

Lumbriculus variegatus

Live Material Care Guide



Background

The fresh water oligochaete, *Lumbriculus variegatus* is found throughout North America and Europe but is not widely observed. It prefers shallow habitats at the edges of ponds, lakes, and marshes where it feeds on decaying vegetation and microorganisms. In nature, *Lumbriculus* uses its head to forage in sediments and debris, while its tail, specialized for gas exchange, often projects upwards in a bent fashion just below the water's surface. This bent position facilitates gas exchange with its pulsating dorsal blood vessel.

Worms cultured in the laboratory are usually small (4–6 cm in length) compared to field collected ones (up to 8 cm in length). Mature worms (all hermaphrodites) rarely reproduce sexually and may produce transparent cocoons, each containing a few embryos that undergo direct development with no larval stage. Small worms, about 1 cm in length emerge in about 2–3 weeks. Reproduction in the laboratory is always by asexual fragmentation, during which each worm spontaneously divides into two or more body fragments. Each fragment then undergoes rapid regeneration to form a complete organism.

Distinguishing head and tail ends is not too difficult because head segments are more darkly pigmented, wider, and more maneuverable than the tail segments. Body segments are not as predictably specialized in this oligochaete as in some of its close relatives. The blood is red due to the pigment, erythrocrurin, in the plasma. The blood flows in a closed system of vessels and capillaries and is pumped by rhythmic contractions of the dorsal blood vessel. The worm's central nervous system consists of a fused cerebral ganglion and a ventral nerve cord that runs the entire length of the body.

Lumbriculus Culture

A culture can be set up in a small, clean aquarium or similar container that will hold fresh pond or spring water to a depth of 2–3 inches. It is critical that no soap or other chemical residue is in the container. Use fresh spring water and aerate the culture water with a steady but gentle supply of air. Do not aerate vigorously since the worms like to lie quietly in the water. Add some strips or squares of paper toweling (brown type preferred). Have the culture container going for several days before your worms arrive. Keep a lid partially over the culture to reduce water loss due to evaporation.

Open a shipped order of *Lumbriculus* immediately upon receipt. Decant the water the worms were shipped in and gently slide the worms into the fresh spring water in the culture container. Allow the worms to adjust and sit undisturbed for 24 hours.

Feed the *Lumbriculus* with sinking fish food pellets (Flinn Catalog No. FB0408). Start with one or two pellets that have been broken into pieces. Do not add new pellets until the old ones are consumed! *Lumbriculus* can survive for very long periods of time with little or no feeding — do not overfeed! (The extra food fouls the water and kills the worms.)

Clean the culture periodically (every 2–4 weeks) as indicated by the clarity of the water. Carefully pour off the old water being sure the worms are at the bottom as well as the paper toweling. Add fresh spring water and use it to “rinse” the culture—then carefully pour this water off of the culture. If necessary, rinse several times. Then refill the culture back to the 2–3 inches of fresh water and add more paper toweling if needed. With minimal, routine care your culture can be kept for long periods of time. Keep the culture in a place where it does not get too hot nor cold. Excess worms can be used in labs as live fish food.

Areas of Study

Lumbriculus lends itself to studies in motion, behavior, regeneration, and drug effects. Their ease of use also makes them ideal for student designed investigations. Your use will only be limited by your imagination! A few obvious starting points are outlined below

1. *Locomotion*

Study its undulatory swimming motion and its 180° body reversal when its head is touched. Watch its peristaltic crawling. Calculate its rate of speed in miles per hour (mph).

2. *Behavior*

What happens with repeated stimulation of various body segments? Does color affect their behavior? Does it respond to light stimuli? How about heat and cold? Do they prefer a certain substrate?

3. *Regeneration*

Tail segments regenerate a head, head segments regenerate a tail, middle segments regenerate both. As the segments regenerate, they should be isolated in fresh spring water and not fed until fully grown. The regeneration process is visible in just a few days. Blood in cut segments continues to flow in the same direction allowing the identification of the head and tail end throughout the regeneration process.

4. *Drug Effects on Circulation*

The single dorsal blood vessel is, in essence, a heart the length of the body of *Lumbriculus*. The blood is forced forward with regular contractions (valves at each segment will prevent backflow) which can be observed and timed. Use Flinn Slide Gel (F0075) to create a chamber for observing the pulsating vessel. Administer drugs (such as nicotine) on top of the worm in the observation chamber making sure to rinse the worm and chamber between drugs and varying doses.

***Lumbriculus variegatus* is available from Flinn Scientific, Inc.**

Catalog No.	Description
LM1220	<i>Lumbriculus variegatus</i>
FB0408	Weekend/Holiday Food Pellets
F0075	Flinn Slide Gel

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.