

*Nature's
Wonders*

Beetles

OF THE WORLD



Volume 2: Cockroaches, Lightning Bugs & More

3D model set by Ken Gilliland

Nature's Wonders

Beetles of the World

Volume Two

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Introduction

Beetles are insects that form the order *Coleoptera*. Their front pair of wings are hardened into wing-cases, called the Elytron which distinguishes them from most other insects. There are about 400,000 described species, making it the largest of all orders and about 25% of all known animal species.

This Add-on Set comes with eight different species of beetle. It includes a variety of cockroaches including the American, German, Smokey-brown, Brown-banded and Oriental. Also included is the striking Colorado Potato Beetle, the firefly/lightning bug and clicker beetle.

It comes in both Poser and DAZ Studio native versions and supports Firefly, 3Delight, Superfly and Iray render engines.

Overview and Use

This set uses a common model to recreate digitally the beetle species included in this volume. Each species uses specific morphs from the generic model to single-out its unique features.

- **Models included in this volume:**
 - None. **This add-on set requires the "Nature's Wonders" Beetles (base set) model & morphs to function**

The set is located within the **Animals : Nature's Wonder** folder. Here is where you will find a number of folders, such as **Manuals**, **Resources** and **Fauna Libraries**. Let's look at what is contained in these folders:

- **Fauna Libraries:** This folder holds the actual species and poses for the "premade" fauna. The fauna for this set can be found in the following folder(s):
 - **Insects / Beetles of the World**
- **Manuals:** Contains a link to the online manual for the set.
- **Props:** Contains any props that might be included in the set
- **Resources:** Items in this folder are for creating and customizing your fauna included in the set

Creating a Specific Beetle using Poser

1. For this example, we'll create the Stag Beetle.
2. Load Poser, select the FIGURES library and go to the "Animals", "Nature's

Wonders" and then the Nature's Wonders Fauna Libraries Insects folder.

3. Go to the Beetles of the World folder and select the Firefly or Superfly sub-folder.
4. Select the Stag Beetle (or a Beetle of your choice) and load it by clicking the mouse.

Creating a Specific Beetle using DAZ Studio

1. For this example, we'll create the Stag Beetle.
2. Load DAZ Studio and go to the "Animals", "Nature's Wonders" and then the Nature's Wonders Fauna Libraries Insects folder.
3. Go to the Beetles of the World folder and select the Iray or 3Delight sub-folder.
4. Select the Stag Beetle (or a Beetle of your choice) and load it by clicking the mouse.

Using the Poses

The poses were designed for the default model. The base or "hip" section of the model is **elyrta**. Since different individual species may use body scaling, it may alter the expected ground level of the species model. Some adjusting may be necessary (e.g. the "ytran" dial may need to be used to raise or lower the model). Cockroaches do not use generic beetle poses and require cockroach-specific poses.

To Fly or Not Fly?

First, a crash course in Insect Biology... All beetles have 2 sets of wings; the Elytron (2 halves of the shell) are technically the fore wings, and then the hind wings (which actually do the flying). Some beetles through evolution have lost their ability to fly, and while they have hind wings, they are of no use because the Elytron (shell halves) are fused together.

Below, are the flight capabilities of beetles included in this set that can fly:

- American Cockroach- primarily use their wings for gliding or short bursts of flight
- Oriental Cockroach- it can barely fly
- Smokey Brown Cockroach- primarily use their wings for short bursts of flight
- German Cockroach- it can barely fly
- Brown-banded Cockroach- it can barely fly
- Lightning Bug (or Firefly)- Adult beetles can fly long distances
- Colorado Potato Beetle-- They fly, but are very clumsy at it.
- Click Beetle- it can barely fly

Lightning Bug Glow

The glow of the lightning is controlled through the "BodyLuciferase" material. In Firefly, Superfly and 3Delight turning up the ambient color strength will increase the glow. In Iray, it is controlled through the Emission section Luminance amount.

Nature's Wonders

Beetles of the World

FIELD GUIDE

Volume 2

American Cockroach

Oriental Cockroach

Smokey Brown Cockroach

German Cockroach

Brown-banded Cockroach

Lightning Bug (or Firefly)

Colorado Potato Beetle

Click Beetle

American Cockroach

Periplaneta americana

This insect is the largest species of cockroach routinely found in homes, and often considered a pest. In certain regions of the U.S. it is colloquially known as the “Waterbug”, though it is not a true waterbug, since it is not aquatic. It is also known as the “Ship Cockroach”, “Kakerlac”, and “Bombay Canary”.

Despite their name, American cockroaches are native to Africa and the Middle East. They are believed to have been introduced to the Americas only from the 17th century onward as a result of human commercial patterns, including the Atlantic slave trade.

It has an average length around 1.6 inches (40 mm) and is about 0.28 inches (7 mm) tall. They are reddish brown and have a yellowish margin on the pronotum, the body region behind the head. Immature cockroaches resemble adults except they are wingless. It has the longest life cycle, up to about 700 days.



American cockroaches are omnivorous and opportunistic feeders that eat materials such as cheese, sweets, beer, tea, leather, bakery products, starch in book bindings, manuscripts, glue, hair, flakes of dried skin, dead animals, plant materials, soiled clothing, and glossy paper with starch sizing. They are

particularly fond of fermenting foods. They have also been observed to feed upon dead or wounded cockroaches of their own or other species.

Cockroaches can pick up disease-causing bacteria, such as Salmonella, on their legs, and later deposit them on foods and cause food poisoning or infection if they walk on the food.

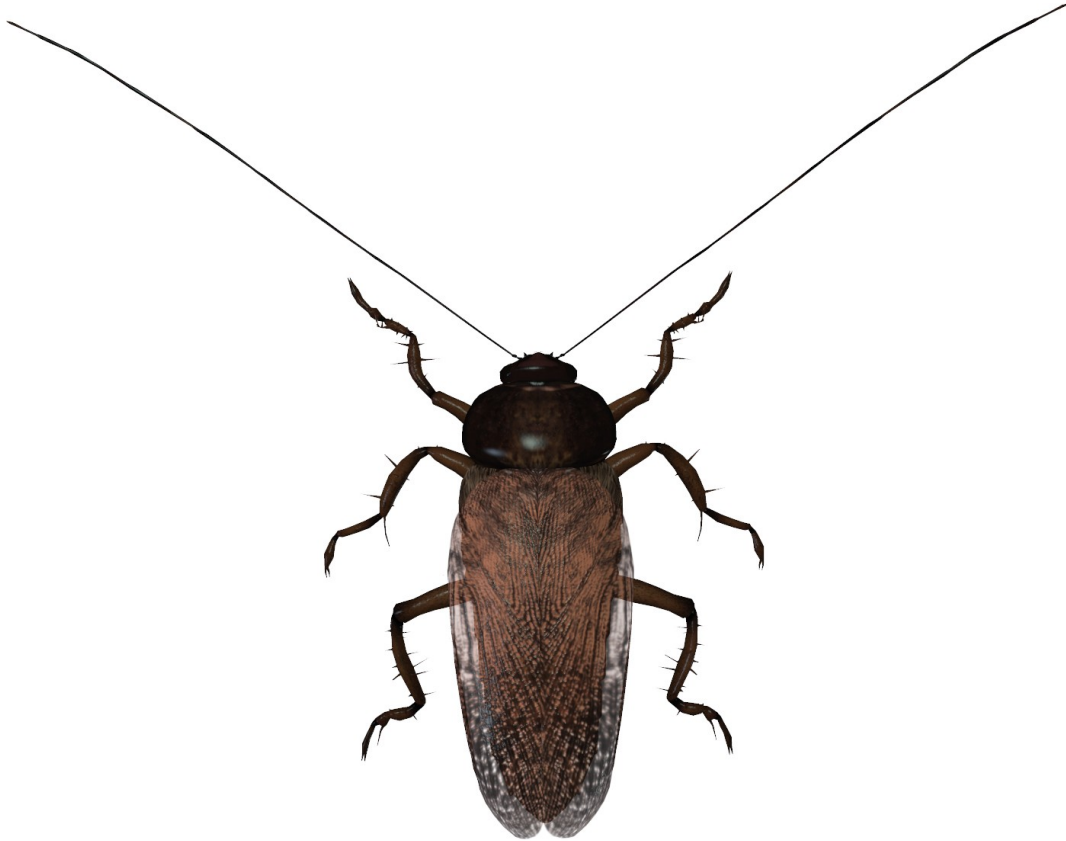
They are fast... in an experiment, an American cockroach registered a record speed of 3.4 mph (5.4 km/h), about 50 body lengths per second, which would be comparable to a human running at 210 mph (330 km/h).

American cockroach nymphs are capable of limb regeneration. It has been used as an ingredient in traditional Chinese medicine, with references to its usage in the Compendium of Materia Medica and Shennong Ben Cao Jing. In China, an ethanol extract of the American cockroach, Kāngfùxīn Yè (康复新液), is prescribed for wound healing and tissue repair.

Oriental Cockroach

Blatta orientalis

It is also known as the “Waterbug“ (as they live in damp areas) or black cockroach (as their bodies are mostly dark). Originally endemic to the Crimean Peninsula and the region around the Black Sea and the Caspian Sea, its distribution is now cosmopolitan.



It is a large species of cockroach, adult males being (0.7–1.4 inches (18–29 mm) and adult females being (0.7 –1.1 inches (20–27 mm). It is dark brown or black in color and has a glossy body. The female has a somewhat different appearance from the male, appearing to be wingless at a casual glance, but is brachypterous, having non-functional wings just below her head. She has a wider body than the male. The male has long wings, which cover three quarters of the abdomen and are brown in color, and has a narrower body. Both of them are flightless. The female oriental cockroach looks somewhat similar to the Florida woods cockroach and may be mistaken for it.

To thrive, cockroaches need a source of food/liquid and a place to hide, preferring warm places and relatively high humidity; the optimum temperature for oriental cockroaches is between 20 and 29 °C (68 and 84 °F). Female oriental cockroaches have vestigial tegmina (reduced fore wings) and males

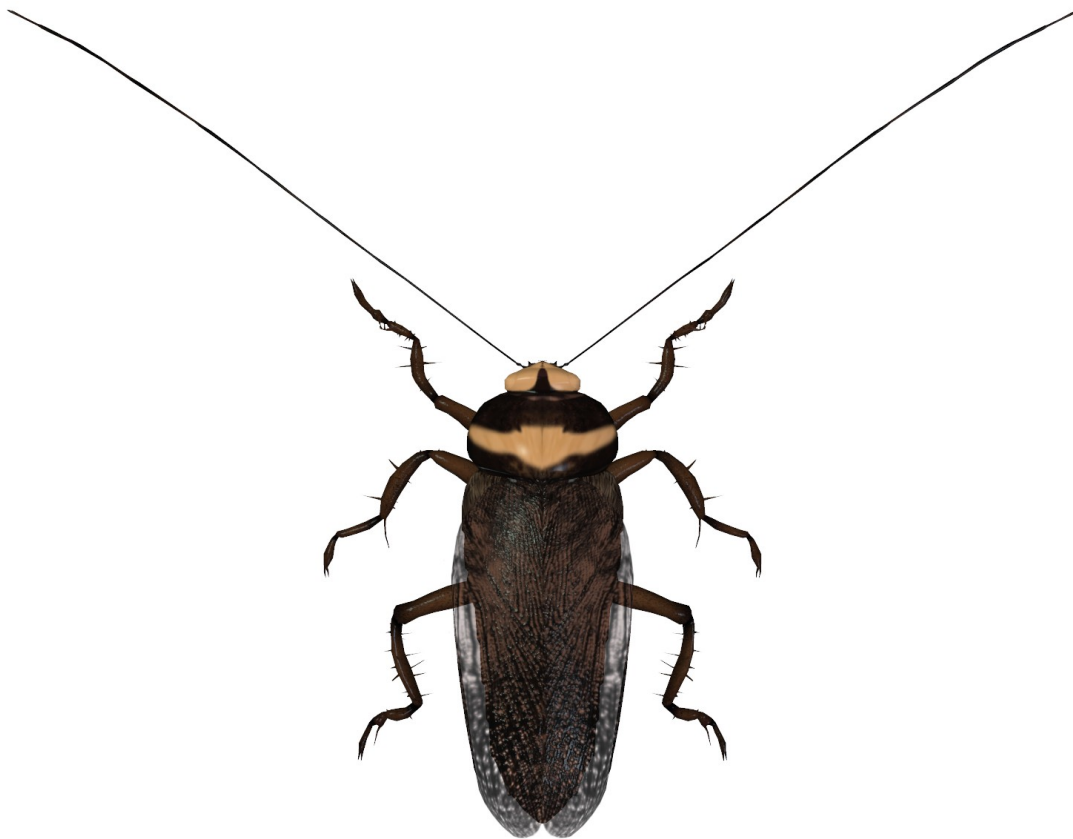
have longer tegmina. Oriental cockroaches are mainly nocturnal, and they can be elusive in that a casual inspection of an infested dwelling during the day may show no signs of roach activity.

Cockroaches transfer bacteria and viruses from their legs to food, dishes, utensils, and counter-tops and they are known to spread dysentery, E. coli, Salmonella, and food poisoning.

Smoky-brown Cockroach

Validiblatta fuliginosa

It is a species of cockroach in the family Blattidae. It is a large, winged species, growing to a length of 1.3–1.4 inches (32–35 mm). It is very common in Japan, as well as the southern United States and tropical climates; notably, it can be found in Florida, Eastern North Carolina, Louisiana, Mississippi, Texas, and other Gulf coastal states, and along the southern Mississippi River. The cockroach can also be found in Australia, such as in warmer cities like Sydney and Brisbane. Most notably in South America, these cockroaches are seen in Argentina to Paraguay geographical range. The cockroach has also been recently reported in Asia, Europe, Australia, and Northern America.



The Smoky-brown cockroach prefers warmer climates and is not cold-tolerant. It may, however, be able to survive colder climates by going indoors. It often lives around the perimeter of buildings especially places where these insects can feed and confine themselves.

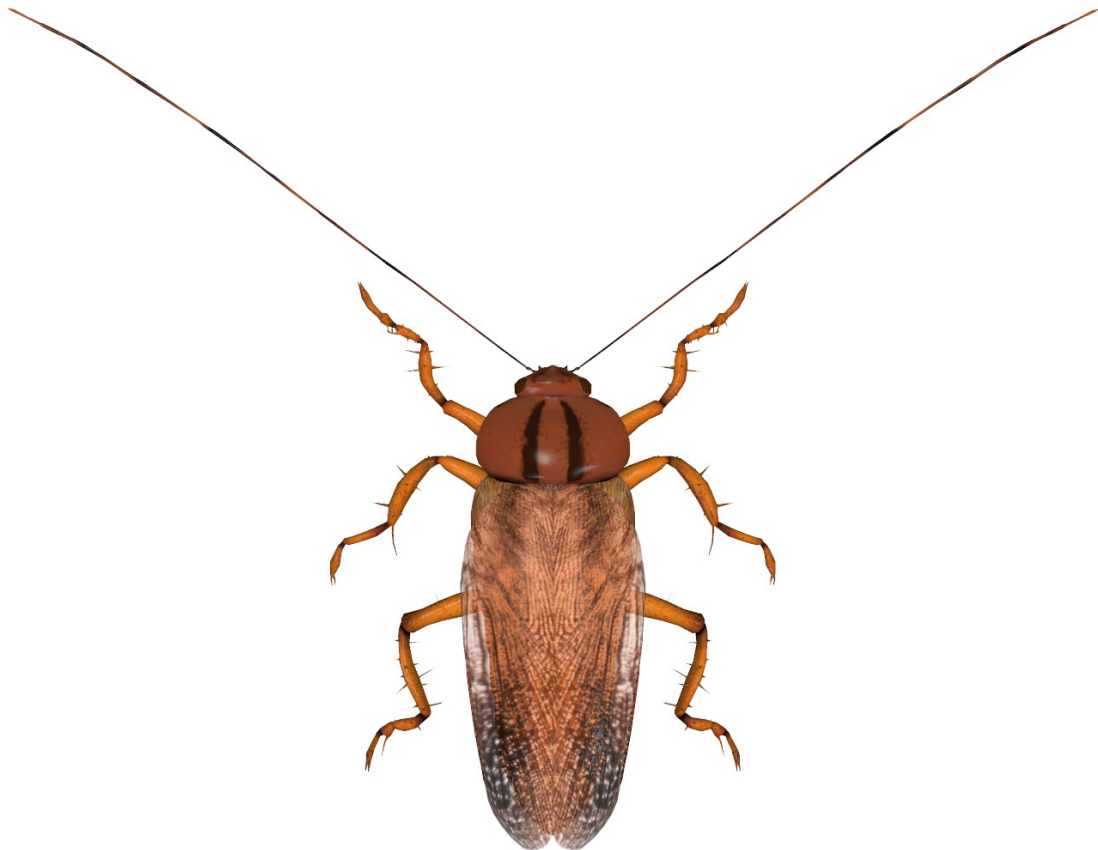
It is a detritivore (dead organic material) and can feed off a wide array of organic (including decaying) matter. Like most cockroaches, it is a scavenger, whereby it feeds on many different types of foods including dry earthworms, pet food, pet waste such as feces and urine, paper, and many types of ripe fruits.

German Cockroach

Blattella germanica

It is colloquially known as the “Croton bug”, is a species of small cockroach, typically about 0.43 to 0.63 inches (11 to 16 mm) long. In color it varies from tan to almost black, and it has two dark, roughly parallel, streaks on the pronotum running anteroposteriorly from behind the head to the base of the wings. Although it has wings, it can barely fly, although it may glide when disturbed. It

It is one of the few species of cockroach that are domestic pests, it probably is the most widely troublesome example. It is very closely related to the Asian cockroach, and to the casual observer, the two appear nearly identical and may be mistaken for each other.

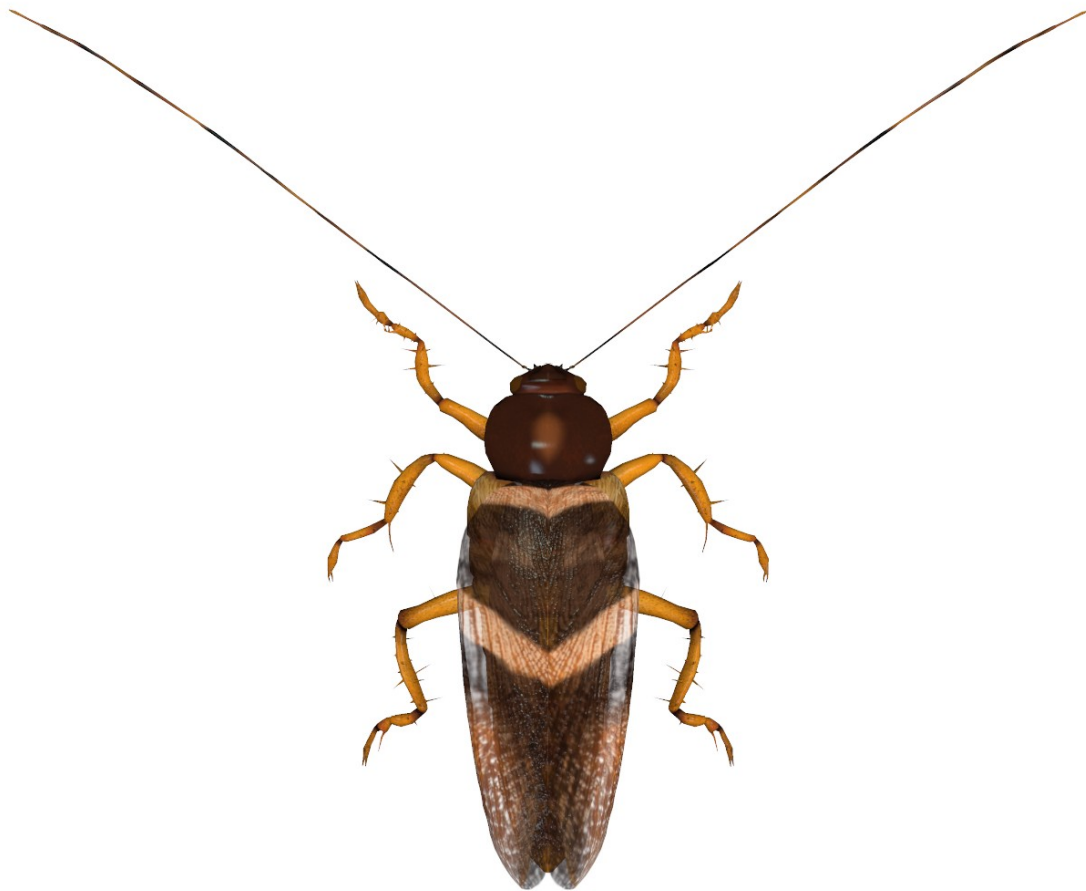


German cockroaches are omnivorous scavengers. They are attracted particularly to meats, starches, sugars, and fatty foods. Where a shortage of foodstuff exists, they may eat household items such as soap, glue, and toothpaste. In famine conditions, they turn cannibalistic, chewing at each other's wings and legs.

Brown-banded Cockroach

Supella longipalpa

It s a species of small cockroach, measuring about 0.40 to 0.55 inches (11 to 14 mm long and the most well-known in the genus Supella. It is tan to light brown and has two light-colored bands across the wings and abdomen, which may sometimes appear to be broken or irregular but are quite noticeable. The bands may be partly obscured by the wings. The male has wings that cover the abdomen, while the female has wings that do not cover the abdomen completely. The male appears more slender than the female, the female appears wider.



The brown-banded cockroach has a fairly wide distribution, being found in the northeastern, southern, and mid-west regions of the United States quite commonly. They are one of the most recent alien cockroaches to form breeding colonies in Britain and Ireland. They need less moisture than the German cockroach so they tend to be more broadly distributed in the home, such as in living rooms and bedrooms. They can often be found in homes and apartments, but are less common in restaurants. They tend not to be found in the daytime, since they avoid light.

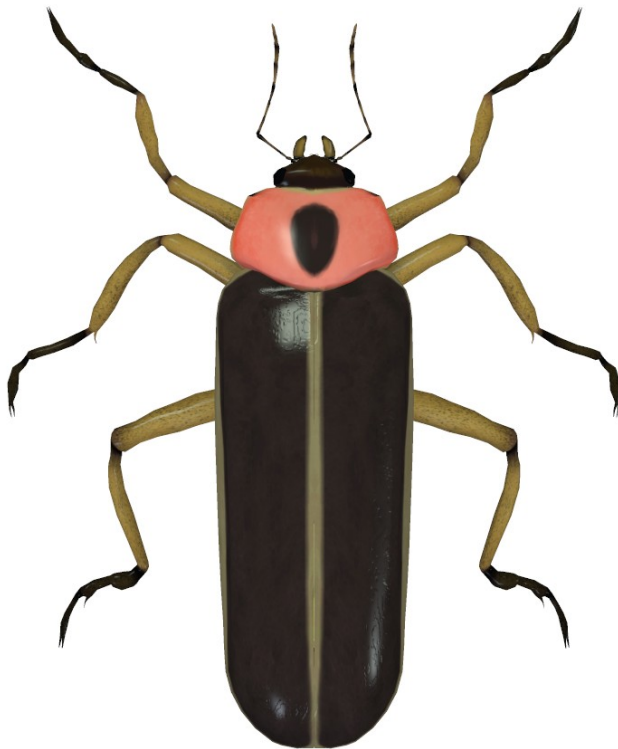
Lightning Bug

Photinus pyralis

It also known as the Common Eastern Firefly or Big Dipper Firefly. It is the most common species of firefly in North America, and is typically found east of the Rocky Mountains.

They are small soft-bodied beetles that are 0.4–0.7 inches (9–19 mm) long. They have flat black or brown bodies with wing coverings, or elytra, that extend the length of their entire thorax and abdomen. The elytra have a yellow border. The head shield, or pronotum, is pale yellow, with a black dot in the center, surrounded by pink or red.

An organ on its abdomen is responsible for its light production. The light producing enzyme is luciferase, and is found within cells of the lantern.



Luciferase requires oxygen, luciferin and adenosine triphosphate (ATP) to catalyze a chemical reaction that produces bioluminescence in these insects. It has been shown that the glow is not controlled by the tracheal end cells (which were thought to contain valves) nor by central nerve impulses through studies involving low oxygen conditions. Pupae of these beetles have different light organs than the adult. They do not

have the characteristic tracheal end cells of the flashing adults, and whereas the adults emit bright flashes, pupae emit low intensity glowing.

These fireflies are most noticeable around twilight in the spring and summer months. The common name, big dipper firefly, is due to the characteristic flight of the males, whose trajectory appears to follow a J-shape, lighting on the upswing. During flight, this J-pattern is used alongside light flashing to attract females, who rest on vegetation and signal back to males if interested. The firefly flashes are stimulated by light-activated proteins, not rhythmic impulses as originally thought.

Although their conservation status is classified as "Least Concern" by the IUCN Red List, these fireflies do face some dangers. The biggest threats to their populations include light pollution, pesticide use, climate change, and human building and development in their habitats.

Colorado Potato Beetle *Leptinotarsa decemlineata*

This beetle is also known as the 'Colorado beetle', the 'Ten-striped Spearman', the 'Ten-lined Potato Beetle', and the 'Potato Bug'. It is known for being a major pest of potato crops. It is native to the Rocky Mountains, it spread rapidly in potato crops across the United States and then Europe from 1859 onwards.

It is about 0.4 inches (10 mm) long, with a bright yellow/orange body and five bold brown stripes along the length of each of its wings.



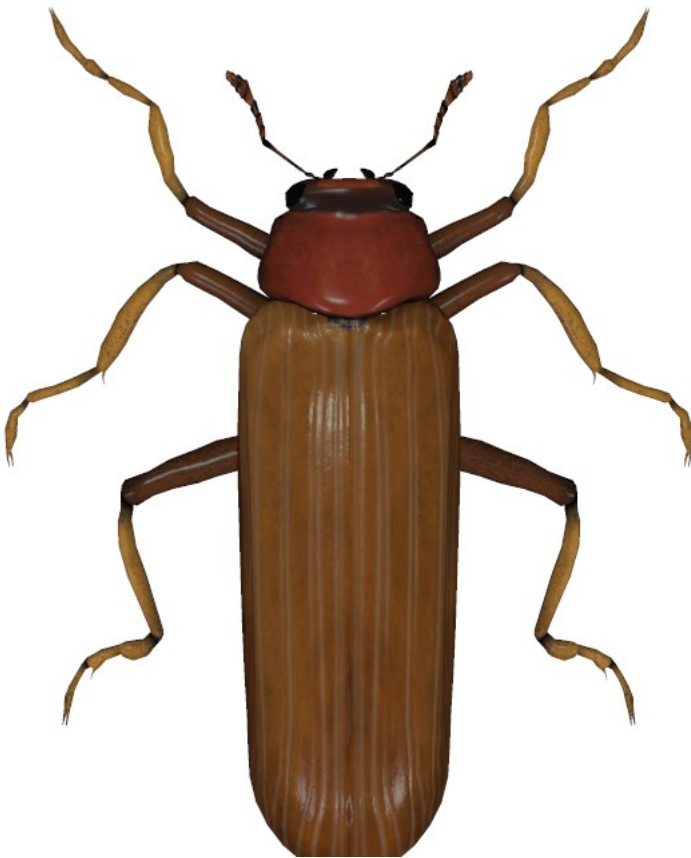
Click Beetle

Denticollis linearis

This beetle is present in most of Europe, in the East Palearctic realm, the Nearctic realm, and the Near East. Other names for this beetle include elaters, snapping beetles, spring beetles or skipjacks.

They are a cosmopolitan beetle family characterized by the unusual click mechanism they possess. There are a few other families of Elateroidea in which a few members have the same mechanism, but most elaterid

subfamilies can click. A spine on the prosternum can be snapped into a corresponding notch on the mesosternum, producing a violent "click" that can bounce the beetle into the air. The evolutionary purpose of this click is hotly debated. The theories include that the clicking noise deters predators or is used for communication, or that the click may allow the beetle to "pop" out of the substrate in which it is pupating. It is unlikely that the click is used for avoiding predators as it does not carry the beetle very far (<50 cm), and in practice click beetles usually play dead or flee normally.



The pronotum varies from orange-red to brownish, the elytra from dark-brown to yellowish, while the head and femora are generally blackish, the tarsi and tibia are orange-yellow.

The larvae are omnivorous, feeding on many different plants and other species larvae. The adults grow up to 0.35–0.51 inches (9–13 mm) long and can mostly be encountered from May through July in broadleaved and coniferous host-trees.

Special Thanks to...

....my betatesters Alisa and FlintHawk

and the Beatles (who I listened to throughout this project)

Species Accuracy and Reference Materials

The author-artist has tried to make these species as accurate to their real life counterparts as possible. Beetles of the same species vary considerably, as do all other animals in nature. These beetles were created using the correct field markings and the most common similarities.

With the use of one generic model to create dozens of unique Beetle species, some give and take is bound to occur. In addition, 3D-models have many technical challenges, which make exact representations difficult, if not impossible. It's best to think of these Beetles represented as resembling the particular species, and they may not, in some cases, be 100% scientifically accurate.

The model and morphs were created using Luxology's Modo. The texture maps were created in Corel's Painter. The model was rigged and materials were created in Smith-Micro's Poser and DAZ's DAZ Studio.

Internet Sources:

- **Wikipedia** (<http://www.wikipedia.com>)
- **The Smithsonian** (<https://www.si.edu/spotlight/buginfo/beetle>)
- **San Diego Zoo** (<https://animals.sandiegozoo.org>)
- **The Wildlife Trusts** (<https://www.wildlifetrusts.org>)
- **BugGuide.Net** (<https://bugguide.net>)
- **Entomologist.Net** (<https://entomologist.net/beetles/>)