

Nature's
Wonders

Beetles

OF THE WORLD

Volume 1: Common Beetles of the World

3D model set by Ken Gilliland

Nature's Wonders

Beetles of the World

Volume One

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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 Beetle species of Beetle. It includes the some of the most common beetles such as the Summer Chafer, Fig eater and Christmas Beetle, as well as the Sacred Scarab (of Ancient Egypt) and the African Dung Beetle (and yes, the Dung Ball is included). Also included is the striking Japanese Beetle and 10-lined June Beetle.

It comes in both Poser and DAZ Studio native versions and support 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 "Nature's Wonders" Beetles (base set) 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).

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:

- African Dung Beetle- They fly to travel between dung deposits
- Sacred Scarab- They fly to travel between dung deposits
- **Black Vine Weevil- It cannot fly, the Elytron is fused together.**
- Fig eater Beetle- They fly, but are very clumsy at it.
- Japanese Beetle- Adult beetles can fly long distances
- 10-lined June Beetle- They fly, but are very clumsy at it.
- Summer Chafer- They can fly, generally moving from fruit tree to fruit tree
- Christmas Beetle- They are clumsy fliers, but can fly long distances

Nature's Wonders

Beetles of the World

FIELD GUIDE

Volume I

African Dung Beetle

Sacred Scarab

Black Vine Weevil

Figeater Beetle

Japanese Beetle

Ten-lined June Beetle

Summer Chafer

Golden Stag Beetle

African Dung Beetle

Scarabaeus satyrus

This species inhabits the South African savanna. Adults are 0.7–1.6 inches (19–40 mm) long.

They eat the dung of herbivores and omnivores, and prefer that produced by the latter. Most dung beetles search for dung using their sensitive sense of smell. Some smaller species simply attach themselves to the dung-providers to wait for the dung. After capturing the dung, a dung beetle rolls it, following a straight line despite all obstacles. Sometimes, dung beetles try to steal the dung ball from another beetle, so the dung beetles have to move rapidly away from a dung pile once they have rolled their ball to prevent it from being stolen. Dung beetles can roll up to 10 times their weight.



These beetles roll a ball of dung for some distance from where it was deposited, and bury it, excavating an underground chamber to house it. An egg is then laid in the ball, the growing larva feeding on the dung, pupating, and eventually emerging as an adult. The daily dung of one elephant can support 2,000,000 beetles.

Dung beetles play a role in agriculture and tropical forests. By burying and consuming dung, they improve nutrient recycling and soil structure. Dung beetles have been further shown to improve soil conditions and plant growth on rehabilitated coal mines in South Africa. They are also important for the

dispersal of seeds present in animals' dung, influencing seed burial and seedling recruitment in tropical forests.

The nocturnal African dung beetle is one of the few known invertebrate animals that navigate and orient themselves using the Milky Way.

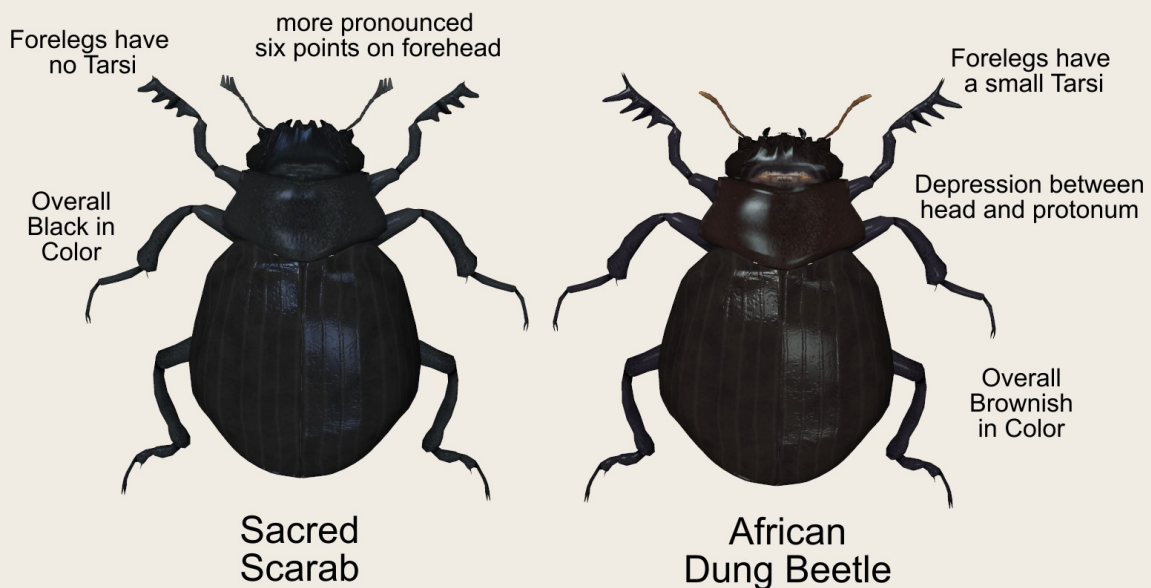
Past research showed these insects routinely dance in circles on top of their dung balls to help navigate away from rival beetles as quickly as possible. As scientists looked for this dancing, they noticed the beetles climbed onto the excrement balls most often during the midday heat.

Now researchers believe that dung beetles might also use excrement to keep themselves cool.

"Dung beetles are the first example of an insect using a mobile, thermal refuge to move across hot soil," researcher Jochen Smolka, a neuroethologist at Lund University in Sweden, told LiveScience. "Insects, once thought to be at the mercy of environmental temperatures, use sophisticated behavioral strategies to regulate their body temperature[s]."

Differences Between a Sacred Scarab & Dung Beetle

*Sacred Scarabs are actually a type of Dung Beetle



Sacred Scarab

Rabaeus sacer

It is the type species of Dung Beetle. It is native of southern Europe, northern Africa and western Asia, and it was venerated in ancient Egypt. It has been recorded from Afghanistan, Albania, Armenia, Azerbaijan, Bulgaria, Cyprus, Egypt, Eritrea, Ethiopia, France (including Corsica), Greece, Hungary, Iran, Iraq, Israel, Italy (including Sardinia and Sicily), Jordan, India (Kashmir), Libya, Mauritania, Montenegro, Morocco, Palestine, Pakistan, Romania, Portugal, Russia (southernmost), Saudi Arabia, Serbia, Spain, Sudan, Syria, Turkey, Turkistan and Ukraine. In Europe, much of its distribution is in coastal regions near the Mediterranean and the Black Sea, where it often inhabits dunes and marshes.

It is an all-black beetle with adults measuring 0.7–1.6 inches (19–40 mm) long. Its head has a distinctive array of six projections, resembling rays. The projections are uniform with four more projections on each of the tibiae of the front legs, creating an arc of fourteen "rays". The functionality of these projections are adaptations for digging and for shaping the ball of dung.



They have the front legs of other beetles of its genus, but unlike those, the front legs of this species are unusual; they do not end in any recognizable tarsus, the foot that bears the claws. There is only a vestigial claw-like structure that might be of some assistance in digging. The mid- and hind-legs of Scarabaeus have normal, well-developed 5-segmented tarsi, but the front legs are specialized for excavation and for forming balls of dung. Their diet consists of fruit, fungi, carrion, and insects.

It is the most famous of the scarab beetles. To the Ancient Egyptians, it was a symbol of Khepri, the early morning manifestation of the sun god Ra, from an analogy between the beetle's behavior of rolling a ball of dung across the ground and Khepri's task of rolling the sun across the sky. They accordingly held the species to be sacred. The Egyptians also observed young beetles emerging from the ball of dung, from which they mistakenly inferred that the male beetle was able to reproduce without needing a female, simply by injecting his sperm into the ball of dung. From this, they drew parallels with their god Atum, who also begat children alone.

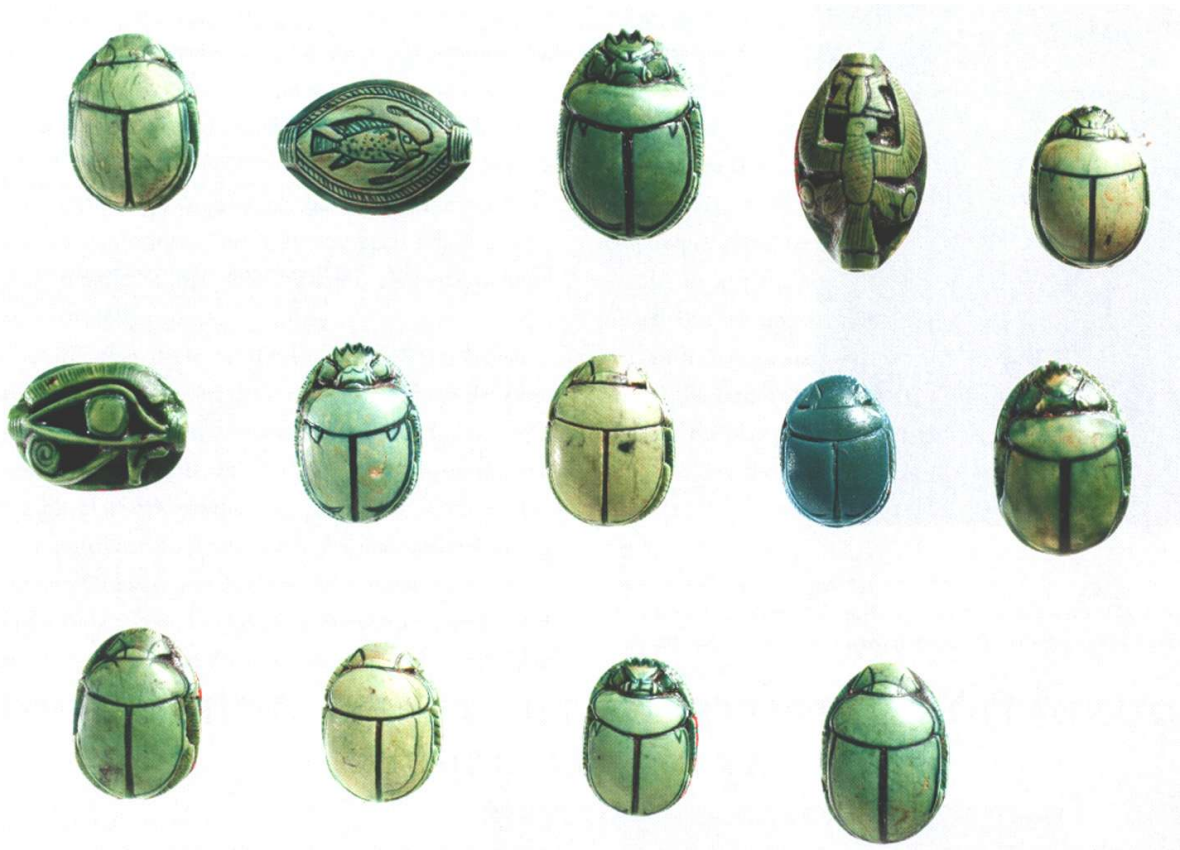


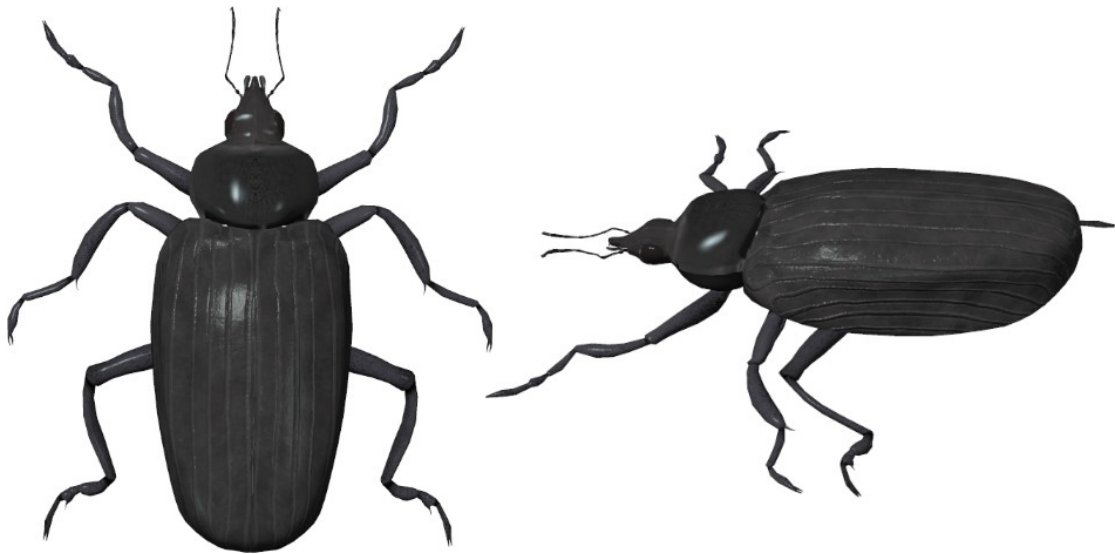
Photo: Metropolitan Museum of Art

Black Vine Weevil

Otiorhynchus sulcatus

It is an insect native to Europe, but common in North America as well. It is a pest of many garden plants. It is 0.35–0.51 inches (10-13 mm) long.

The adult weevil is matte black with fused wing covers, and is unable to fly. It feeds at night on the outer edges of leaves, causing the leaves to have a notched margin. Broadleaved evergreen plants such as Camellia, Rhododendron, Euonymus and Bergenia are particularly prone to damage, although a wide range of different garden plants are susceptible to attack.



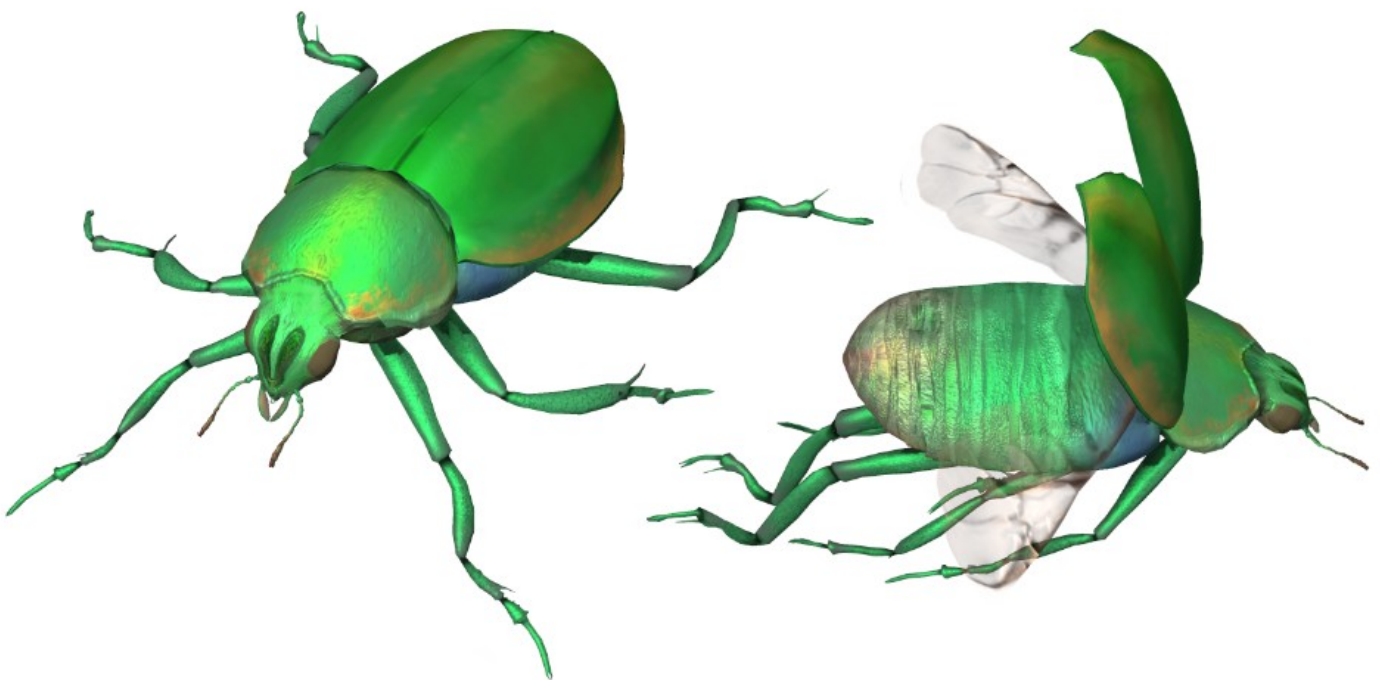
Female weevils have the ability to reproduce parthenogenetically with fertilization of eggs required to produce males, though no males have been observed. This form of parthenogenesis is known as thelytoky. Grubs grow up to 1 cm in length, have a slightly curved, legless body and are creamy white in colour with a tan-brown head. They live below the soil surface, and feed on roots and cambium at the base of trunks. They mostly cause damage to herbaceous plants, particularly those growing in containers, where root growth is restricted. Severe infestations can result in complete root destruction and hence plant death.

Fig eater Beetle

Cotinis mutabilis

It is also known as the green fruit beetle or fig beetle. It is a member of the scarab beetle family. It belongs to the subfamily commonly called flower chafers since many of them feed on pollen, nectar, or petals. Its habitat is primarily the southwestern United States (including California and Mexico). They inhabit tropical and subtropical forests, oak forests, and cloud forests, as well as many different types of vegetation and land in urban areas between 0 - 2,700 meters above sea level.

Adult fig eater beetles grow to approximately 1.25 inches (32 mm). They are active during daylight hours, often congregating in the shade of trees near choice breeding grounds to find mates. They make a loud buzzing sound similar to that of carpenter bees, possibly because they do not need to open their elytra in order to fly, an ability shared with many other flower beetles.



Its natural diet includes fruit from cacti and sap from desert trees. Their range has expanded considerably since the 1960s with the increasing availability of home gardens, compost piles, and organic mulch. The larvae eat decomposing organic matter, such as that found in compost piles, manure piles, and organic mulch, and occasionally plant roots, such as the roots of grass in lawns.

Japanese Beetle

Popillia japonica

The Japanese beetle is a species of scarab beetle. Due to the presence of natural predators, the Japanese beetle is not considered a pest in its native Japan, but in North America and some regions of Europe, it is a noted pest to roughly 300 species of plants. Some of these plants include rose bushes, grapes, hops, canna, crape myrtles, birch trees, linden trees, and others.

The adult beetles damage plants by skeletonizing the foliage (i.e., consuming only the material between a leaf's veins) as well as, at times, feeding on a plant's fruit. The subterranean larvae feed on the roots of grasses.



An adult measures 0.6 inches (15 mm) in length, with iridescent copper-colored elytra and green thorax and head. A row of white tufts (spots) of hair project from under the wing covers on each side of the body. Males are slightly smaller than females. Grubs are white and lie in curled positions. A mature grub is roughly 1 inch (2.5 cm) long.

Ten-lined June Beetle

Polyphylla decemlineata

It also known as the watermelon beetle, is a scarab beetle found in the western United States and Canada. They are relatively large in size, some growing to sizes as large as 1.5 inches (3 cm) or more. As in other members of this genus, the males have large distinctive antennae consisting of several lamellate plates, which they close up when threatened. The antennae are used to detect pheromones emitted by the females. The wing covers (elytra) have four long white stripes and one short stripe each. The underside of the thorax is covered with brownish hairs.

The adults are attracted to light and feed on foliage. They can make a hissing sound when touched or otherwise disturbed, which can resemble the hissing of a bat. This sound is made by their wings pushing down, forcing the air out between their wings and back. They can be an agricultural pest affecting a wide range of crops because their larvae feed on plant roots and can weaken or kill the plants.



Summer Chafer

Amphimallon solstitiale

The species can be found throughout Europe, extending into Turkey and even occurring in portions of East Asia.

It is also called the European June beetle, and is similar to the cockchafer but much smaller, approximately 0.8 inches (20 mm) in length. They are declining in numbers now, but where found they are often seen in large numbers. At dusk they actively fly around tree tops looking for a mate and can often be found drowning in pools of water the following morning. They are also attracted to light and come in through open, lit windows and fly around lamps, making quite a racket while bumping into lights. They are found throughout the Palearctic region (and North America) and, commonly seen from June to August, living in meadows, hedgerows, and gardens, and eating plants and tree foliage.



The larva of summer chafer undergo a two to three-year period of development underground, feeding upon host plants. Carabid beetles hunt and consume the larvae and serve as its primary predator in arable fields.

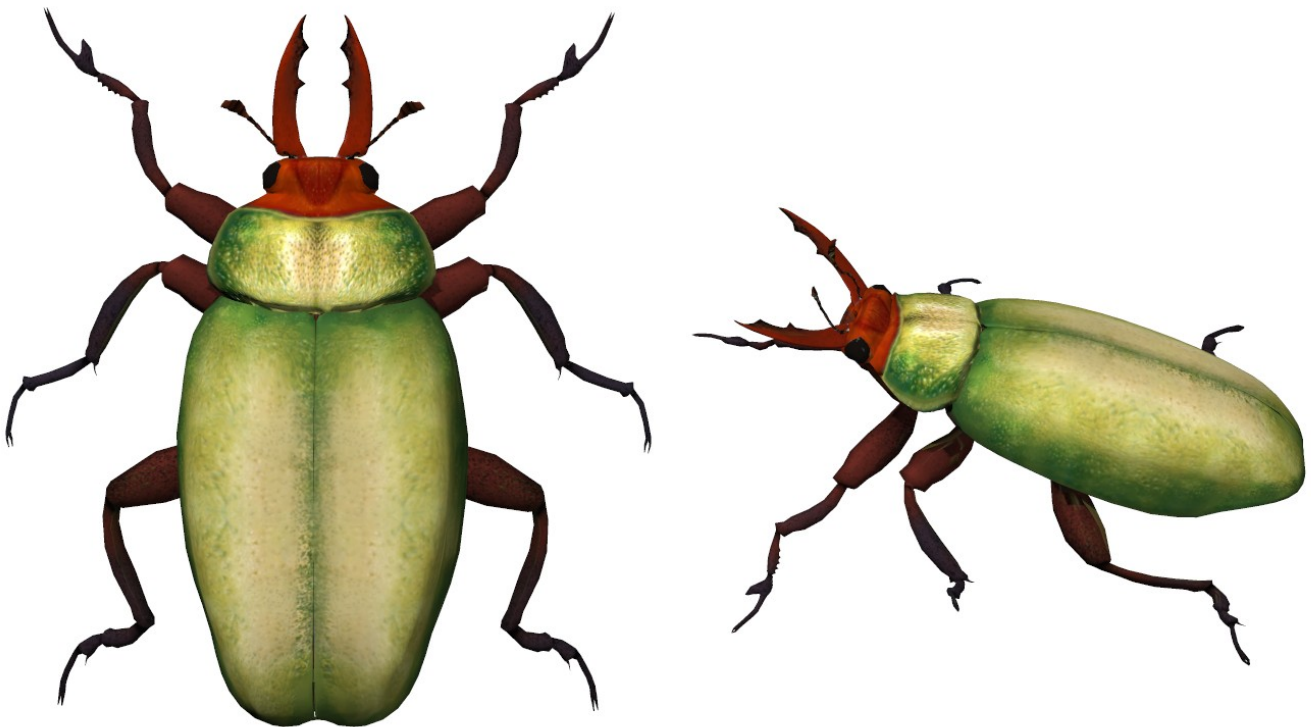
These June beetles act as root pests for a number of economically important crops including potatoes, rape, legumes, chestnuts, and turf-grass. As generalist herbivores, they primarily feed upon secondary roots with smaller amounts of anti-herbivore chemicals across many different species. Several chemical and bio-control agents have been developed to control their populations, including their endemic bacteria and entomopathogenic nematodes

Golden Stag Beetle

Lamprima aurata

It is a species of beetle in the family Lucanidae and also referred to as the "Christmas Beetle". It is native to Australia and can be found in Tasmania and south-eastern mainland Australia in dry sclerophyll forests.

Of the five species in the genus Lamprima, only two occur on the Australian mainland: L. aurata, and the closely related L. imberbis, which live in northeastern New South Wales.



This beetle has an oval, shiny body. It measures between 15 and 25 mm in length. It is fairly variable in coloration, so it has been given many names by various authors. The color of the males is typically metallic golden green or yellow with colorful legs, while females may be blue, blue-green or dull brown. Females are smaller than the males, and males have larger mandibles prolonged forwards used for fighting.

The larvae are sapro-xylophagous and will spend two years feeding on rotting logs. Adults are free-flying and will move about on the ground during the day and drink the nectar of flowers, especially eucalypts. Males can be found on rotting logs defending their territory.

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/>)