



A Dissection Guide to the Earthworm

Lumbricus terrestris



Observe carefully. Identify structures.

Connect anatomy with function.

Prepared by Ted Ehrheart • Mr. E Science

ILLUSTRATED BOOKLET

C.H.I.

Character • Honor • Integrity

1 Meet the Earthworm

An earthworm's slender, segmented body is built for moving through soil. Kingdom Animalia; phylum Annelida; class Clitellata (earthworms are traditionally grouped as Oligochaeta); genus *Lumbricus*; species *Lumbricus terrestris*.

An annelid body plan

Earthworms belong to the phylum Annelida, the segmented worms. Their repeated body units are called segments or **metameres**. They have bilateral symmetry, a fluid-filled body cavity called the **coelom**, a complete digestive tract, and a closed circulatory system. Thin internal partitions called **septa** separate many of the body compartments.

The common nightcrawler, *Lumbricus terrestris*, is native to Europe and introduced in North America. It lives in moist soil, using burrows and feeding on decaying plant material. Compare the diagrams with your specimen; preserved colors and organ visibility vary.

Materials

Earthworm specimen; dissecting tray; dissecting scissors; probe; 10–15 dissecting pins; gloves; colored pencils; and teacher-required protective equipment. Optional: a hand lens for small structures. Use the final materials list on your lab write-up.

Work safely

Wear gloves, eye protection, and any other teacher-required protective equipment. Keep specimens and tools in the work area. Handle scissors and pins carefully. Follow your teacher's directions for handling the specimen, cleaning equipment, and disposal. Wash your hands when finished.

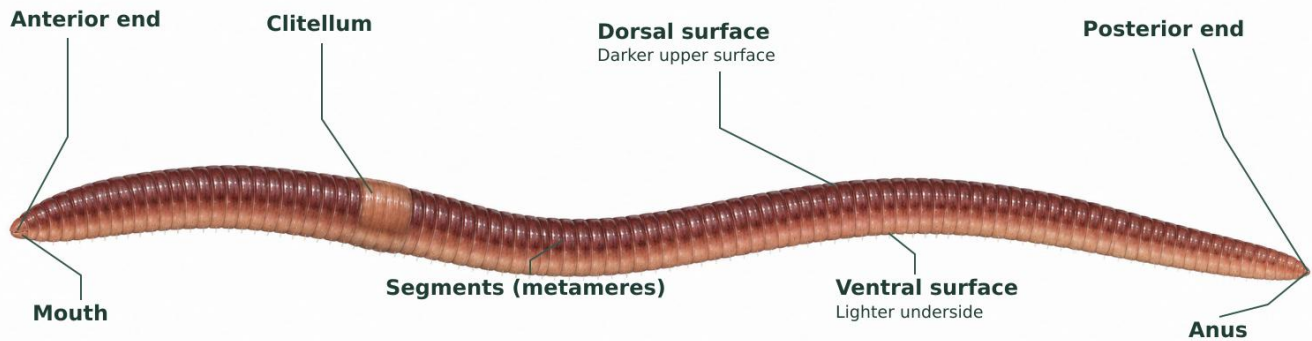
How to use this booklet

Use the external illustration on facing page 3: the **clitellum** is your landmark near the anterior end; the mouth is **anterior**, the anus posterior, the dorsal surface darker, and the ventral surface lighter. Read the opening procedure on page 4 with the internal diagram on facing page 5. Use pages 6–7 for body functions, self-checks, and sources.

Your scientific record

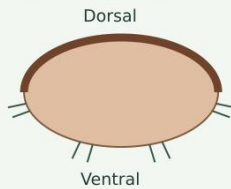
Complete your drawings and written responses on the separate lab write-up. Record what you actually observe. Use diagrams and photos to help identify structures, and mark anything you cannot identify as “not observed”; however, make sure to include it in your diagram.

2 External anatomy



Setae • magnified arrangement

Schematic end view of a typical body segment



Four pairs of setae (eight bristles)

One lateral pair and one ventral pair on each side.

Setae grip the soil as the worm moves.

Bristles enlarged for visibility; inset not to scale.

Artwork is for identification; do not use it to count segments.

Setae reference: Richard Fox, Invertebrate Zoology OnLine, Lander University.

Orient your specimen

Locate the darker **dorsal** surface and lighter **ventral** surface. Our **external landmark** is the **clitellum**. It is the thickened reproductive band closer to the **anterior** end. Find the **mouth** at the anterior end and the **anus** at the **posterior** end. The small prostomial lobe lies above the mouth.

Segments and setae

Examine the segments, metameres. Use a hand lens, if available. In *Lumbricus* sp., the setae are tiny bristles. The typical arrangement is four pairs: a lateral pair and a ventral pair on each side. The setae help anchor the worm. The inset enlarges them for visibility; count segments on a specimen, not this artwork. Run your fingers along the sides of the worm to feel the setae.

Draw what you see

Use colored pencils to portray accurate anatomy colors in your specimen. Compare your observations with the diagrams and photos. Keep labels readable and leader lines clear. Label: **Mouth, Anus, Metameres, Clitellum, Setae, Dorsal, Ventral, Anterior, Posterior**

3 Open, observe, identify

Open the dorsal body wall

1. Place the specimen dorsal side up. Gently straighten and untwist it without overstretching. Pin both ends with the dorsal side still facing up.
2. Use fine-point scissors for controlled cuts in the delicate body wall. Make a shallow snip through the epidermis/body wall approximately 1 inch posterior to the **clitellum**. Lift the body wall and cut anteriorly just to one side of the dorsal midline to protect the dorsal blood vessel. Avoid internal organs.
3. Use the probe to gently separate the **septa** from the body wall. Pin the body wall back at a low angle so the pin shafts hold them open, with the points secured in the tray. Rotate the tray to reach the opposite side comfortably.

Internal Landmark

4. Locate the three pairs of whitish, saclike **seminal vesicles** in approximately the segment 9–14 region. This is your **internal landmark**. They support development and storage of the worm's own sperm.

Follow the digestive pathway

5. Identify the digestive organs before disturbing them; follow their connections in the illustration on facing page 5. Segment ranges below are approximate locating guides, not exact boundaries. Count from the mouth-bearing first segment, excluding the prostomial lobe.

Follow this pathway: **Mouth** → **pharynx** (approximately segments 3–6), muscular food intake → **esophagus**, passage to the **crop** (approximately segments 12–17), a thin-walled sac for temporary storage → **gizzard** (approximately segments 17–20), muscular grinding → intestine, digestion and absorption → anus, exit for undigested material. The anterior intestine ("stomach") may be saclike but is continuous with the remaining intestine, not a separate third pouch.

Circulation and Excretion

6. Examine the worm's closed circulatory system: blood stays within vessels. The **dorsal blood vessel** lies above the digestive tract; the ventral vessel lies beneath it. Five pairs of aortic arches (hearts) surround the esophagus and connect these vessels. Most segments contain a pair of nephridia, small whitish tubules along the lateral walls of the coelom (body cavity). These excretory organs remove wastes and regulate water and salts.

Reproduction and Nervous System

Earthworms have both male and female reproductive organs (testes and ovaries) and are hermaphroditic. Species with separate male and female individuals are dioecious.

7. Locate the internal landmark again: the three pairs of seminal vesicles, which support development and storage of the worm's own sperm.

Testes and ovaries may be difficult to see. The **brain** (cerebral ganglia) consists of two small, whitish, pear-shaped lobes above the anterior pharynx. Nerve connections pass around the pharynx to a ganglion beneath it, which connects to the ventral nerve cord. The cord runs beneath the gut along the ventral midline.

8. Complete the main internal drawing before disturbing the intestine. Then, with teacher direction, gently move or remove a short posterior section to expose the **ventral nerve cord**. Add the exposed cord to your drawing and record your observations before cleanup. Use references to check labels.

4 Internal anatomy reference

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Earthworm • Internal Anatomy

Lumbricus terrestris | Dorsal opening • Anterior at top

Cerebral ganglia

Brain

Pharynx

Nephridia

Aortic arches

Five pairs ("hearts")

Crop

Anterior intestine

Saccular region

Intestine

Ventral nerve cord

Body wall

Opened and pinned back

Esophagus

Seminal vesicles

Septa

Gizzard

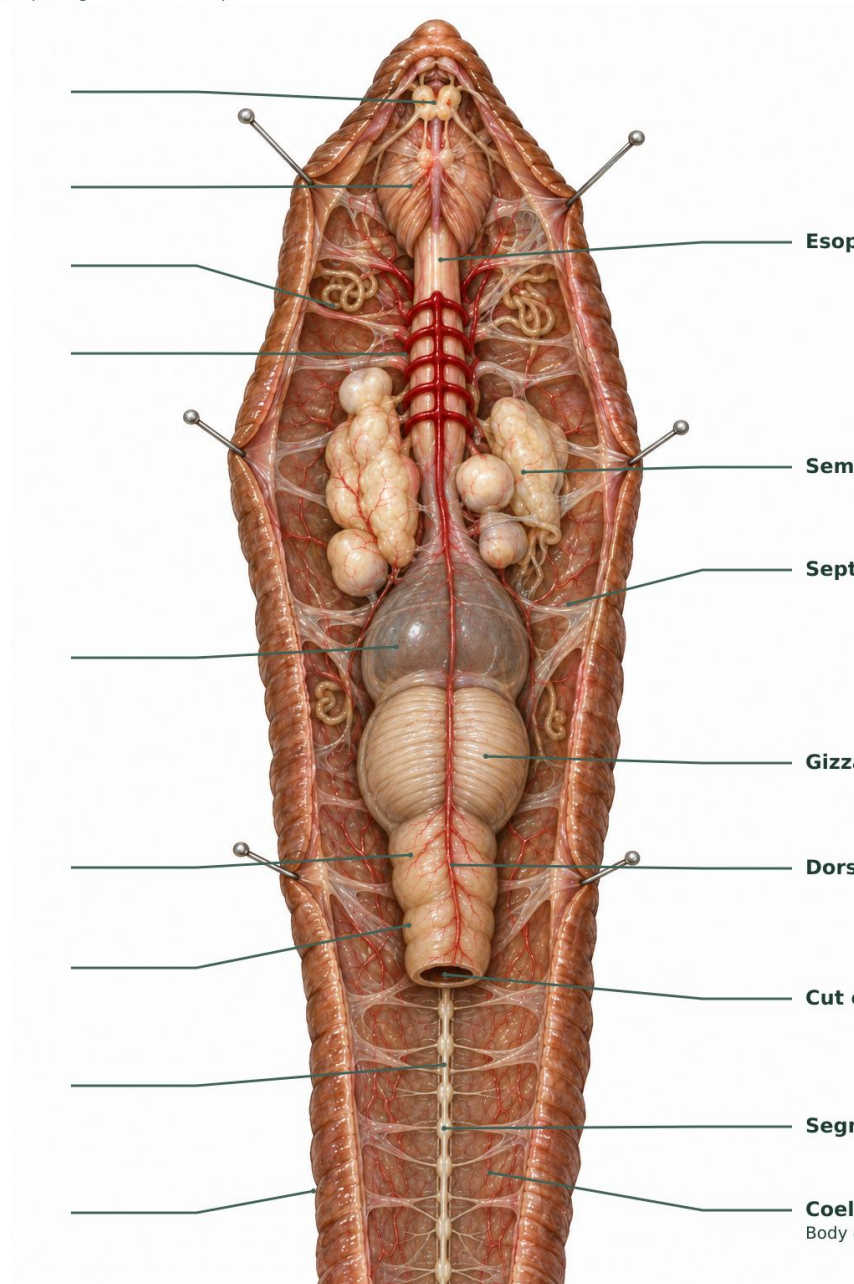
Dorsal blood vessel

Cut end of intestine

Segmental ganglion

Coelom

Body cavity



Read with page 4. Dorsal opening; anterior at top. The lower intestine has been removed to reveal the ventral nerve cord. Fine reproductive structures are not individually labeled. Colors and visibility vary among specimens.

5 Life beneath the surface

Movement without legs

Circular muscles surround the body, while longitudinal muscles run along it. Circular muscle contraction makes a region longer and narrower. Longitudinal muscle contraction makes it shorter and thicker. Setae anchor parts of the body as coordinated contractions move other parts forward. Fluid within the body cavity helps support these changes in shape.

Breathing through moist skin

Earthworms have no lungs. Oxygen and carbon dioxide move across the moist body surface. Blood transports gases between the skin and internal tissues. This helps explain why suitable moisture is essential to their way of life.

Feeding and soil activity

Nightcrawlers collect decaying plant material at the surface and draw it into burrows. Ingested material passes through the digestive tract, where food is stored, ground up for easier digestion, and absorbed. Undigested material leaves the digestive tract through the anus and returns to the soil as casts.

Burrowing and feeding can mix organic and mineral material and change how air and water move through soil. The effects depend on the habitat: introduced earthworms can also disrupt forest-floor communities that developed without them. Do not release classroom specimens or unused bait into the environment.

Reproduction

An individual earthworm has both male and female reproductive organs and is hermaphroditic. Species with separate male and female individuals are dioecious. Nightcrawlers normally exchange sperm with a partner. The clitellum produces material for a cocoon. Eggs and stored sperm enter the cocoon as it slips from the body; development occurs within it.

Clean up

Place the specimen and tissue in the bag or container provided, following your teacher's disposal instructions. Collect all pins, clean and dry the tools and tray as directed, clean the work area, and wash your hands.

Think like a biologist

1. How does the worm's body shape support its way of life?
2. Why does the gizzard have a different wall structure from the crop?
3. Which structures were easiest to recognize, and what made others difficult? Use specimen evidence.

6 Reference, recording & sources

Keep these distinctions clear

- Crop stores; gizzard grinds; intestine digests and absorbs.
- Dorsal blood vessel lies above the gut; ventral nerve cord lies below it.
- Septa are partitions; coelom is the body cavity.
- Seminal vesicles support the worm's own sperm; receptacles receive sperm from a partner.

Sources and acknowledgments

Ehrheart, Ted. Mr. E Science Earthworm Dissection write-up, classroom directions, and dissection photographs/video.

Fox, Richard. Invertebrate Anatomy OnLine: Lumbricus terrestris. Lander University.
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Hall, David H. An Illustrated Dissection Guide to the Earthworm. RANACO, 1999. Classroom reference supplied by Ted Ehrheart.

Scott Foresman Addison Wesley. Biology: The Web of Life Lab Manual, Lab 37, "Earthworm Anatomy," pp. 223–225. Classroom reference supplied by Ted Ehrheart.

New illustrations developed for Mr. E Science with AI-assisted artwork and separately editable SVG labels. Publisher pages and artwork are not reproduced.

Think like a biologist... answers

1. A slender body moves through narrow soil spaces; muscles and setae help it advance.
2. The crop stores food; the gizzard's thick muscular wall grinds it.
3. Answers vary. Give observed examples; size, color, preservation, and overlapping tissues can affect identification.



**Good science builds knowledge.
Good character builds a life.**

**Observe with care.
Record with honesty.
Treat living things with respect.**



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Earthworm Dissection Guide • September 2026