that can be used to clean oil spills either in open or close sites. The concentrations of hydrocarbons (Polycyclic Aromatic Hydrocarbons (PAHs) and aliphatic hydrocarbons) in contaminated and non-contaminated water were determined using Gas Chromatography-Fluid Ionization Detection (GC-FID) method. In contaminated groundwater with crude petroleum, six PAHs compounds were detected. The compounds are Naphthalene (0.12×10^2 ppm), Acenaphthylene (0.075×10^2 ppm), Anthracene (0.067×10^2 ppm), Benz(a)anthracene (0.033×10^2 ppm), Benzo(b)fluoranthene (0.114×10^2 ppm) and Benzo(a)pyrene (0.193×10^2 ppm). Only one aliphatic compound in contaminated groundwater sample, it is C_{22} (6.535×10^2 ppm). Meanwhile, in non-contaminated groundwater with crude petroleum, only one PAH compound was detected. It is Anthracene (0.063×10^4 ppm), but no aliphatic compound was found in this sample.

PENGASINGAN DAN PENGECAMAN AMOEBAE DARIPADA AIR BAWAH TANAH YANG TERCEMAR DENGAN PETROLEUM MENTAH

ABSTRAK

Dalam kajian ini beberapa spesies amoeba telah diasingkan dan dikenalpasti dari air bawah tanah yang tercemar dan yang tidak tercemar dengan petroleum mentah. Pengecaman amoebae adalah berdasarkan morfologi sista dan tropozoit serta pergerakannya berdasarkan kekunci Page (1988). Hasil kajian mendapati terdapat sekurang-kurangnya satu spesies amoeba, diasingkan dan dikenalpasti dari air tercemar iaitu *Vahlkampfia* sp. dan sekurang-kurangnya dua spesies amoeba dalam air tidak tercemar iaitu *Vahlkamfia* sp. dan *Echinamoeba* sp. Kajian ini adalah satu langkah permulaan untuk digunakan sebagai cara membersihkan tumpahan minyak samada di kawasan terbuka atau tertutup. Kepekatan kandungan hidrokarbon (hidrokarbon polisiklik aromatik (PAH) dan alifatik) dalam air tercemar dan air tidak tercemar telah ditentukan menggunakan kaedah gas kromatografi-pengesanan cecair ionik (GC-FID). Dalam sampel air tercemar, enam sebatian aromatik dikesan iaitu Naftalena (0.12×10^2 ppm), Acenaphtilena (0.075×10^2 ppm), Anthrasena (0.067×10^2 ppm), Benz(a)anthrasena (0.033×10^2 ppm), Benzo(b)fluoranthena (0.114×10^2 ppm) and Benzo(a)pyrena (0.193×10^2 ppm). Hanya satu sebatian alifatik dalam air tercemar iaitu C_{22} (6.535×10^2 ppm). Sementara itu, dalam air tidak tercemar dengan petroleum mentah, hanya satu sebatian PAH telah dikesan iaitu Anthracena (0.063×10^4 ppm), tetapi tiada sebatian alifatik dikesan dalam sampel ini.