

Breeding Guppies

Age Group: Elementary School

Objective

- To learn about the basics of evolution through selective breeding and reproduction.

Background Lesson

The guppy (*Poecilia reticulata*) is one of the most popular freshwater aquarium fish in the world. Discovered in 1866, these small fish are native to parts of the Caribbean as well as Central and South America such as Brazil and the Virgin Islands. Over the years, selective breeding has produced a large variety of color patterns, larger bodies and more flowing tails. There are a dozen standard tail types recognized by the International Fancy Guppy Association (IFGA) and the colors and patterns available seem almost endless.

Guppies are colorful and easy to keep, with males and females easy to tell apart. They are so easy to breed, that they are also known as the millionfish.

The Activity

Materials

- Note-taking materials (pencils, paper, clipboards)
- Water thermometers
- 4 – 6 small to medium size aquariums (20 – 40 L or 5 – 10 gal)
- Dip nets
- Live or artificial plants and rocks
- Aquarium heaters
- Air pumps
- Filters
- Water treatment and testing kits
- Food – frozen bloodworms, fish flakes, pellets or brine shrimp for adults and powdered food for fry
- Old pantyhose
- Digital camera for recording (optional)

Preparation

Research how to care for guppies as well as how they mate, or have older or advanced students do this as a preparatory exercise. Consult your local aquarium hobbyists or a guppy fancy group for advice (or possibly a free pair of guppies).

Set up your tanks. Most guppy fanciers recommend that your water be hard (contain dissolved minerals), with a temperature around 22-24 °C (72°-76° F) and

have a slightly alkaline but stable pH. Line the tanks with gravel substrate as well as rocks and plants. Cover the water filter intake on the tank that will hold the fry with pantyhose to make sure the fry do not get sucked inside.

Procedure

- 1. Obtain your male and female guppies. Males tend to be more colorful, with smaller bodies and a larger caudal (tail) fins than females. Make sure your female is not already pregnant; the gravid spot will be larger and darker than normal. You may also want a second male to act as a competitor in case the first male is not interested. Encourage students to monitor temperature and water quality in the aquariums. Have them note the colors and caudal fin shapes of the fish and suggest what their fry will look like.**
- 2. Set up your breeding pair. Place the male and female together in the offspring tank. You may need to add the second male if the first one does not seem interested.**
- 3. Record your guppies mating. The male will follow the female closely, spreading his fins in a display. The male will touch his copulatory organ to the female's, just in front of their anal fins. Place the male back in his own tank after his job is done.**
- 4. Watch the female gestate and then spawn the fry. If the female is pregnant, she will have a bulging dark area in her belly known as the gravid spot. Over about 28 to 40 days, the gravid spot will become larger, darker and move closer to the anal vent before she spawns. Guppies have been documented to have anywhere between 2 to 100 fry, but you most likely will get between 30 and 60. The fry will emerge and then swim to the surface to fill their air bladders.**
- 5. Separate your parent and offspring guppies. There is a lower chance of the mother eating her fry if she is well fed, but it is usually a good precaution to move her into her own tank.**
- 6. Raise the fry. You should be able to tell males and females apart after about a month. Separate the males and females into their own tanks, or there is a good chance they will breed. Have students count the number of males and females and describe their colors and tail fin shapes.**
- 7. Decide what to do with the guppies. They can be sold to the pet store, given away to friends or the local aquarium hobbyists. Do not release exotic plants and animals into the wild as they will likely be eaten by a predator right away. Even worse, they can reproduce out of control; damaging the environment and crowding out native species. Also, don't flush them down the toilet. Despite what you saw in Finding Nemo, most drains don't lead to the ocean.**

Post Activity Discussion

- Do guppies lay eggs or bear live young? Why do you think their ancestors would develop this ability?**
- Why do you think males are more colorful and have brighter colors than females?**

- What traits are encouraged by the fact that males don't fight each other and have to perform a display for the female? What traits would be encouraged if males did have to fight each other and didn't have to perform a display for the female?
- Compare the colors and caudal fin shapes of the parents and offspring. How similar are they? What would you need to do to produce more of a certain colour or tail fin shape?

Possible Assignments

- Compare pictures of guppies in tanks with those found in the wild and have students note differences in size, colors and other physical traits. Ask students to discuss what traits would be desired in the wild versus the traits that aquarium hobbyists want. This can also be done with dogs, farm animals and domesticated plants.
- Ask students to select a plant or animal and discuss what traits they would try to get by breeding them. Encourage them to look at many different types of plants and animals (fruits, farm animals, bread yeast), different traits (disease resistance, more eggs, smaller size, faster growth) and how they would do it (breeding, separating cultures, genetic engineering).
- Compare adjacent sections of continents on a world map such as the East coast of South America and the West coast of Africa, or the East portion of Africa near to the West coast of Madagascar. Discuss what sort of fossils as well as modern day plants and animals you would expect to find in these areas if they had once 'fit' together? Combined with the fact that the guppy was originally native to parts of the Caribbean, Central and South America, what does this tell us about guppies and these land masses?
- Fish and birds are the most diverse vertebrates on earth, with approximately 31 200 and 10 000 known species. What are the general characteristics of these animals that have allowed so many species to evolve?

One Fish at a Time