

## Assignment 3: Energy Transfer

### Teaching Notes

#### Part I

- Frozen mice can be ordered from an online pet or laboratory supply company.
- Burying beetles need to be trapped. This in itself can be an engaging activity for students and a simple introduction to field sampling methods. Review the video from the online module titled “The Story Behind the Data;” it provides directions for setting up beetle traps. Following is a list of materials required to make one beetle trap:
  - 1 large coffee can. Puncture the base with several holes to allow water drainage.
  - 1 tall metal or wooden stake. Traps need to be elevated off the ground to protect them from unwanted visitors (such as coyotes).
  - A few feet of wire to secure the trap to the stake
  - A piece of wire mesh large enough to cover the top of the can. Cut a small hole in the center for the beetles to fall through.
  - 1 rubber band. This needs to be large and strong enough to wrap around the can and secure the mesh lid.
  - Fresh soil to fill 2/3 of the can. If the soil is hard and clay-based, mix in a bit of potting soil.
  - 1 chicken drumstick.
  - Water. Add a few splashes to the soil.Set the trap and return daily to check for beetles. Add water to the trap if the soil is cracked and dry. The chicken drumstick will need to be replaced if it has dried out or become riddled with maggots.
- The availability of burying beetles will depend on your location. Consider the following descriptions:
  - “*Nicrophorus investigator* is widely distributed throughout Canada and Alaska and along the Rocky Mountains to New Mexico and Arizona. It is occasionally found in the northeastern United States.” (Ratcliffe 1996)
  - “*Nicrophorus guttula* is widely distributed in the western half of the United States, southern British Columbia, Alberta, and Saskatchewan in Canada, and northern Baja California in Mexico.” (Ratcliffe 1996)If possible, contact a local entomologist to discuss the occurrence of burying beetles in your area.
- Beetle trapping will be most successful during the months of June, July, and August. However, substantial numbers can still be collected in May and September, and even April and October (depending on the local climate).
- Please be aware that the American burying beetle, *Nicrophorus americanus*, is an endangered species; it should not be trapped and used for the biomass conversion experiment. The USFWS South Dakota Field Office describes an easy method for identifying American burying beetles and distinguishing them from other *Nicrophorus*:  
<https://www.fws.gov/southdakotafieldoffice/BEETLE.HTM>



Ratcliffe, B.C. 1996. The Carrion Beetles (Coleoptera: Silphidae) of Nebraska. The University of Nebraska State Museum. Lincoln, NB, pp. 67-70.

▪ **Question 7**

Below is an example of what Data Table A might look like:

Container	Beetle species	Mass of carcass (g)	Date and Status	Date and Status	Date and Status	Date and Status
1	Ng	20.30	11/30/16 mouse in ball 80% buried	12/1/16 buried eggs	12/2/16 eggs	12/5/16 larvae!
2	Ng	20.02	11/30/16 buried	12/1/16 no eggs	12/2/16 no eggs	12/5/16 no eggs
3	Ng	31.68	11/30/16 mouse in ball 50% buried	12/1/16 hair removed 80% buried eggs	12/2/16 buried eggs	12/5/16 larvae!
4	Ng	28.00	11/30/16 buried	12/1/16 no eggs	12/2/16 no eggs	12/5/16 eggs
5	Ng	31.35	11/30/16 75% buried	12/1/16 75% buried no eggs	12/2/16 buried eggs	12/5/16 1 beetle eaten

▪ **Question 8**

Direct students to empty the soil from their containers into a large tub. Use plastic spoons to methodically dig through the soil and pick out the larvae. Weigh each individual larva. The electronic balance should record the weight to three decimal places.

**Part II**

▪ **Question 1**

Students can use the Excel file titled “BeetleBiomassSampleData” to supplement their own data and increase the overall sample size. This sample data set was populated by undergraduate students from the Fall 2016 General Ecology course at Idaho State University. It is authentic.

▪ **Question 3**

The figure below may be helpful for students struggling to understand what happens to energy when it is “consumed” by an animal:

Molles, M. C. 2013. Ecology: Concepts and Applications. Seventh Edition. McGraw-Hill, New York, NY, pp. 405.

