



Discovery Day – Amazing Adaptations Bombardier Beetle

Video Premieres
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on Facebook!

What you need

- Small tube (e.g., test tube)
- Pipette or medicine dropper
- Googly eyes
- Several tiny pom-pom craft balls
- Glue
- 3 pipe cleaners
- Funnel (paper funnels work well, though!)
- 1 tablespoon of baking soda
- 1 pipette-full of distilled vinegar

Follow the steps below to create your own bombardier beetle, famous for their unique defensive adaptation of spraying predators with an explosive chemical reaction!

Preparation

1. Gather your supplies listed above.

What to do

1. Take the 3 pipe cleaners and wrap each one around the middle of the test tube such that you form 6 legs (three legs per side). Bend the bottom of each pipe cleaner to create “feet.” This should enable the beetle to stand on its own.
2. Glue the googly eyes to the closed end of the test tube.
3. Glue the pom-pom balls along the test tube to model bombardier beetle coloration.
4. Allow the glued-on parts to dry for at least half an hour.
5. Use the funnel (or make a funnel out of paper) and pour the tablespoon of baking soda into the test tube which represents the beetle’s abdomen.
6. Place your beetle in an area (such as an empty sink or a plastic tub) where you don’t mind things getting wet. Make sure the open end of the test tube is pointed away from your face.
7. Use the pipette or medicine dropper to suck up some distilled vinegar. Then squeeze the vinegar into the test tube.
8. Watch the chemical reaction that takes place! You can keep adding vinegar until all the baking soda in the beetle is gone.



Image from the Morehead Planetarium & Science Center YouTube channel

What is happening?

This activity demonstrates how bombardier beetles are specially adapted with a defense mechanism to protect themselves from predators. When disturbed, real bombardier beetles eject a stinky, near-boiling-hot, explosive chemical spray from the tip of their abdomen – accompanied with a popping sound. The spray is produced by a reaction between two chemical compounds, hydroquinone and hydrogen peroxide. These two chemicals are stored in reservoirs in the beetle’s abdomen. When combined, the byproduct of these chemicals can result in chemical burns and severe eye irritation. To avoid chemical burns, in this activity we use baking soda and vinegar to create a less-stinky, endothermic (heat-absorbing rather than heat-releasing) reaction, which is much safer for kids!

Why do bombardier beetles have hydroquinone and hydrogen peroxide inside them? Hydrogen peroxide is a natural byproduct of metabolism in almost all living creatures. And insects use hydroquinone to harden their shells. The bombardier beetles have evolved to store these chemicals instead of breaking them down or using them up, and so they utilize them as a terrific defensive adaptation!