



# MILLIPEDES OF OHIO *field guide*

OHIO DIVISION OF WILDLIFE

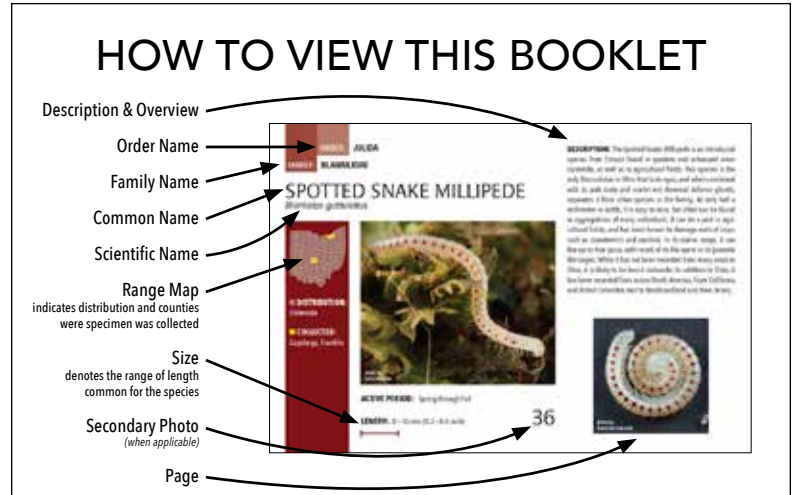


# INTRODUCTION

Text by: Dr. Derek Hennen & Jeff Brown

Millipedes occupy a category of often seen, rarely identified bugs. Few resources geared towards a general audience exist for these arthropods, belying their beauty and fascinating biology. There is still much unknown about millipedes and other myriapods, particularly concerning specific ecological information and detailed species ranges. New species await discovery and description, even here in North America. This situation makes species identification difficult for anyone lucky enough to stumble upon one of these animals: a problem this booklet intends to solve. Here we include information on millipede life history, identification, and collecting tips for all ~50 species of Ohio's millipedes. Millipede species identification often depends on examining the male genitalia, but to make this booklet accessible as a field guide, some species are grouped together under one account.

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# MILLIPEDES OF OHIO

## HOW TO USE THIS GUIDE

This booklet is meant to be a useful introduction to millipedes. It will provide a springboard for you to leap from, and avoids getting bogged down in myriapod minutia. The species listed here are those which are found in Ohio and can be reasonably identified from photographs or casual examination with a hand lens or magnifying glass. Species level identification is provided for Ohio's obvious species, but a genus-level identification is often more likely with millipedes. It's frequently necessary to examine an adult male's gonopods to identify a millipede to species, and that requires consulting specialized scientific literature. Furthermore, many of our more colorful millipedes participate in mimicry complexes with each other, mak-

ing species identification even more difficult or impossible. Millipedes also do not reach their full coloration until adulthood, so juvenile or recently molted individuals will look differently from the adults. Due to this, color should not be trusted as the only character for species identification, so be cautious. If you can only figure out a millipede's family or genus level identification and it's more than you knew previously, that is a victory! This guide will be useful to the family and sometimes genus level in many areas of eastern North America outside of Ohio, but be aware that there are many additional families, genera, and species outside of Ohio.



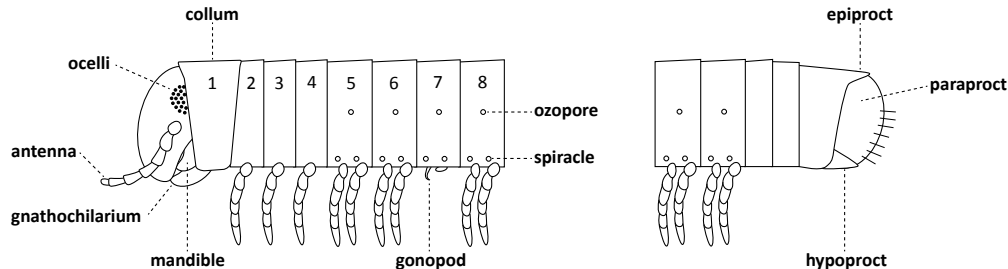
# MILLIPEDE ANATOMY

Millipedes are classified within the arthropod Subphylum Myriapoda, which includes four classes: Diplopoda (millipedes), Chilopoda (centipedes), Symphyla (garden centipedes), and Paupoda (pauropods). Myriapods are most closely related to the insects and crustaceans, and are separated from other arthropod groups by having one pair of antennae and having twelve or more pairs of legs. Each class of myriapods can be recognized by the following features: millipedes have two pairs of legs on most body rings, centipedes have one pair of legs on each body ring and large venom jaws beneath the head, garden centipedes have beaded antennae, and pauropods have antennae with two branches.

Millipedes come in a variety of shapes, but are typically flat or cylindrical. The flat-backed millipedes often have lateral extensions of their exoskeleton called **paranota**, which can obscure their legs, and which help them wedge themselves into crevices. The millipede body has two main parts: a head and a trunk. The head has one pair of 7-segmented, elbowed antennae with many sensory pores and setae and two patches of simple eyes (ocelli) may be present

on either side of the head. The mouth is made up of three main features: an upper lip (labrum), a pair of mandibles, and a flattened grinding-plate, the gnathochilarium. Millipedes are vegetarians and they eat dead leaves, wood, and fungi. The trunk is made up of a varying number of body rings, ranging from as few as a dozen to as many as a couple hundred, depending on the millipede. The first ring after the head is called the **collum**: it is legless. The second, third, and fourth rings each have one pair of legs. The following rings each have two pairs of legs. The last few rings lack legs, and the last ring is called the **telson**. The telson is made up of a dorsal epiproct which is sometimes triangular or square-shaped, two lateral anal valves, and a ventral hypoproct, a small rounded plate.

Millipedes breathe through kidney-shaped openings near the base of each legpair, called spiracles. These spiracles connect to tracheae that carry oxygen directly to their organs and muscles. Millipedes have a simple heart that is a dorsal tube running the length of their bodies, and their nervous system is composed of a brain located in the head and a ventral nerve cord.



## HOW TO FIND MILLIPEDES



LAWRENCE COUNTY, OHIO  
photo by DEREK HENNER

Although millipedes can occasionally be found indoors, this is not their preferred habitat, and are likely either seeking moisture, escaping unfavorable conditions, or wandered inside by mistake. Around the exterior of houses and buildings, they may be found in mulch, compost, under trash cans, or under flower pots. If you want to avoid having millipedes as roommates, it is recommended to move millipede habitat away from building foundations.

The easiest way to find millipedes is to search areas with trees and a layer of leaf litter, and slowly turn over rocks, logs, and leaf piles. Millipedes are most often found at the interface between the soil and the leaf litter, so you may have to clear away the top layer of litter before finding them. Be sure to look both on the ground and on the underside of the cover you lifted up, as

they often cling to the surface. A three-pronged garden claw or other similar tool functions as an excellent and inexpensive device to uncover millipedes and can be used to brush aside leaves and turn over rocks. Additionally, a flashlight or headlamp is useful for illuminating the dim habitats under the forest canopy. If you're having difficulty finding millipedes, try searching in habitats with more moisture, such as leaf litter near streams or in small depressions on the forest floor. When you're finished searching an area, please remember to return leaf piles, rocks, and logs back to their original positions to help protect and preserve these important habitats for all the animals living there.

In addition to leaf piles, other prime millipede microhabitats include loose bark of fallen logs or standing dead trees. Some millipedes are easier to find at night, and can often be found on trails, logs, or tree trunks with the aid of a flashlight or headlamp. Some millipedes fluoresce under an ultraviolet flashlight, glowing a bright blue-green hue, making them exponentially easier to locate during the night. Millipedes are safe to handle, but be sure to wash your hands afterwards, as their defensive secretions can irritate eyes or other sensitive areas. You should also be aware that grabbing a millipede will typically induce it to poop on you, another one of their defensive strategies.

Millipedes usually have two different reactions to being exposed. The first is to curl up into a defensive spiral, usually remaining motionless. Millipedes using this defensive reaction give ample time for a calm, short photography session: a welcome respite from the usual entomological trials of photographing the erratic movements of butterflies or dragonflies. The second common reaction for millipedes is to flee, seeking cover. They are not fast runners, so should be easy to observe, but some genera, such as Brown Crested Millipedes (*Abacion* spp.) and Shining Quick Millipedes (*Cleidogona* spp.), are surprisingly quick. Fleeing millipedes will often attempt to bury themselves beneath leaf litter or soil and disappear into the subterranean void within seconds.



Smaller or more cryptic millipedes may require more specialized collection techniques, such as pitfall traps or leaf litter extraction with a Berlese funnel. These are excellent methods for collecting millipedes and

other forest floor arthropods, and you will find many species you miss by just hand collecting. Some millipedes are also more active in certain seasons and dormant in others (the order Chordeumatida, for example, contains many families that are most active during the cooler months of the fall and winter), so be sure to search for millipedes at different times of the year.

If you are interested in collecting millipedes, note that they should be stored in vials of isopropyl alcohol or ethanol, not pinned dry, as many insects are. Most importantly, always obtain the proper permissions and permits if you are planning to collect millipedes on land you don't own, such as state or national parks. As an alternative to collecting millipedes, photographing millipedes is also a great way to learn about these creatures. As you search for millipedes, you'll also encounter many other small, fascinating animals you may not have previously known about. Sharing your photos on social media or websites such as iNaturalist.org and BugGuide.net is a fun way to both keep track of which species you've seen and document range data that might not be known.



## LIFE CYCLE

All millipedes begin their lives as eggs, laid by the female in moist soil or other detritus on the forest floor. Female millipedes lay from a dozen to a few hundred eggs at one time, and egg laying can occur over a period of weeks. Some millipedes construct egg chambers out of their feces and the surrounding soil in small ball-shaped structures or in larger domed chambers. Millipedes typically do not exhibit parental care, but some species in the order Platydesmida are known to take care of the eggs. The eggs hatch after a few weeks, and the newly-hatched millipedes only have three pairs of legs.



As they grow and shed their exoskeleton, juvenile millipedes will add more legs and body rings at the posterior end of their body. Some millipedes stop molting once they've reached adulthood (the orders Polydesmida and Chordeumatida), while others will continue to molt through their lives and may keep adding more rings and legs until they die (such as the Julida). Millipedes molt in sheltered places, and typically build molting chambers out of dirt for protection. Some millipedes, such as those in the orders Chordeumatida and Callipodida, will use **spinnerets** to spin a silken web around themselves for protection while molting. Juveniles may molt 10 times or more until they become adults. Millipede lifespans last anywhere between a few years to a decade in some instances.





# REPRODUCTION



ABACION GONOPODS  
photo by DEREK HENNEN



APHELORIA GONOPODS  
photo by DEREK HENNEN

The seventh ring is particularly important for millipede identification because this is where the male genitalia are typically located. Male millipedes typically have one or two pairs of walking legs on this ring (the 8th or 8th and 9th) modified into structures called **gonopods**, which they use to transfer sperm to the female during mating. The shape of these gonopods are species-specific and are used to identify millipede species. Males of the orders Platydesmida and Polyzoniida have their 9th and 10th leg pairs modified into gonopods. Gonopods may be fully exposed or concealed within the body, and often do not look like legs at all. Gonopods are the main feature used in species identification and may need to be dissected out of the body with an insect pin. The gonopods take sperm from the penes, located on the coxae of the 2nd legpair on the third body ring. The gonopods are then inserted into the cyphopods of the female during mating. The **cyphopods** are the female genital openings and are located in a paired pouch behind the 2nd legpair on the third body ring.

The only order of millipedes in Ohio that lacks gonopods is the Polyxenida, the bristly millipedes. Instead of using gonopods, male bristly millipedes spin silk-like webs, in which they deposit a spermatophore. A female bristly millipede will find these threads and follow them to the spermatophore, which she will pick up and use to fertilize her eggs.

## HABITATS

Millipedes are found on all continents except Antarctica, and occur basically everywhere besides aquatic habitats. They can live anywhere from mountains, to caves, to grasslands, to deserts, to forests. Some are wide-ranging and tolerate a variety of diets and conditions, but others are much more specific in their preferences, choosing unexpected places such as bird nests, pine cones, or among tree roots. Millipedes are common in all of Ohio's counties, but the greatest species diversity is found in southern Ohio's unglaciated regions, where forests harbor ample millipede habitat.

Moist deciduous forests provide ideal millipede habitat. As most millipedes lack a protective waxy cuticle, they can easily dry out. Because of this, they are most often found in humid microhabitats: under piles of leaves, under logs, or under rocks. They also often dig down into the soil, particularly during their juvenile life stages. Millipedes are almost exclusively detritivores, meaning they feed on decaying organic matter such as fallen leaves or decaying wood. Many are more active at night, and will seek shelter during daylight hours, when humidity is lower and temperatures are higher.



LAWRENCE COUNTY, OHIO  
photo by DEREK HENNEN

# ECOLOGICAL ROLE



LITTLE HOCKING, OHIO  
photo by DEREK HENNEN

Millipedes are most often found in forests, where they function as major detritivores and feed on dead plant material such as leaves and wood. They break down the detritus on the forest floor and reduce it into small pieces, which microorganisms can then feed on. It is by this continual action of breaking down organic matter that millipedes play an important role in nutrient cycling. Without millipedes constantly churning through the undergrowth, forests would have organic matter piling up and a slower rate of nutrient cycling. Millipedes also burrow through the soil, forming small tunnels and loosening the soil as they go.

While millipedes typically feed on dead leaves and other detritus, some species have slightly different diets. Millipedes in the order Platydesmida are known to feed on fungi. Pincushion millipedes in the order Polyxenida are known to graze on algae, and species in the family Polyzoniidae have triangular mouthparts modified for suctorial feeding, rather than chewing. The American giant millipedes (genus *Narceus*) can often be seen on tree trunks at night, feeding on mosses and lichens.

# COLORATION & CHEMICAL DEFENSE



Millipedes come in all colors of the rainbow, showing off a dazzling array of patterns. Typically, juvenile millipedes will be pale or lighter shades of their adult coloration, so take care not to mistake a juvenile color pattern for a different species than its adult. Their colors often relate to their natural defenses. Millipedes that are brown or other earthy shades mainly rely on camouflage to blend in with their environment and avoid predators. Some of our other species, however, show off bright, bold colors. Cherry millipedes in the family Xystodesmidae, for example, often have yellow stripes or orange spots against a black base color to warn predators of their powerful chemical defenses. They use a mix of benzaldehyde (which smells like cherries) and hydrogen cyanide (a potent poison) to ward off attacks. If a predator

attempts to eat one of these millipedes, they will immediately be hit with a very bitter taste and will spit the millipede back out. This means that millipedes are poisonous, since the poisons must be ingested to be effective, but they are not venomous: millipedes can't bite to deliver their poisons.

Many of Ohio's millipedes have chemical defense glands and discharge these glands through **ozopores**. Ozopores look like tiny holes on the sides of the rings, and may occur all along the body starting on the 6th ring or might only occur on some of the rings. In species that are lighter in color, the defense glands themselves can often be seen through the exoskeleton, appearing as black to red spots (such as in the Spotted Snake Millipede, *Blaniulus guttulatus*).



The types of defensive chemicals millipedes use differs, depending on the millipede. The chemical p-cresol (a phenol) is the main component in the defenses of the genus *Abacion*, and smells quite foul, in addition to being repellent to ants. The defenses of the Juliformia (the orders Julida, Spirobolida, and Spirostreptida) are composed of benzoquinones and hydroquinones, and terpenes and heterocyclic nitrogen-containing compounds are the defenses of the orders Platydesmida and Polyzoiiida. The order Polydesmida, which includes the cherry millipedes mentioned previously, use cyanide-containing compounds as their main defense.

None of the chemical defenses of Ohio's millipedes are dangerous to humans, but nonetheless, millipedes should not be ingested. Care should be taken to avoid getting the chemicals in your eyes, as they can cause irritation. Wash your hands with soap and water after touching any millipedes as a precaution. Many of the chemicals millipedes release can discolor the skin upon contact, at first appearing bright yellow, and then quickly changing to

a purplish-brown color that appears similar to a bruise. The discoloration fades in a matter of days, as does the smell.



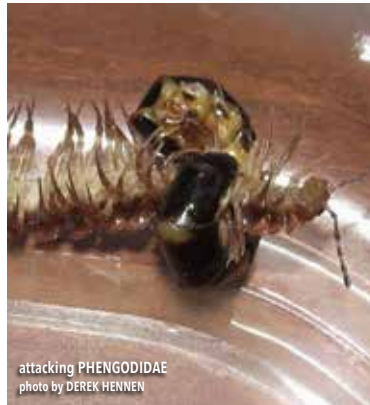
Only two of Ohio's millipede orders lack chemical defenses: the pincushion millipedes (Polyxenida) and the sausage millipedes (*Chordeumatida*). Instead of chemicals, they use different defensive strategies. The bristly millipedes rely on barbed hairs at the posterior end of their body (almost like a porcupine): if confronted by a predator such as an ant, they will thrust these hairs at the predator. The bristles will detach from the millipede and entangle the predator, which then attempts to groom the hairs away, further ensnaring itself. The millipede simply runs away. The sausage millipedes rely on camouflage or speed: they may either curl into a spiral, protecting their softer underside, or attempt to run away from threats.

# MILLIPEDE PREDATORS & PARASITES



PHENGODIDAE  
photo by DEREK HENNEN

Despite their formidable chemical defenses, millipedes do have to deal with various predators. Some of these predators are generalists, eating prey other than millipedes. This category includes animals like small rodents, birds, ground beetles, and amphibians. A separate category are the predators which specialize on eating millipedes. These predators have developed strategies to avoid the toxic defensive secretions of millipedes in unique ways. The millipede assassin bugs (Reduviidae: Ectrichioidiinae) attack the ventral trunk and intersegmental membranes of millipedes in the superorder Juliformia and the order Polydesmida, injecting toxic



attacking PHENGODIDAE  
photo by DEREK HENNEN

saliva and enzymes to immobilize the millipede before consuming it. One species, *Rhiginia cruciata*, occurs in Ohio, and is often found in leaf litter habitats. Another group of millipede specialists are the glowworm beetles in the family Phengodidae. Larvae and adult females of this family are bioluminescent like lightning bugs (Lampyridae), and have sickle-like mandibles. They use these mandibles to pierce the softer underside of millipedes and inject digestive enzymes, similar to the millipede assassin bugs. Once immobilized, the glowworm beetle eats its way through the millipede, taking care to avoid the noxious chemical glands.

Other organisms are parasitic on millipedes. Female scuttle flies (Phoridae) in the genus *Myriophora* are parasitoids, and lay their eggs inside the millipede, which later hatch and feed internally. Millipedes also have to deal with parasitic nematodes, which can live inside their gut, sometimes in distressingly high numbers. In addition to these parasites, they also must contend with parasitic



fungi. The recently described *Arthropaga myriopodina* fungus causes infected millipedes to climb to an elevated location before death, after which fungal spores will burst through the membranes that connect each ring. Another parasitic fungus (*Troglomyces twitteri*) is transferred between millipedes in the genus *Cambala* during mating, but does not kill the millipede.





ORDER POLYXENIDA

POLYXENUS LAGURUS  
photo by DEREK HENNEN

## BRISTLY MILLIPEDES

The Bristly Millipedes are the most basal order of millipedes, classified in their own subclass, the Penicillata. These millipedes have a unique array of characteristics, including a soft exoskeleton that lacks calcium and many setae covering their bodies. They have tufts of hair along each side of their bodies and tufts of barbed, hooked hairs at their posterior end. These hairs are used for defense against predators, similar to a porcupine. They have 11 to 13 body rings, lack chemical defenses, and are quite small, with body length ranging from 1 to 5 mm. Adult males lack gonopods or other modified mating appendages. Bristly millipedes are sometimes confused with the larvae of beetles in the family Dermestidae. Three families occur worldwide, and two occur in North America. The Polyxenidae can be found throughout much of North America, while the Lophoproctidae lack ocelli and are limited to Florida, Texas, and Mexico.



ORDER: POLYXENIDA

FAMILY: POLYXENIDAE

# PINCUSHION MILLIPEDE

*Polyxenus lagurus*



## DISTRIBUTION:

Likely statewide, but uncommonly collected

## COLLECTED:

Greene, Franklin, and Summit Counties



photo by  
JASON M. CROCKWELL

**ACTIVE PERIOD:** Active during the warmer seasons, aggregates under bark during winter

**LENGTH:** 2 – 4 mm (0.15 inches)



**DESCRIPTION:** The Pincushion Millipede is Ohio's most whimsical millipede, and at first glance may be confused with a carpet beetle larva. It lacks the hard exoskeleton of other millipedes and is classified in a separate subclass, the Penicillata. It is a tiny species only a few millimeters long, and has 11 body rings and 13 leg pairs. Its most prominent feature is its hairiness: it is covered in rows of setae along its head and back, and has star-shaped tufts of bristles along its sides. It possesses two large tufts of barbed bristles at its posterior end which are used to defend against ants and other predators, which can quickly entangle and incapacitate would-be predators. This is its main defense, as it lacks chemical defenses. This millipede lives in forest leaf litter and under the bark of trees and other similar habitats, where it is thought to feed on lichen, algae, and small fungi. Its range is not well-known in Ohio, but is likely to be found statewide. Concerted collecting with methods such as pitfall trapping or leaf litter extraction with Berlese funnels are the best ways to find this minuscule millipede. During late fall and winter, this species is often found under tree bark and even in pine cones. Mating is indirect, with males depositing packets of sperm in the leaf litter. Female passers-by are guided to the sperm packets by silk threads the male spins and attaches to the packets. Females later lay fewer than a dozen eggs in nests constructed from their defensive bristles. This species was introduced to Ohio from Europe, and can be found throughout North America.



## ORDER POLYXENIDA

*PETASERPES CRYPTOCEPHALUS*  
photo by BRAD VON BLON

# CAMPHOR MILLIPEDES

The Camphor Millipedes are curious-looking millipedes that are liable to be mistaken for small slugs or leeches at first glance. They have slightly arched bodies that are often glossy and shining, with narrow, triangular heads that are much smaller than the width of their bodies. Camphor millipedes lack a longitudinal dorsal groove, and adults have more than 20 body rings. The order includes three families, all of which occur in North America. The Polyzoniidae occur throughout North America, while the Hirudisomatidae occur along the west coast and in central Mexico, and there is one disjunct species in the southern Appalachian Mountains. The third family, the Siphonotidae, has been introduced from the tropics to the Gulf Coast region of the U.S.

ORDER: POLYZONIIDA

FAMILY: POLYZONIIDAE

# SLUG MILLIPEDE

*Petaserpes cryptocephalus*



**DISTRIBUTION:**  
Statewide

**COLLECTED:**  
Adams, Crawford,  
Cuyahoga, Delaware,  
Hocking, Lake,  
Logan, Lorain,  
Marion, Portage,  
Richland, Summit,  
Washington, Wayne,  
Wood



photo by  
JASON M. CROCKWELL

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 7 - 24 mm (0.2 - 0.9 inches)



**DESCRIPTION:** The Slug Millipede may easily be confused for a slug or other legless inhabitant of the leaf litter, due to how its broad, cream-colored body obscures its small legs from above. Upon closer inspection, its purple-brown antennae, cone-shaped head, and thin, white legs show it to be a millipede, despite its unique appearance. This species can vary in color from creamy white to light orange, has a slightly domed body, and has a glossy sheen. Its chemical defenses have a distinctive camphor-like odor, making it an easy species to identify by smell alone, sometimes even before the millipede itself is seen. Interestingly, its chemical secretions are slightly sticky, possibly as an added defense against predators. The Slug Millipede lives in soil and moist leaf litter, and is often found near rocks and logs in deciduous forests. Females can be strikingly larger than the males, sometimes reaching two times the length of the males. Additional species in the genus *Petaserpes* may eventually be found in Ohio, and the species can be separated based on characters of the gonopods. Species in the genus *Petaserpes* are found throughout eastern North America, from Georgia north through Quebec, Canada, and west to the Ozarks.



photo by  
DEREK HENNEN



ORDER PLATYDESMIDA

ANDROGNATHUS CORTICARIUS  
photo by DEREK HENNEN

## FEATHER MILLIPEDES

The Feather Millipedes comprise a small order of species that live on decaying wood, where they feed on fungi that colonize the wood. Feather millipedes have a dorsal longitudinal groove, more than 35 body rings, and have paranota (lateral extensions of the body wall on each ring). They have pear-shaped heads that lack ocelli. The order includes two families: the Andrognathidae and the Platydesmidae. In North America, the family Andrognathidae occurs in the eastern U. S. and along the west coast, as well as in Mexico, while the Platydesmidae can be found from central Mexico south to Panama.

ORDER: PLATYDESMIDA

FAMILY: ANDROGNATHIDAE

# EASTERN NOODLE MILLIPEDE

*Andrognathus corticarius*



**DISTRIBUTION:**  
Southern Ohio

**COLLECTED:**  
Adams, Scioto



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Spring through Fall, with peak activity during the Summer

**LENGTH:** 11 – 27 mm (0.4 – 1 inch)



**DESCRIPTION:** The Eastern Noodle Millipede is a thin (0.6 – 1 mm wide), spindly millipede only rarely seen in Ohio. Varying in color from creamy yellow to oaky brown, this species appears at first glance to be a root of some sort, before its thin, cream-colored legs and pear-shaped head are noticed. It has bilobed paranota on its fifth ring which resemble the shape of a butterfly's wing, which are best observed using a hand lens or microscope. This species is almost always found under logs, where it clings to the decomposing bark. Other members of the Platydesmida are known to feed on fungi that grow on dead wood, but the feeding habits of the Eastern Noodle Millipede are unknown. It is typically found in aggregations of many individuals, and is slow moving once exposed. Rarely, this species can be found in leaf litter. In Ohio, it is known only from Adams and Scioto Counties, but may be more widely distributed than is currently known, due to its cryptic habitat preferences. This species can be found throughout the southeastern United States from the Gulf Coast north to Indiana, Ohio, and Pennsylvania.



photo by  
DEREK HENNEN



*ABACION SPP.*  
photo by MALISA SPRING

## CRESTED MILLIPEDES

The Crested Millipedes are named after the longitudinal crests present on their body rings. This order of millipedes has species with 40 to 60 body rings as adults, a dorsal longitudinal groove, and raised longitudinal crests on their rings. Their ocelli are arranged in triangular patches, and these species also have ozopores along the sides of their body, from which they expel their pungent chemical defenses. At the posterior end of the body, they have a pair of spinnerets on their epiproct. The order contains eight families worldwide, with two in North America. Abacionidae is limited to eastern North America, while Tynommatidae occurs in western North America, from central California south to Mexico and east to southern Texas.

ORDER: CALLIPODIDA

FAMILY: ABACIONIDAE

# BROWN CRESTED MILLIPEDE

*Abacion spp.*



## DISTRIBUTION:

Statewide

## COLLECTED:

Adams, Ashland, Athens, Belmont, Butler, Clermont, Coshocton, Crawford, Cuyahoga, Delaware, Erie, Fairfield, Franklin, Gallia, Greene, Hamilton, Hardin, Highland, Hocking, Knox, Lawrence, Medina, Montgomery, Morgan, Pickaway, Portage, Preble, Shelby, Stark, Summit, Washington, Wayne



photo by  
MATT CLAGHORN

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 30 – 50 mm (1.2 – 2 inches)



**DESCRIPTION:** Three species of Brown Crested Millipedes occur in Ohio: *Abacion lactarium*, *A. tessellatum*, and *A. magnum*. These species can only be separated by examining the male gonopods. They can tolerate a variety of habitats ranging from moist to dry, and are found in leaf litter and under rocks and logs. They are chocolate-brown in color dorsally, and light tan on the underside of their body. They have a light brown middorsal groove running the length of their body, and they also have thin, light brown stripes at the shoulder level. Their legs and antennae are light brown to dark brown in color, and they have triangular patches of eyes near their antennae. They also have a pair of small spinnerets at the posterior end of their body, which they use to spin a silken cocoon for molting. Their body has a rough texture, due to their many straight, ridge-like crests covering the lateral and dorsal portions of each ring. The crests bearing the ozopores are larger than the surrounding crests and have a small concave dent in a teardrop shape. The Brown Crested Millipedes may be the most foul-smelling of Ohio's millipede species, and their chemical secretions are emitted as milky white droplets when disturbed. These millipedes are also quite fast for millipedes, and will run away immediately after being uncovered. Brown Crested Millipedes may be confused with species in the genus *Cambala*, which also have crests along their bodies, but Brown Crested Millipedes are more common and lack the "neck"-like constriction behind the head. Brown Crested Millipedes occur throughout eastern North America, from Minnesota south to Texas and east to New York and Florida.



**ORDER CHORDEUMATIDA**

**PSEUDOTREMIA**  
photo by CHRISTIAN SCHWARZ

## SAUSAGE MILLIPEDES

The Sausage Millipedes take their name from the general shape of their bodies, which are somewhat sausage-like in appearance and tapered posteriorly. These millipedes are generally small, but some species grow to a little over an inch long. Adults have 26 to 30 body rings (though Ohio's species have either 28 or 30), and they do not have ozopores or chemical defenses. Sausage millipedes have a dorsal longitudinal groove on their body rings, though it may be hard to see due to the size of these animals, and each ring has six large setae. They also have spinnerets on their epiproct, similar to the Crested Millipedes. This is a large order with about 50 families worldwide, and North America has about 15 families. In eastern North America, the Cleidogonidae and Trichopetalidae are the more common families. Many Sausage Millipedes are active during the cooler seasons.



ORDER: CHORDEUMATIDA

FAMILY: CLEIDOGONIDAE

# SHINING QUICK MILLIPEDE

*Cleidogona* spp.



**DISTRIBUTION:**  
Statewide

**COLLECTED:**  
Adams, Athens,  
Crawford,  
Delaware, Hancock,  
Hocking, Monroe,  
Muskingum, Preble,  
Washington, Wayne



photo by  
MALISA SPRING

**ACTIVE PERIOD:** Spring and Fall

**LENGTH:** 15 - 25 mm (0.5 - 1 inch)



**DESCRIPTION:** Three species of Shining Quick Millipedes occur in Ohio: *Cleidogona caesioannulata*, *C. celerita*, and *C. fustis*; all look identical and can only be identified by examining the gonopods. These species appear to be entirely brown at first look, but upon closer inspection, are pleasingly speckled with white patches. They also have short hairs that are widely separated across their backs, rather than set close together on bumps like the Winterchill Millipedes (genus *Conotyla*). Lacking chemical defenses, Shining Quick Millipedes flee within seconds of being uncovered from beneath leaf litter and logs, and are uncannily adept at disappearing into the soil. Adults have 30 body rings, and are smooth-bodied, lacking any wrinkles or obvious tubercles. Adult males may have swollen shoulders, but lack the pronounced tubercles and longer setae found in the genus *Conotyla*. Little is known about their ecology, but like the Brown Crested Millipedes, they also spin silken cocoons for molting. The species *C. caesioannulata* is the most widespread species, occurring from Pennsylvania south through North Carolina, and is likely to be found in the eastern half of the state. *Cleidogona celerita*, on the other hand, is only known from a few spots near the Indiana border, and is found west through Illinois, though its full distribution in Ohio is unknown. The last species, *C. fustis*, appears to live in unglaciated southeast Ohio, and is found in Kentucky, West Virginia, and Virginia. There are over 70 described species of *Cleidogona* and can be found from eastern North America south to Costa Rica.

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ORDER: CHORDEUMATIDA

FAMILY: CLEIDOGONIDAE

# PURPLE ROUGH-BACKED MILLIPEDE

*Pseudotremia* spp.



■ **DISTRIBUTION:**

Southern Ohio

■ **COLLECTED:**

Lawrence, Monroe,  
Washington



**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 17 – 32 mm (0.6 – 1.3 inches)



**DESCRIPTION:** The Purple Rough-Backed Millipedes were first recorded in Ohio a little over a decade ago, and have only been seen a few times since, making them some of the most rarely-seen millipedes in the state. While they are in the same family as the Shining Quick Millipedes (genus *Cleidogona*), they are easily separated by the small raised bumps and wrinkles on their backs and their purple coloration. The genus contains 79 species, with many only known from caves and restricted to small ranges. The Purple Rough-Backed Millipedes may be found in leaf litter or under rocks and logs, particularly on slopes with loose soil and leaf litter. One species, *Pseudotremia salisae*, is known from Lawrence County. Individuals of an undescribed species have recently been found in Monroe and Washington Counties in eastern Ohio. More work is needed to understand the biology and distribution of this genus in Ohio, which is at the limits of its northern distribution.

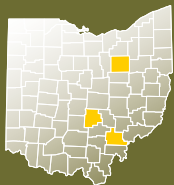


ORDER: CHORDEUMATIDA

FAMILY: CONOTYLIDAE

# WINTERCHILL MILLIPEDES

*Conotyla spp.*



## DISTRIBUTION:

Appalachian  
Plateaus Region

## COLLECTED:

Athens, Fairfield,  
Wayne



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Fall through early Spring

**LENGTH:** 14 - 25 mm (0.5 - 1 inch)



**DESCRIPTION:** The Winterchill Millipedes are among Ohio's least-known millipedes, and are only known from three places in the state. Winterchill Millipedes are deep brown in color and appear similar to Shining Quick Millipedes (genus *Cleidogona*), but they have long hairs set close together on small bumps at their shoulders, which immediately identifies them. These millipedes are likely more widespread than we know, but adults are only active during the chillier seasons, when few people are searching for millipedes. Ohio has two species of Winterchill Millipedes: *Conotyla ocyptes*, found in southern Ohio, and *Conotyla personata*, which is only known from Wayne County in northern Ohio. These species are only identifiable by examining the gonopods of the males. Specimens are most often found in rotten wood, especially under bark, but may also be found in leaf litter. They prefer cool microhabitats such as forest ravines and hemlock woods, and can also be found in moist deciduous forests. Due to their preferences for cool microhabitats, it is thought that Winterchill Millipedes expanded their range northward after glaciation. The genus is known from Kentucky and southern Indiana east to North Carolina and Maine, and thus may be found in more areas of Ohio in the future.



photo by  
DEREK HENNEN

ORDER: CHORDEUMATIDA

FAMILY: TRICHOPETALIDAE

# CRESCENT MOON MILLIPEDE

*Trichopetalum lunatum*



■ **DISTRIBUTION:**  
Statewide

■ **COLLECTED:**  
Athens, Hocking,  
Washington, Wayne



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Fall through early Spring

**LENGTH:** 5 - 8 mm (0.2 - 0.3 inch)



**DESCRIPTION:** Those who search the undergrowth with a keen eye for the lilliputian are rewarded with a chance to find the Crescent Moon Millipede, a pale millipede easily confused with random debris. This millipede gets its name from the shape of its eyepatches, which are formed by ten small ocelli that look like a crescent moon. It is one of the state's smallest millipedes, at only half a centimeter in length, but is easily recognized by its porcelain-white body and long defensive hairs. It is the only species in the order Chordeumatida in Ohio with 28 rings as an adult; all other Chordeumatida in Ohio have 30 rings in adulthood. The Crescent Moon Millipede lives in deciduous forests and may be found underneath decaying logs or in moist leaf litter. This species lacks chemical defenses, but has long hairs coated with sticky liquid, which may protect it from possible predators. Records of this millipede show it to be cool-weather active, particularly in the fall. While most records of this species are from southern Ohio, it is likely to be found statewide, based on its presence in both Indiana and Michigan. Its range includes Wisconsin south to Kentucky and east to Virginia and Newfoundland, Canada, and the genus is found throughout central-eastern North America.

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ORDER: CHORDEUMATIDA

FAMILY: STRIARIIDAE

# CARAMEL HOODED MILLIPEDE

*Striaria* sp.



■ **DISTRIBUTION:**

Southern Ohio

■ **COLLECTED:**

Adams County

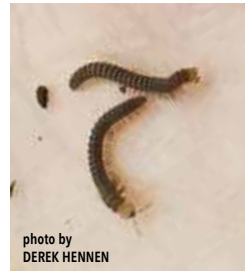


**ACTIVE PERIOD:** Year-round

**LENGTH:** 12 - 25 mm (0.4 - 1 inch)



**DESCRIPTION:** The Caramel Hooded Millipede is a species known only from Adams County in southern Ohio, but it may possibly be in other areas of southern Ohio, yet undetected. It can be identified by its hood-like collum, which partially covers its head, the ridge-like crests on its body rings, and its three-lobed tail. Its common name refers to its overall body color and its large collum that covers its head like a hood. Additionally, this millipede has a wax-like coating that covers its body, giving it a somewhat stiff and thickened appearance. These features are best seen with a hand lens, due to this millipede's small size. Its mahogany-brown color helps it easily blend in with its surroundings, and it is typically found in the leaf litter or under logs. The combination of its small size and camouflaging color requires a keen eye to unearth it from the depths of the forest. The Caramel Hooded Millipede seems to be found in drier habitats than other millipedes, thanks to its wax layer protecting it from drying out. This genus occurs from Indiana east to Maryland and south to Georgia, and also in Idaho.





ORDER SPIROBOLIDA

NARCEUS AMERICANUS-ANNULARIS species complex  
photo by JERRY CANNON

## IRON MILLIPEDES

The Iron Millipedes are typically large millipedes with hard exoskeletons, often between two and four inches long, with the largest species growing to 9 inches long (though they don't get quite this large in Ohio). Adults have more than 32 body rings and lack a dorsal longitudinal groove, and almost always have ocelli. The fifth body ring only has one leg pair, and the front of the face has a vertical line extending upwards from the labrum. Adult males have gonopods which are withdrawn into the body ring. There are about 11 families in this order worldwide, and 8 occur in North America, with most of these in the southern U. S. and Mexico. The most common family in the U. S. is the Spirobolidae. Along with the Ornate Millipedes (order Spirostreptida) and Snake-like Millipedes (order Julida), the Iron Millipedes comprise the Juliformia, a group of millipedes that are long and cylindrical.

ORDER: SPIROBOLIDA

FAMILY: SPIROBOLIDAE

# AMERICAN GIANT MILLIPEDE

*Narceus americanus-annularis* species complex



**DISTRIBUTION:**  
Statewide

**COLLECTED:**

Adams, Ashland, Athens, Belmont, Clermont, Columbiana, Coshocton, Crawford, Cuyahoga, Fairfield, Franklin, Gallia, Geauga, Greene, Guernsey, Hamilton, Harrison, Highland, Hocking, Jackson, Jefferson, Lake, Lawrence, Licking, Lorain, Medina, Monroe, Montgomery, Morgan, Muskingum, Perry, Pickaway, Ross, Scioto, Summit, Vinton, Warren, Washington, Wayne, Wood, Wyandot



**ACTIVE PERIOD:** Spring through Early Fall

**LENGTH:** 46 - 124 mm (1.8 to 5 inches)

**DESCRIPTION:** The American Giant Millipede, or Ironworm, is Ohio's largest and most distinctive millipede. It is currently classified as a species complex, based on morphological and genetic evidence, a problem for future taxonomists to resolve. It is found statewide, particularly in forested regions of the state. It is easily identified by its large size, gray to black rings with red caudal stripes, and red legs and antennae. It is an easily-startled gentle giant, and if picked up, curls into a loose spiral. It may defecate and release its chemical defenses, which are smelly and harmless, but can stain human skin. Ironworms are most often found in moist deciduous forests, but can tolerate a wide range of environments and are sometimes found in drier areas. They can be found in leaf litter and under rocks, logs, or loose bark. They often can be found crawling along the ground or climbing on rock walls and overhangs. At night, they are known to climb tree trunks. They feed on decaying leaves and dead wood, and are sometimes found feeding on mosses or lichens. Females of this species can lay egg batches numbering from 70-260 eggs. Egg laying may occur in both late spring and fall, and females deposit eggs singly in a 3 mm wide ball of compressed mud and feces. These look similar to their normal feces, but contain a small chamber inside that holds the egg. This species complex is widespread in North America, and can be found from Texas to Minnesota and east to the Atlantic Coast. It can be found in forested areas throughout Ohio, but is uncommon in the Till Plains and Lake Plains regions



ORDER SPIROSTREPTIDA

CAMBALA ANNULATA  
photo by DEREK HENNEN

## ORNATE MILLIPEDES

The Ornate Millipedes are large millipedes, typically one to four inches long, but can grow much bigger. This order includes the longest millipedes in the world, the Giant African Millipedes, which can grow to over a foot long. Adults in this order typically have more than 32 body rings and lack a dorsal longitudinal groove. Ocelli are typically present, and the fifth body ring has two pairs of legs, differing from the Iron Millipedes. Ornate Millipedes lack the vertical line extending upwards from the labrum that Iron Millipedes possess. Species in this order often have large crests on their bodies, similar to the Crested Millipedes, but the crest bearing the ozopore is larger and rounded. This order has about 10 families, three of which occur in North America. In eastern North America, the Cambalidae is found from Texas east to the Atlantic Coast, and north to Pennsylvania and Ohio. The Spirostreptidae is common in the southwestern U. S. and Mexico and includes the desert millipede, a long species that is common in the pet trade. A small family including only two species, the Choctellidae, can be found in Tennessee and Alabama. Along with the Iron Millipedes (Spirobolida) and Snake-like Millipedes (Julida), the Ornate Millipedes comprise the Juliformia, a group of millipedes that are long and cylindrical.



ORDER: SPIROSTREPTIDA

FAMILY: CAMBALIDAE

# VIOLET RIDGED MILLIPEDE

*Cambala annulata*



## DISTRIBUTION:

Central and Southern Ohio

## COLLECTED:

Adams, Athens, Gallia, Hocking, Jackson



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Fall through Spring

**LENGTH:** 44 - 60 mm (1.7 - 2.4 inches)



**DESCRIPTION:** The Violet Ridged Millipede is a beautiful amethyst-colored millipede found in the Appalachian Plateaus region of southern Ohio, where it is uncommonly encountered. If prodded, this species often remains stiff and motionless after releasing its scarlet-colored chemical defenses. Its chemicals have a sharp and pungent smell that may stain skin a bright yellow color that gradually fades to an iodine purple color that will last for a few days. The ozopores of this species are located on large, orb-shaped ridges along its back. The Violet Ridged Millipede looks similar to the Brown Crested Millipedes (genus *Abacion*), but it can be identified by having its eyes in a line, rather than a triangular patch, and has white legs and antennae, instead of brown. This species prefers moist habitats such as the hemlock ravines of the Hocking Hills region, and may also be found in general deciduous forests under leaf litter and under logs. When the habitat is drier, groups of individuals are sometimes encountered in groups under logs. It is active during the cooler months of the year and rarely seen during the dry, hot summer months. The Violet Ridged Millipede is larger and more colorful than the Amber Ridged Millipede, which is smaller and pale yellow in color. The Violet Ridged Millipede is more common farther south in its range, and occurs from Indiana to Pennsylvania and south to Florida.



photo by  
DEREK HENNEN

ORDER: SPIROSTREPTIDA

FAMILY: CAMBALIDAE

# AMBER RIDGED MILLIPEDE

*Cambala minor*



■ **DISTRIBUTION:**  
Southern Ohio

■ **COLLECTED:**  
Clark, Delaware,  
Franklin, Greene,  
Montgomery, Ross



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Fall through Spring

**LENGTH:** 25 – 38 mm (1 – 1.5 inches)



**DESCRIPTION:** The Amber Ridged Millipede is more widespread in the state than the Violet Ridged Millipede, occurring in the Appalachian Plateaus and Till Plains regions of central and southern Ohio. It is less showy than the Violet Ridged Millipede, being smaller in size and varying in color from creamy white to pale amber. Its red defensive chemicals can often be seen through its body, sometimes causing confusion with the Spotted Snake Millipede (*Blaniulus guttulatus*), but the presence of ridges on its back immediately separates these two species. The Amber Ridged Millipede appears to be more tolerant of drier conditions, and can live in oak, hickory, and pine forests as well as damp woods. It can be found in leaf litter and under rocks and logs, and may sometimes be found in caves. Spring and Fall are the best seasons to search for this species in above-ground habitats. The Amber Ridged Millipede occurs from Virginia west to Oklahoma and south to Louisiana.



photo by  
MALISA SPRING



ORDER JULIDA

BLANIULUS GUTTULATUS  
photo by SEAN MCCANN

## SNAKE-LIKE MILLIPEDES

The Snake-like Millipedes are generally small millipedes, typically one to three inches long, but can grow larger outside of North America. They get their name from their snake-like cylindrical bodies, but may also be confused with worms at first glance. Adults in this order typically have more than 26 body rings and lack a dorsal longitudinal groove. Ocelli can be present or absent, and the fifth body ring has two pairs of legs, differing from the Iron Millipedes. Male millipedes in this order typically have modified first legs, which may be transformed into small hooks or greatly enlarged. This order has 16 families worldwide, 10 of which occur in North America. The Blaniulidae, Julidae, and Parajulidae are the most commonly encountered families in North America. Most of the Blaniulidae and all the Julidae are introduced from Europe. Blaniulids are quite small and thin and typically pale in color. Julids are larger and have impressed striations encircling their body rings. Parajulids are native to North America and larger in size, have striations ventrally on their body rings, and males are immediately recognizable by their enormous first leg pair. Along with the Iron Millipedes (Spirobolida) and Ornate Millipedes (Spirostreptida), the Snake-like Millipedes comprise the Juliformia, a group of millipedes that are long and cylindrical.

ORDER: JULIDA

FAMILY: BLANIULIDAE

# SPOTTED SNAKE MILLIPEDE

*Blaniulus guttulatus*



■ **DISTRIBUTION:**  
Statewide

■ **COLLECTED:**  
Cuyahoga, Franklin



**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 8 - 16 mm (0.3 - 0.6 inch)



**DESCRIPTION:** The Spotted Snake Millipede is an introduced species from Europe found in gardens and urbanized areas statewide, as well as in agricultural fields. This species is the only Blaniulidae in Ohio that lacks eyes, and when combined with its pale body and scarlet red chemical defense glands, separates it from other species in the family. At only half a millimeter in width, it is easy to miss, but often can be found in aggregations of many individuals. It can be a pest in agricultural fields, and has been known to damage roots of crops such as strawberries and zucchini. In its native range, it can live up to four years, with much of its life spent in its juvenile life stages. While it has not been recorded from many areas in Ohio, it is likely to be found statewide. In addition to Ohio, it has been recorded from across North America, from California and British Columbia east to Newfoundland and New Jersey.



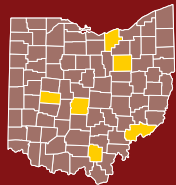
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ORDER: JULIDA

FAMILY: BLANIULIDAE

# THIN SNAKE MILLIPEDES

*Choneiulus palmatus*, *Nopoiulus kochii*, *Proteroiulus fuscus*,  
*Virgoiulus minutus*



■ **DISTRIBUTION:**  
Statewide

■ **COLLECTED:**  
Champaign,  
Franklin, Jackson,  
Lorain, Washington,  
Wayne



**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 5 - 15 mm (0.2 - 0.6 inch)



**DESCRIPTION:** Ohio has 4 species of Blaniulidae that lack eyes, and they are difficult to impossible to identify from photos, so all are discussed here. They differ in the shape of their gonopods, and in the length of the hairs around each ring, and need to be examined under a microscope to identify them to species. The Sawdust Millipede, *Virgoiulus minutus*, is North America's sole native species of Blaniulidae, while the rest are all introduced from Europe. Introduced species of Blaniulidae known to occur in Ohio include the Palm Millipede (*Choneiulus palmatus*), the Beige Snake Millipede (*Nopoiulus kochii*), and the Ochre Snake Millipede (*Proteroiulus fuscus*). Coloration in these species range from creamy white to light tan, and these millipedes are typically around half a millimeter in width. Like the Spotted Snake Millipede, they are typically found in urbanized or otherwise disturbed habitats, where they can be recognized by their thinness. The Sawdust Millipede occurs in more natural habitats, and has often been found in decaying logs and stumps, particularly pine. Males of this species are rare, and females are thought to be parthenogenetic: able to reproduce and lay viable eggs without mating with a male.



ORDER: JULIDA

FAMILY: JULIDAE

# SHORT SNAKE MILLIPEDES

*Brachyiulus spp.*



■ **DISTRIBUTION:**  
Statewide

■ **COLLECTED:**  
Cuyahoga, Franklin,  
Hamilton, Jefferson,  
Licking, Stark,  
Washington, Wayne



**ACTIVE PERIOD:** Year-round

**LENGTH:** 7 - 13 mm (0.3 - 0.5 inch)



**DESCRIPTION:** Ohio has two species of Short Snake Millipedes, both introduced from Europe: *Brachyiulus lusitanus* and *Brachyiulus pusillus*. These are our smallest Julidae, and both species can be recognized by their low number of body rings compared with other Julidae, their almost imperceptible tail, and their coloration: hazelnut brown on their sides with a light tan-yellow stripe dorsally, which is divided by a thin black line. The species can only be separated by their gonopod characters. The Short Snake Millipedes are most often found in urbanized and other disturbed habitats, where they live in leaf litter, gardens, mulch, or within dead stumps and under other woody debris. Short Snake Millipedes are found statewide and occur in urbanized areas throughout North America.



ORDER: JULIDA

FAMILY: JULIDAE

# BARREL MILLIPEDES

*Cylindroiulus* spp.



## DISTRIBUTION:

Statewide

## COLLECTED:

Ashtabula, Clark,  
Cuyahoga,  
Delaware, Erie,  
Franklin, Geauga,  
Greene, Knox,  
Lake, Lucas, Shelby,  
Stark, Summit,  
Washington, Wayne



**ACTIVE PERIOD:** Year-round

**LENGTH:** 9 - 29 mm (0.3 - 1.1 inches)



**DESCRIPTION:** Four species of Barrel Millipedes can be found in Ohio, all of which are introduced from Europe: *Cylindroiulus caeruleocinctus*, *C. latestriatus*, *C. punctatus*, and *C. truncorum*. Barrel Millipedes range in color from light tan to darkly bronzed brown, and can be distinguished from other Julidae based on the lack of a tail or having a rounded, clubbed tail and having only a few pairs of setae on the anal valves, as opposed to being rather hairy. Barrel Millipedes are also quite cylindrical along their entire body length and do not narrow at the posterior end of their bodies. The most common species in the state is *C. caeruleocinctus*: it is the largest Barrel Millipede in Ohio, growing to lengths of 20 - 29 mm, is bronzed brown in color, and lacks a tail. The species *C. punctatus* is slightly smaller, growing to lengths of 14 - 27 mm, is light tan in color, and is the only Barrel Millipede in Ohio with a clubbed tail. The other two species, *C. latestriatus* and *C. truncorum*, are smaller and vary in color, but can only be identified by examining the gonopods. The Barrel Millipedes occur statewide in urbanized and disturbed habitats and are found in leaf litter and under decaying wood, and have also been introduced in other localities throughout North America.



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ORDER: JULIDA

FAMILY: JULIDAE

# FURRY SNAKE MILLIPEDE

*Ophiulus pilosus*



## DISTRIBUTION:

Statewide

## COLLECTED:

Adams, Ashland, Athens, Belmont, Butler, Clark, Crawford, Cuyahoga, Delaware, Erie, Fairfield, Franklin, Greene, Guernsey, Hamilton, Hancock, Hardin, Hocking, Knox, Montgomery, Morgan, Muskingum, Preble, Richland, Ross, Stark, Summit, Trumbull, Tuscarawas, Warren, Washington, Wayne



photo by  
MALISA SPRING

**ACTIVE PERIOD:** Year-round

**LENGTH:** 13 - 30 mm (0.5 - 1.2 inches)



**DESCRIPTION:** The Furry Snake Millipede is an introduced species in Ohio, originally native to Europe. It can be found statewide, even in natural areas, and is one of our most common millipedes. It is typically smaller than the Barrel Millipedes (*Cylindroiulus spp.*), but larger than the Short Snake Millipedes (*Brachyiulus spp.*). The Furry Snake Millipede is, as the common name implies, quite hairy compared to other similar-looking species, especially at its posterior end. Its color is dark brown and mottled, and it has a pointed tail that is light tan in color. Differing from the Barrel Millipedes, this species slightly tapers posteriorly. The Furry Snake Millipede is widespread throughout eastern North America and can be found in a wide variety of habitats, ranging from forest litter to urban yards.



photo by  
MALISA SPRING

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ORDER: JULIDA

FAMILY: PARAJULIDAE

# EASTERN CRYSTAL MILLIPEDES

Tribe Aniulini



## DISTRIBUTION:

Statewide

## COLLECTED:

Adams, Allen, Champaign, Clark, Darke, Fairfield, Franklin, Hamilton, Hancock, Harrison, Henry, Lake, Licking, Lucas, Medina, Preble, Washington, Wayne



photo by  
EVEN DANKOWICZ

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 19 - 40 mm (0.7 - 1.5 inches)



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**DESCRIPTION:** The Eastern Crystal Millipedes include three species in the Tribe Aniulini in Ohio: *Aniulus garius*, *Aniulus (Hakiulus) diversifrons*, and *Oriulus venustus*. Their common name comes from the form of the male gonopods, which look like intricate crystal sculptures. These three species look very similar to each other and can only be identified by examining the gonopods. Eastern Crystal Millipedes range in color from light purple to orange with a slight mottled pattern, and have a light bronze-gold stripe surrounding each ring posteriorly. Small dark spots can often be seen down the sides of their bodies, which are the chemical defense glands. Like other millipedes in the family Parajulidae, males can immediately be identified based on their greatly enlarged first leg pair. Eastern Crystal Millipedes can be found throughout the state in leaf litter, under rocks and logs, and sometimes in agricultural fields. The species *Aniulus garius* is known as the corn millipede, due to how often it has been found in agricultural settings. Both *Aniulus garius* and *Oriulus venustus* are widespread in North America, being found as far west as Utah north to Alberta, Canada, and east to Virginia and Quebec, Canada. The species *Aniulus (Hakiulus) diversifrons* has a slightly smaller range, and is found from North Dakota south to Texas and east to Ohio, but has not been found south of the Ohio River.



photo by  
DEREK HENNEN

ORDER: JULIDA

FAMILY: PARAJULIDAE

# FLOCCULENT TAILED MILLIPEDE

*Ptyoiulus impressus*



**DISTRIBUTION:**  
Statewide

**COLLECTED:**

Adams, Ashland, Ashtabula, Athens, Brown, Butler, Carroll, Clermont, Crawford, Cuyahoga, Delaware, Fairfield, Franklin, Gallia, Geauga, Guernsey, Hamilton, Hocking, Holmes, Lawrence, Licking, Monroe, Morgan, Muskingum, Perry, Portage, Preble, Ross, Summit, Warren, Washington, Wayne



photo by  
JASON M. CROCKWELL

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 29 - 58 mm (1.1 - 2.3 inches)

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**DESCRIPTION:** The Flocculent Tailed Millipede is a common millipede in Ohio, and earns its name from the many hairs on the posterior portion of its body. Its distribution is likely statewide, but no records are known from the northwest quadrant of the state, even though this species has been found in southeast Michigan. The state's largest parajulid, it can grow as big as 2 inches long, with females typically being larger than males. Its color ranges from brown to dark purple, with a slightly mottled pattern and dark spots marking its chemical defense glands down the sides of its body. The Flocculent Tailed Millipede can be distinguished from other Parajulidae in Ohio based on the exceptional hairiness of the posterior end of the body and by the presence of a straight, moderately long tail that extends past the end of the body. This species can be found in a variety of habitats, but is typically found in moist leaf litter or under rocks and logs. There is a report from 1903 of a mass aggregation of this millipede on the campus of The Ohio State University, but such large aggregations are rare. This species has a large distribution east of the Mississippi River in eastern North America, ranging from Quebec, Canada south to Florida.



photo by  
JASON M. CROCKWELL

ORDER: JULIDA

FAMILY: PARAJULIDAE

# SICKLE TAILED MILLIPEDE

*Uroblaniulus canadensis*



■ **DISTRIBUTION:**

Eastern and Northern Ohio

■ **COLLECTED:**

Allen, Athens, Logan, Summit



**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 25 - 33 mm (1 - 1.3 inches)



**DESCRIPTION:** The Sickie Tailed Millipede is uncommonly encountered in Ohio, but is immediately recognizable thanks to its uniquely decurved tail, which is long and sharp. Older individuals have longer, more curved tails that abruptly bend at an almost 90 degree angle. This curved tail and the presence of only a few pairs of setae separate it from Ohio's other Parajulidae species. The Sickie Tail Millipede is a mottled light tan to golden-orange in color, with a slightly purple hue. It and other species in the genus *Uroblaniulus* are boreal in distribution, preferring the cooler temperatures of northern latitudes and higher elevations of the Appalachian Mountains. However, a few Ohio records are known in the eastern and northern portions of the state. It likely lives in the northwestern region of Ohio, as it's known from adjacent southeastern Michigan and historical records report it for Logan and Allen Counties. The Sickie Tail Millipede is most likely to be found under logs or within leaf litter.



**DECURVED TAIL**

photo by DEREK HENNEN



ORDER POLYDESMIDA

SEMIONELLUS PLACIDUS  
photo by LAURA HUGHES

## FLAT-BACKED MILLIPEDES

The Flat-backed Millipedes comprise the order Polydesmida, the most diverse order of millipedes, with about 3,500 species worldwide. These millipedes range in size from a tenth of an inch long to up to five inches in length, but are typically from the small to moderate size range in North America. Their name comes from the horizontal extensions of their body wall, called paranota, which make them appear flat. Adult Flat-backed Millipedes typically have 19 or 20 rings, and all lack ocelli. They also have lack a dorsal longitudinal groove. These millipedes have potent chemical defenses and include the cherry millipedes (family Xystodesmidae), which use a combination of benzaldehyde and hydrogen cyanide to deter predators. However, these chemicals are harmless to humans and are easily washed off, though it is recommended to avoid ingesting them. About 30 families occur worldwide, and about a dozen can be found in North America. The families Paradoxosomatidae, Polydesmidae, and Xystodesmidae are some of the most commonly encountered families in North America. The Paradoxosomatidae includes introduced species from Asia that are often found in yards and other human-proximity habitats. The Polydesmidae includes both introduced and native species that are generally brown to pink and have various sculpturing on the dorsal portion of their body rings. The Xystodesmidae are medium to large brightly colored species that smell like cherries or almonds if disturbed.

ORDER: POLYDESMIDA

FAMILY: MACROSTERNODESMIDAE

# OHIO GHOST FLAT-BACK

*Chaetaspis ohionis*



■ **DISTRIBUTION:**  
Southern Ohio

■ **COLLECTED:**  
Athens, Lawrence,  
Washington



photo by  
LAURA HUGHES

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 12 - 15 mm (0.4 - 0.6 inch)



**DESCRIPTION:** The Ohio Ghost Flat-back is something of a mystery in the state: it may be placed in the wrong genus, but no one has found a male specimen to confirm the identity of this species since its original description. Adults of this species may be confused with juvenile flat-backed millipedes because of their pale coloration and small size, but close examination reveals that they have 20 body rings, proving them to be adults. They can be distinguished from similar-looking flat-backed millipedes by having mostly smooth body rings, with only a slight depression dorsally, instead of the transverse groove that Greenhouse Millipedes (*Oxidus gracilis*) have or raised blisters that species in the family Polydesmidae possess. They are pale white to light yellow in color, and live under rocks and logs or beneath moist leaf litter. Females are found during late Spring and through the Summer, but it is likely that males are active during early Spring and during the Fall. Few records of the Ohio Ghost Flat-back are known, but all are from the Unglaciated Allegheny Plateau region. The Ohio Ghost Flat-back is only known from Ohio, but related species are found in the southern and central United States, with a few species being restricted to caves.



photo by  
DEREK HENNEN

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ORDER: POLYDESMIDA

FAMILY: PARADOXOSOMATIDAE

# GREENHOUSE MILLIPEDE

*Oxidus gracilis*



■ **DISTRIBUTION:**  
Statewide

■ **COLLECTED:**  
Adams, Allen, Ashland,  
Ashtabula, Athens, Belmont,  
Butler, Carroll, Champaign,  
Clark, Clermont, Coshocton,  
Crawford, Cuyahoga,  
Delaware, Erie, Fairfield,  
Franklin, Geauga, Greene,  
Guernsey, Hamilton, Hancock,  
Hardin, Hocking, Knox,  
Lake, Lawrence, Licking,  
Madison, Medina, Miami,  
Monroe, Montgomery,  
Morgan, Muskingum, Noble,  
Ottawa, Pike, Portage, Preble,  
Ross, Scioto, Shelby, Stark,  
Summit, Trumbull, Warren,  
Washington, Wayne, Wood



**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 16 - 25 mm (0.6 - 1 inch)



**DESCRIPTION:** The Greenhouse Millipede is one of the most successful millipedes on the planet, having spread to every continent except Antarctica, aided by humans. Native to east Asia, this species earned its name from its conspicuous presence in greenhouses worldwide, to which it traveled in the soil of potted plants. It has been introduced into Ohio and established itself throughout the state. This species lives in a variety of habitats, ranging from urbanized areas and backyards to forests and agricultural fields. It can be identified by its short paranota and dorsal transverse groove on each body ring, which all other Ohio millipedes lack. Its color varies from russet tan to dark, coffee brown, and its paranota are paler than the rest of the body ring. Juveniles are lighter and are easily mistaken for other species without closer inspection. Greenhouse Millipedes reach maturity during the summer and are reported to lay eggs in the Fall or possibly year-round. This species is conspicuous for its mate-guarding behavior: males are often seen riding on the backs of females after mating. Juveniles overwinter in the soil and other protected places before emerging in early Spring, and can reach maturity in as little as five to six months. Local populations of this species can reach high numbers, sometimes becoming a nuisance by entering into homes. News reports of this phenomenon often crop up during Spring and Summer, when residents become irritated by the Greenhouse Millipede's foul smell and distressingly high numbers right outside their door.

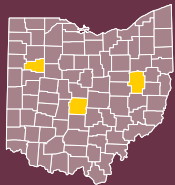
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ORDER: POLYDESMIDA

FAMILY: POLYDESMIDAE

# COMPACT FLAT-BACKED MILLIPEDE

*Brachydesmus superus*



## DISTRIBUTION:

Likely Statewide

## COLLECTED:

Allen, Franklin,  
Tuscarawas



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 8 - 10 mm (0.3 - 0.4 inch)



**DESCRIPTION:** The smallest flat-backed millipede in the state, the Compact Flat-backed Millipede is an introduced species from Europe. True to its common name, this species is quite tiny, barely reaching a centimeter in length and one millimeter or less in width. It is most likely to be encountered in urbanized or otherwise disturbed habitats statewide, where it is typically found under logs or other woody detritus, but sometimes also in leaf piles. It only has 19 body rings as an adult, and is pale to pretzel brown in color. The only other flat-backed millipede in Ohio with 19 body rings is the Granulated Millipede (*Scytonotus granulatus*), but the Compact Flat-backed millipede is much smaller and lacks the numerous small hairs on its back sported by the Granulated Millipede. This species is active during late Spring and late Fall, with a lull in activity during the Summer. In Spring or early Summer, females construct small, domed egg nests composed of soil and feces and lay about 50 eggs, which hatch after a few weeks. While few records exist for this species in Ohio, it most likely occurs statewide. It occurs in North America from Michigan and Ontario, Canada south through North Carolina.



photo by  
MALISA SPRING

ORDER: POLYDESMIDA

FAMILY: POLYDESMIDAE

# EUROPEAN SCULPTED MILLIPEDE

*Polydesmus inconstans*



■ **DISTRIBUTION:**

Likely Statewide

■ **COLLECTED:**

Cuyahoga, Delaware, Franklin



photo by  
MALISA SPRING

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 10 - 16 mm (0.4 - 0.6 inch)



**DESCRIPTION:** As its name implies, the European Sculpted Millipede is an introduced species in Ohio. Slightly larger than the Compact Flat-backed Millipede (*Brachydesmus superus*), the European Sculptured Millipede can be distinguished by its stronger sculpted pattern dorsally on its body rings, its darker color, which ranges from burgundy red to carrot orange, and by the presence of 20 body rings in adults, rather than 19. This species may also be confused with the Pink Flat-backs (genus *Pseudopolydesmus*), but is smaller than these species and has stronger sculpturing. The European Sculpted Millipede lives in urbanized habitats and other human-adjacent areas, where it can be found under debris in yards, in leaf litter, and under stones and logs. Females lay eggs from Spring to mid-Summer in domed nests made of mud and feces. This species is found in eastern North America from southern Canada south through North Carolina.



photo by  
MALISA SPRING



ORDER: POLYDESMIDA

FAMILY: POLYDESMIDAE

# CANADIAN FLAT-BACK

*Pseudopolydesmus canadensis*



■ **DISTRIBUTION:**  
Northeast Ohio

■ **COLLECTED:**  
Ashtabula, Summit



**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 22 – 29 mm (0.9 – 1.1 inch)



**DESCRIPTION:** The Canadian Flat-back is a strikingly colored species found only in the northeastern corner of Ohio. Its brick-red paranota and black mid-dorsal stripe set it apart from the other Pink Flat-backs (genus *Pseudopolydesmus*) that occur in Ohio, and indeed, all other flat-backed millipedes in the state. This species is more common in the Appalachian Mountains and colder northern states and provinces in eastern North America, but also manages to extend its distribution south to Florida. A delightful species to encounter, it lives in leaf litter and under logs. Like other species in the family Polydesmidae, females construct dome-shaped nests out of mud and feces to lay their eggs, and a few hundred can be laid at a time, which are placed in a donut-shaped ring within the nest. The eggs are held together with thin threads of silk and sealed inside, and hatch within a few weeks. This species is relatively uncommon in Ohio, even in the northeast, compared with the other Pink Flat-backs.



ORDER: POLYDESMIDA

FAMILY: POLYDESMIDAE

# PINK FLAT-BACKS

*Pseudopolydesmus collinus* and *Pseudopolydesmus serratus*



**DISTRIBUTION:**

■ Southern Ohio (*P. collinus*)

**COLLECTED:** ■ *P. collinus*: Athens, Clermont, Hamilton, Montgomery, Pike, Preble, Ross, Washington



**DISTRIBUTION:**

■ Statewide (*P. serratus*)

**COLLECTED:**

■ *P. serratus*: Adams, Ashland, Ashtabula, Athens, Belmont, Butler, Champaign, Clark, Clermont, Columbiana, Coshocton, Crawford, Cuyahoga, Delaware, Fairfield, Franklin, Gallia, Geauga, Greene, Guernsey, Hamilton, Hancock, Hocking, Holmes, Jefferson, Lake, Licking, Madison, Mahoning, Medina, Miami, Monroe, Montgomery, Morrow, Muskingum, Ottawa, Perry, Pike, Portage, Preble, Ross, Stark, Summit, Tuscarawas, Warren, Washington, Wayne



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 16 – 33 mm (0.6 – 1.3 inches)



**DESCRIPTION:** In addition to the Canadian Flat-back (*Pseudopolydesmus canadensis*), Ohio has two additional species of Pink Flat-backs: the Rolling Hills Flat-back (*Pseudopolydesmus collinus*) and the Common Pink Flat-back (*P. serratus*). These two species are very similar in appearance and are best identified by their gonopods, so are treated together here. Generally, the Rolling Hills Flat-back is darker than the Common Pink Flat-back, but this varies. Both species are typically darker brown-red in the middle of their body rings, with light pink to peach paranota, but not the bold brick-red paranota and dark black medial stripe that the Canadian Flat-back has. The Rolling Hills Flat-back is found only in the southern half of Ohio, and ranges from Indiana southeast to North Carolina. It is smaller, with a length of 16 to 25 mm, and often found in riparian areas near rivers and streams. The Common Pink Flat-back is found statewide, and is one of the most widely-distributed millipede species in eastern North America, being from found Minnesota south to Texas and east to Newfoundland, Canada to Florida. It is the largest species of Pink Flat-back in Ohio, with a typical length of 23 to 33 mm, and is a habitat generalist, living in most habitats except heavily urbanized ones. Both species are most often found in leaf litter and under logs.

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ORDER: POLYDESMIDA

FAMILY: POLYDESMIDAE

# GRANULATED MILLIPEDE

*Scytonotus granulatus*



## DISTRIBUTION:

Statewide

## COLLECTED:

Adams, Athens, Champaign, Clermont, Delaware, Fairfield, Franklin, Gallia, Hamilton, Harrison, Hocking, Muskingum, Perry, Portage, Ross, Washington, Wayne



**ACTIVE PERIOD:** Fall through Spring

**LENGTH:** 12 - 16 mm (0.4 - 0.6 inch)



**DESCRIPTION:** The Granulated Millipede is uncommonly encountered in Ohio, despite living throughout the state. This is due to two main factors: its small size and its habit of being active during the cooler seasons, when searching for millipedes loses some of its allure. This behavior is similar to the cold-active Winterchill Millipedes (genus *Conotyla*), however, meaning that even when the weather takes a boreal turn, there are still interesting millipedes to find! The Granulated Millipede differs from other flat-backed millipedes in having four rows of small bumps on each body ring which are set with small setae, giving the millipede a velvety granulated texture. Adults have 19 body rings, and adult females have reduced paranota on body rings five to nine. They range in color from fuchsia pink or peach orange to darker cherry red, and the paranota are lighter in color than the rest of the body. Granulated Millipedes are most often found in moist leaf litter and under logs in deciduous forests, particularly in cool microhabitats. A wide-ranging species, the Granulated Millipede lives in southern Canada south to Oklahoma and east to Vermont and South Carolina, but is absent from the Blue Ridge Mountains.

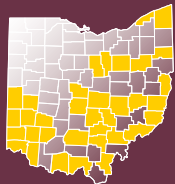


ORDER: POLYDESMIDA

FAMILY: XYSTODESMIDAE

# LOG LURKER

*Euryurus leachii*



## DISTRIBUTION:

Eastern and Southern Ohio

## COLLECTED:

Adams, Ashland, Ashtabula, Athens, Belmont, Butler, Carroll, Clermont, Clinton, Cuyahoga, Darke, Delaware, Fairfield, Franklin, Gallia, Geauga, Greene, Guernsey, Hamilton, Hocking, Jefferson, Lake, Licking, Mahoning, Miami, Monroe, Montgomery, Morgan, Muskingum, Perry, Preble, Richland, Ross, Scioto, Stark, Vinton, Warren, Washington, Wayne



photo by  
MALISA SPRING

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 25 – 30 mm (1.0 – 1.2 inches)



**DESCRIPTION:** The Log Lurker is a striking and unmistakable species in Ohio, immediately recognized by its three pumpkin-orange spots on each body ring. The background color of each body ring is slate grey, and its legs are cream-white, while its antennae can vary from white to light brown. This is the only flat-backed millipede in Ohio with a broad, square-shaped tail, adding to its distinctness. It was previously placed in the family Euryuridae, but is now considered part of the family Xystodesmidae. The Log Lurker can be found throughout Ohio, except for the northwest quadrant of the state, and is always found under or within hardwood logs or near woody debris in moist deciduous forests. Multiple individuals are typically found within the same log, and peeling back the bark will expose them. It is rare to find it in leaf litter, and does not live within logs of coniferous trees. Its chemical defenses smell similar to the cherry millipedes, but with an added kick, akin to spicy cherries. The Log Lurker, like some other flat-backed millipedes, fluoresces a brilliant blue-green color under ultraviolet light, and all body parts of this species glow. This millipede is found from Pennsylvania and West Virginia west to northeast Arkansas and east to western Virginia.



photo by DEREK HENNEN

ORDER: POLYDESMIDA

FAMILY: KYSTODESMIDAE

# OHIO TWISTED-CLAW

*Nannaria ohionis*



■ **DISTRIBUTION:**  
Southeast Ohio

■ **COLLECTED:**  
Athens, Hocking,  
Perry, Washington



photo by  
CADE CAMPBELL

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 25 – 33 mm (1.0 – 1.3 inches)



**DESCRIPTION:** The Ohio Twisted-Claw is one of Ohio's two species of Twisted-Claw Millipedes, both of which are in the cherry millipede family. Instead of relying on flashy colors to warn predators of their potent chemical defenses, they opt instead for camouflage and sport chestnut brown colors that help them blend in with the leaf litter. The Ohio Twisted-Claw has small pink to red spots on its paranota, separating it from the Loam-dwelling Twisted-Claw (*Nannaria terricola*). Its small body size, small triangular sternal projections near the base of each leg, and lack of bright colors separate it from other cherry millipedes. Additionally, Ohio Twisted-Claw males have leg pairs before the gonopods with claws that are twisted and broadened at the tip, which are most easily seen with the aid of a hand lens. Females lack these claw modifications, and their exact function for the male is unknown. The Ohio Twisted-Claw is typically found in leaf litter, but may also be found under logs or stones in mesic deciduous forests. They're often found in riparian habitats, buried in the top layer of the soil, and can often be found in the cool, moist microhabitats of sandstone ravines and hemlock gorges. This species is only found in southeast Ohio, and has also been found in Wood County, West Virginia.



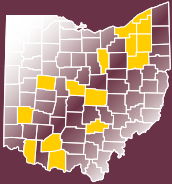
photo by JOE BREHM

ORDER: POLYDESMIDA

FAMILY: XYSTODESMIDAE

# LOAM-DWELLING TWISTED-CLAW

*Nannaria terricola*



## DISTRIBUTION:

Northeast to  
Southwest Ohio

## COLLECTED:

Adams, Ashland,  
Clermont, Cuyahoga,  
Delaware, Geauga,  
Highland, Hocking,  
Lake, Licking, Logan,  
Montgomery,  
Portage, Stark,  
Summit



**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 25 – 33 mm (1.0 – 1.3 inches)



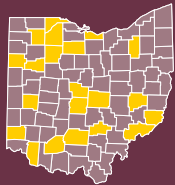
**DESCRIPTION:** The Loam-dwelling Twisted-Claw is Ohio's other and more widespread Twisted-Claw Millipede. It can be found from the northeast quadrant of the state south to the southwestern quadrant, but is absent from the range of the Ohio Twisted-Claw (*Nannaria ohionis*) in southeast Ohio. The two species do occur together in the Hocking Hills region, however. The Loam-dwelling Twisted-Claw is chestnut-brown in color, with white spots on its paranota, separating it from the pink-spotted Ohio Twisted-Claw. Its small size, small triangular projections near the base of each leg, and muted coloration separates it from the other cherry millipedes in Ohio, which are larger and brightly-colored. This species is found in moist leaf litter in mesic deciduous forests, especially in riparian areas and cool ravines near boulders, as well as under logs and stones. The Loam-dwelling Twisted-Claw will often be buried a few centimeters into the soil, making it easy to miss during a cursory search. This species is sometimes seen killed by a fungus that specializes on millipedes, *Arthropaga myriapodina*. Millipedes infected with this fungus will climb on top of sticks, logs, or other high areas before dying, and fungal spores burst out from between the intersegmental membranes between its body rings. Such victims can easily be identified by the bright white spores emerging from their bodies, which may look like small bits of cotton candy when fresh. The Loam-dwelling Twisted-Claw is only known from Ohio.

ORDER: POLYDESMIDA

FAMILY: KYSTODESMIDAE

# TRAVELING CHERRY MILLIPEDE

*Pleuroloma flavipes*



■ **DISTRIBUTION:**  
Statewide

■ **COLLECTED:**  
Allen, Butler,  
Clermont, Delaware,  
Erie, Franklin,  
Guernsey, Hancock,  
Henry, Highland,  
Hocking, Licking,  
Lucas, Miami,  
Monroe, Ross,  
Seneca, Summit, Van  
Wert, Washington,  
Wood



**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 23 – 35 mm (0.9 – 1.4 inches)



**DESCRIPTION:** The Traveling Cherry Millipede is the most widespread species of cherry millipede in eastern North America, occurring from North Dakota east to Quebec, Canada, and south to Louisiana and North Carolina. This species is grey-brown to black with yellow paranota and a yellow to orange stripe on each body ring. The stripe across the posterior margin of each body ring can vary from thin to thick, often being larger in the middle of the ring, when it can form a semi-lunar or triangular shape. This species is larger than the Twisted-Claw Millipedes (genus *Nannaria*), but smaller than other cherry millipedes, and can be identified based on the wrinkles on its body rings and the hairy, triangular lobes on its sterna, which can only be seen by examining the underside of the millipede. The Traveling Cherry Millipede earns its name from its curious habit of forming large aggregations of hundreds to thousands of individuals that make their way across the landscape, typically reported during the summer. These aggregations can include both juveniles and adults, but what causes this millipede to aggregate in such numbers is still a mystery. The Traveling Cherry Millipede can be found in leaf litter and under logs or rocks, and while it occurs throughout the state, it is more common in northern Ohio.



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ORDER: POLYDESMIDA

FAMILY: XYSTODESMIDAE

## NORTHERN APPALACHIAN CHERRY MILLIPEDE

*Appalachioria separanda calcaria*



■ **DISTRIBUTION:**

Extreme southern  
Ohio

■ **COLLECTED:**

Lawrence



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 38 - 49 mm (1.5 - 2.0 inches)

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**DESCRIPTION:** The Northern Appalachian Cherry Millipede just barely makes it into Ohio, and is so far only known from Lawrence County near the West Virginia and Kentucky borders. This species is part of a genus that was recently described, *Appalachioria*, and aptly enough, its species are limited to the Appalachian Mountains and foothills. This millipede is one of our largest cherry millipedes and can grow to two inches long. It is easily confused with the Aromatic Cherry Millipede (*Apheloria virginensis corrugata*), but it is slightly smaller. The Northern Appalachian Cherry Millipede is brown-black with yellow to orange stripes on the posterior edge of each body ring that connect to paranotal spots of the same color, and its legs range from yellow to slightly orange. In other parts of its range, this genus is known to mimic the colors of *Apheloria*, and it likely does this in Ohio as well, making color an unreliable character for species identification. However, the gonopods of males of the Northern Appalachian Cherry Millipede have a notch near the top of their curve, while the Aromatic Cherry Millipede lacks this notch. Like other cherry millipedes, this species can be found in leaf litter and under logs or stones in moist deciduous woods. This species is also known from southwest Virginia and West Virginia.



ORDER: POLYDESMIDA

FAMILY: XYSTODESMIDAE

# AROMATIC CHERRY MILLIPEDE

*Apheloria virginiensis corrugata*



■ **DISTRIBUTION:**  
Statewide

■ **COLLECTED:**  
Adams, Ashland, Ashtabula, Athens, Belmont, Carroll, Champaign, Clermont, Columbiana, Coshocton, Crawford, Delaware, Erie, Fairfield, Franklin, Gallia, Greene, Guernsey, Hamilton, Harrison, Hocking, Huron, Jackson, Lake, Lawrence, Licking, Lorain, Mahoning, Medina, Monroe, Montgomery, Morgan, Morrow, Muskingum, Noble, Perry, Pickaway, Pike, Ross, Scioto, Summit, Vinton, Washington, Wayne



photo by  
CHRIS POLING

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 40 – 60 mm (1.6 – 2.3 inches)



**DESCRIPTION:** The Aromatic Cherry Millipede is one of Ohio's most charismatic millipedes: colorful, large, and fragrant, this millipede always draws a crowd. This species is the largest cherry millipede in the state, often exceeding two inches in length, and it also packs the highest amount defensive chemicals. Its defensive chemicals are potent, being composed mainly of benzaldehyde and hydrogen cyanide, and are emitted from small pores along the sides of its body. These chemicals are in too low of an amount to be harmful to humans and smell like almonds or sweet cherries, but are poisonous to predators that would otherwise eat this millipede. The Aromatic Cherry Millipede is typically dark black with a bright yellow stripe along the posterior edge of its body rings, which connects to yellow paranotal spots. Sometimes these spots are edged with red, and its legs range from yellow to red. Its gonopods are circular, lack any notch (present in the Northern Appalachian Cherry Millipede) and have a hook-like process at the base, separating it from other large cherry millipedes in the state. It is a common species in Ohio, particularly in southern Ohio, and lives in deciduous forests, where it can be found in leaf litter and under logs and stones. It occurs statewide, though records from the northwest quadrant of the state are lacking. However, it is likely present there in suitable habitats. This species occurs throughout northeastern North America.



photo by  
DEREK HENNEN

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ORDER: POLYDESMIDA

FAMILY: XYSTODESMIDAE

# MOHICAN CHERRY MILLIPEDE

*Rudiloria mohicana*



■ **DISTRIBUTION:**

Eastern Ohio

■ **COLLECTED:**

Ashland, Athens,  
Hocking



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 25 - 45 mm (1.0 - 1.8 inches)

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**DESCRIPTION:** The Mohican Cherry Millipede gets its name from the place where it was described from, Mohican State Park. This millipede lives only in the Unglaciaded Appalachian Plateau region of Ohio, and it is uncommon, with definitive records from three counties: Ashland, Athens, and Hocking. The Mohican Cherry Millipede may be confused with the widespread Aromatic Cherry Millipede, but is smaller and its gonopods are the shape of a loose scythe rather than an almost complete circle. Additionally, its color pattern is the most variable of all cherry millipedes in Ohio. Its body is black with either a yellow to orange stripe along the posterior margin of its body rings, a yellow to orange middorsal spot, or both. It also has yellow small to large paranotal spots on each body ring, further adding to its diversity of color patterns. These colors and patterns are not necessarily consistent at each location this species is found: up to five color patterns have been found in a single five square meter area. The Mohican Cherry Millipede can be found in moist deciduous forests and sandstone ravines shaded by hemlock trees, where it lives within leaf litter and under rocks and logs. This species, like other large-bodied cherry millipedes, fluoresces blue-green under ultraviolet light, making it easy to find during the night.



photo by DEREK HENNEN

ORDER: POLYDESMIDA

FAMILY: KYSTODESMIDAE

# SALMON CHERRY MILLIPEDE

*Semionellus placidus*



## DISTRIBUTION:

Northwest,  
Southwest, and  
Southeast Ohio

## COLLECTED:

Allen, Clermont,  
Hardin, Monroe,  
Seneca, Washington,  
Wood



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 25 – 30 mm (1.0 – 1.2 inches)



**DESCRIPTION:** The Salmon Cherry Millipede occupies an interesting position relative to other cherry millipedes in Ohio. It is more closely related to species from western North America than to those found in the eastern part of the continent, which is reinforced by its different body shape. Instead of the large paranota that other cherry millipedes in Ohio have, the Salmon Cherry Millipede has small, reduced paranota, particular at the posterior end of its body. This species also has less vibrant coloration, being dark brown with pale salmon-orange stripes along the posterior margin of its body rings. Its distribution in Ohio is a bit strange as well, as this species is found in three corners of the state, but is absent from the northeastern corner. Even in counties where this species has been found, its distribution is sporadic, and it is uncommonly encountered. The Salmon Cherry Millipede lives in deciduous forests in leaf litter and under rocks and logs, and is typically found near streams and rivers. Where this species does occur, it is often abundant, and many individuals may be found at one locality. This species also fluoresces well under ultraviolet light, with its entire body lighting up in a blue-green glow as the millipede moves through the undergrowth like a small shining star. The Salmon Cherry Millipede occurs from Minnesota southeast to Virginia.



photo by  
DEREK HENNEN



STRIGAMIA BIDENS  
photo by DEREK HENNEN

## OTHER MYRIAPODA

In addition to the millipedes (Class Diplopoda), the Subphylum Myriapoda contains three additional classes: the Chilopoda (centipedes), Symphyla (garden centipedes or symphylans), and Pauropoda (pauropods). The centipedes and the millipedes are the most well-known groups, due to their larger body size and higher species diversity. Garden centipedes and pauropods live in the soil and are quite small, typically only two to ten millimeters in length, and are not as well-studied as the centipedes and millipedes. During your search for millipedes, you're likely to also encounter these other myriapods, so a short primer on the major groups are given in the following pages.



## CLASS PAUROPODA

PAUROPODA  
photo by STEVEN WANG

# PAUROPODS

Paupods are the closest relatives to millipedes and are easily overlooked, due to their small size. They range in length from 0.3 to 2 millimeters and are rarely seen; they are typically collected by soil extraction methods, such as with a Berlese funnel. They are pallid in color, typically being pale white or light brown, lack ocelli, and have 11 segments with 8 to 11 leg pairs. Paupods can be recognized by their unique branched antennae, which all other myriapods lack. They are detritivores, living in the leaf litter, under the bark of logs, or at various depths within the soil. Paupods are found worldwide, except for Antarctica, and about 800 species are known from twelve families in two orders, the Hexamerocerata and Tetramerocerata. In North America, only the order Tetramerocerata is known, and two commonly encountered families are the Pauropodidae and Eurypauropodidae.



CLASS SYMPHYLA

SYMPHYLA  
photo by STEVEN WANG

## GARDEN CENTIPEDES

Garden centipedes are slightly larger than pauropods. They are typically 2 to 10 millimeters in length, and are cream to translucent white in color. Adults have 14 trunk segments and 11 or 12 leg pairs. Garden centipedes lack ocelli, and have two tracheal openings on the sides of their head. They can be recognized by their long, beaded antennae. Garden centipedes are detritivores found in the leaf litter and soil, and some species are known to be agricultural pests. About 200 species are known worldwide in two families, the Scolopendrellidae and the Scutigereidae. The Scolopendrellidae are smaller than the Scutigereidae (less than 4 mm long) and have either pointed posterior projections on their tergites (dorsal plate of the body segment) or reduced tergites. The Scutigereidae are larger (greater than 4 mm long) and have tergites with rounded posterior lobes. Mating is indirect, with males depositing spermatophores that are later picked up by the females and stored in special pouches in their heads. The female later lays her eggs in the soil or on plants, guarding the eggs until they hatch.



CLASS CHILOPODA

HEMISCOLOPENDRA MARGINATA  
photo by GRAHAM MONTGOMERY

## CENTIPEDES

Centipedes are the only carnivorous myriapods, and comprise a class of 3,000 described species, with the estimated total diversity of the group around 8,000 species. Centipedes are typically flattened and have one pair of legs per segment. Their most recognizable trait is their forcipules, sometimes also called maxillipeds, which are actually a modified pair of legs. They are used to capture and incapacitate their prey, and have an internal venom gland, which delivers the venom through a small hole at the tip of the forcipules. Most centipedes are harmless to humans and are more likely to flee upon being discovered, but some large tropical centipedes can inflict medically significant bites. Centipedes live in the soil, under the bark of logs, under rocks, and within leaf litter. They can survive in a wide range of habitats, from forests to deserts, and even in houses, where they are considered beneficial due to their habit of eating other house pests. Despite their name, centipedes do not have 100 legs. Many species have between 15 and 23 pairs of legs, while the Soil Centipedes can have more than 100 legs. All centipedes have an odd number of leg pairs as adults. There are five orders of centipedes, and four orders can be found in North America: the Long-legged Centipedes (Order Scutigermorpha), the Stone Centipedes (Order Lithobiomorpha), the Soil Centipedes (Order Geophilomorpha), and the Bark Centipedes (Order Scolopendromorpha).



## ORDER SCUTIGEROMORPHA

SCUTIGERA COLEOPTRATA  
photo by FEDERICO.CROVETTO

# LONG-LEGGED CENTIPEDES

Long-legged centipedes get their name from their exceptionally long legs, particularly those of their last segment. Their antennae are also quite long, and all these long appendages can be a bit intimidating to humans. They are not aggressive however, and are fast to run away, which they can do quite quickly. Species are typically about an inch long, but some tropical species can reach four or five inches in length. Long-legged centipedes have 15 pairs of legs, but hatch with only four pairs, adding more legs with each molt. These are the only centipedes with compound eyes, and the only order with their spiracles (breathing holes) located dorsally on their segments, rather than on their sides. There are three families worldwide, and two families occur in North America: the Psellioididae, limited to tropical portions of Mexico, and the Scutigeraidae, with a widely introduced species typically limited to buildings, and a native species in Arizona, Texas, and Oklahoma. The common house centipede (*Scutigera coleoptrata*) can now be found throughout North America, but a second introduced species, *Thereuonema tuberculata*, was recently discovered in the Dayton area.



ORDER: SCUTIGEROMORPHA

FAMILY: SCUTIGERIDAE

# HOUSE CENTIPEDE

*Scutigera coleoptra*



## DISTRIBUTION:

Statewide

## COLLECTED:

Allen, Athens, Butler, Clark, Clermont, Columbiana, Coshocton, Cuyahoga, Darke, Delaware, Fairfield, Franklin, Fulton, Greene, Hamilton, Hancock, Hocking, Jefferson, Lake, Licking, Lorain, Lucas, Madison, Mahoning, Medina, Montgomery, Morrow, Ottawa, Richland, Scioto, Shelby, Stark, Summit, Tuscarawas, Warren, Washington, Wayne, Wood



photo by  
MELINDA FAWYER

**ACTIVE PERIOD:** Year-round

**LENGTH:** 20 – 30 mm (0.8 – 1.2 inches)



**DESCRIPTION:** The House Centipede is a misunderstood roommate that may inspire fear, but humans have little to fear from this unique centipede. Immediately recognized by its 15 pairs of long legs and large eyes, the house centipede has been introduced from the Mediterranean region and now takes up residence in buildings throughout North America. An efficient predator, the house centipede pays rent through the removal of unwanted household pests such as cockroaches, flies, and other small arthropods. It is quite fast, and will flee upon being discovered in dark corners of buildings. This centipede prefers damp areas in buildings, and thus is found around drains, bathtubs, and in basements. It is found in buildings throughout Ohio, and may be encountered outside only during warmer seasons; it cannot survive the freezing outdoor winter temperatures. House centipedes do not exhibit parental care of their eggs, but rather hide them in soil or dark crevices.



photo by  
JIM MCCORMAC

65



ORDER LITHOBIOMORPHA

LITHOBIOMORPHA  
photo by GRAHAM MONTGOMERY

## STONE CENTIPEDES

Stone Centipedes are small brown centipedes that live in leaf litter, under the bark of logs, and under stones. Their typical length ranges from 4 to 35 millimeters (about 0.1 to 1.4 inches) and they are most often found in forests, though they may also be found in natural detritus in parks or in backyards. Like the Long-legged Centipedes (Order Scutigermorpha), adults have 15 pairs of legs; juvenile centipedes add more leg pairs as they molt. Stone Centipedes have much shorter legs than the Long-legged Centipedes, have small ocelli rather than compound eyes, and have their spiracles located on the sides of their body rather than dorsally. Additionally, their tergites (dorsal plates of each body segment) alternate between short and long plates, rather than being similarly-sized as in other centipede orders. Stone centipedes typically have stout setae on their legs called spurs, and the presence or absence of these spurs is often useful for species identification. Adult males often have modified posterior legs that aid with identifying the species, but are quick to drop them to distract predators (and irritate biologists). The taxonomy of this order is complicated and our knowledge of this group of centipedes is lacking, as few people have studied the North American species. Two families are generally agreed upon, the Henicopidae and the Lithobiidae. Additional families have been established for the North American species, but may actually be groups within the Lithobiidae. Species in the Lithobiidae are generally larger than those in the Henicopidae, and have large spurs on their legs, which the Henicopidae lack. Common species of Lithobiidae in Ohio include *Lithobius forficatus*, introduced from Europe and often found in urbanized habitats, and *Bothropolys multidentatus*, a rather large species about an inch long.



## ORDER GEOPHILOMORPHA

GEOPHILOMORPHS SP.  
photo by GRAHAM MONTGOMERY

# SOIL CENTIPEDES

Soil Centipedes are the leggiest centipedes, having 27 or more pairs of legs, with up to 191 leg pairs. Juveniles hatch with their full set of leg pairs and grow larger as they molt, but do not add additional pairs of legs. Soil Centipedes are the most diverse order of centipedes, with about 1,200 species worldwide, and are recognizable by their thin bodies and short legs. They are sometimes mistaken for worms, and live in the soil, leaf litter, and under logs. Their long, flexible bodies (generally about 1 to 6 cm long) allow them to crawl through small spaces within the soil, where they hunt for small arthropods and other prey. Soil Centipedes lack eyes, relying on smell to navigate through their environment. These centipedes are typically pale yellow in color, but may be scarlet red or light orange. Females exhibit parental care of her eggs, coiling around them and keeping them safe from fungi and other predators until they hatch. Soil Centipedes have sternal glands on the underside of their body segments, from which they release chemical defense compounds to protect themselves from predators. A few species can release bioluminescent defenses from these glands, though this phenomenon is not known in any species from North America. There are about 13 families of Soil Centipedes worldwide, and common families in Ohio include the Geophilidae, Schendylidae, and Linotaeniidae.



## ORDER SCOLOPENDROMORPHA

*SCOLOPOCRYPTOPS SEXSPINOSUS*  
photo by DEREK HENNEN

# BARK CENTIPEDES

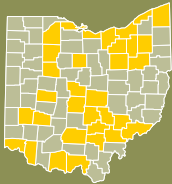
Bark Centipedes are Ohio's largest centipedes, with lengths ranging from one to three inches. None of the species in the state are dangerous, but they can inflict a bite that is on par with the sting of a hornet, and should be treated with respect. In tropical regions, some species can grow to a foot in length and their bites are medically significant. Bark Centipedes, like Soil Centipedes (Order Geophilomorpha), hatch from their eggs with their full set of legs, either 21 or 23 pairs. Some species have ocelli, while others lack them completely. Females exhibit parental care and take care of the eggs and young juveniles, cleaning off any fungus or other material. This order includes five families worldwide, and four occur in Ohio. The Scolopocryptopidae is the only family with 23 pairs of legs; Ohio's other Bark Centipedes all have 21 pairs. These are large, orange-red centipedes that lack ocelli and are often found under bark or in leaf litter. The Scolopendridae are the only Bark Centipedes in Ohio that have ocelli, and the family is represented in the state by the Kentucky Blue Centipede (*Hemiscolopendra marginata*). The Plutoniumidae are large centipedes instantly recognizable by their last leg pair, which is enormous and thickened, while the Cryptopidae are small, yellow centipedes that do not have an enlarged last pair of legs.

ORDER: **SCOLOPENDROMORPHA**

FAMILY: **SCOLOPOCRYPTOPIDAE**

# RED CENTIPEDES

*Scolopocryptops spp.*



## DISTRIBUTION:

Statewide

## COLLECTED:

Adams, Ashtabula, Athens, Champaign, Clermont, Crawford, Cuyahoga, Delaware, Erie, Fairfield, Franklin, Greene, Hamilton, Hancock, Hardin, Hocking, Lake, Licking, Lorain, Medina, Montgomery, Morgan, Ottawa, Perry, Portage, Ross, Scioto, Stark, Summit, Vinton, Washington, Wayne, Wood



photo by  
JIM McCORMAC

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 30 – 70 mm (1.2 – 2.8 inches)

69

**DESCRIPTION:** The Red Centipedes are Ohio's most commonly-noticed Bark Centipedes and are found statewide. They are recognized based on their 23 leg pairs, large body size, and orange-red coloration. Ohio has two species: the Eastern Red Centipede (*Scolopocryptops sexspinosus*) and the Blue Belly Centipede (*Scolopocryptops nigradius*). The Eastern Red Centipede is often larger and found statewide, while the Blue Belly Centipede reaches a maximum length of about 45 mm, does not range into the northern quarter of the state, and often has blue patches ventrally on its body. Additionally, the Eastern Red Centipede has many setae on its second antennal segment, while the Blue Belly Centipede has fewer setae on its second antennal segment. These centipedes live in a variety of habitats, ranging from urbanized areas to forests, and are found in leaf litter and under the bark of fallen logs. The Eastern Red Centipede is the more common of the two species, and females are sometimes found brooding their young in logs during the summer.



photo by  
GRAHAM MONTGOMERY

ORDER: **SCOLOPENDROMORPHA**

FAMILY: **SCOLOPENDRIDAE**

# KENTUCKY BLUE CENTIPEDE

*Hemiscolopendra marginata*



■ **DISTRIBUTION:**  
Southern Ohio

■ **COLLECTED:**  
Adams, Athens,  
Clermont, Gallia,  
Hamilton, Hocking,  
Pike, Scioto, Vinton



photo by  
JIM McCORMAC

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 30 – 60 mm (1.2 – 2.3 inches)

70

**DESCRIPTION:** The Kentucky Blue Centipede is the state's most fearless centipede—it commonly ventures inside of homes and is not averse to giving a formidable bite, with effects on par with a hornet sting. This species is only found in the southern quarter of Ohio, with the state's most northern record in the Hocking Hills region. The Kentucky Blue Centipede is the only Bark Centipede in the state with ocelli, four on each side of its head. It has 21 pairs of legs and reaches lengths between one and two and a half inches long. Its body has a blue-green tinge with pale orange legs and a darker orange head, separating it from Ohio's other Bark Centipedes. It is active from Spring to Fall, with a peak in activity during the Summer. Unlike other Bark Centipedes, it is not commonly found in leaf litter, preferring pine logs and stumps, where it can be found by peeling off large pieces of bark.



photo by  
DEREK HENNING

ORDER: **SCOLOPENDROMORPHA**

FAMILY: **PLUTONIUMIDAE**

# BIG-LEG CENTIPEDE

*Theatops posticus*



■ **DISTRIBUTION:**

Southern Ohio

■ **COLLECTED:**

Adams, Clermont,  
Gallia, Scioto,  
Vinton, Washington



photo by  
DEREK HENNEN

**ACTIVE PERIOD:** Spring through Fall

**LENGTH:** 30 - 45 mm (1.2 - 1.8 inches)



**DESCRIPTION:** The Big-leg Centipede lives up to its name: its last pair of legs are huge and thick, looking more like a pair of pincers than legs! The exact function of these legs is unknown, but biologists have hypothesized that they may be used to grip prey. These large legs provide the easiest way to identify this species. The Big-leg Centipede has 21 pairs of legs and lacks ocelli, separating it from the other large Bark Centipedes in the state. Its body is light yellow-orange in color, with the head and posterior end a darker pumpkin orange color. It is not as common as the Red Centipedes (genus *Scolopocryptops*), and is restricted to the southern half of the state. The Big-leg Centipede is most often found in moist leaf litter, either deciduous or mixed deciduous-pine, but may be encountered under stones as well.



photo by  
GRAHAM MONTGOMERY

## GLOSSARY

**Collum:** The first segment of the millipede body behind the head, does not have any legs. When counting the number of segments a millipede has, this is where you should start counting.

**Cyphopods:** Sexual organs of female millipedes, held in a pouch behind the second leg pair. Cyphopods include a plate-like receptacle that cover the tops of the valves, where male millipedes insert their gonopods during mating.

**Detritivore:** An animal that feeds on dead organic material, particular plant or fungus material.

**Epiproct:** The dorsal plate of the telson, often extended into a tail. Most often triangular in shape, but sometimes square-shaped or curved.

**Forcipules:** In centipedes, the modified first leg pair located below the head. Forcipules have a venom gland and a hole at their tip and are used to subdue prey.

**Gonopods:** Modified legs male millipedes use for mating with females. Most adult male millipedes have these structures, which often do not look like legs at all, and can be quite intricate. Often smooth and glassy yellow.

**Molt:** To shed the exoskeleton. Myriapods molt between their life stages to be able to grow in body size and reach adulthood.

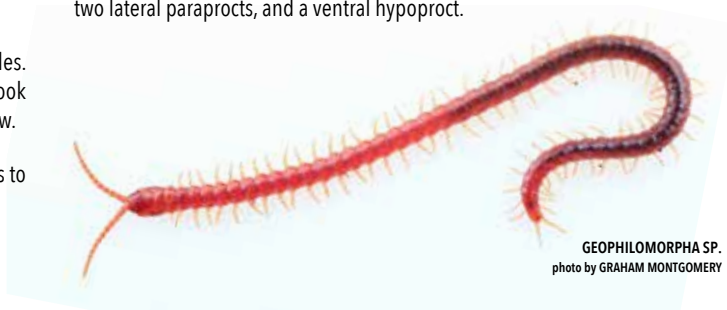
**Ozopores:** Small pores on the side of a millipede's body, where chemical defenses are expelled. Ozopores are connected to the chemical glands inside the millipede's body.

**Paranota:** Horizontal extensions of the body wall of the millipede, best seen in species of the order Polydesmida, the flat-backed millipedes. Sometimes also present in other orders, such as the Platydesmida and Chordeumatida.

**Spinnerets:** Structures that look like thickened setae in a short sleeve, used to spin a silk-like material for a molting chamber or egg nest. Some millipedes have one or two pairs of spinnerets at the end of their epiproct.

**Spiracles:** Circular or kidney-shaped openings near the base of each legpair through which millipedes breathe. Spiracles are connected to tracheae, which carry oxygen directly to their organs and muscles.

**Telson:** The last segment of the millipede, made up of a dorsal epiproct, two lateral paraprocts, and a ventral hypoproct.



GEOPHILOMORPHA SP.  
photo by GRAHAM MONTGOMERY



## SUGGESTED REFERENCES

Much of the specific ecological, distributional, and taxonomic information about millipedes is only found in primary scientific literature. Importantly, male gonopod illustrations are included in research papers, and these structures often need to be examined to accurately identify a species. Many of these useful papers can be accessed for free through the Biodiversity Heritage Library website (<https://www.biodiversitylibrary.org>). The website Millibase (<http://millibase.org>) hosts a plethora of information about current taxonomy of millipedes and has a searchable list of millipede literature. Educational websites like BugGuide (<https://bugguide.net>) and iNaturalist (<https://www.inaturalist.org>) allow anyone to share their nature photos, and useful information on myriapods can be found on these websites. However, some misidentifications are unavoidable with photos, so use additional resources with these websites.



## PHOTO CREDITS

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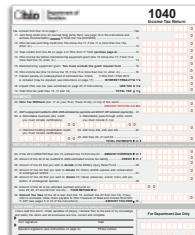
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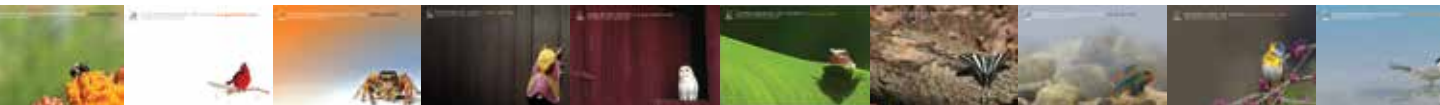
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# OHIO DIVISION OF WILDLIFE



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PUBLICATION 5527

CANADIAN FLAT-BACK  
photo by SEBASTIAN ECHEVERRI