CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
S1307

Project Title
Concentrating Trypansoma lewisi in Transparent Growth Medium: A Model for Improving Field Diagnosis of T. brucei

Abstract

Objectives/Goals
The overall objective of this project is to demonstrate that it is possible to exploit cathodic galvanotaxis (the migration of ciliates and flagellates to the cathode of a DC field) in such a way that it will concentrate living trypanosomes in an electrolyte solution. If this could be demonstrated, it might be possible to construct a small device, using a battery as a voltage source, with which a field scientist could concentrate trypanosomes in a blood sample. A simple concentration technique could make the field detection of sleeping sickness more sensitive, especially when the parasites are still in their early stages and not plentiful enough in blood to be easily detected.
To do this, however, two secondary objectives were presented. First, we would have to find a way cultivate the test-subject, Trypanosoma lewisi, in an optically clear solution, so that it would be possible to examine the influence on the living organism of DC fields of different strengths. Normally, T. lewisi is cultured in a blood agar that lacks the required transparency. Second, we would have to build a device that would accommodate the tests of cathodic galvanotaxis. This device would have to be a small chamber, with a cathode in one end and an anode in the other. It would also need to be completely transparent for examination of the galvanotaxis should it occur.

Methods/Materials
A transparent chamber capable of maintaining a uniform current through it was constructed using a large microscope slide, fragments of standard microscope slides, two platinum wires, and silicone adhesive. T. lewisi was successfully cultured in a solution containing 40 mL of Schneider's Drosophila medium, 10 mL of Fetal Bovine Serum, and 1 mL streptomycin/penicillin. To perform the actual experiment, place a sample of T. lewisi in the constructed chamber. Then induce desired current in the sample by completing a circuit through the appropriate resistor. After 40 minutes, check the results by performing a double blind experiment with a trained microscopist.

Results
The secondary objectives were accomplished, and initial results indicate that the overall objective can also be successful.

Conclusions/Discussion
Some indication of success has been found with direct observation of the cathode and anode within the test cell. However, our trials with the experiment so far are insufficient to make a definite claim; more trials will need to be carried out.

Summary Statement
My goal is to show that trypanosomes will migrate to and concentrate at the cathode of a DC field; a diagnostic device could be created implementing the results that would improve the field detection accuracy of early-stage trypanosomiasis.

Help Received
Elaine Preston was a great help throughout the entire process. Not only did she introduce the experiment idea to me, but she also taught me how to use the necessary laboratory equipment, helped me obtain the required materials, and supervised me as I carried out the actual experiments.