CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)
Skylar Y. Li

Project Number
38659

Project Title
Natural vs. Artificial: Which Is the Best Insulator?

Abstract

Objectives/Goals
The objective of this experiment is to test and determine the best heat insulating material out of a variety of natural and artificial materials.

Methods/Materials
Plastic bowls, plastic cups, plastic lids, super glue, duck fat, pork lard, bird feathers, aluminum foil, styrofoam, plastic bag, hot and cold water, digital stopwatch, digital thermometers, and data book.

Results
I tested the heat insulating properties of the materials by their ability to retain the heat of hot water at 5 different time intervals over a 15 minute period. Based on my results, the natural materials helped to maintain the hot water at the high temperature losing on average of 39.3F versus 42.0F for the artificial materials. Specifically, I found that the bird feathers was the best performing thermal insulating material helping the hot water to only lose 39.0F after 15 minutes.

Conclusions/Discussion
Repeated trials of testing showed small differences in temperature change but still a drop none the less. It is concluded that the best thermal insulator tested was the bird feathers. This makes sense because you can commonly find duck down in jackets and blankets. You can also look in nature. Penguins live in freezing temperatures and swim in frigid waters! They have two types of feathers. The inner layer of feathers fluff up, meaning that the air occupies the space around the feather strands. This creates a layer of trapped air around the penguin keeping it warm. The outer layer of feathers are slick and straight. They are meant to help penguins swim efficiently and quickly in the water. This also prevent the inner layer of feathers from getting wet.

Summary Statement
As measured by the temperature loss of the water at each time interval, I found that bird feathers were the most effective insulator.

Help Received
I performed all of the experiment design, testing, and recording of data myself. My science teacher gave me a few suggestions on how to improve the experiment.