

GENOTOXIC EFFECT OF MERCURY AND ZINC ON
ICHTHYOPHYCIDA SP. (MILK ISOLATE) AND
ICHTHYOPHYCIDA SP. (SEMI WETLAND
ISOLATE): A LABORATORY STUDY

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2008

GENOTOXIC EFFECT OF MERCURY AND ZINC ON *ACANTHAMOEBA SP.*
(HKL ISOLATE) AND *ACANTHAMOEBA SP.* (SETIU WETLAND ISOLATE):
A LABORATORY STUDY

By

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A research report 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
UNIVERSITI MALAYSIA TERENGGANU
2008

1100057864

This project report should be cited as:

Syafaf, S. S. 2008. Genotoxic effect of mercury and zinc on *Acanthamoeba sp.* (HKL isolate) and *Acanthamoeba sp.* (SW isolate): A laboratory study. Undergraduate final year project report, Bachelor of Science in Biological Sciences, Faculty of Science and Technology, Universiti Malaysia Terengganu, Terengganu. 40p.

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PENGAKUAN DAN PENGESAHAN LAPORAN PITA I DAN II

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk GENOTOXIC EFFECT OF MERCURY AND ZINC ON *ACANTHAMOEBA SP.* (HKL ISOLATE) AND *ACANTHAMOEBA SP.* (SW ISOLATE): A LABORATORY STUDY oleh SYAFAF SYAZWANI BINTI SIDEK, No. matrik: UK12453 telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan oleh 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 research report entitled Genotoxic Effect of Mercury and Zinc on *Acanthamoeba sp.* (HKL isolate) and *Acanthamoeba sp.* (Setiu Wetland isolate): Laboratory Study is the result of my own research except as cited in the references.

Signature : .....
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ACKNOWLEDGEMENTS

Special thanks to my project supervisor, Prof. Madya Dr. Nakisah Mat Amin and my co-supervisor Dr. Antonina Abdullah for their invaluable assistance and providing comments and suggestion in the successful completion of this project.

I want to express my deep gratitude to Phd student, Pn. Fatimah who have contributed significantly and did yeoman duty helping in running alkaline comet assay method. I wish to acknowledge the cooperation of post graduate students from INOS for their kindly help and provided helpful criticism.

Many of my friends who had helped me a lot deserve a very special thank you.

Finally, once again I must thank my family members especially my parents for their support and their advice.

ABSTRAK

Logam-logam berat berada dalam keadaan stabil di persekitaran dan tidak boleh diuraikan atau dimusnahkan. Sebaliknya, logam-logam berat ini cenderung berkitar dalam udara, tanah, mendakan dan air. Aktiviti manusia telah mengubah kitar dan tahap semulajadi (biokimia dan geokimia) sesetengah logam berat. Logam yang berlebihan di dalam air, udara dan tanah menyumbang kepada pencemaran dan risiko kepada kesihatan manusia serta organisma hidup yang lain termasuk *Acanthamoeba*. *Acanthamoeba* ialah ameba yang hidup bebas dan berpotensi menjadi patogen. Ameba ini tersebar luas di dalam persekitaran dan tidak bergantung kepada perumah untuk pemindahan dan penyebarannya. Kajian sebelum ini menunjukkan logam-logam berat seperti zink, plumbum, kadmium dan merkuri merencatkan pertumbuhan *Acanthamoeba* spp. Oleh itu, objektif kajian ini adalah untuk menentukan IC₅₀ merkuri dan zink terhadap dua isolat *Acanthamoeba* dan untuk menganalisa kerosakan DNA disebabkan oleh merkuri dan zink ke atas dua isolat *Acanthamoeba* dengan menggunakan asai komet berkali-kali. Ameba diuji dengan lima kepekatan yang berlainan dan satu sebagai kawalan bagi tiga replikasi. Daripada keputusan yang diperolehi, nilai IC₅₀ yang merencat 50% *Acanthamoeba* sp. (isolat HKL) selepas dirawat dengan zink ialah 49 ppm dan *Acanthamoeba* sp. (isolat SW) ialah 39ppm. Manakala nilai IC₅₀ yang merencat 50% *Acanthamoeba* sp. (isolat HKL) selepas dirawat dengan merkuri ialah 2.8ppm dan *Acanthamoeba* sp. (isolat SW) ialah 1.1ppm. Kerosakan DNA dalam sel-sel *Acanthamoeba* lebih tinggi bagi rawatan merkuri berbanding rawatan zink. Ini menunjukkan merkuri lebih toksik daripada zink terhadap kedua-dua *Acanthamoeba*. *Acanthamoeba* sp. (isolat HKL) lebih berdaya tahan terhadap kedua-dua logam berbanding *Acanthamoeba* sp. (isolat SW).

ABSTRACT

Heavy metals are stable in the environment and cannot be degraded or destroyed. Therefore, they tend to build up in the atmosphere, soils, sediments and water. Human activities have altered the natural (biochemical and geochemical) cycles and levels of some heavy metals. Excessive levels of metals in air, aquatic and terrestrial contributed pollution and pose risk to human and other living things including *Acanthamoeba*. *Acanthamoeba* is a free living amoeba that potentially becomes pathogenic. They are widely distributed in the environment and not dependent upon a host for transmission and spread. The previous study showed that heavy metals like cadmium, lead, mercury and zinc inhibit the growth of *Acanthamoeba* spp. So, the objectives of the present study are to determine the IC₅₀ of mercury and zinc against two *Acanthamoeba* isolates and to observe the DNA damage caused by zinc and mercury on the two *Acanthamoeba* isolates by comet assay. The amoebae were treated with five different concentrations of the metals and with a control in three replications. From the result obtained, the IC₅₀ value that inhibits 50% of *Acanthamoeba* sp. (HKL isolate) after treated by zinc is 49 ppm and *Acanthamoeba* sp. (SW isolate) is 39ppm. While the IC₅₀ value that inhibits 50% of *Acanthamoeba* sp. (HKL isolate) after treated by mercury is 2.8ppm and *Acanthamoeba* sp. (SW isolate) is 1.1ppm. The DNA damage in *Acanthamoeba* cells by mercury treatment is higher than zinc treatment. This shows that mercury is more toxic than zinc to both *Acanthamoeba*. *Acanthamoeba* sp. (HKL isolate) is more resistant towards both metals compared with *Acanthamoeba* sp. (SW isolate).