Teacher Background Information
A World In a Bottle (SC070106)

A terrarium is a miniature community that can illustrate the transfer of energy through a community. It also illustrates to students the use of a model to represent real-world situations. Both concepts should be stressed during instruction. The key benchmark involves transport of energy from producers to consumers. There is also the opportunity to explore biomass and food pyramids. The second law of thermodynamics describes how energy is dissipated as it is changed—passed from producer to consumer. So a model ecosystem like the terrarium must have a much greater mass of plants than animals to survive for a long period of time. (Because we should always take the opportunity to reinforce respect for living things in our lessons, it is a good idea to have a definite end to this lesson. Return the animals to nature and plant the seedlings outside before the terrariums die or become moldy.)

The unit requires careful planning so that the seeds are germinated and tiny plants are ready for insertion into the terrarium. Our sample lesson plan suggests that the seeds be planted in paper cups on day 4 of the unit, in preparation for construction of the ecosystem on days 10 and 11. In fact, the crickets and worms could live in the bottle while the plants grew (with the cap off) but to do the lab that way could create misconceptions about the importance of producers in natural ecosystems. Students will germinate 8 seeds, and plant 6 in their terrarium. Two will be saved for the next laboratory.

The student reading on actual research indicates the difference between a food web (which only shows where the energy goes) and a food pyramid (which graphically shows how much energy is in each trophic level, as represented by digestible “bio-“ mass.) This will be a new twist on the familiar food chain for students, as they think about the “large” mass of plants compared to the “small” mass of a rabbit. Such quantitative biology is important in building a foundation for future lessons. About 90% of the energy available at any tropic level is used or wasted by the organisms at that level. About 10% of the energy goes on to the next level.