

# Mushroom Maestros

Primary Curriculum	Grade 3
Supplemental Curriculum	Grades 2–5+
Notes	Mushroom packaging kit has 3-month shelf life (can be shipped separately). Not for use by students/teachers with fungal allergies or severe hay fever/allergies. Standard unit/refill kit comes with enough materials for 30 students.

## Description

**What can YOU make out of mushrooms?**

Mention mushrooms, molds, slimes, or other fungi to kids and you’re likely to get a bunch of scrunched noses and a chorus of “ewwws!” That all changes when Eben and Gavin start to explain how mushroom technology is changing the way we think about packaging, sculpture, and many other things.

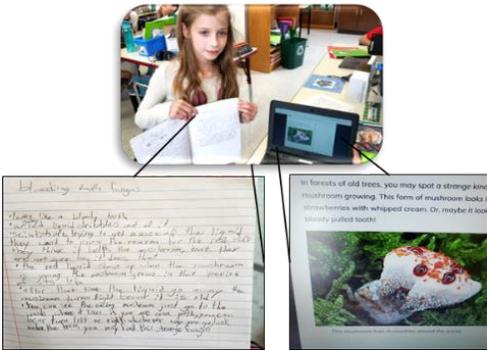
Using the game-changing mushroom-based technologies coming out of Ecovative’s Mycelium Foundry as the overarching phenomenon, students explore traits, characteristics, and engineering as they ask themselves: *“How and why do traits develop and how can humans use them to solve problems and develop technology?”*

## Main Investigations

### Traits & Characteristics Sorting Cards



### Mushroom Trait Research



### Mushroom Packaging Design Project



## Number of Lessons\* Best Suited For

**Full unit** – 25 lessons  
**Supplemental program** – minimum 7 lessons  
 (requires 2 weeks for mushroom packaging to grow)

*\*Lesson = 30–40 min. block, 50% of full unit lessons can be delivered in non-science classes*

- Classroom science instruction (Grade 3)
- Summer camps (minimum 2 weeks) (Grades 2–5+)
- Afterschool programs that have regular attendance or flexible programming (Grades 2–5+)

## Overarching Enduring Understanding

How can naturally occurring materials can be used to create healthier, safer, and cleaner products that put less stress on the environment?

### Number of Lessons\*

Full unit – 25 lessons

Supplemental program – minimum 7 lessons (requires 2 weeks for mushroom packaging to grow)

\*Lesson = 30 – 40 min block, 50% of full unit lessons can be delivered in non-science classes

### FLOW OF INSTRUCTION

#### Investigation: “Stolen from Nature” (mini research project, occurs during week 1)

Students gather, analyze, and interpret data to look critically at the similarities and differences of various organisms in nature and start constructing explanations about why similar organisms may be different and what purpose those differences serve.

For the activity students find something from nature that we use—either directly or modified—and ask the following questions: *Which traits make the organism useful to us? Are there traits that might make it less useful? Are there versions of the organism that are less useful? What traits don't matter? Why did some attributes develop and others not?* (For example, pine trees—tall, straight; bamboo—tall, straight, grows fast; madrone trees—slow-growing, curvy.)

#### Investigation: Hi Fungi! Are You a Friend or Foe? (research activity, occurs during week 3)

Students do research to gather evidence and data on why different traits/characteristics developed in various fungi species. They will compare similarities and differences that exist between parents and offspring, as well as between types of fungi.

#### Investigation: Terrific Traits (summative challenge, occurs during weeks 4, 5, & 6)

After some practice with looking at species variations and identifying different characteristics and traits, students will pick a plant- or fungi-inspired technology for the summative challenge. In this challenge students must construct an explanation, by **providing evidence**, of why the plant or fungus has developed the way that it has. This explanation should include both the variations in a given trait and why some versions of those variations are more useful than others.

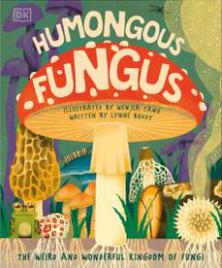
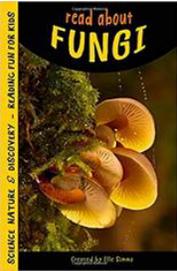
#### Investigation: Mushroom Packaging (hands-on activity, occurs during weeks 2, 3, and 4)

In small groups students will mix, grow, mold, and track the creation of mycelium-based products from a dormant material (*substrate*) over the course of 10 days. In the beginning they will outline design and evaluation criteria as well as the project constraints. Throughout the process they will make observations about any changes in material processing and performance with respect to the initially stated constraints and criteria for their design. At the end students will evaluate their product with respect to their initially stated performance criteria, compare their product with their classmates', and suggest possible improvements for both their own process and for those of the other groups.

#### Investigation: Who Are You Most Closely Related To? (sorting game, occurs during week 2)

As students practice identifying patterns associated with traits and characteristics of various living organisms, they learn about how (and why) scientists organize and classify different organisms. Areas of focus include connections between parents and offspring and connections between different types of animals.

## Parts List

Full Unit	
<p><b>Printed Materials</b></p> <ul style="list-style-type: none"> <li>• Educator Guide</li> <li>• Individual My <i>STEM Explorer Notes™</i> notebooks</li> <li>• Individual My <i>STEM Stories™</i> notebooks</li> <li>• Timeline sheets</li> <li>• Introductory investigation sheets</li> <li>• Traits and Characteristics sorting cards</li> </ul>	<p><b>Trade Books</b></p> <div style="display: flex; justify-content: space-around;">   </div>
<p><b>Provided Equipment &amp; Materials</b></p> <ul style="list-style-type: none"> <li>• Grow-It-Yourself classroom kit* (mycelium, planter forms, nitrile gloves)<sup>1</sup></li> <li>• All-purpose flour<sup>1</sup></li> <li>• Pushpins</li> </ul>	<div style="display: flex; justify-content: center; align-items: center;">  </div> <ul style="list-style-type: none"> <li>• <i>Judy Wearing. Fungi: Mushrooms, Toadstools, Molds, Yeasts, and Other Fungi</i></li> <li>• <i>Elle Simms. Read about Fungi: Reading Fun for Kids</i></li> <li>• <i>DK Books: Humongous Fungus (Underground and All Around)</i></li> </ul>
<p><b>Common Equipment &amp; Materials Needed but NOT Provided</b></p> <ul style="list-style-type: none"> <li>• Large mixing bowls or tubs (3–6)</li> <li>• Measuring cup, teaspoons</li> <li>• Tape or binder clip</li> <li>• Tap water</li> <li>• Oven</li> <li>• Kitchen Scale (optional)</li> <li>• Cookie sheet (or similar)</li> </ul>	<p><b>Digital Resources</b></p> <ul style="list-style-type: none"> <li>• Electronic copies of printed materials<sup>1</sup></li> <li>• How-To videos for investigations<sup>1</sup></li> <li>• Easy-to-use links to publicly available videos and other information.</li> </ul>

## Supplemental Unit

### Printed Materials

- Educator Guide
- Individual My STEM Explorer Notes™ notebooks
- Individual My STEM Stories™ notebooks
- Timeline sheets
- Introductory investigation sheets
- Traits and Characteristics sorting cards

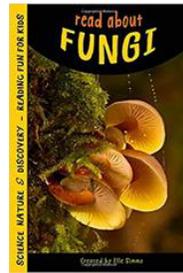
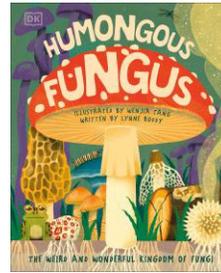
### Provided Equipment & Materials

- Grow-It-Yourself classroom kit\* (mycelium, planter forms, nitrile gloves)<sup>1</sup>
- All-purpose flour<sup>1</sup>
- Pushpins

### Common Equipment & Materials Needed but NOT Provided

- Large mixing bowls or tubs (3–6)
- Measuring cup, teaspoons
- Tape or binder clip
- Tap water
- Oven
- Kitchen Scale (optional)
- Cookie sheet (or similar)

### Trade Books



- Elle Simms. *Read about Fungi: Reading Fun for Kids*
- DK Books: *Humongous Fungus (Underground and All Around)*

### Digital Resources

- Electronic copies of printed materials<sup>1</sup>
- How-To videos for investigations<sup>1</sup>
- Easy-to-use links to publicly available videos and other information.

## Refill Kit

### Printed Materials

- Educator Guide
- Individual My STEM Explorer Notes™ notebooks
- Individual My STEM Stories™ notebooks
- Timeline sheets
- Introductory investigation sheets

### Provided Equipment & Materials

- Grow-It-Yourself classroom kit\* (mycelium, planter forms, nitrile gloves)<sup>1</sup>
- All-purpose flour<sup>1</sup>
- Pushpins

### Digital Resources

- Electronic copies of printed materials
- How-To videos for investigations
- Easy-to-use links to publicly available videos and other information.

## Overarching Enduring Understanding

**How can naturally occurring materials can be used to create healthier, safer, and cleaner products that put less stress on the environment?**

**Number of Lessons\***

Full unit – 25 lessons

Supplemental program – minimum 7 lessons (requires 2 weeks for mushroom packaging to grow)

\*Lesson = 30 – 40 min block, 50% of full unit lessons can be delivered in non-science classes

**FLOW OF INSTRUCTION****3-LS4-2**

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

**3-LS3-1**

Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

**3-5-ETS1-1**

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

**3-5-ETS1-2**

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

**Investigation: “Stolen from Nature” (mini research project, occurs during week 1)**

Students **gather, analyze, and interpret data** to look critically at the similarities and differences of various organisms in nature and start **constructing explanations about why similar organisms may be different** (3-LS3-1) and **what purpose those differences serve** (3-LS4-2).

For the activity students find something from nature that we use—either directly or modified—and ask the following questions: *Which traits make the organism useful to us? Are there traits that might make it less useful? Are there versions of the organism that are less useful? What traits don't matter? Why did some attributes develop and others not?* (For example, pine trees—tall, straight; bamboo—tall, straight, grows fast; madrone trees—slow-growing, curvy.)

**Investigation: Hi Fungi! Are You a Friend or Foe? (research activity, occurs during week 3)**

Students do research to gather **evidence and data on why different traits/characteristics developed in various fungi species**. They will **compare** similarities and differences that exist between parents and offspring, as well as between types of fungi.

**Investigation: Terrific Traits (summative challenge, occurs during weeks 4, 5, & 6)**

After some practice with looking at species variations and identifying different characteristics and traits, students will pick a plant- or fungi-inspired technology for the summative challenge. In this challenge students must construct an explanation, by **providing evidence**, of why the plant or fungus has developed the way that it has. This explanation should include both the variations in a given trait and why some versions of those variations are more useful than others.

**Investigation: Mushroom Packaging (hands-on activity, occurs during weeks 2, 3, and 4)**

In small groups students will mix, grow, mold, and track the creation of mycelium-based products from a dormant material (*substrate*) over the course of 10 days. In the beginning they will outline **design and evaluation criteria** as well as the **project constraints**. Throughout the process they will make **observations** about any changes in material processing and performance **with respect to the initially stated constraints and criteria** for their design. At the end students will **evaluate their product with respect** to their initially stated **performance criteria**, **compare** their product with their classmates', and **suggest possible improvements** for both their own process and for those of the other groups.

**Investigation: Who Are You Most Closely Related To? (sorting game, occurs during week 2)**

As students practice **identifying patterns associated** with traits and characteristics of various living organisms, they learn about how (and why) scientists organize and classify different organisms. Areas of focus include connections between parents and offspring and connections between different types of animals.