

THE EFFECTS OF TIME AND TEMPERATURE ON
ACANTHAMEBA CASTELLANII
IN LABORATORY TEST

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CYTOTOXIC EFFECTS OF LEAD AND CADMIUM ON
ACANTHAMOEBA CASTELLANII: A LABORATORY TEST

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**PENGAKUAN DAN PENGESAHAN LAPORAN
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Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: CYTOTOXIC EFFECTS OF LEAD AND CADMIUM ON *Acanthamoeba castellanii* oleh Hasme Heryanti Binti Abdul Ghani, No. Matrik UK 7777 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, Kolej Universiti Sains dan Teknologi Malaysia.

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ABSTRACT

Cadmium (Cd) and lead (Pb) are heavy metals that are dangerous pollutants and often deposited with natural sediment in the bottoms of streams. Heavy metal poisoning can result when heavy metal dissolved in water and is withdrawn for agricultural or human use. *Acanthamoeba* spp are microscopic and single-celled organisms that commonly found in the environment. Therefore, the purpose of this study is to investigate the effect of lead and cadmium on *Acanthamoeba castellanii* in the laboratory. Any pollutant that enters the aquatic environment will affect the life of this amoeba in the food web of aquatic system. The results obtained from this study demonstrate that lead and cadmium cause inhibition to the growth of *Acanthamoeba castellanii*'s population. In toxicity test, the most toxic metal has the lower value of EC_{50} . In this study, only 13.4 ppm of cadmium needed to inhibit 50% of the amoeba population and 23.8 ppm of lead needed to cause such inhibition. Thus, *Acanthamoeba castellanii* seems to tolerate with high concentration of lead. The maximum inhibition observed in this study was 97.6% for Cd, and 66.27% for Pb. The amoeba cells after treatment with heavy metals were observed to be smaller and slower in movement. The treated cells after Acridine Orange Propodium Iodine Staining shows their nuclei were stained orange, indicating the lost integrity of their cell membranes, which lead to the cell death. The type of cell death observed in this study due to heavy metal toxicity is necrosis. Also under Scanning Electron Microscopy (SEM), the cells membrane of the amoeba after treatment with the heavy metal was damaged.

**KESAN PLUMBUM DAN KADMIUM KE ATAS
Acanthamoeba Castellanii : SUATU KAJIAN MAKMAL**

ABSTRAK

Kadmium (Cd) dan plumbum (Pb) merupakan bahan-bahan pencemar yang beracun dan berbahaya. Keracunan logam berat seperti kadmium dan plumbum terjadi apabila ia larut dalam air. *Acanthamoeba* merupakan organisma unisel dan mikroskopik. *Acanthamoeba* dapat ditemui di persekitaran samada di air, udara atau tanah. Tujuan kajian ini adalah untuk mengkaji kesan kadmium dan plumbum ke atas *Acanthamoeba castellanii* di makmal. Logam berat yang terdapat di persekitaran akuatik secara tidak langsung akan menjejaskan kitar hidup ameba dalam rantai makanan sistem akuatik. Keputusan yang diperoleh dari kajian ini menunjukkan kadmium dan plumbum boleh merencatkan pertumbuhan populasi *Acanthamoeba castellanii* dalam makmal. Dalam ujian ketoksikan, logam yang lebih toksik mempunyai nilai EC_{50} yang paling rendah. Dalam kajian ini, hanya 13.4 ppm kadmium diperlukan untuk merencat 50 % populasi ameba, manakala 23.8 ppm plumbum diperlukan untuk perencatan. Tahap perencatan maksimum diperhatikan dalam kajian ini adalah 97.6% untuk Cd dan 66.27% untuk Pb. Sel-sel ameba yang telah dirawat menjadi kecil dan perlahan pergerakannya. Nukleus sel-sel yang telah dirawat dengan logam berat berwarna oren apabila diwarnakan dengan pewarna Acridine Orange Propodium Iodine. Ini menunjukkan ia kehilangan kekenyalan membran dan mengalami kematian sel iaitu necrosis. Di bawah Scanning Electron microscopy (SEM), sel ameba yang dirawat menjadi berlubang dan bocor membran selnya.