

MICROSCOPIC MARVELS



LESSON PLAN

Nematodes and Ecosystem Connections

Exploring nematodes in the Nebraska Sandhills and their role in ecosystems, scientific inquiry, and careers in ecology, agriculture, and science communication.



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BACKGROUND



The Team

Dr. Tom Powers (PI), Dr. Dorota Porazinska (Co-PI), Dr. Jamie Loizzo (Co-PI), colleagues, students, and stakeholders came together to find out more and communicate about a collection of nematodes that have adapted to a wide range of habitats, including the Nebraska Sandhills.

Research Overview

The team collected and analyzed aquatic nematodes throughout water systems in Nebraska to determine their appearance, genetics, and connection to their surrounding environments (ecology). Together, these different pieces of information could provide insights about nematode roles in these lakes.

Microscopic Marvels Website

<https://streamingscience.com/miscropic-marvels/>

The National Science Foundation's Poorly Sampled and Unknown Taxa (NSF PurSUiT) program (AWD# 2327478) funded the project (2024-2027). The funding supported scientists' discovery of biodiversity and description of poorly known species around the world. Currently, it's estimated that scientists have described less than 30,000 nematode species on the planet.

LEARNING OBJECTIVES



BY THE END OF THE LESSON, YOUR STUDENTS WILL BE ABLE TO:

- | | |
|-----------------|--|
| Describe | nematodes and their ecological roles in soil and aquatic systems |
| Explain | the contributions of nematodes to ecosystem services in the Nebraska Sandhills |
| Analyze | scientific inquiry used to study nematodes and alkaline lake ecosystems |
| Evaluate | careers highlighted in the podcast and the skills required for science communication |
| Develop | a science communication product focused on nematodes and ecosystem health |

NEXT GENERATION SCIENCE STANDARDS ALIGNMENT

This lesson supports the following Next Generation Science Standards

MS-LS2-3	Develop a model to describe cycling of matter and energy flow in ecosystems.
HS-LS2-6	Evaluate claims about cycling of matter and energy among organisms.
Nature of Science	Scientific inquiry, evidence-based reasoning.
Common Core ELA	Speaking & Listening, Informational Writing.



USE THIS LINK TO ACCESS PODCASTS:

<https://streamingscience.com/miscropic-marvels/>

MICROSCOPIC MARVELS EPISODES



University of Florida undergraduate and graduate students enrolled in Dr. Jamie Loizzo's Podcasting to Increase Science Literacy course in the Department of Agricultural Education and Communication in spring 2025 interviewed scientists, student researchers, and ranchers and produced the following Microscopic Marvels podcast series:

EPISODE LINKS

[EP 1: Hidden in the Sand: Researching Nematodes and the Nebraska Sandhills](#)

[EP 2: Science and Nematodes](#)

[EP 3: Harvesters of Sunlight and Grass: Ranchers as Conservationists \(Part 1\)](#)

[EP 4: Harvesters of Sunlight and Grass: Ranchers as Conservationists \(Part 1\)](#)

[EP 5: Communicators and Storytellers](#)

[EP 6: Interview with Media Specialists for Nematode Science](#)

[EP 7: How Storytelling Makes Science Matter](#)

[EP 8: A Student's Nematode Journey](#)

[EP 9: A Student's Nematode Journey](#)

LESSON FLOW

DAY ONE



ENGAGE & EXPLORE (40 MINUTES)

- Distribute the Student Worksheet to guide note-taking and reflection throughout the lesson.
- Distribute the Podcast Listening Guide.
- Use the podcast PowerPoint presentation for the lesson.
- When prompted with the “Podcast Listening Guide” slide, play a portion of a podcast episode from the Microscopic Marvels series of you/your students’ choice
- Your class could listen together, or students could listen individually on their own

EXPLAIN (15 MINUTES)

- When prompted with the “Reflection and Discussion” slide - review Student Worksheet and Podcast Listening Guide
- Facilitate a whole-class discussion to synthesize ideas from the lesson and podcast.
- Use guiding questions such as:
 - Why are nematodes important indicators of ecosystem health?
 - What scientific questions are researchers asking about the Sandhills and alkaline lakes?
 - Who are the people involved? And what do they do?
 - Scientists, ranchers, student researchers, science communicators, etc.
 - How does this research illustrate the nature of scientific inquiry?
- Highlight how scientists collect evidence, revise hypotheses, and communicate findings, reinforcing the nature of science and real-world research practices.

LESSON FLOW

DAY TWO



EXTEND (30-40 MINUTES)

- Distribute Science Communication Project Guide
- Using the podcast PowerPoint presentation introduce the culminating task: students will create a science communication product that explains the role of nematodes in ecosystem health to a specified audience (e.g., ranchers, students, policymakers, stakeholders, etc.).
- Students may choose from formats such as a short podcast script, infographic, or blog post.
- Provide clear criteria and expectations, including:
 - Scientific accuracy and clarity
 - Effective use of evidence from the podcast and lesson materials
 - Consideration of audience and communication goals
- Circulate to provide feedback, prompt deeper connections, and support students in refining both content and communication strategies.

EVALUATE (10 MINUTES)

- Students share their science communication products in small groups.
- Peers provide brief feedback on clarity, engagement, and scientific understanding.
- The teacher evaluates student work using a rubric that assesses:
 - Accuracy of ecological concepts
 - Integration of scientific inquiry and career connections
 - Creativity and effectiveness of communication
- Conclude with a short reflection discussion on how science communication connects research, careers, and public understanding.



DESCRIBE TWO SURPRISING FACTS ABOUT NEMATODES OR ALKALINE LAKES.

PODCAST LISTENING GUIDE

HOW DO NEMATODES AFFECT ECOSYSTEM SERVICES?

DESCRIBE THE NEBRASKA SANDHILLS

WHAT DID YOU LEARN ABOUT THE INDIVIDUALS' CAREERS IN THE PODCAST?

STUDENT WORKSHEET

NEMATODES & ECOSYSTEM SERVICES

Name and Date:

Describe the Nebraska Sandhills.

Define nematodes in your own words.

Explain how nematodes contribute to nutrient cycling.

List one service provided by nematodes.

List two roles nematodes play in ecosystems.

Reflect: Why is studying nematodes important to understand ecosystems?

SCIENCE COMMUNICATION PROJECT GUIDE

★ YOUR TASK

Your task is to create a science communication project that explains what nematodes are, why they matter to ecosystems, and how scientific research helps us understand ecosystem health, particularly in the Nebraska Sandhills. You will decide how to present this information and who you want to communicate with.

★ CHOOSE FORMAT

You may create a short podcast script or audio piece lasting one to three minutes, design an infographic, or write a short blog post or article of approximately 300 to 500 words. If you have another creative idea, your teacher may approve it as long as it clearly communicates scientific ideas.

★ CHOOSE AUDIENCE

As part of this project, you will select an audience for your work, such as students your age, ranchers or land managers, policymakers or community stakeholders, or members of the general public. The language, tone, and overall design of your project should be tailored to the audience you choose.

★ WANT TO SHARE?

If you would like your project to be featured on Streaming Science, you are welcome to submit it for possible publication. You can email your project to streamingscience1@gmail.com. In your message, include your name or names, your school and grade level, the title and format of your project, and a short note explaining who your audience is. Selected projects may be shared as part of Streaming Science's efforts to highlight student voices in science communication.



RUBRIC



Criteria	Excellent (25)	Proficient (15)	Developing (5)
Accuracy of Science Content	All information is accurate	Minor errors	Several errors
Creativity & Engagement	Highly engaging and creative	Some creativity	Limited creativity
Clarity & Organization	Clear and well-organized	Mostly clear	Unclear or disorganized
Career Reflection	Insightful reflection	Basic reflection	Minimal reflection



UF UNIVERSITY of FLORIDA



PLATTE BASIN
TIMELAPSE



PHOTOGRAPHY AND EDUCATOR PACKET CREATION: MAGGIE MURPHY & DR. JAMIE LOIZZO