

Abstract

Project Title: Different Butterflies Different Lift

Project ID: 56

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A brief explanation of your project. Enables judges to receive a base understanding of your project and work.

Butterflies use the lift created by the wind to help them fly, especially species traveling long distances like the Monarch who can cover 50 miles a day and more during migration. Other species like the Fourbar Swordtail do not migrate or travel long distances and spend their whole life in the same area. My hypothesis is that the shape of the butterfly wings and the angle it presents to the wind determines the amount of lift while flying. An angle of 70° should provide the best lift; wing shapes based on the Monarch and the Swordtail will be used in this study.

To test this hypothesis, supports were built with angles of 0-90 degrees. Butterfly shapes were attached to the supports and placed in a homemade wind tunnel to measure the lift at different angles. The lift created by the wind was measured in grams for each angle. The main difficulty of this project was to build a consistent wind tunnel each time.

Results show that the Monarch gets a better lift from the wind than the Swordtail. Moreover, the Monarch is more sensitive to the angle of the wind on the wings, 30° being the best one. Butterflies who fly long distances for their migration like the monarch have higher lift than those who stay in the same area like the Fourbar Swordtail. My hypothesis was not supported because the results show that 30° is the most effective angle for them to get extra lift from the wind and save energy for long distance flight.

Monarch butterflies are endangered, to preserve them we need to understand everything affecting their migration, including flight aerodynamics (lift) and the effect of the wing's shape on long distance flight.

Items to Include:

- **Introduction:** Why did you do this project and why is it important? How will this effect people and why is it needed? Inspire the reader to continue learning more about your research and read your report.
- **Problem Statement and Engineering Goal / Hypothesis:** What is the problem you were solving and what was your engineering goal or hypothesis.
- **Procedures:** How did you solve the problem and or test your hypothesis. Don't go into details, provide a broad, conceptual view of what you did. For engineering, what was your design criteria.
- **Results:** What was the outcome? Use your data and numbers to describe your result.
- **Conclusion:** Was your hypothesis supported or the engineering goal met?