

Project Title: All About Arsenic

School: Mount Desert Elementary School

Grade Level: 7/8

Teacher: Sarah Dunbar

Project Partners: Jane Disney, MDI Biological Laboratory
Hannah Lust, MDI Biological Laboratory

Teacher Profile: Sarah Dunbar is a middle school science teacher at Mount Desert Elementary. Sarah received a bachelor's degree in Elementary Education and a Masters degree in curriculum and instruction with a focus on science education from University of Massachusetts. She is in her 14th year of teaching. Sarah looks for learning opportunities that inspire and motivate her students to have an impact. The All About Arsenic project provides a learning platform for students to inform and educate their community about the health effects of arsenic in drinking water.

Summary:

The 7th and 8th grade at Mount Desert Elementary School participated in an arsenic investigation.

This project had three parts:

1. Classroom Investigation (Duckweed and Lettuce seed bioassays)
2. Well water testing
3. Community outreach and advocacy

Middle School Science Practice Standards:

MS.S.1-SEP-Asking Questions and Defining Problems

MS.S.3-SEP-Planning and Carrying Out Investigations

MS.S.8-SEP-Obtaining, Evaluating, and Communicating Information

MS.S.5-SEP: MS.S.5-SEP-Using Mathematics and Computational Thinking

1. Classroom Investigation
Data to Action [Lesson plan](#)

The students started the project by researching arsenic. The purpose of this project was to become “experts” in a subtopic about arsenic. The classes brainstormed what was most important for them to learn about arsenic so

that they could be community advocates and help educate their community about arsenic. Groups researched and presented on topics like:

What is arsenic?

What are the health impacts of Arsenic exposure?

What do you do if you have high levels of arsenic?

Why do we have high levels of arsenic in Maine and New Hampshire?

What is the history of arsenic?

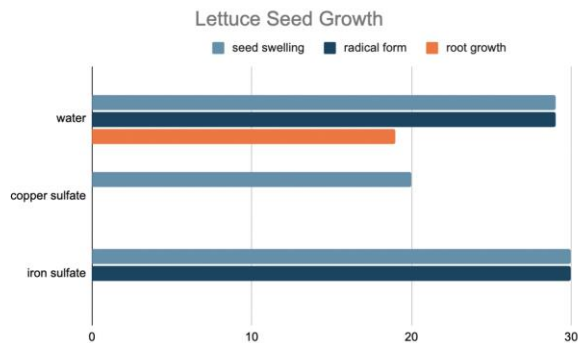
How does arsenic get in well water?

Understanding the issues regarding arsenic in well water provided a springboard into their guided inquiry projects.

The 7th grade conducted a guided inquiry. One group's inquiry was a lettuce seed bioassay and the other was a duckweed bioassay. Lesson plans are attached below.

[Lettuce Seed Bioassay](#)

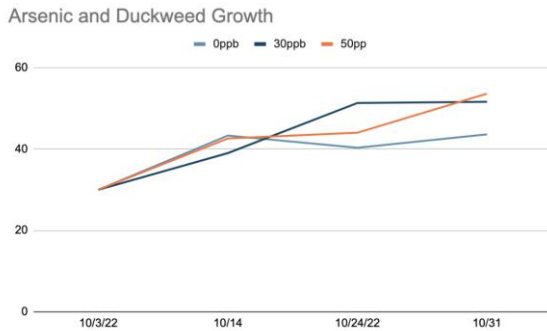
Data and Results



- * there was only root growth in the water group
- * the copper sulfate group only had seed swelling
- * radical form happened in both water and iron sulfate groups

[Duckweed Bioassay](#)

Data



- The 50 parts per billion arsenic water had the most growth over the 28-day period.
- The 0 parts per billion arsenic water, or just regular water, had the least growth over the course of the experiment.

2. Students collected water samples from their own homes and we offered samples to MDES families. We sent 13 samples to be analyzed. They were able to analyze and interpret the data for arsenic in well water in the town of Mount Desert.
3. Advocacy- The 7th grade students decided to create posters for the Town Meeting for Mount Desert.

Project Details:

- How many students were in the class that was involved in this project?

19 students in grades 7

Did you:

- Collaborate with any other teachers in your school? yes
- Go on any field trips? No
- Conduct any experiments? What kinds of questions did students ask?

Lettuce seed and duckweed bioassays

- Invite any guests to visit your classroom? Jane Disney visited grade 7 to help provide background information on the project and help them set up their bioassays.

- How did you use Tuva, both for the arsenic data and for other datasets?

For the 7th graders who were new to Tuva we started the year with learning how to navigate Tuva. We used the Disney vs. Pixar data set as a way to explore possible questions and features that Tuva has to offer. After our results came in, the 7th grade used TUVA to analyze the well samples. They also included graphs and data from Tuva on their posters for the town meeting.

- How did you plan your community meeting?

We did not have a community meeting this year but they had posters set up for the town meeting.

Discussion:

- What did students learn? My students learned how to conduct an experiment using the scientific method, they learned how to collect and analyze data. They also learned how to share their findings and communicate to a greater audience.
- What did you learn? I learned to be willing to share ideas and advocate at any level is important, and that student choice allows for more commitment to the work.
- What would you do differently? In the past I have done this project in both 7th and 8th grade. This year I decided to just do this with the 7th grade. I feel like I would like to return to doing this with 7th and 8th. After their 7th grade year, they come in as 8th graders with more background information and are able to dive deeper into the project.

Conclusion:

This year the All About Arsenic Project was a much smaller scale project in my classroom. However, I was really happy with the bioassays the 7th grade did. It was a nice introduction into inquiry for them. It created a good flow to the school year. I do wish we had more time to prepare for the poster session at the Town meeting. There was a pretty big gap between when we started the project and the Town Meeting so we ended up getting busy with other projects. I was really impressed with my students ability to dive back into the project and create posters to help inform the community about the importance of testing your well water. Their posters were thoughtful and supported with evidence from our data set. It was a small way to share out and advocate but they did a really good job.

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