



## A Teacher's Resource Guide to

# Millipedes & Centipedes

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### What are millipedes and centipedes?

Millipedes and centipedes are both arthropods in the subphylum Myriapoda meaning many legs. Although related to insects or “bugs”, they are not actually insects, which generally have six legs.

### How can you tell the difference between millipedes and centipedes?

Millipedes have two legs per body segment and are typically have a body shaped like a cylinder or rod. Centipedes have one leg per body segment and their bodies are often flat.

### Do millipedes really have a thousand legs?

No. Millipedes do not have a thousand legs nor do all centipedes have a hundred legs despite their names. Most millipedes have from 40-400 legs with the maximum number of legs reaching 750. No centipede has exactly 100 legs (50 pairs) since centipedes always have an odd number of pairs of legs. Most centipedes have from 30-50 legs with one order of centipedes (Geophilomorpha) always having much more legs reaching up to 350 legs.

### Why do millipedes and centipedes have so many legs?

Millipedes and centipedes are **metameric** animals, meaning that their body is divided into segments most of which are completely identical. **Metamerization** is an important phenomenon in evolution and even humans have a remnant of former **metamerization** in the repeating spinal discs of our backbone. Insects are thought to have evolved from **metameric** animals after specializing body segments for specific functions such as the head for sensation and the thorax for locomotion. Millipedes and centipedes may be evolutionary relatives to the ancestor of insects and crustaceans.

### How do they get around with so many legs?

Millipedes move their legs in a wave-like undulation along their body propelling themselves forward (or backward!) against the substrate. This method of movement rather slow it is great for burrowing into the ground, a task that millipedes excel at.

Centipedes are able to attain rapid speeds by undulating their body slightly while walking. Centipede legs also grow in length towards the end of the body, which allows legs a bigger gait by avoiding the leg immediately in front.

### **How big do they get?**

The largest known millipede was an African millepede (*Archispirostreptus gigas*) that reached 15.2 inches. The largest centipedes can reach almost 12 inches long.

### **How do they grow?**

Millipedes and centipedes grow by moulting like all other arthropods. Some millipedes and centipedes get new segments and legs every time they moult and all are capable of regenerating lost body parts.

### **Where do millipedes and centipedes live?**

Millipedes and centipedes don't have the waxy cuticle of insects so they must stay away from extreme sunlight to avoid desiccation. They typically require moist microhabitats like under rocks or in leaf litter. Despite this fact, centipedes have reached beyond the Arctic Circle and millipedes are found on every continent except Antarctica.

### **What do they eat?**

Almost all millipedes are detritivores eating decaying plant material and are important in recycling nutrients. Centipedes are strictly predators and their first pair of legs has been modified into poison claws for grasping and paralyzing prey.

### **Why are some millipedes and centipedes brightly colored?**

Some millipedes and centipedes have warning coloration. Large centipedes are capable of inflicting a painful bite with their poison claws and their bright colorations wards off potential predators. Millipedes aren't defenseless either. Many millipedes roll into a tight spiral when aggravated by a potential predator and secrete a noxious fluid (often deadly cyanide) from holes in their sides.

### **Why are millipedes and centipedes important?**

Millipedes were the first terrestrial animal! They are also very important recyclers of organic materials and aerate and enrich soil. Centipedes are the top terrestrial invertebrate in many ecosystems. So both types of animals are important members of healthy ecosystems.

### **Why else are they important to conserve?**

There is still so much that we don't know about them. New species are discovered all the time! New discoveries include the tiny (0.4") centipede, *Nannarrup hoffmani*, found in NY Central Park and the Shocking Pink Dragon millipede from Thailand.

## Additional Resources

Millipedes and centipedes are greatly understudied given their abundance and appeal. There is not a lot of easily accessible information about them out there, but listed are some of the better resources available.

### **Books:**

Lewis, J. G. E. 1981. **The biology of centipedes**. Cambridge University Press, Cambridge.

*Very detailed, authoritative source on the biology of centipedes although slightly outdated.*

Hopkin, S. and Read, H. 1992. **The biology of millipedes**. Oxford University Press, Oxford.

*Nearly everything known about millipedes until 1992 is contained in this book. Somewhat dense but contains interesting information.*

### **Websites:**

[www.wikipedia.org](http://www.wikipedia.org)

*Wikipedia provides a broad coverage of both millipedes and centipedes.*

[www.myriapoda.org](http://www.myriapoda.org) (Recently, this website has been down.)

*One of the best resources for a general overview of millipede and centipede biology online. Maintained by Paul Marek an expert in millipedes from the University of Arizona.*

### **Amazing Millipede Video:**

[http://www.apheloria.org/Paul\\_Marek/Leggiest\\_Animal.html](http://www.apheloria.org/Paul_Marek/Leggiest_Animal.html)

*Paul Marek, the researcher who maintains myriapoda.org is also the person who rediscovered the animal with the most legs on the planet, which was thought to be extinct. Check out this website for a video of this truly astounding creature.*

### **Centipede Grabbing Bat Clip:**

<http://video.google.com/videoplay?docid=8313878609430213933#>

*A clip from David Attenborough's series Life in the Undergrowth.*

### **Millipedes and Centipedes in the Pet Trade:**

Many online websites sell millipedes and centipedes as pets. Millipedes can make an interesting class pet and most are easy to care for, cheap, and harmless. Centipedes are interesting pets but require live prey (crickets), cannot be handled, and are substantially more dangerous.

## Games and Activities:

### **Legs Game:**

Tell the kids that they're going to pretend to be millipedes and centipedes today. Explain how both millipedes and centipedes are composed of nearly identical segments and the legs of each segment are controlled independently by a little brain in each segment. Their arms will represent legs and they are going to line up in the fashion of a centipede or millipede.

First, have them imitate a centipede. Make sure they have their arms get longer as they get further back on the "centipede" since all centipede exhibit this trait as it helps to make sure the front legs don't get in the way of the legs in the back. Have the students move their arms pretending to walk like a centipede. (How centipedes actually walk is a complicated process and very difficult to actually mimic. Having the children move their arms with one forward and the other back is accurate enough and effective for the exercise.) Mention that centipedes actually undulate their bodies slightly while walking.

Then, a millipede. Have the students pair up to form a body segment. Millipede segments were actually formed from the fusion of two individual segments ancestrally. Millipedes move their legs in a wave like motion from the front to the back. Both pairs of legs in a segment move up at the same time and as they start to go back down the next two pairs of legs are already coming up. When the legs reach the ground they use this to propel themselves forward.

Talk about the difficulties of coordinating so many legs as they've experienced firsthand. Explain how centipede legs are adapted to move very fast for catching prey while millipedes move more slowly but are extremely good at burrowing with this type of movement.



## True/False Interesting Facts Worksheet Millipedes and Centipedes



1.    \_\_\_                           One species of millipede can fly.
2.    \_\_\_                           One type of millipede glows in the dark
3.    \_\_\_                           Some centipedes can swim fairly well.
4.    \_\_\_                           Centipedes can kill humans with their poisonous bite
5.    \_\_\_                           Some giant pill millipedes when curled up reach the size of a baseball.
6.    \_\_\_                           Centipedes can spin webs.
7.    \_\_\_                           *All* millipedes are plant eaters.
8.    \_\_\_                           Millipedes were the first animals on land.
9.    \_\_\_                           Large centipedes can catch bats in flight.
10.  \_\_\_                           Millipedes may live with ants in their nests.

**Answers:** 1. **False.** But, one species can jump! It raises its body into a hump and uses it as a sort of spring to propel itself several body lengths forward. 2. **True.** One genus of millipedes that live on mountains in California has members that are known to be glow in the dark. Interestingly, these millipedes are blind and do not have obvious warning coloration. For these reasons, it is thought that the glow in the dark ability is to warn predators of its toxicity. 3. **True.** Large centipedes such as the Vietnamese centipede are capable of swimming very well. They wriggle their bodies like a snake in water and can swim across rivers this way. 4. **False.** Although centipede bites can be quite painful, they have never been recorded to have killed anyone. 5. **True.** Giant pill millipedes from Madagascar exhibit “island gigantism” like the tortoises of the Galapagos’s and the Komodo dragons of Indonesia. 6. **True.** Centipedes (and a few millipedes) can spin sperm webs for mating. They are not circular orb webs like a spider’s but centipede webs can be suspended off the ground and they always hold a spermatophore for the female to take up. 7. **False.** A few millipedes have been observed to eat decaying animals as well as plants. One order (Callipodida) also contains several species of millipedes that have been seen to seize and devour prey but the vast majority of millipedes eat decaying plants. 8. **True.** Although the fossil record is scarce, the very first animal recorded on land was a millipede. 9. **True.** Amazingly, some cave-dwelling centipedes will dangle down from the top of caves and catch bats in mid-flight. 10. **True.** Despite the ferociousness of many ants to invaders of the colony, some millipedes are able to thrive in ant nests and have even been observed to be carried along with the ants during migration to a new nest. The bristly millipede has special adaptations to live among ants like the bristles it is named after which will break off and entangle ants if it is attacked.