

Planaria

Planarians belong to the phylum Platyhelminthes (flatworms). Their body plan features bilateral symmetry; a permanent, internal reproductive system; various layers and bundles of muscles; a branching, blind gut that reaches throughout the body; an excretory system composed of “flame cells”; and a simple nervous system with an enlarged “brain” in the front end. Research indicates that planarians can master a two-choice maze, that, their responses to stimuli can be conditioned, and that memory of training can be artificially transferred from one planarian to another. Planarians, (and other flatworms) are considered by animal behaviorists to be the simplest animals that exhibit an ability to learn in response to simple conditioning.

Unlike their parasitic cousins, the flukes and tapeworms, planarians are free-living. Freshwater planarians live on the undersides of rocks and debris in streams, ponds and springs. They avoid strong light and are much more active at night than during the day.

Care and Maintenance

Planaria is available from Region 20, Living Science Materials Center or any biological supply company. Use care to avoid damaging the animals when moving them. They can be moved individually with a glass pipette or, after carefully pouring out the shipping water, use your finger to dislodge the planarians from the walls and bottom of the jar and transfer them into fresh spring water. Do not use deep containers. Planarians keep best for extended periods in a large, shallow, enameled or stainless steel tray. *Keep the water clean and change it daily.* Use only spring water or unpolluted pond water. Wash the old culture bowl free of slime and film, but do not use soap or detergents. Simply run your fingers around the sides and bottom to dislodge the slime, and then pour it off with the foul water. Extreme heat or cold will harm planarians. Maintain a temperature of 69° to 72° F. for most species. Brown planarians can be fed hard –boiled egg yolk. Feeding once a week is usually sufficient, but you may need to vary this routine according to the number of worms being maintained.

The amount of food depends upon the number of animals and the size of the culture vessel. For example, for 50 planarians in an 8-inch culture dish half-filled with spring water, feed a pea-sized portion. Do not over feed.

Allow planarians to eat for about 30 minutes, and then transfer the worms to a bowl of fresh water. If you retain the same bowl, remove the food particles, clean the container, and rinse the top off with fresh spring water to prevent a detrimental increase in bacteria.

Regeneration

Planarians exhibit remarkable powers of restoring lost body parts. Of all the various common freshwater flatworms, members of the family Planariidae (such as *Dugesia*) usually perform quite well in regeneration studies. In most cases, pieces of moderate size—regardless of which part of the worm you cut—form complete animals. Smaller pieces may not be able to regenerate perfect heads, however. As a rule, the degree of regeneration of the head region depends on the level from which you take the cutting: the more posterior the cutting, the less likely it is that a normal head will regenerate.

Dugesia tigrina is a dependable species for experimentation because it is easily maintained.

Planaria (cont)

Procedure: First place the worm on a moistened cork, ice cube or piece of cold glass, where it should extend itself. While observing through a magnifier, make cuts to the worms, using a razor blade or very sharp scalpel. After the operation, place the individual pieces in separate culture dishes partially filled with clean spring water or pond water. Cover the dishes to reduce evaporation, and keep them in a cool place with subdued light.

Do not feed the planarians, for they are hardly in a position to begin eating right away. During the first day or two you should renew any cuts that were intended to separate only and not detach; otherwise the parts will fuse back together.

Sexual Cycle and Cocoons

The black planarian and the brown planarian undergo a sexual cycle during the latter part of February or in early March, depending on the temperature of the water in the collecting pools. During this period the worms are easily torn and will die from excessive handling. Do not feed them at this time. Cover the culture bowls and change the spring water every three days.

If you maintain planarians as suggested, the sexually mature worms will deposit cocoons (first noticed as swellings on the ventral sides) in the culture dish. Carefully remove the cocoons and place them in small glass culture dishes of spring water maintained at room temperature. Change the water every two to three days.

After about two or three weeks, the outer cover of the cocoon will crack and two to six very small planarians will emerge. The culture procedure is the same as for full-grown planarians, except that the pieces of food given should be about the size of a pencil lead. With care, you should be able to raise the juvenile to full size.