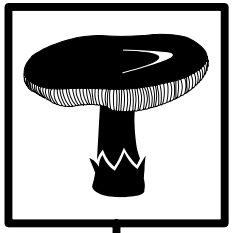
ARTHROPODS!

A COLORING/LEARNING GUIDE FOR YOUNG NATURALISTS

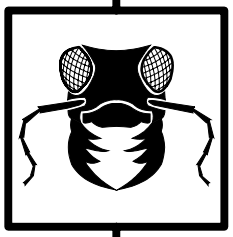
by Matt Bertone

- DIETS -

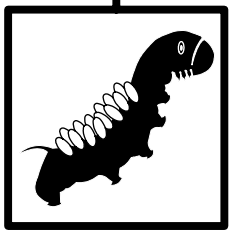


DETRITIVORES (dee-trite-a-voors): Also known as scavengers or decomposers, these arthropods feed on decaying plants or animals. Also included in this group are arthropods that feed on other decomposers (such as bacteria and fungi) and dung feeders.

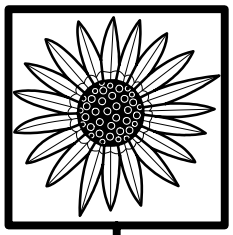
HERBIVORES (urb-a-voors): These arthropods consume live plants. They may chew on leaves, bore into live wood, suck plants juices, mine leaves or chew on roots. Some even cause plants to grow spectacular homes for them (**galls**).



CARNIVORES (karn-a-voors): These arthropods consume live animals. Some hunt other animals, while others ambush or trap their prey. Many have appendages used to grab victims, while some use venoms to subdue and digest prey.



PARASITOIDS (para-sit-oyds): These arthropods parasitize other animals. They are different from true parasites, because they usually kill the host. Adults lay eggs in, on or near the host, where the larvae hatch and (usually) enter the host's body. Larvae feed for some time until they pupate and become adults.



NECTIVORES & POLLENIVORES (neck-tiv-voors & pol-in-a-voors): These arthropods feed on flowers, either drinking the sugary nectar or feeding on the protein-rich pollen grains. Some insects are specially adapted to suck nectar from flowers, having very long mouthparts. Others (such as bees) are adapted to collect and distribute pollen.

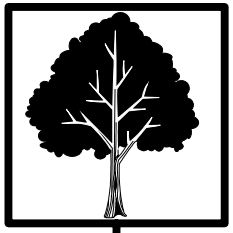
HAEMATOPHAGES (hee-mat-o-fages): These arthropods consume blood. This may include ectoparasites that live on a host, feeding on its blood (such as fleas or lice), or free-living arthropods that slice or pierce skin to feed on blood. Many blood feeders transmit diseases.

- DANGEROUS ARTHROPODS -

Some arthropods are prepared to defend themselves with venoms. Some of these toxins are merely painful, while others are life-threatening (either being very potent or causing allergic reactions). Arthropods with this symbol should be approached catiously and should never be provoked to defend themselves. Keeping a distance is good for both you and the arthropod.

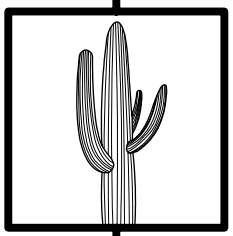
Other arthropods with this symbol are potentially life threatening because they can transmit diseases. Care should be taken to avoid getting bitten by any of these animals.

- HABITATS -

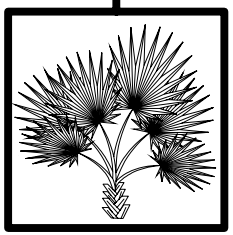


TEMPERATE FORESTS are dominated by broad-leaved trees that shed their leaves during the winter (deciduous). Shrubs, herbaceous undergrowth and mosses are also common in these habitats.

FIELDS & MEADOWS are filled with grasses, herbaceous plants and wilflowers. Few trees grow in these open areas.

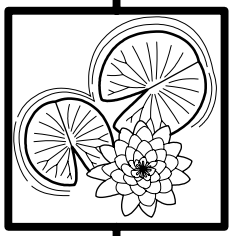


DESERTS receive very little rain and are usually very hot and dry. They are often occupied by succulent plants (such as cacti) and low-growing, woody shrubs.

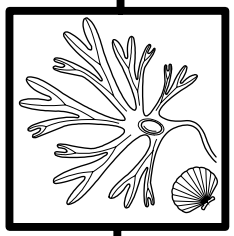


TROPICAL RAINFORESTS are known for being hot and humid, and receive large amounts of rain. They are inhabited by many families and species of plants (broad-leaf) that are generally green all year long.

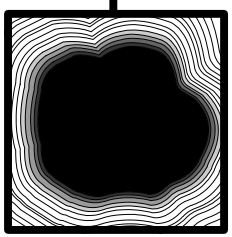
ALPINE/BOREAL HABITATS are normally cool in the summer and cold to very cold in the winter. They are filled with needle-bearing, evergreen trees and other cold-hardy plants (including lichens that attach to rocks)



FRESHWATER HABITATS include marshes, ponds, lakes, streams and rivers. Dominant plants associated with these habitats include freshwater algae, reeds, grasses, water lilies and other plants.



COASTAL & MARINE HABITATS are supplied with saltwater, and are dominated by salt-tolerant plants including algae and seaweeds. Some trees (for example mangroves) are also adapted to these habitats. Tiny plankton are a rich source of nutrients in these places.



CAVES are always dark, and very nutrient poor. Plants generally do not grow in caves, and nutrients must be brought in by other sources, such as water or animals. Arthropods inhabiting caves are often specially adapted to life in the dark, having small eyes and many touch sensors.

NOTE: These are general representatives of the types of habitats in which you will find arthropods. The habitat of a particular arthropod depends on a number of factors, including climate, soil type, altitude and geographic region. Many groups of arthropods also live in multiple habitats (just think about everywhere the common house fly - *Musca domestica* - is found!).

- DISTRIBUTION -

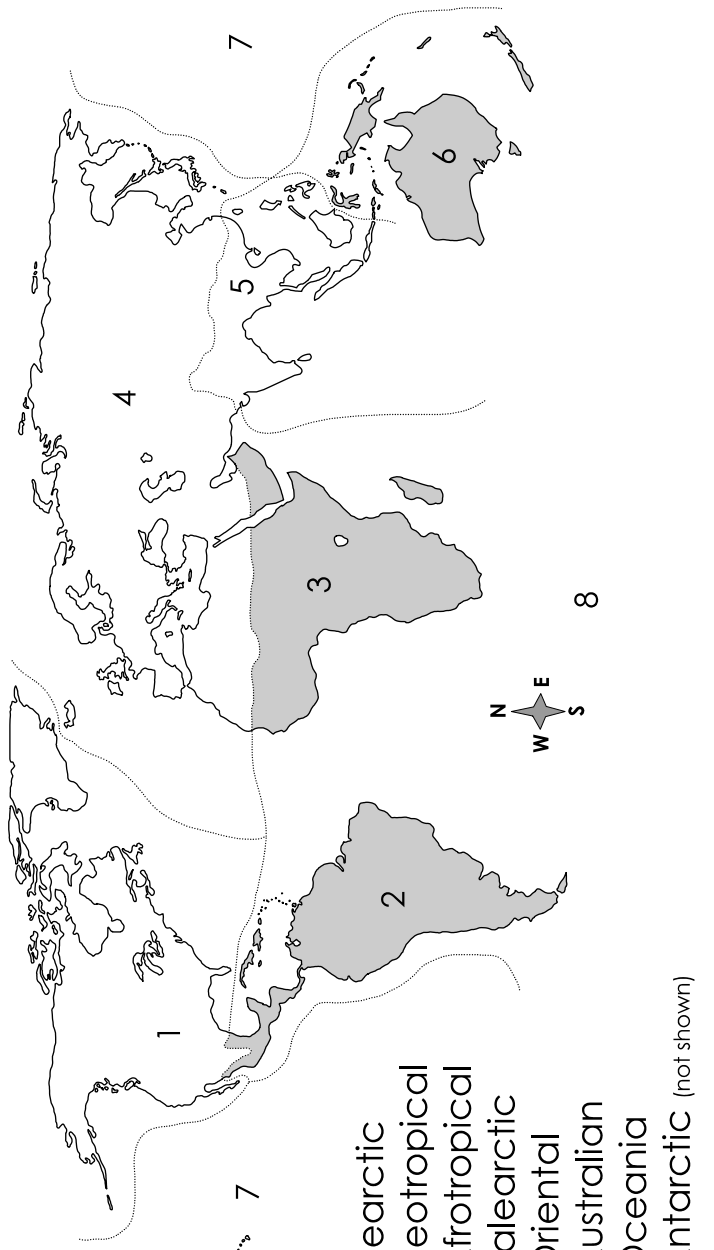
Arthropods live everywhere on Earth. They are found on every continent (even Antarctica) and on all islands. They are also found in just about every aquatic habitat, from mountain streams, to the extreme depths of the oceans. Some species of arthropods have limited distributions and can only be found at a particular location on Earth (for example, one family of true flies - Mormotomyiidae - is only known to live with bats in one rock in Africa!). Other arthropods, through natural or human actions, have colonized large areas of the earth's surface (for example, the cat flea - *Ctenocephalides felis* - occurs worldwide, no doubt spread through human travels).

Biologists use specific names for areas of the world when talking about the distribution of animals and plants (this of course applies to arthropods, which are animals): these are called **biogeographic regions**. The following is a list of region names and the familiar areas these regions represent:

- The **Nearctic** (*nee-ark-tik*) region includes North America and some of North Mexico
- The **Neotropical** (*nee-o-trop-ik-al*) region includes S. Mexico, the Carribean Islands, Central America and South America
- The **Afrotropical** (*afro-trop-ik-al*) region includes subsaharan Africa, Madagascar and the S. Arabian peninsula
- The **Palearctic** (*pay-lee-ark-tik*) region includes Europe, N. Africa and N. Asia (including the N. Middle-East, China and Japan)
- The **Oriental** (*or-ee-en-tal*) region includes India, Southeast Asia and most of Indonesia and surrounding islands
- The **Australian** (*aw-stray-lee-in*) region includes the islands around and including Papua New Guinea, Australia, New Zealand and Tasmania
- The **Oceania** (*oh-she-an-ee-uh*) region includes the islands of the Pacific Ocean
- The **Antarctic** (*ant-ark-tik*) region includes Antarctica

These regions are generally thought to represent groups of organisms that have similar geographical or evolutionary histories. While many groups of organisms do not strictly abide by these 'borders', others are restricted to one (or a few) of these regions. For instance, rock crawlers (in the insect family Grylloblattidae) are found only in the Nearctic and Palearctic. Conversely, moss bugs (in the insect family Peloridiidae) are only found in the Neotropical and Austalian regions. Though these regions define a broad area in which to find a particular arthropod, the habitat in which it lives is perhaps more imprtant for encountering it.

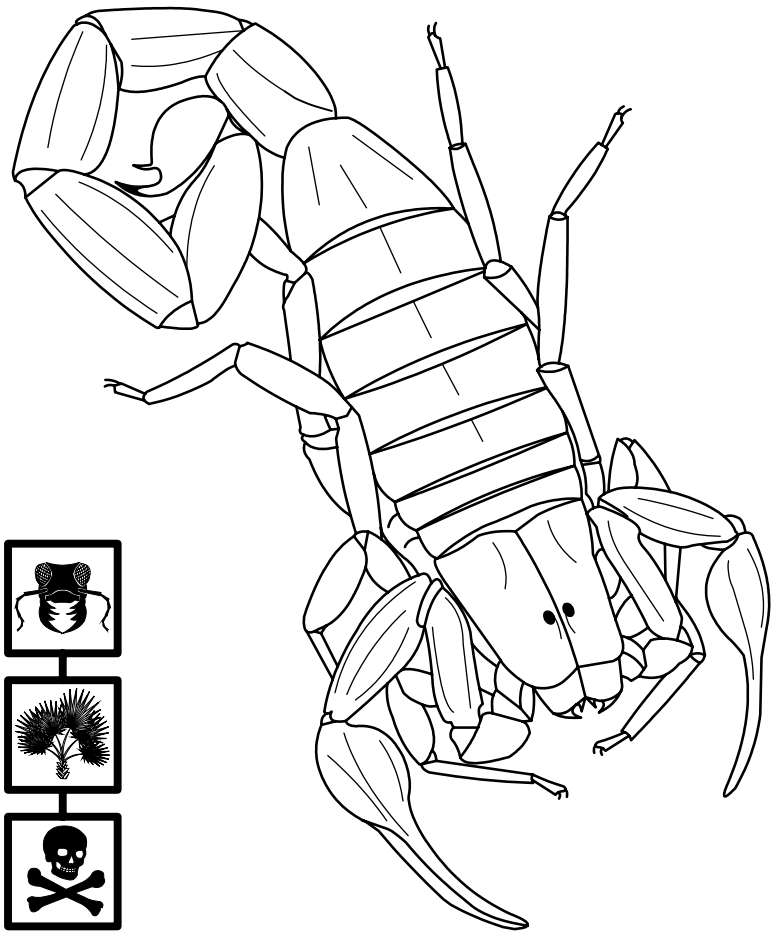
BIOGEOGRAPHIC REGIONS OF THE WORLD



1. Nearctic
2. Neotropical
3. Afrotropical
4. Palearctic
5. Oriental
6. Australian
7. Oceania
8. Antarctic (not shown)

SCORPIONS

× 2



Florida bark scorpion
Centruroides gracilis

CLASS: Arachnida (arachnids)
ORDER: Scorpiones (scorpions)
FAMILY: Buthidae
GENUS: *Centruroides* (bark scorpions)
SPECIES: *gracilis*

SIZE: 2 - 6 inches (50 - 150 mm)
DIET: Arthropods & very small vertebrates
HABITAT: Humid forests/rainforests; under bark and leaf-litter
DISTRIBUTION: Southern USA, Central & South America

ADDITIONAL INFORMATION:

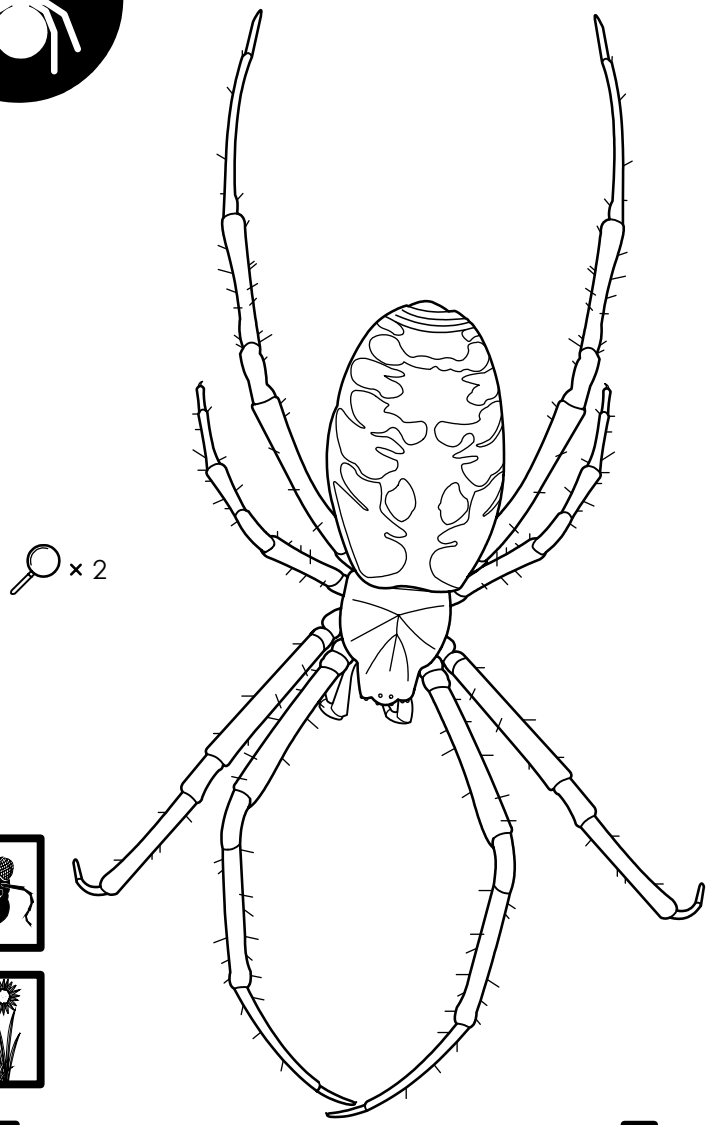
- As with all scorpions, the Florida bark scorpion is venomous, though its sting is usually not fatal. Other members of the family Buthidae (booth-a-dee) are the most venomous arthropods in the world.

- Females give live birth to many young, who crawl onto her back for protection until they are old enough to fend for themselves.

- Scorpions, like this one, glow (fluoresce) green/yellow/blue under ultra violet (UV) light.

- Scorpions were the first animals to crawl on dry land, coming ashore long before the first vertebrates.

SPIDERS



black & yellow argiope
Argiope aurantia

CLASS: Arachnida (archnids)
ORDER: Aranea (spiders)
FAMILY: Araneidae (orb weavers)
GENUS: *Argiope* (argiopes)
SPECIES: *aurantia* (black & yellow argiope)

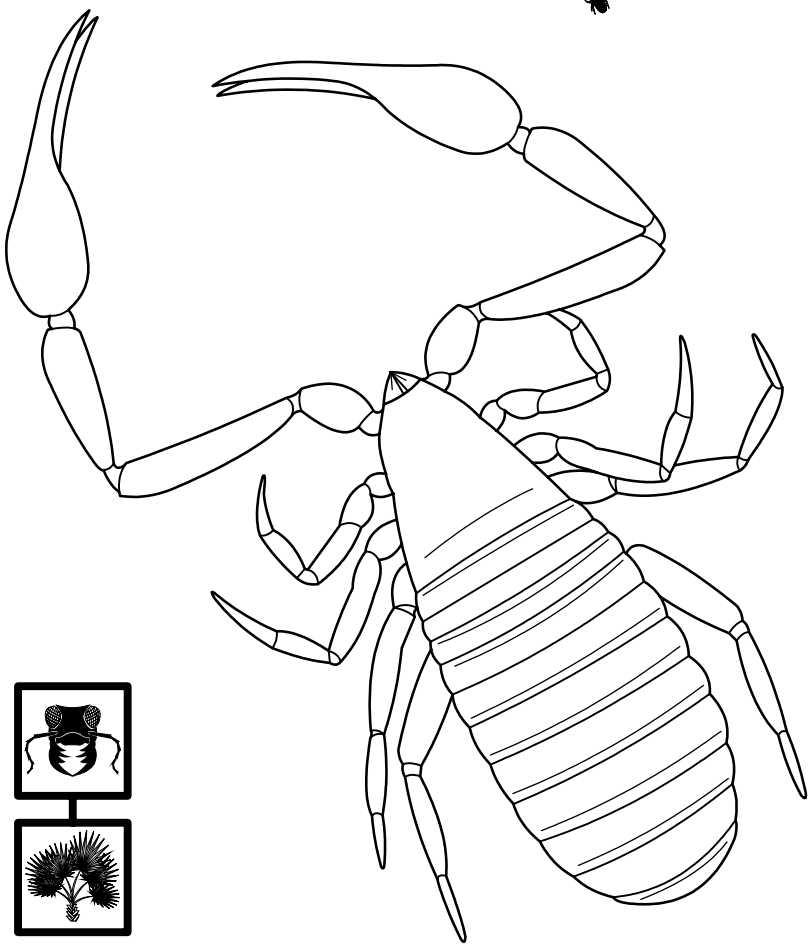
SIZE: Female: 1/2 - 1 inches (14 - 25 mm); Male: 1/4 inch (5 - 6 mm) [*length not including legs*]
DIET: Insects and small vertebrates
HABITAT: Fields and forest edges
DISTRIBUTION: North America (into Central America)

ADDITIONAL INFORMATION:

- Argiopes (ar-gy-o-pees) are orb weavers, meaning that they spin a large spiral web made of both sticky threads (used to capture prey) and non-sticky threads (used by the spider to move across the web). Argiopes sit head-down in the center of the web, waiting for prey to fly/jump into the web. They often spin thick zig-zags or spirals in the center of the web, and rest in the middle of them. The reason for this specialized webbing is not fully understood: it may keep larger animals from walking/flying into the web, but it may also attract insects by reflecting UV light (something that flowers often use to attract insects).

- Though they are large and scary looking, orb weavers are generally docile, and not dangerous to humans.

PSEUDOSCORPIONS



pseudoscorpion

C L A S S : Arachnida (arachnids)
O R D E R : Pseudoscorpionida (pseudoscorpions)

S I Z E : 1/12 - 1/3 inches (2 - 8 mm)
D I E T : Small arthropods
H A B I T A T : Found in many habitats, but commoin in tropical and temperate rainforests and caves; even found in households; often found under bark of trees
D I S T R I B U T I O N : Worldwide

A D D I T I O N A L I N F O R M A T I O N :

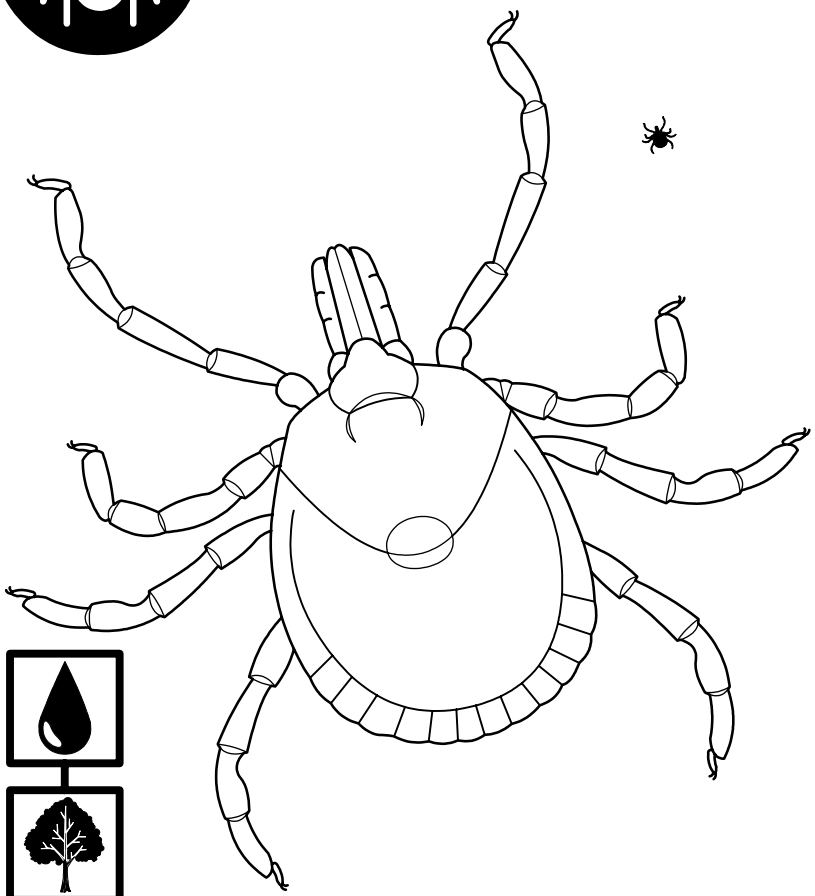
- Pseudoscorpions (***pseudo-*** meaning false) resemble true scorpions, but do not have a stinger. Though they do produce venom in their claws, pseudoscorpions are harmless to humans.

- Many pseudoscorpions produce silk from their mouthparts.

- Pseudoscorpions are often found hitching rides on large insects (usually beetles). There they feed on smaller arthropods that are also hitching rides (such as mites). In the animal kingdom, the act of riding on another animal for transport is known as **phoresy**.

- Pseudoscorpions are beneficial to humans by eating destructive pests such as clothes moths, carpet beetles and booklice.

MITES & TICKS



lone star tick
Amblyomma americanum

CLASS: Arachnida (arachnids)
ORDER: Acari (mites & tick)
FAMILY: Ixodidae (hard ticks)
GENUS: *Amblyomma*
SPECIES: *americanum* (lone star tick)

SIZE: 1/8 inches (3 - 4mm)
DIET: All life stages feed on vertebrates blood
HABITAT: Temperate forests; found in undergrowth, shrubs and grasses
DISTRIBUTION: North America (Southeastern USA)

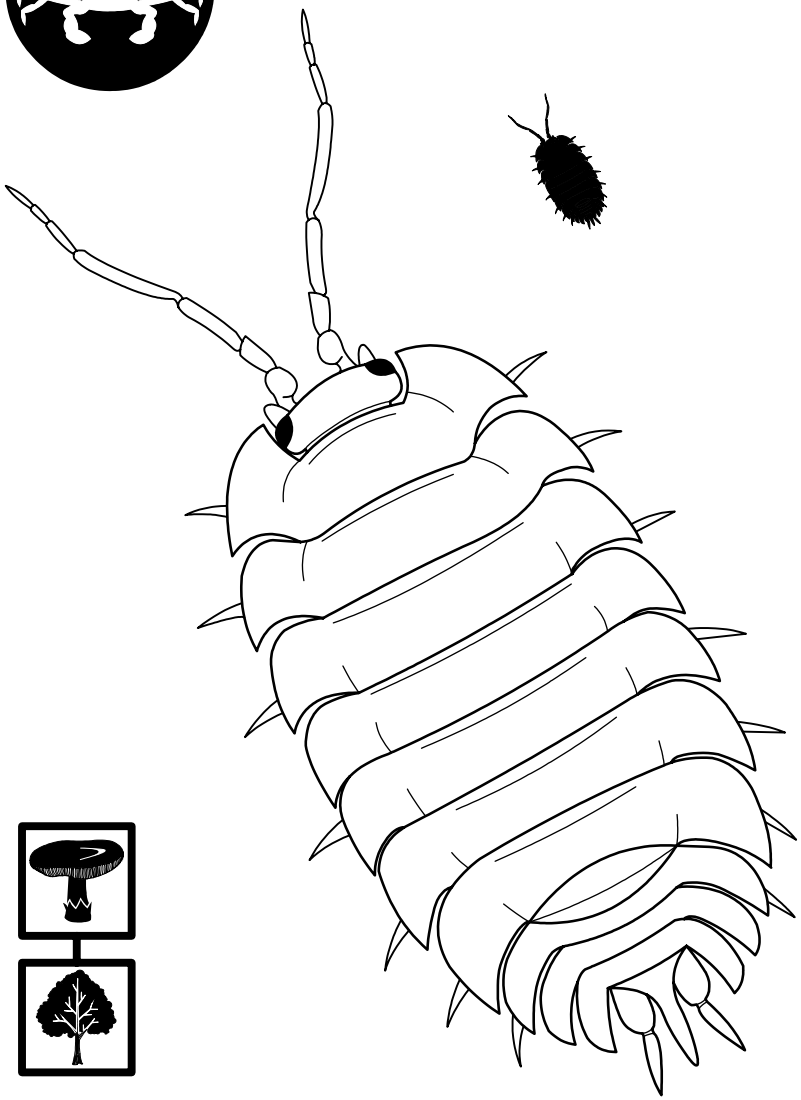
ADDITIONAL INFORMATION:

- Lone star ticks are so-called because of the pale yellow dot ('star') on their dorsal surface.

- Lone star ticks can transmit diseases, including erlichiosis (er-lick-ee-o-sis), tularemia (tool-a-reem-ee-a), and STARI (Southern tick-associated rash illness). Bites do not always end in disease transfer, but are often irritating anyway. Care should be taken to check yourself for ticks after hikes in areas where they live - you may not want them, but they want you!

- Burning or suffocating a tick to make it stop feeding is NOT ADVISED! A scared tick will often regurgitate its body fluids (and any diseases) into the bite. The best thing to do is use blunt tweezers to grab the tick, close to the 'head'/skin, and pull directly out (do not twist).

ISOPODS



woodlouse/sowbug
***Oniscus* sp.**

CLASS: Malacostraca (crabs, shrimp, etc.)
ORDER: Isopoda (isopods)
FAMILY: Oniscidae (woodlice & sowbugs)
GENUS: *Oniscus*

SIZE: 3/8 - 1/2 inches (10 - 15mm)
DIET: Decaying vegetable matter and fungi
HABITAT: Temperate forests and meadows; found under logs and rocks
DISTRIBUTION: North America & Europe (into Asia)

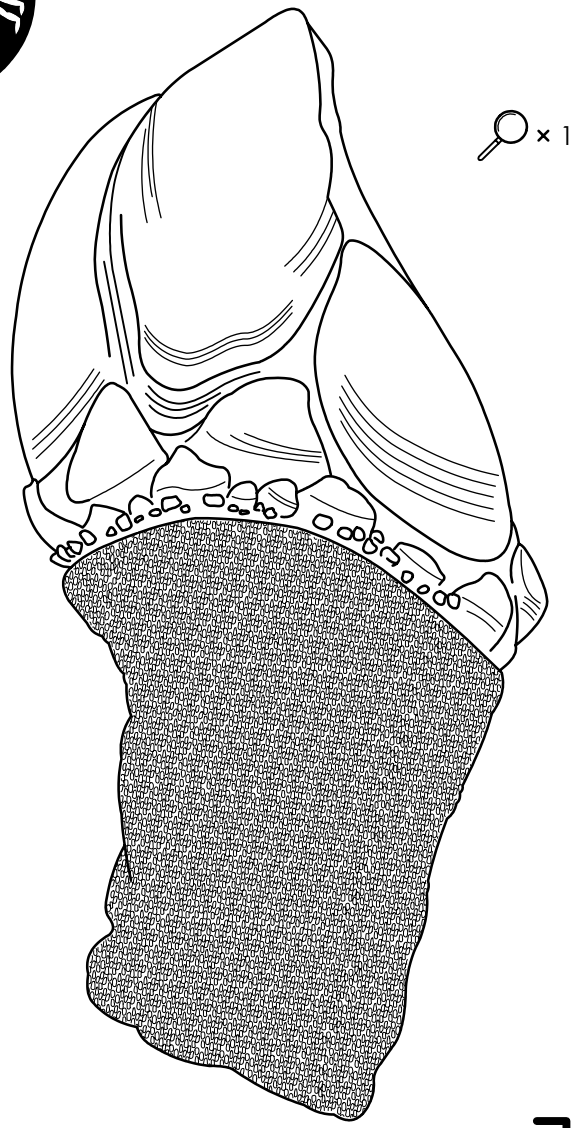
ADDITIONAL INFORMATION:

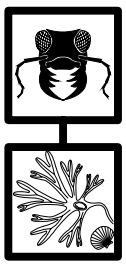
- Woodlice (including pillbugs and rock slaters) are the most abundant land crustaceans. Over 3,000 species of woodlice occur worldwide.

- Woodlice, as with most crustaceans, breath using gills - they can only survive on land in moist habitats.

- Female woodlice carry the eggs and young in a brood pouch under their body.

BARNACLES





goose barnacle
Pollicipes sp.

C L A S S : Maxillopoda
O R D E R : Pedunculata (goose barnacles)
F A M I L Y : Pollicipedidae
G E N U S : *Pollicipes*

S I Z E : 3 - 4 inches (80 - 100 mm)
D I E T : Plankton and small invertebrates
H A B I T A T : Attached to rocks on shore and in tide pools; also found on driftwood and other floating debris
D I S T R I B U T I O N : Pacific and Atlantic Coasts

A D D I T I O N A L I N F O R M A T I O N :

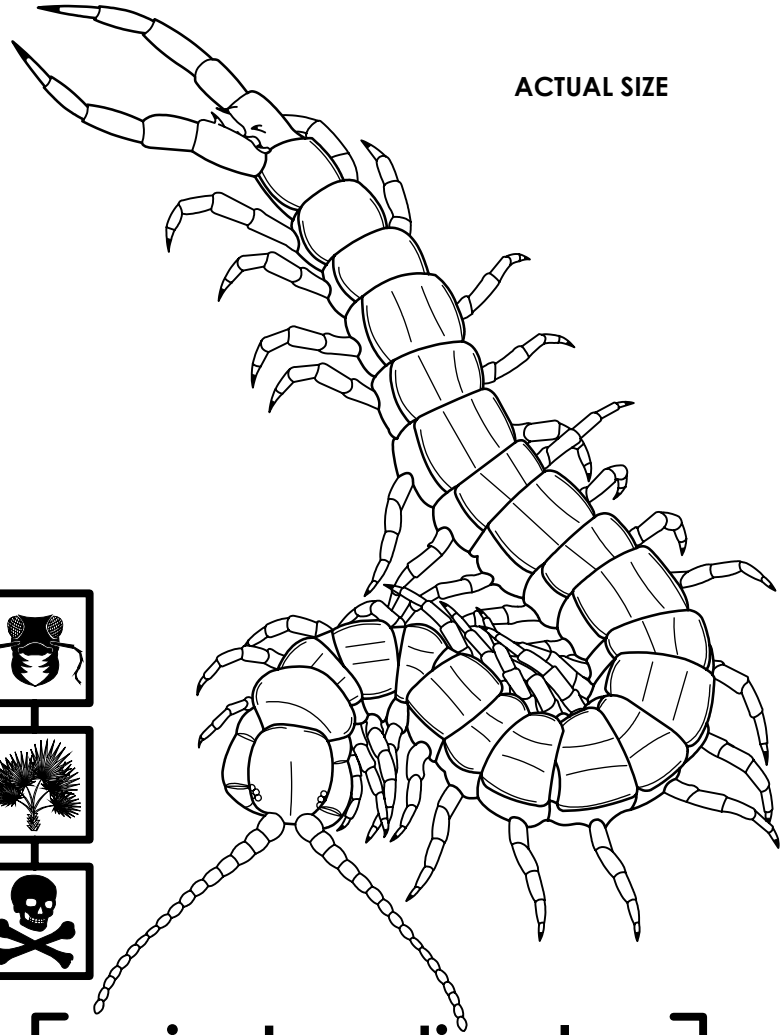
- Barnacles may seem to be related to molluscs (clams, oysters, snails, etc.), but they are in fact arthropods. Young barnacles are motile, and go through a number of stages before settling down to become adults. The long stalk is actually the back (**dorsum**) of the animal, while inside the 'shell' are the legs (**cirri**: used to capture food), mouthparts and reproductive organs. Most barnacles are hermaphrodites, meaning that they are both male and female.

- Goose barnacles are so-called because early Europeans, that did not know where certain geese laid eggs, thought that the geese came frombarnacles.

- Goose barnacles are eaten as food by some cultures.

- Barnacles were the specialty of Charles Darwin, father of the theory of evolution.

CENTIPEDES



ACTUAL SIZE

giant centipede
Scolopendra sp.

CLASS: Chilopoda (centipedes)
ORDER: Scolopendromorpha
FAMILY: Scolopendridae
GENUS: *Scolopendra* (giant centipedes)

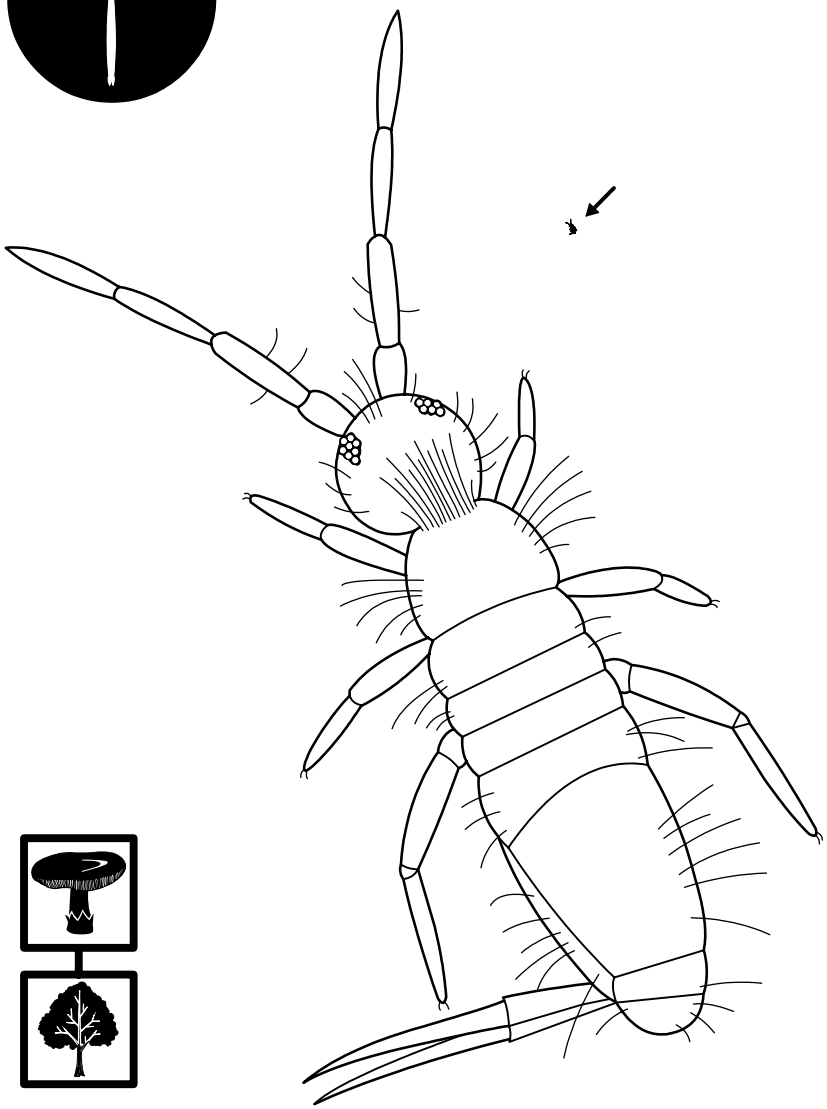
SIZE: 3 - 12 inches (76 - 305 mm)
DIET: Arthropods and small vertebrates
HABITAT: Tropical/sub-tropical and temperate forests, deserts and grasslands; found in leaf litter, under rocks or in decaying logs
DISTRIBUTION: Worldwide

ADDITIONAL INFORMATION:

- Giant centipedes are some of the largest land arthropods, sometimes reaching a foot long. Like all centipedes, they have a specialized pair of front legs (maxillipeds) that act as fangs used to deliver venom. Because of this, they are able to capture and kill animals as big as lizards, mice and small bats. This also means that they are able to defend themselves with a venemous bite - one that is very painful, but not usually deadly. Giant centipedes can also give a hard pinch with their hind legs, so it is best not to handle them.

- Giant centipedes are good mothers, curling around their batch of eggs and protecting them from predators.

SPRINGTAILS



elongate springtail
Entomobrya sp.

CLASS: Hexapoda (insects & entognaths)
ORDER: Collembola (springtails)
FAMILY: Entomobryidae (entomobryid springtails)
GENUS: *Entomobrya*

SIZE: 1/32 - 1/16 inches (1 - 2 mm)
DIET: Decaying matter found in/on soil
HABITAT: Among leaf litter in forested areas
DISTRIBUTION: Worldwide

ADDITIONAL INFORMATION:

- Springtails are so-called because most have a forked tail process (called the **furcula**) which is folded under the body and held by a lock (called a **tenaculum**) when at rest. If frightened, the springtail releases the furcula which launches it into the air - thus the name 'springtail'.

- Entomobryidae are often covered in scale-like setae. Many times these setae are iridescent, giving the springtails a shiny, rainbow color.

- The eyes of springtails are composed of many small simple eyes. A maximum of eight of these simple eyes can be found on each side of the head.

EARWIGS

European earwig
Forficula auricularia

CLASS: Insecta (insects)
ORDER: Dermaptera (earwigs)
FAMILY: Forficulidae
GENUS: *Forficula*
SPECIES: *auricularia* (European earwig)

SIZE: 2/3 - 4/5 inches (15 - 20mm)
DIET: Living and decaying plant matter; will feed on small live arthropods and their eggs
HABITAT: Temperate habitats; usually found under stones, logs, or in cracks and crevices
DISTRIBUTION: Europe & North America (introduced)

ADDITIONAL INFORMATION:

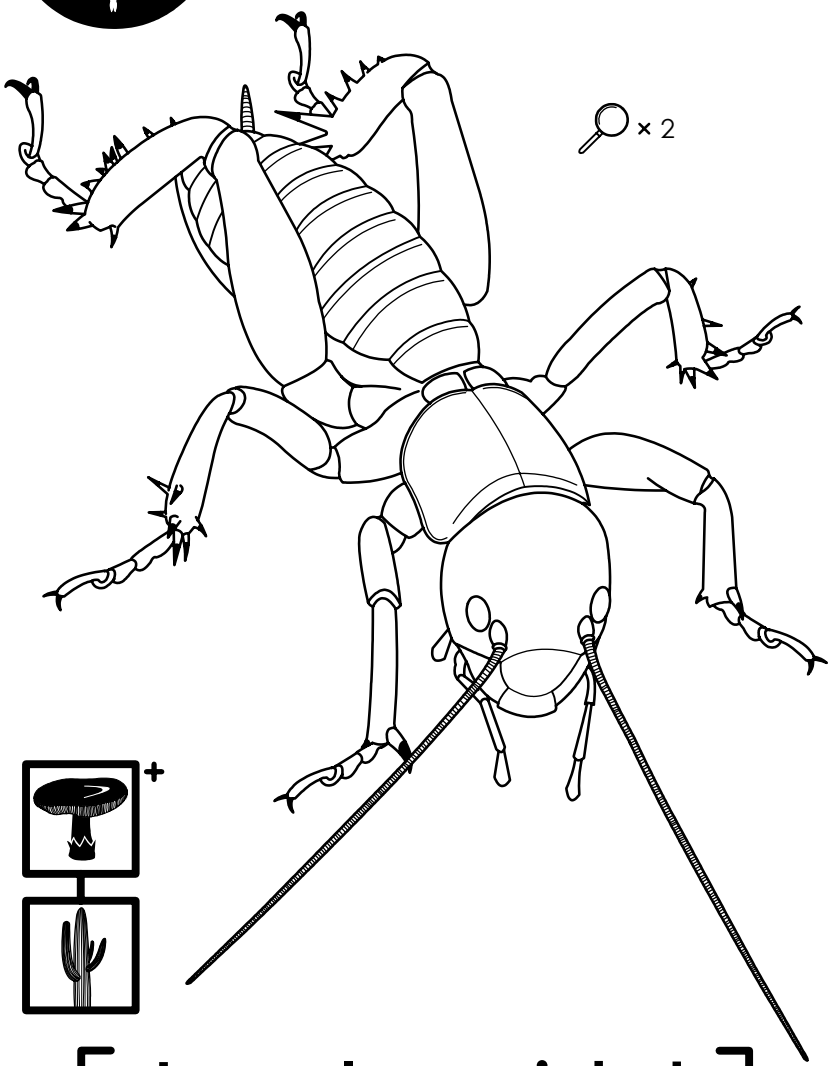
- Contrary to popular belief, earwigs do not enter human ears to lay eggs. Instead, they make a nest in the ground in which the female lays eggs. She will stay and guard the young until they reach maturity.

- Earwigs are known for having pincer-like **cerci** (sur-see) at the end of their abdomen. They use these to hunt for food and to defend themselves. Larger earwigs should be handled with caution, since they can give a painful pinch.

- The European earwig is sometimes a pest of vegetable crops.

- Males (shown) have long, curved cerci, with teeth near the base. The cerci of females are shorter, more straight and do not have teeth

GRASSHOPPERS & CRICKETS



Jerusalem cricket
Stenopelmatus sp.

C L A S S : Hexapoda (insects & entognaths)
O R D E R : Orthoptera (grasshoppers, crickets & katydids)
F A M I L Y : Stenopelmatidae (stone crickets & wetas)
G E N U S : *Stenopelmatus* (Jerusalem crickets)

S I Z E : 1 - 2 3/4 inches (21 - 69 mm)
D I E T : Decaying organic matter & arthropods
H A B I T A T : Dry rocky areas/deserts; burrow underground
D I S T R I B U T I O N : Southwest USA & Mexico

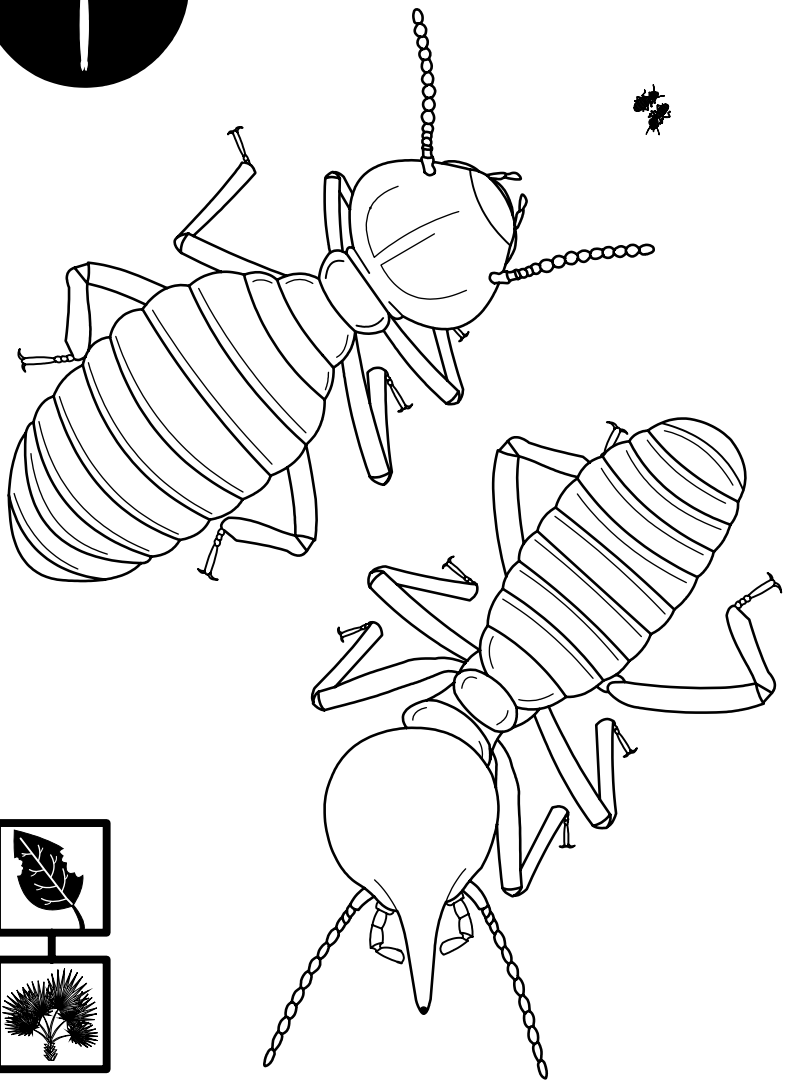
A D D I T I O N A L I N F O R M A T I O N :

- Jerusalem crickets go by many names including potato bugs, niño de la tierra (Spanish: "child of the earth"), cara de niño (Spanish: "child's face"), wó see ts'inii (Navajo: "skull insect"), or old bald-headed man.

- Jerusalem crickets are nocturnal. Unlike most crickets that rub their wings together to 'sing', Jerusalem crickets do not have wings. Instead they communicate by thumping the ground with their abdomen.

- Though not generally aggressive, care should be taken when handling these insects. They can emit foul odors, poke you with their heavy spines or give you a hard bite with their mandibles.

COCKROACHES, TERMITES & MANTISES



nasute termites
Nasutitermes sp.

C L A S S : Hexapoda (insects & entognaths)
O R D E R : Dictyoptera (cockroaches, mantises & termites)
F A M I L Y : Termitidae
G E N U S : *Nasutitermes* (nasute termites)

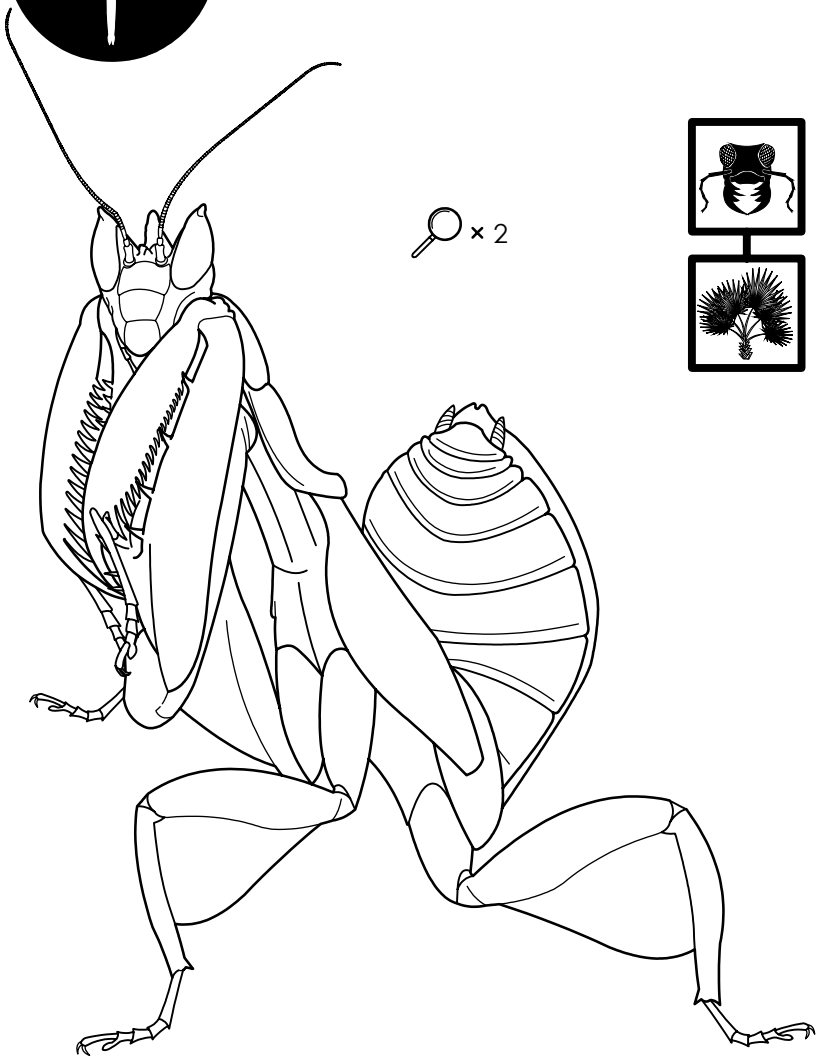
S I Z E : 5/32 - 1/4 inches (3 - 6 mm)
D I E T : Dried/decaying wood and other dried plant materials
H A B I T A T : Tropical/subtropical areas; make nests in trees (out of mud and debris) or in ground
D I S T R I B U T I O N : Worldwide

A D D I T I O N A L I N F O R M A T I O N :

- All termites have castes. While most species have soldiers with large mandibles (used to bite attackers), nasute (*nay-szoot*) termite soldiers (bottom in picture) have a head shaped like a nozzle. Using this nozzle, they spray an irritating and sticky liquid that quickly immobilizes ants, spiders, centipedes and other would-be predators. The spray also has an alarm **pheromone**, used to warn the worker termites (top in picture) of danger.

- The nests of these termites can often be seen in trees in the tropics, where they resemble large mud balls. The termites work on the ground, and in order to get there without being attacked, they have to build little tubes running from the nest to the ground. When these tubes are broken, the soldiers rush out to meet the potential attacker.

COCKROACHES, TERMITES & MANTISES



orchid mantis

Hymenopus coronatus

C L A S S : Hexapoda (insects & entognaths)
O R D E R : Dictyoptera (cockroaches, mantises & termites)
F A M I L Y : Hymenopodidae (flower mantises)
G E N U S : *Hymenopus* (orchid mantises)
S P E C I E S : *coronatus*

S I Z E : $1^{1/4}$ - $2^{1/3}$ inches (30 - 60 mm)
D I E T : Arthropods and small vertebrates
H A B I T A T : Tropical rainforests; found among vegetation or on flowers
D I S T R I B U T I O N : Malaysia, Indonesia and Sumatra

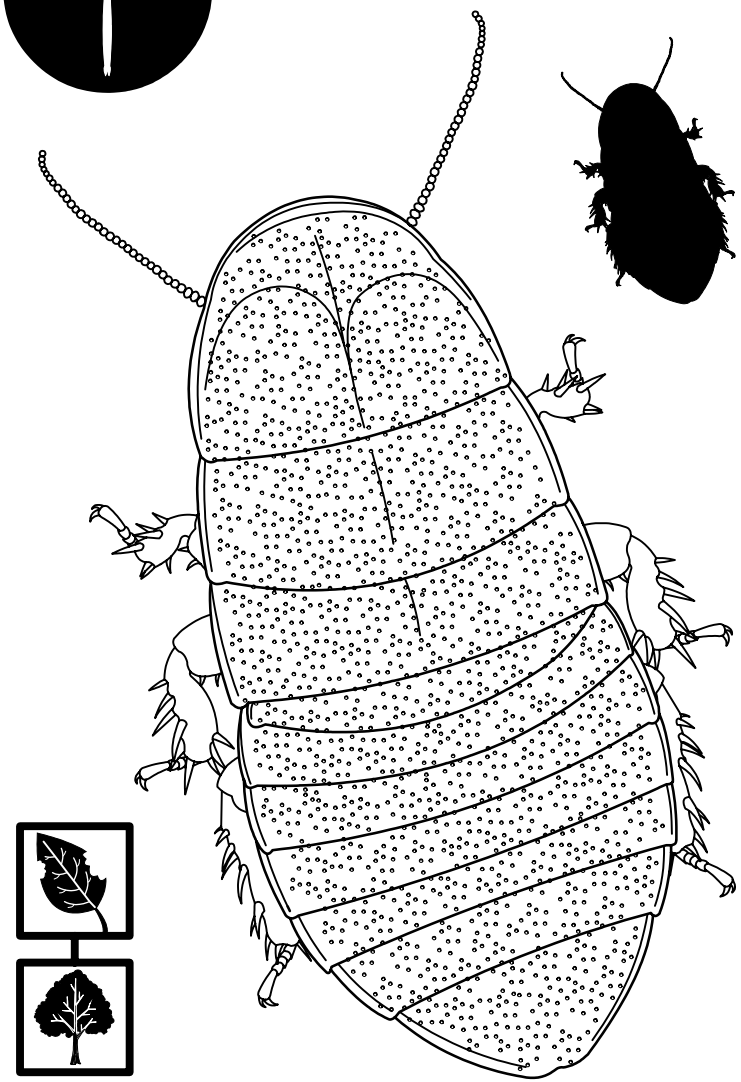
A D D I T I O N A L I N F O R M A T I O N :

- Orchid mantises are masters of camouflage - they have legs that resemble flower petals and become the color of their surroundings over time (ranging from greens and white, to bright pinks and purples). They sit still and use this camouflage to hide from predators and prey (usually unsuspecting insects coming to flowers).

- Orchid mantis males are half the size of females.

- Like all mantises, the orchid mantis uses **raptorial** front legs to capture prey.

COCKROACHES, TERMITES & MANTISES



brown-hooded cockroach
Cryptocercus punctulatus

C L A S S : Hexapoda (insects & entognaths)
O R D E R : Dictyoptera (cockroaches, mantises & termites)
F A M I L Y : Cryptocercidae
G E N U S : *Cryptocercus* (hooded cockroaches)
S P E C I E S : *punctulatus*

S I Z E : 1 - $1^{1/4}$ inches (25 - 30 mm)
D I E T : Dead/decaying wood
H A B I T A T : Found inside rotting logs in deciduous forests
D I S T R I B U T I O N : Eastern USA (Appalachia)

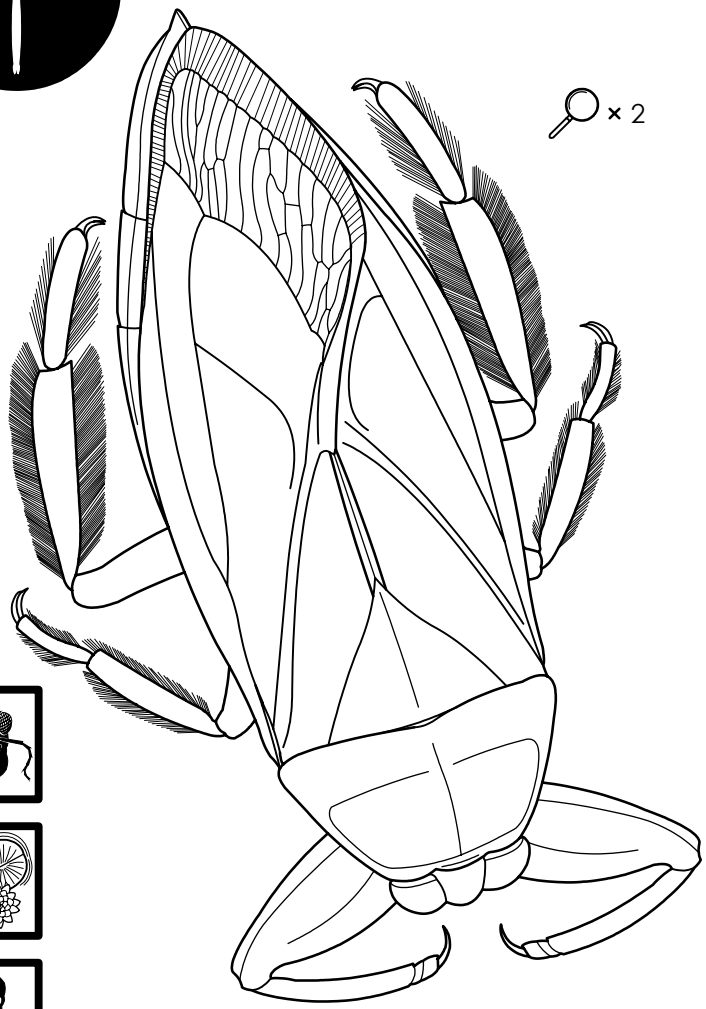
A D D I T I O N A L I N F O R M A T I O N :

- Only about seven species of hooded cockroaches exist throughout the world (found in the USA, Russia and China). They are not commonly encountered because they live inside rotting logs and never enter houses for food.

- Brown-hooded cockroaches live in extended families, where adults and **nymphs** live together inside rotting logs. These cockroaches use specific microorganisms to help break down the cellulose in the wood they eat. Young cockroaches get the right microorganisms by eating the **frass** of adults.

- Termites are thought to have evolved from cockroaches, and evidence shows they share a common ancestor with the Cryptocercidae. Both groups are social (termites being truly social) and feed on wood with the aid of microorganisms.

BUGS & HOPPERS



giant water bug
Lethocerus sp.

C L A S S : Hexapoda (insects & entognaths)
O R D E R : Hemiptera (true bugs & hoppers)
F A M I L Y : Belostomatidae (giant water bugs)
G E N U S : *Lethocerus*

S I Z E : $2^{1/4}$ - $2^{1/2}$ (57 - 65 mm)
D I E T : Arthropods and small vertebrates (small amphibians and fish)
H A B I T A T : Ponds, lakes and other standing bodies of fresh water; found among vegetation
D I S T R I B U T I O N : Worldwide

A D D I T I O N A L I N F O R M A T I O N :

- Giant water bugs go by many names including toe biters and electric light bugs. The first name refers to their ability to bite when stepped on or picked-up; they use a sharp 'beak' to pierce the skin and inject venom (normally used to kill prey). Though caution should be taken to avoid bites (which are similar to a bee sting), the bites are not fatal. The name electric light bug comes from their habit of flying to lights at night.

- After mating, female giant water bugs glue the eggs to the male's back (or vegetation close to the water). There he protects them from enemies and keeps them oxygenated (though they live in water, giant water bugs breathe air).

- Giant water bugs are large insects and are eaten by many people in southeast Asia. Scents from their glands are also collected for use by people.

BUGS & HOPPERS

leaf-footed bug

C L A S S : Insecta (insects)
O R D E R : Hemiptera (true bugs & hoppers)
F A M I L Y : Coreidae (squash & leaf-footed bugs)

S I Z E : 3/4 - $1^{3/4}$ inches (19 - 44 mm)
D I E T : Plant juices (rarely predatory)
H A B I T A T : Various habitats, from dry scrub areas to tropical rainforests; found on vegetation
D I S T R I B U T I O N : Worldwide (species shown is from tropical Costa Rica)

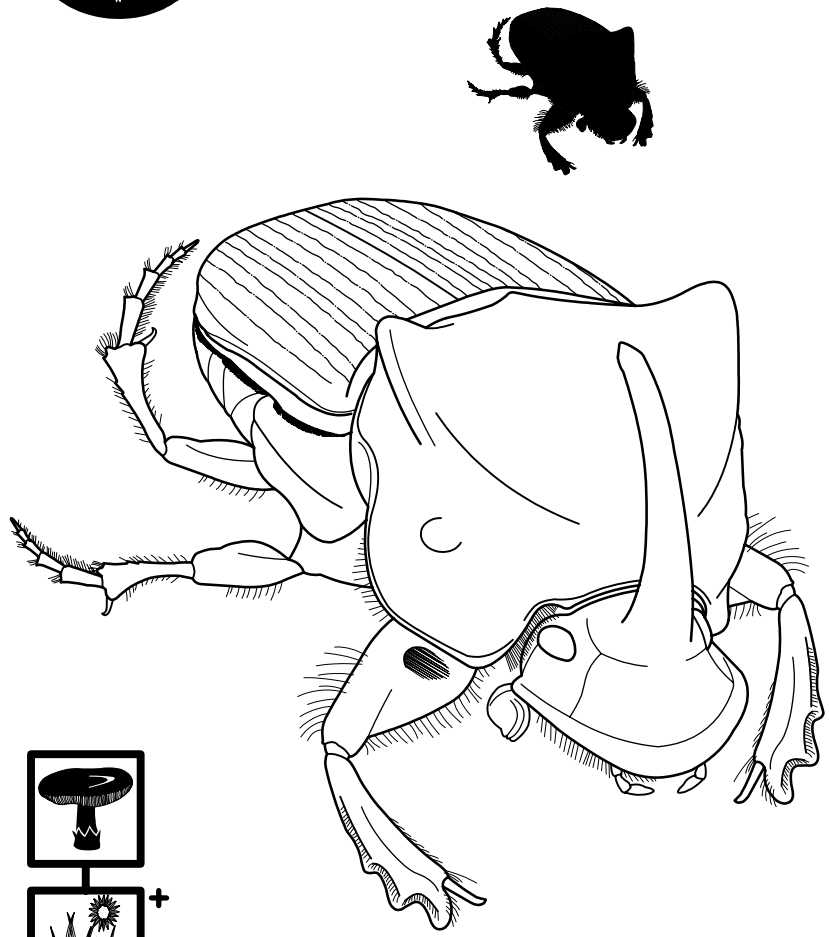
A D D I T I O N A L I N F O R M A T I O N :

- Leaf-footed bugs are so-called for their expanded hind **tibiae** (tib-ee-ee), which are leaf-like and sometimes brightly colored. They may use their feet to warn would-be predators that they smell and taste bad.

- Other members of the family Coreidae (Core-ee-a-dee) are serious pests of squashes, cucumbers and melons, and are often called squash bugs.

- As with all true bugs, leaf-footed bugs have a straw-like mouth that is used to suck juices. They do not chew the plant, but pierce it and drink the nutrient rich sap.

BEETLES



rainbow scarab

Phanaeus vindex

CLASS: Hexapoda (insects & entognaths)
ORDER: Coleoptera (beetles & weevils)
FAMILY: Scarabaeidae (scarab beetles)
GENUS: *Phanaeus*
SPECIES: *vindex* (rainbow scarab)

SIZE: 7/16 - 7/8 inches (11 - 22 mm)
DIET: Adults and larvae feed on dung; adults may also feed on carrion
HABITAT: Fields/meadows, forests and other areas (widespread where dung/carrion is found)
DISTRIBUTION: North America

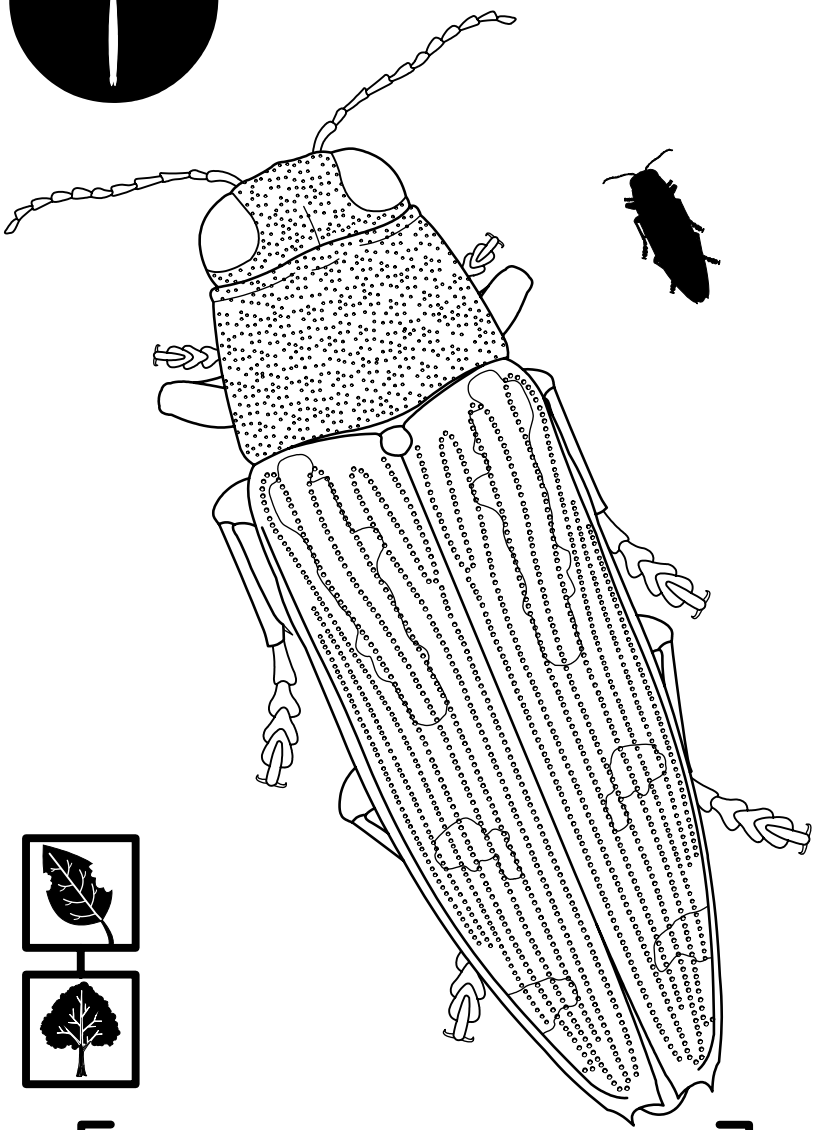
ADDITIONAL INFORMATION:

- Rainbow scarabs are so-called because they are highly irridescent, appearing red, green, yellow and blue. Major males are easily distinguished by the giant horn on their head. Minor (small) males may have a small horn, while females do not have horns.

- Rainbow scarabs form pair bonds, where both adults help to collect dung. They bury large pieces of dung, and form them into a ball; then they lay an egg in it. They also coat the ball in soil to protect it while the larva develops.

- Rainbow scarabs, like all dung beetles, are beneficial to people and ecosystems. They eat and bury large amounts of dung, removing waste from the soil surface and fertilizing the soil. This in turn helps to destroy the habitat of parasitic worms and flies, reducing their numbers.

BEETLES



red-legged jewel beetle
Buprestis rufipes

CLASS: Hexapoda (insects & entognaths)
ORDER: Coleoptera (beetles & weevils)
FAMILY: Buprestidae (jewel beetles)
GENUS: *Buprestis*
SPECIES: *rufipes* (red-legged jewel beetle)

SIZE: 1/2 - 1 inches (18 - 25 mm)
DIET: Larvae feed on beech, maple and oak trees (among others)
HABITAT: Temperate forests
DISTRIBUTION: Eastern North America

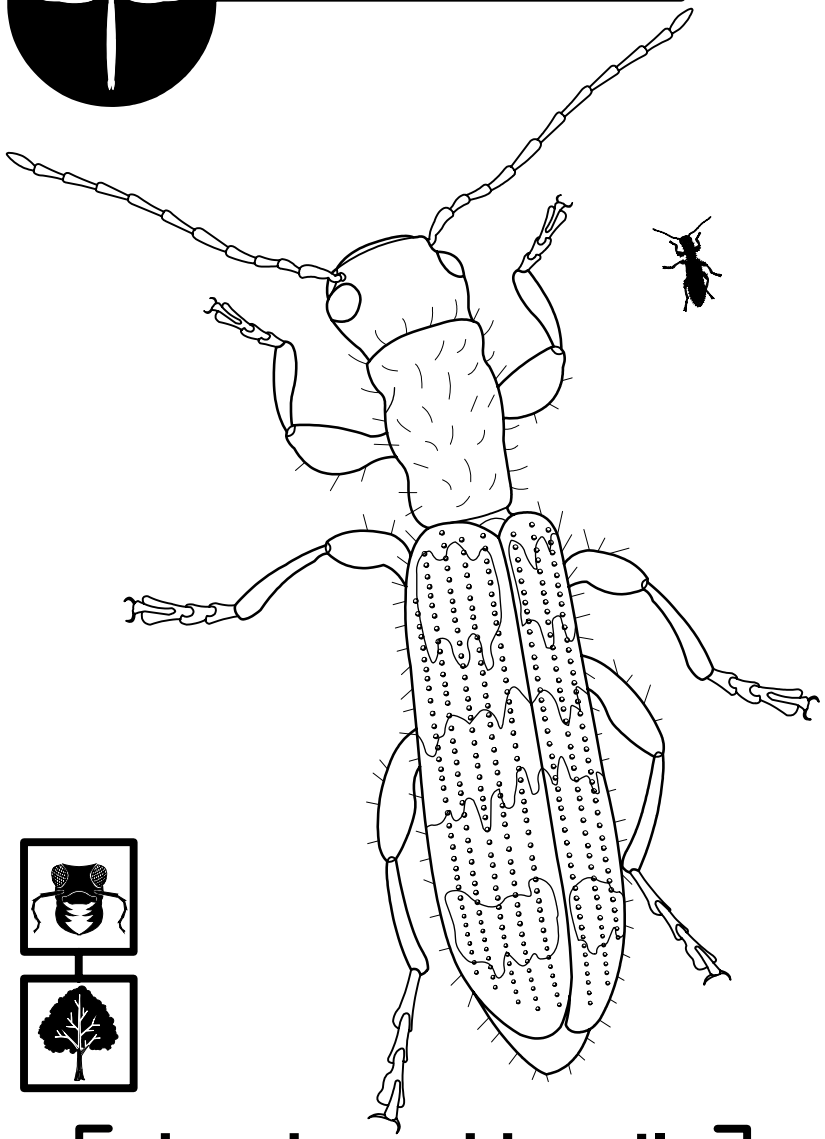
ADDITIONAL INFORMATION:

- Members of the family Buprestidae go by many common names. They are sometimes called jewel beetles, because they have been used as jewelry (and even money) by some cultures. Many are also highly **iridescent**, giving rise to another name: metallic wood-boring beetles. Some people also call them flat-head borers, because the larvae (the ones that do the boring in trees) have a wide and flat head.

- Though the adults do not live very long, larvae of jewel beetles have been known to live up to 20 years.

- Many jewel beetles are serious pests of trees. The larvae bore into the living wood, causing the trees to lose sap and become easy targets for infections.

BEETLES



checkered beetle
Cymatodera sp.

CLASS: Hexapoda (insects & entognaths)
ORDER: Coleoptera (beetles & weevils)
FAMILY: Cleridae (checkered beetles)
GENUS: *Cymatodera*

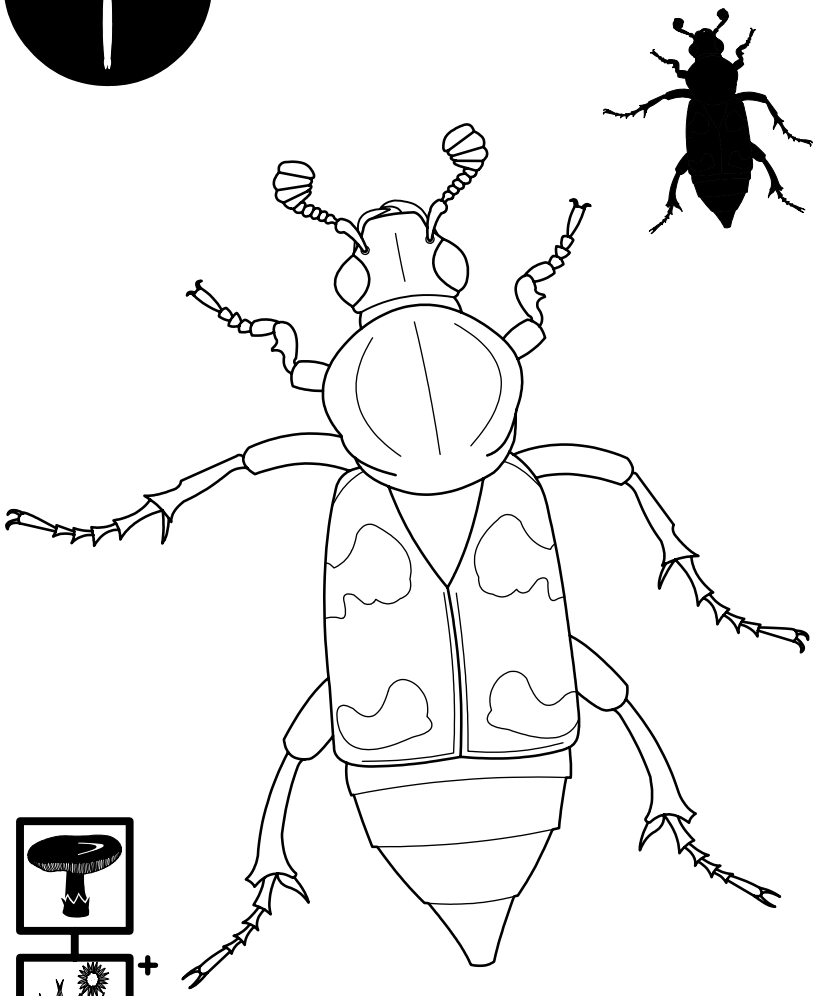
SIZE: 3/16 - 3/8 inches (5 - 10 mm)
DIET: Small arthropods
HABITAT: Wooded areas; usually found running on tree trunks
DISTRIBUTION: North & Central America

ADDITIONAL INFORMATION:

- Checkered beetles are small to medium sized beetles. All have a distinct body where the prothorax ('neck' area) is thin compared to the head and abdomen. Most are also densly covered in **setae**. Many are brightly colored in reds, oranges and yellows, or are metallic.

- Many checkered beetles are beneficial because they eat pest insects, such as moths and wood-boring beetles. They are voracious hunters, feeding on any small invertebrate that they stumble upon.

BEETLES



burying/sexton beetle
***Nicrophorus* sp.**

CLASS: Insecta (insects)
ORDER: Coleoptera (beetles & weevils)
FAMILY: Silphidae (carrion beetles)
GENUS: *Nicrophorus* (burying/sexton beetles)

SIZE: 3/4 - $1^{1/2}$ inches (16 - 35 mm)
DIET: Adults and larvae feed on carrion
HABITAT: Grasslands, forests, tropical forests, arid regions (most places where small carcasses can be found)
DISTRIBUTION: Worldwide (except subsaharan Africa)

ADDITIONAL INFORMATION:

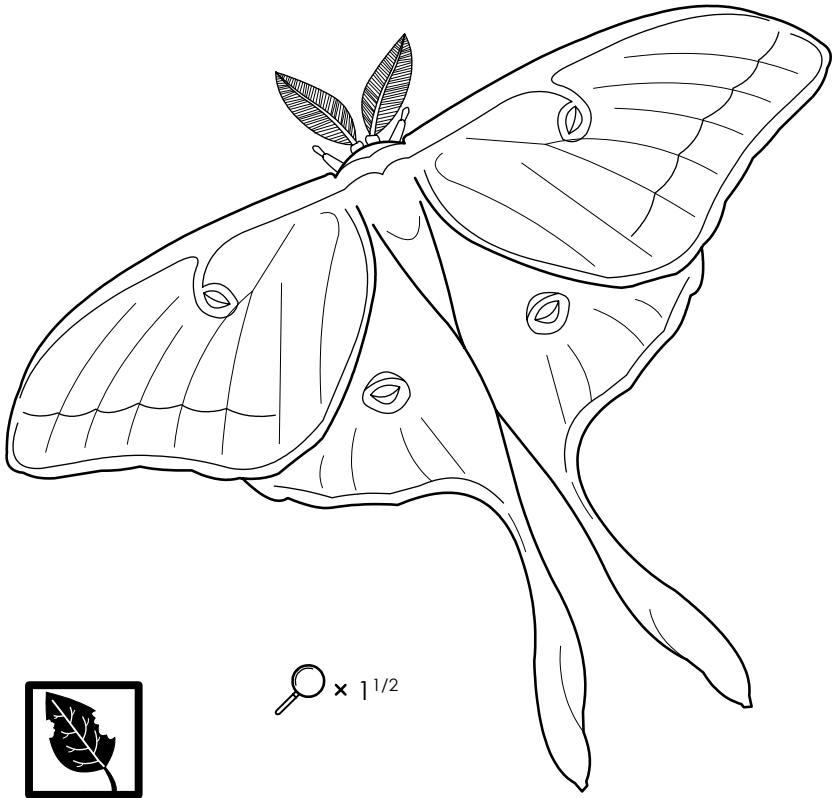
- Adult burying beetles find small animal carcasses, such as small rodents and birds, and bury them underground. There, they raise a small family of larvae.

- Burying beetles are one of the few insects to have bi-parental care of offspring. Both males and females help to care for the larvae, protecting them from other insects and feeding them.

- The largest species in the U.S., the american burying beetle (*N. americanus*), is critically endangered due to habitat loss.

- The name 'sexton' comes from the name of a church officer (sexton) whose job is to maintain the church graveyard.

MOTHS & BUTTERFLIES



× 1 1/2

luna moth
Actias luna

C L A S S : Insecta (insects)
O R D E R : Lepidoptera (moths and butterflies)
F A M I L Y : Saturniidae (giant silk moths)
G E N U S : *Actias* (luna moths)
S P E C I E S : *luna*

S I Z E : 3 - 4 inches (75 - 105 mm) (wingspan)
D I E T : larvae feed on leaves of various trees (such as birch, persimmon. hickory, sweet gum & walnut); adults do not feed
H A B I T A T : Deciduous forests; larvae found on tree leaves; adults can be found at lights
D I S T R I B U T I O N : Canada to North Mexico

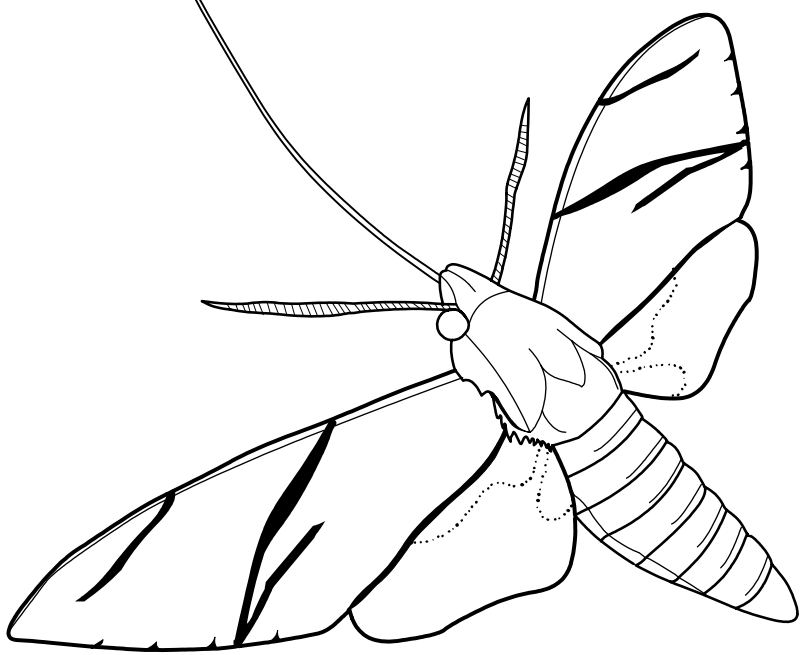
A D D I T I O N A L I N F O R M A T I O N :

- Adult luna moths are nocturnal. At night, females sit and 'call' to males, emitting scent chemicals (**pheromones**) that guide the male to her location. Males may fly from very far just to mate with the female.

- To hide from predators, adult luna moths may look like dead leaves (due to their pale green color). When this doesn't work, they can use the eyespots on their wings to scare predators. Luna moth caterpillars (larvae) camouflage from predators, but can defend themselves by regurgitating nasty liquids.

- The cocoons of luna moths are often wrapped in leaves of the host plant.

MOTHS & BUTTERFLIES



ACTUAL SIZE

Darwin's sphinx moth

Xanthopan morganii praedicta

C L A S S : Hexapoda (insects & entognaths)
O R D E R : Lepidoptera (moths & butterflies)
F A M I L Y : Sphingidae (sphinx moths)
G E N U S : *Xanthopan*
S P E C I E S : *morgani* (Morgan's sphinx)
S U B S P E C I E S: *praedicta* (Darwin's sphinx)

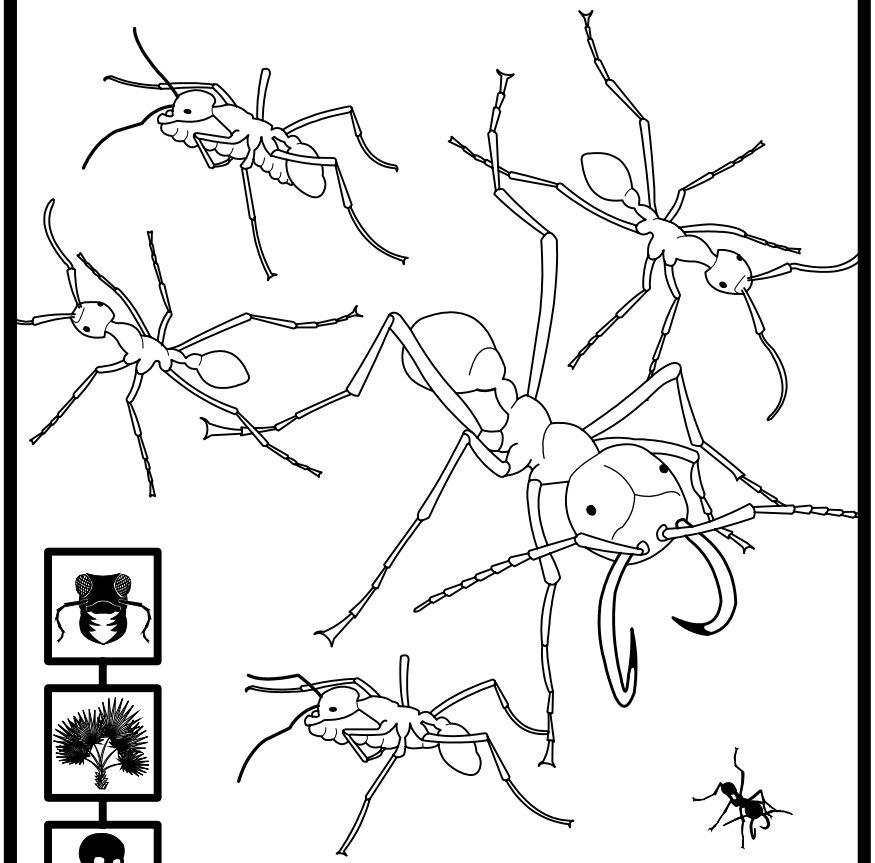
S I Z E : Wingspan 6 inches (150 mm); proboscis 12 inches (300 mm)
D I E T : Larvae (caterpillars) feed on leaves of custard apple; adults feed on orchid nectar
H A B I T A T : Coastal rainforests
D I S T R I B U T I O N : Madagascar

A D D I T I O N A L I N F O R M A T I O N :

- This is a subspecies of large sphinx moths found in Africa and Madagascar. *X. m. praedicta* was so named for Darwin's prediction of it:

Charles Darwin was observing a collection of orchids from Madagascar when he came upon one with a long, green, foot-long nectary. Since these orchids are fragrant at night and have nectar only at the very tip of the nectary, he proposed that a night flying moth, with an incredibly long proboscis, must drink from the orchid (pollinating it in the process). Controversy went on about whether this insect actually existed, until decades later (in 1903, after Darwin's death) when the moth was finally discovered; as predicted, it had a foot-long proboiscis, long enough to reach the nectar.

WASPS, ANTS & BEES



neotropical army ant
Eciton sp.

C L A S S : Insecta (insects)
O R D E R : Hymenoptera (wasps, ants and bees)
F A M I L Y : Formicidae (ants)
G E N U S : *Eciton* (neotropical army ants)

S I Z E : 1/8 - 1/2 inch (3 - 12 mm)
D I E T : Arthropods & very small vertebrates
H A B I T A T : Humid forests/rainforests
D I S T R I B U T I O N : Central & South America

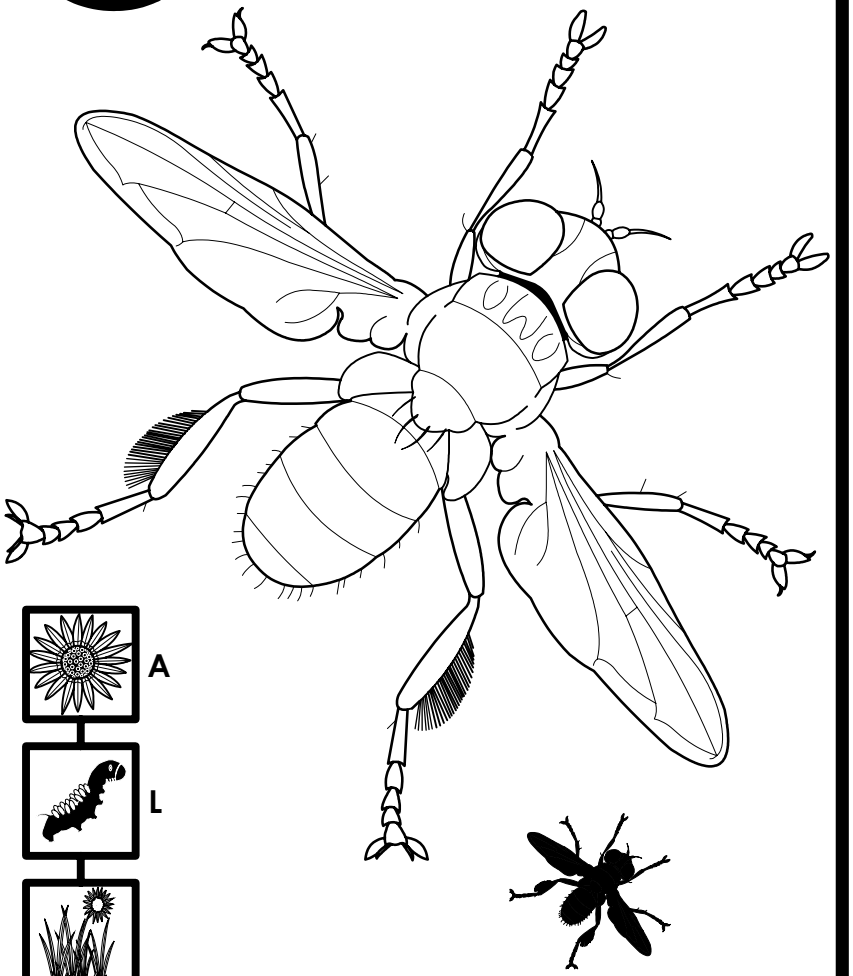
A D D I T I O N A L I N F O R M A T I O N :

- Army ants are so-called because they march in large formations (to hunt prey) and never keep a permanent nest. Instead, they make temporary shelters, called bivouacs (biv-oo-acks), out of live worker ants that hold each others' **tarsi** (tars-ee)!

- Army ant colonies can contain over a million individuals. Workers' activities include tending the queen, hunting for prey, caring for and transporting young, creating bridges and shelters out of their live bodies, and protecting the colony.

- Army ant soldiers (shown on front) can be identified by their large, tong-like mandibles. Caution should be taken when approaching army ant hunting parties - they can sting and bite viciously!

TRUE FLIES



feather-legged fly
Trichopoda sp.

CLASS: Insecta (insects)
ORDER: Diptera (true flies)
FAMILY: Tachinidae (parasitoid flies)
GENUS: *Trichopoda* (feather-legged flies)

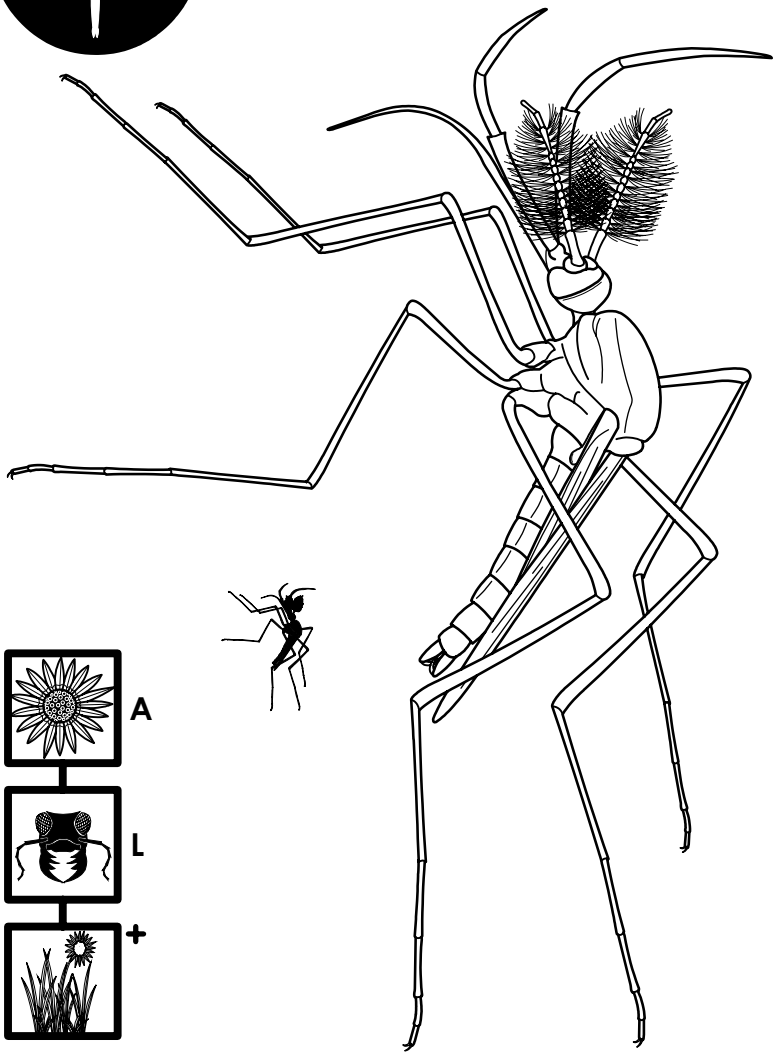
SIZE: 1/4 - 1/2 inches (5 - 13 mm)
DIET: Larvae are internal parasites of other insects; adults feed on nectar from flowers
HABITAT: Meadows, fields and grasslands; adults can often be found on flowers
DISTRIBUTION: North & South America; introduced to Eurasia & Australia

ADDITIONAL INFORMATION:

- Adult females lay eggs on a host, including stink bugs (Pentatomidae) and squash bugs (Coreidae). Only one larva lives in a single bug, feeding on the liquids and internal body parts. When ready to pupate, the fly larva leaves the host, which kills it in the process.

- Though the life cycle of feather-legged flies may seem gruesome, they are important to humans because they control populations of pest insects. The bugs that are parasitized by these flies can become serious pests of things we grow, such as cotton, tomatoes, squashes and melons.

TRUE FLIES



elephant mosquito
Toxorhynchites sp.

CLASS: Hexapoda (insects & entognaths)
ORDER: Diptera (true flies)
FAMILY: Culicidae (mosquitoes)
GENUS: *Toxorhynchites* (elephant mosquitoes)

SIZE: Body: 5/16 inch (7 mm); Wingspan: 1/2 inch (14 mm)
DIET: Larvae feed on other mosquito larvae; adults drink nectar
HABITAT: Larvae are found in pools of water; adults can be found in fields/meadows or forests
DISTRIBUTION: Worldwide

ADDITIONAL INFORMATION:

- Elephant mosquitoes are the largest mosquitoes in the world. They are usually covered with metallic (iridescent) blue scales, and have a proboscis that is bent down in the middle - hence the name 'elephant' mosquito.

- Unlike other mosquitoes, elephant mosquitoes are beneficial to humans. As larvae, they feed on mosquitoes in the water with them (even their brothers and sisters), until one is left. Since the larva that survives gets a lot to eat, adults do not need to feed on blood to make eggs, but instead only drink nectar. For these reasons, elephant mosquitoes have sometimes been released in areas to control other mosquitoes.