CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

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Project Number

38007

Project Title

The Effectiveness of Homemade vs. Professionally Used Density Gradients

Abstract

Objectives/Goals

The eventual objective of this project is to isolate a small strongyle egg using density gradient centrifugation. Five different density gradient solutions are being compared for effectiveness in completing this goal. They have also been tested using macroscopic objects.

Methods/Materials

First, homemade density and viscosity gradients were created using 7 liquids of different densities. These gradients were tentatively tested using a copper BB, a peppercorn, and a plastic BB (never centrifuged). Then, they were tested against three professionally used gradients (Percoll, Histodenz, OptiPrep) in two ways, using the same three macroscopic objects: spun with objects, and spun without (objects added after). There was also a control that was never put through the centrifuge. Currently, a way to use density gradient centrifugation to isolate small strongyle eggs is being devised.

Results

The initial homemade density gradient worked in that the liquids remained separate, and the objects settled according to density. The objects settled according to density in the initial viscosity gradient as well, but the liquids did not remain separated.

The later homemade density and viscosity gradients controls reacted differently, all three objects settled in the same layer in both (Equifar vedlube). The same was true for the homemade density pre-spun. In the homemade viscosity pre-spun, all objects settled in the same layer somewhere in the middle, though the liquid they stopped in is unidentifiable. In both homemade gradients that were spun with the objects, all three objects were at the bottom of the tube. In all three professional gradients, in both tests and the control (excluding Histodenz pre-spun) the peppercorn floated to the top, but both other objects sunk to the very bottom.

Conclusions/Discussion

According to these limited results, neither my homemade gradients, nor the professionally used gradients are effective when testing with a peppercorn, a plastic BB, and a copper BB. However, these professional gradients are meant to be used with microscopic objects, and the objects I was using may have been too dense for them. I don't believe that I can have conclusive results until I begin testing with small strongyle eggs.

Summary Statement

I compared the effectiveness of my homemade density and viscosity gradients against professionally used density gradient solutions.

Help Received

King Royal Industries purchased the professional gradient solutions, but excluding that financial support, I did this project all on my own.