X-Ray Diffraction of Seagull Feather Keratin

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Research Experience for Teachers II
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Professor David Grubb’s Research

• Looking at the keratin protein from a Materials Science viewpoint
• Requires high resolution X-Ray Diffraction data
• Data analyzed to reveal protein characteristics
Previously Published Data

Bear and Rugo 1956
Ragumova et al. 1959
Fraser et al. 1971

- Resolution is excellent
- Poor description of methods used to get these pictures
Cornell’s Facilities for X-Ray Diffraction

Snee Hall
GADDS machine (General Area Detector Diffraction System)

Wilson Synchrotron
CHESS (Cornell High Energy Synchrotron Source)
Keratin Project So Far

Data collected at CHESS

- Tried many different types of feathers
- Tried several different approaches/treatments
- Disappointing results
A New Approach

• “Good” data used seagull feathers, so...
• Focus on different species of seagulls
• Hope to find a species that yields particularly good x-ray diffraction data
A Problem

• Access to different seagull species limited to museum-quality bird WINGS from Cornell

• Cannot remove feathers from these wings
My Contribution to the Project

We decided on two tasks for me to explore:

• Research the preparation of feathers for x-ray diffraction, and

• Figure out how to use an entire bird wing in the GADDS machine
My Results
What Can I Bring Back to my Seventh Grade Science Curriculum?

• **Science Process**: The Importance of Sample Preparation in the Design of an Experiment

• **Trial and Error in Science**
Thank You

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AND...

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