Name: _____ Class: _____ Date: _____

5.3 Grading the Explanations Tool: How does a fungus get small organic molecules to its cells?

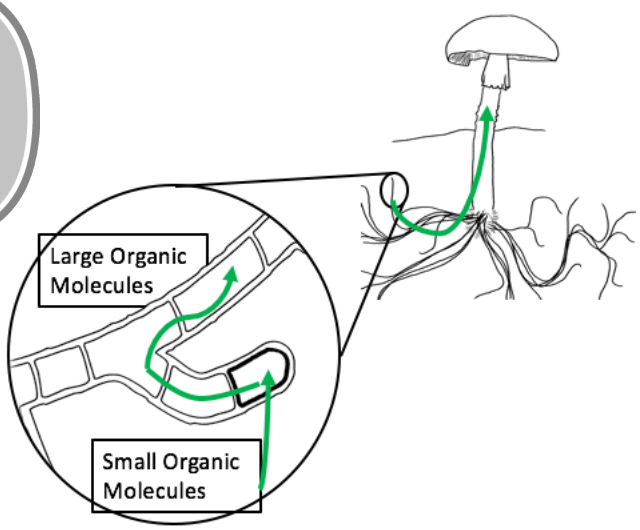
*This worksheet has "grading" in the title because at this point, students can be held accountable for correct answers. Level 4 (correct) responses to the questions are in **blue bold italics** below. There are also comments about common Level 2 and Level 3 responses to help you with grading and making decisions about what to emphasize in future lessons.*

Red italics suggest ways to grade student responses by giving them points for correct or partially correct answers. There are 15 points total on this worksheet.

Carbon TIME Discourse Routine around the Explanations Tool:

1. *Introduction: Students review their Evidence-Based Arguments Tools. Establish the purpose for completing the tool as developing a complete explanation for the unit phenomenon.*
2. *Private thinking and writing: Students complete the Explanations Tool individually.*
3. *Partner or small group work: Students share and compare ideas in pairs/small groups, with the goal of improving their explanations.*
4. *Sharing ideas in whole-class discussion: Class discussions serve to elicit, clarify, and compare explanations from individual students and/or student groups.*
5. *Consensus-seeking discussion accompanied by public writing: Class discussions focus on coming to consensus around a correct, coherent explanation that answers the Three Questions while addressing the 4 steps. We recommend that students revise their explanations in a different colored pen/pencil.*

The Matter Movement Question



Note: fungi produce and release molecules (enzymes) that can break large organic molecules up into small organic molecules.

Draw and label arrows that show how molecules move from detritus into the fungus.

- Show and label molecules with carbon atoms in detritus.
- Show and label how molecules with carbon in detritus move into and through the dark-bordered hyphal cell.
- Show how molecules with carbon move to other cells in the fungus.

Level 4: Labeled arrows showing:

- ***Large organic molecules (or polymers: proteins, fats/lipids and/or carbohydrates) in the detritus.***
- ***Small organic molecules in the detritus.***
- ***Small organic molecules entering the hyphal cell in cellular-scale drawing.***
- ***Small organic molecules (or monomers: amino acids, sugars, fatty acids and glycerol) going through the fungus.***

1 point for each correct arrow/molecule. 4 points total.

The Matter Change Question

Name the chemical change that a fungus uses to break down food: ***Level 4: digestion***
1 point for correct answer.

What molecules are carbon atoms in before the chemical change?
Level 4: Large organic molecules (or

What molecules are carbon atoms in after the chemical change?

polymers: carbohydrates, fats/lipids, and proteins).

1 point for correct answer.

What other molecules are needed?

Level 4: Water

1 point for correct answer.

Chemical Change

Level 4: Small organic molecules (or monomers: amino acids, sugars, and fatty acids)

1 point for correct answer.

What other molecules are produced?

Level 4: none

1 point for correct answer.

The Energy Question

What forms of energy go into this chemical change?

Level 4: Chemical energy

1 point for correct answer.

Energy Transformation

What forms of energy come out of this chemical change?

Level 4: Chemical energy

1 point for correct answer.

Explain in words: How does a fungus get small organic molecules to its cells? (Answer on the back).

Use this Explanations Tool to help guide your written explanation, being sure to answer the Three Questions.

Remember: **Atoms last forever** (so you can arrange atoms into new molecules but can't add or subtract atoms).
Energy lasts forever (so you can change forms of energy, but energy units can't appear or go away).

Level 4 responses should include answers to each of the four numbered steps on the Three Questions poster and handout:

1. ***Matter movement: Large organic molecules (or polymers: carbohydrates, fats/lipids, proteins) are in the detritus.***
2. ***Matter change: Enzymes, released by the fungus, break large organic molecules into small organic molecules (or monomers: amino acids, sugars, fatty acids, glycerol) outside of the fungus.***
3. ***Energy change: The chemical energy of the C-C and C-H bonds in the large organic molecules remains in the C-C and C-H bongs of the small organic molecules.***
4. ***Matter movement: The small organic molecules enter into the hyphal cells and travel to the rest of the fungus.***

Level 2 and 3 responses may describe a digestive process of breaking down food but will state or imply the food is broken down or turned into energy by digestive enzymes. Level 3 responses might include more detail confusing digestion with cellular respiration.

1 point for each correct answer.
4 points total.