

*Nature's
Wonders*

Phasmids

OF THE WORLD



9 Species of Walking Stick and Walking Leaf

3D model set by Ken Gilliland

Nature's Wonders

Phasmids

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Introduction

Phasmids (*Phasmatodea*) are a type of insects whose members are variously known as stick insects, stick-bugs, walking sticks, stick animals, or bug sticks. They are found on all continents except Antarctica. The greatest diversity is found in Southeast Asia and South America, followed by Australia, Central America, and the southern United States. They are herbivorous, with many species living unobtrusively in the tree canopy. Most phasmids are known for effectively replicating the forms of sticks and leaves, and the bodies of some species as camouflage.

They can vary greatly in size, with females typically growing larger than males of the same species. The smallest species is *Timema cristinae* which reaches about 3/4 of an inch (2 cm) long. The largest known as *Phryganistria "chinensis"*, is up to 25 inches (64 cm) in total length. Some phasmids have cylindrical stick-like shapes, while others have flattened, leaf-like shapes. Many species are wingless, or have reduced wings. Stick insects are often kept in captivity: almost 300 species have been reared in laboratories or as pets.

The Nature's Wonders Phasmids set comes with 9 different species on Phasmid ranging from the traditional walking stick form to the giant Malaysian walking stick to the walking leaf types. 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 lizard 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:**
 - **Natures Wonders Phasmid Base** - This model is used with all Phasmids included in this set. .

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/Phasmids 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
 - ... **Based Models:** This folder has the blank, untextured model(s) used in this set. These models are primarily for users who wish to experiment with poses or customize their own species. When using physical renderers such as Iray and Superfly, SubD should be turned to at least "3". For DAZ Studios 3Delight renders, the SubD must be turned from the "High Resolution" setting to the "Base" setting (otherwise some areas will render incorrectly transparent).

Creating a Specific Phasmid using Poser

1. For this example, we'll create the Common stick insect.
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 Phasmids of the World folder and select the Firefly or Superfly sub-folder.
4. Select the Common stick insect (or a Phasmid of your choice) and load it by clicking the mouse.

Creating a Specific Phasmids using DAZ Studio

1. For this example, we'll create the Common stick insect.
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 Phasmids of the World folder and select the Iray or 3Delight sub-folder.
4. Select the Common stick insect (or a Phasmid of your choice) and load it by clicking the mouse.

Using the Poses

Poses have been divided into two types; Leaf and Stick. "Leaf" refers to Walking Leaf type insects while "Stick" (as expected) refers to the Walking Stick form of the insect.

The poses were designed for the default model. 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).

Also because this model supports various types of Phasmids, some Joint

Parameter limits may seem inappropriate for certain types of Phasmids. The limits were created with the “stick” type of insect in mind. The “leaf” or “Winged” forms of this insect may require some pose adjustments and the use of some common sense.

In general, the extreme side-to-side and up-down bending of the thorax and abdomen may cause some distortion in the leaf and winged forms of this insect. Legs bending up might intersect with leaf shaped torso as well. Reducing the bending in these areas will usually correct the problem.

I won't pretend that posing the wings on the **True Leaf Insect** (other than in flight) is going to be easy. That's one reason that the Leaf Winged Climb pose was added to the set. It uses a combination of the normal xyz wing dials with the special morph dials included in the Wings (when Active) section of Action Controls.

To Fly or Not Fly...

The **Black Beauty Stick Insect** does have wings, but they are useless for flight. This species has evolved so much that the wings have shrunk over the centuries and no longer support the body weight of the insect. They are now totally decorative. In addition, they pretty much remain in their stationary default position, regardless of what pose is used.

In the case of the **True Leaf Insect**, only the male can fly (even though the female appears to have usable wings. Also note that this species evolved with only a hind set of wings.

About Stick Insects

The Phasmatodea are an order of insects whose members are variously known as stick insects, stick-bugs, walking sticks or leaves, stick animals, or bug sticks. They can be generally referred to as phasmids, or ghost insects, with phasmids from the family Phylliidae. The group's name is derived from the Ancient Greek φάσμα *phasma*, meaning an apparition or phantom, referring to their resemblance to vegetation it frequents. Their natural camouflage makes them difficult for predators to detect; still, many species have one of several secondary lines of defense in the form of startle displays, spines or toxic secretions. A few species, such as *Carausius morosus*, are even able to change their pigmentation to match their surroundings.

Phasmids are found on all continents (except Antarctica), with the majority being found in the tropical and subtropical environments. They are herbivorous, with many species being found in the tree canopy.

They have an incomplete metamorphosis life cycle with three stages: egg, nymph and adult. Many phasmids do not require fertilized eggs for offspring to be produced. In hotter climates, they may breed all year round; in more temperate regions, the females lay eggs in the autumn before dying, and the new generation hatches in the spring.

Most species are wingless, or have reduced wings. The thorax is long in the winged species, since it houses the flight muscles, and is typically much shorter in the wingless forms. Where present, the first pair of wings is narrow and hardened, while the hind wings are broad, with straight veins along their length and multiple cross-veins. Their wing venation is unique among insects.

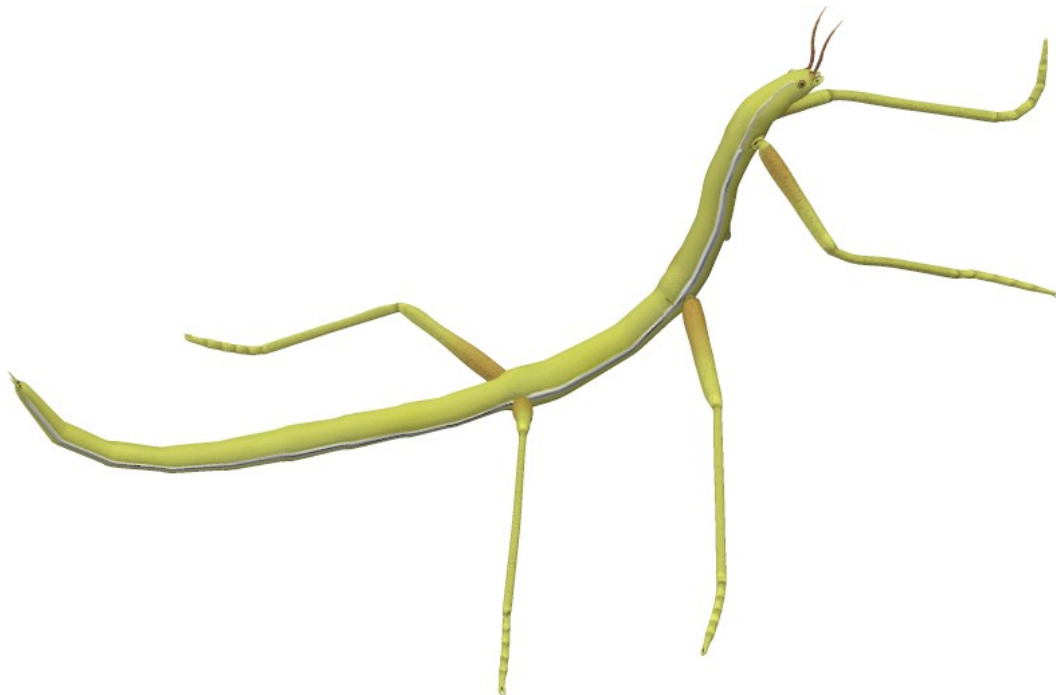
Some stick insects are listed as the world's longest insects. Stick insects, like praying mantises, show rocking behavior in which the insect makes rhythmic, repetitive, side-to-side movements. The common interpretation of this behavior's function is it enhances crypsis by mimicking vegetation moving in the wind. Research has been conducted to analyze the stick insect method of walking and apply this to the engineering of six-legged walking robots. Instead of one centralized control system, it seems each leg of a phasmid operates independently.

Stick insects are often kept in captivity with almost 300 species have been reared in laboratories or as pets. They have been kept as pets since the time of the Han dynasty. In some Asian cultures, it is believed they bring good luck and fortune.

French Stick Insect

Clonopsis gallica

This phasmid is present in various areas along the Atlantic coastline of North Africa and of continental Europe: in France, Corsica included; in Italy, including Sicily, Sardinia and many lesser islands; in Portugal, including the Açores and Madeira and in Spain, including Mallorca and Tenerife. It has been reported also in Croatia and in Greece. It prefers warm environments where it is most active in the night hours.



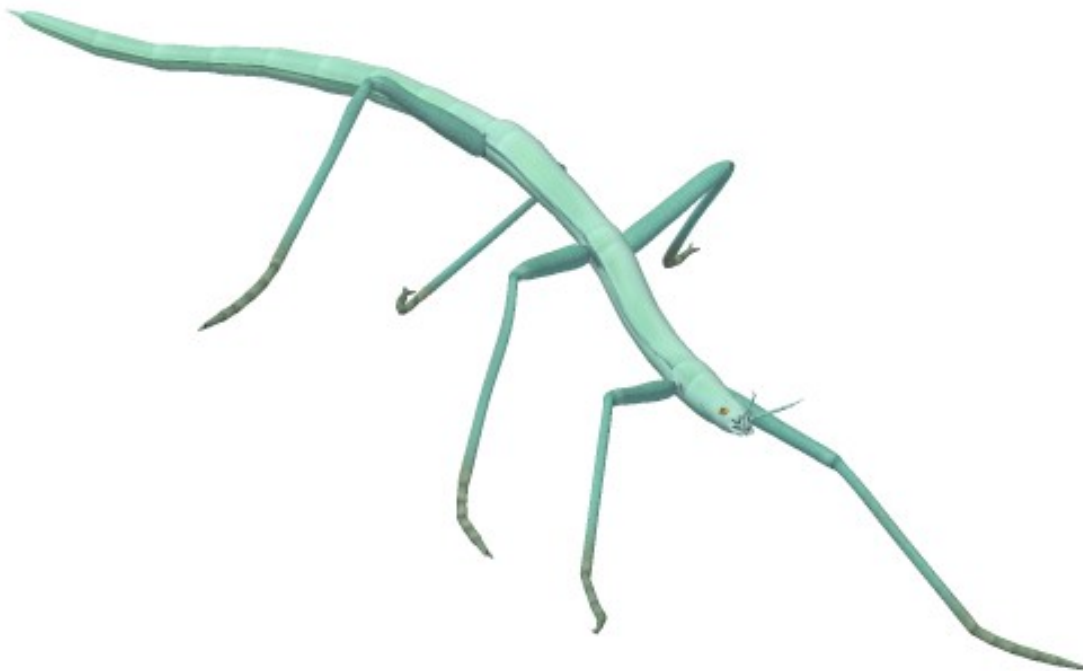
The adult females have a body long up to 9 cm of pale brown or greenish color with a whitish, or pink, line along the sides. Males are smaller, about 6 cm in length.

Its host plants are Rosaceae, Rubus and Prunus. It is less frequently found on Anacardiaceae and on Fabaceae

Spanish Walking Stick

Pijnackeria hispanica

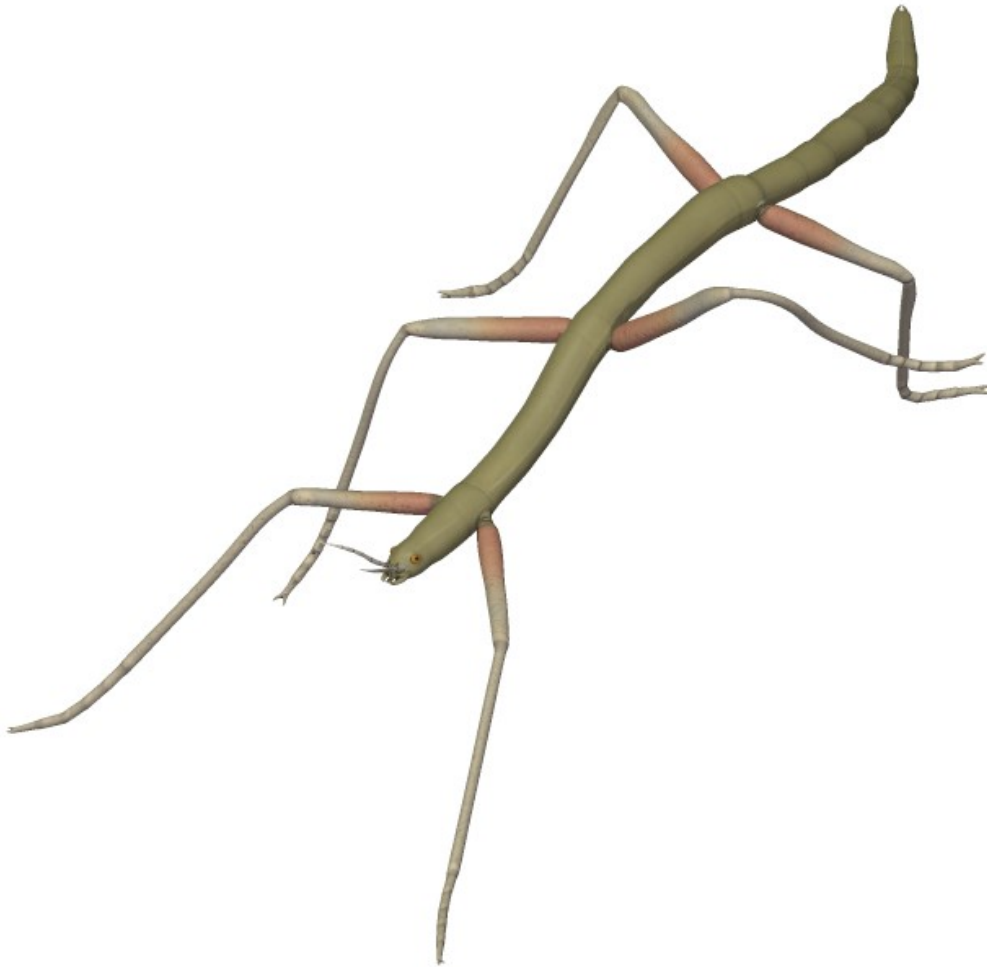
This phasmid is found in Spain and France. This species' color can be turquoise, brown, or green. It usually feeds on rose leaves. This phasmid is slender with short antennae and yellow or brown eyes with a black horizontal stripe or pseudopupil. The adult females have a body long up to 5 cm; males up to 4 cm.



Common Stick Insect

Carausius morosus

This phasmid is found in India. It is also called the 'Indian' or 'laboratory' stick insect. It is the most common form of phasmid kept as a pet. Like the majority of the Phasmatodea, it is nocturnal and females that can reproduce without mating. They live and feed on bramble, ivy, lettuce, privet, rowan, and spiderwort. This species can change its pigmentation to match its surroundings. Females are 9-10 cm in length; males are 8-9 cm.

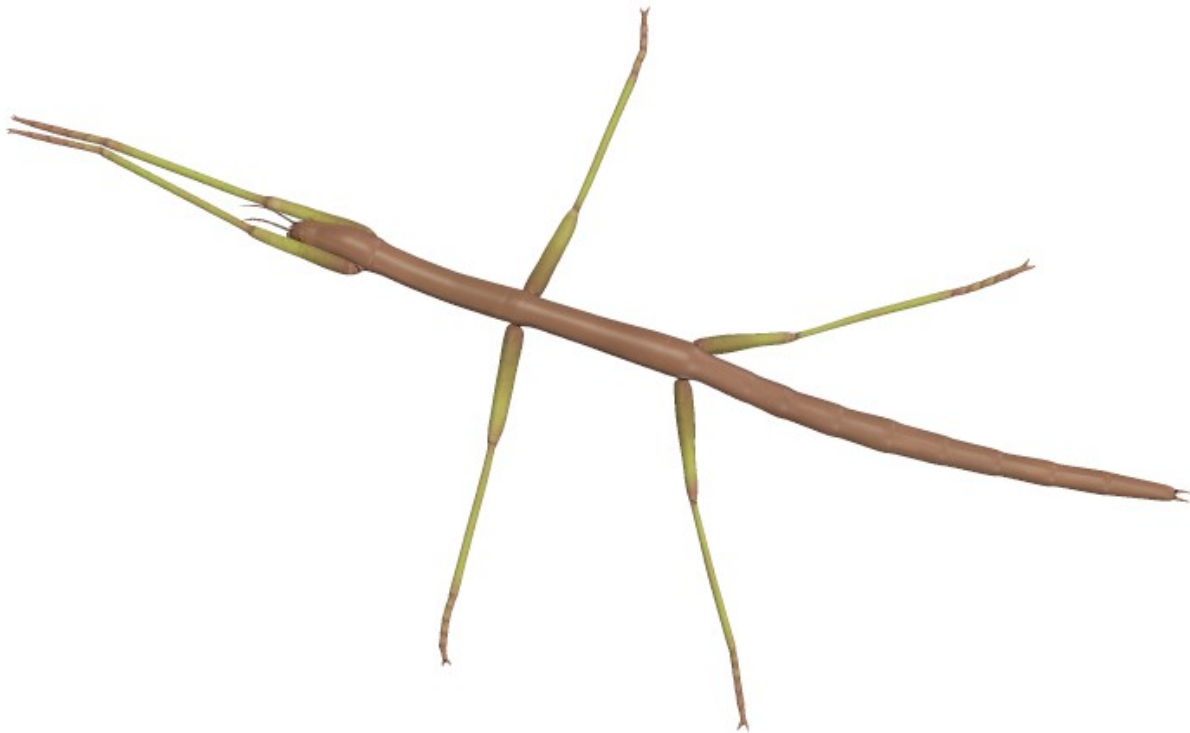


If disturbed, they will play dead by holding their legs along the line of their bodies and becoming stiff. Also, if the wind passes by, they sway like leaves to confuse predators.

Northern Walking Stick

Diaperomera femorata

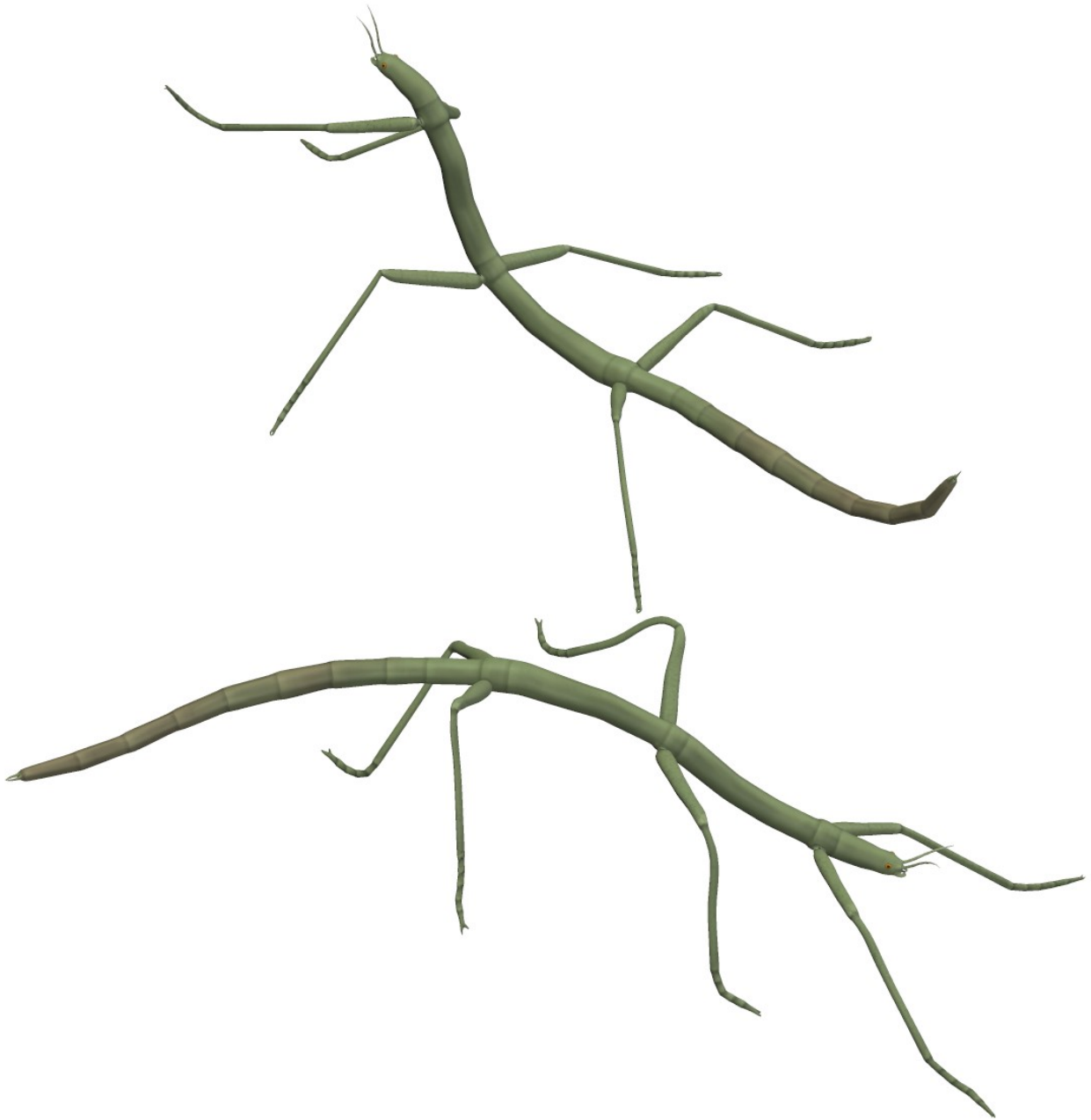
This phasmid is found across North America in deciduous forests. Its range extends from the Atlantic coast from Maine to Florida, as far west as California and northwards to North Dakota. It also occurs in Canada (where it is the only stick insect) being present in Alberta, Manitoba, Ontario and Québec. Even though the common walking-stick is a generalist it does tend to prefer foliage from oak and hazelnut trees. The average length of this species is 7.5cm (3 in) for males and 9.5cm (3.7 in) for females.



Giant Malayan Stick Insect

Phobaeticus serratipes

This phasmid is found in Peninsular Malaysia, Singapore and Sumatra. It is the second longest known phasmid in the world. Females can measure up to 55.5cm (21.7 inches). It was discovered by Gray in 1835.



Its host plants are Bramble (Rubus spp.), Oak (Quercus robur) and Raspberry (Rubus idaeus). It is a popular species among the pet trade due to its size..

Black Beauty Stick Insect

Peruphasma schultei

This phasmid is found in the Cordillera del Condor region of northern Peru. It known as the black beauty stick insect and the golden-eyed stick insect . In the wild the insect feeds on Schinus plants, but will feed on privet, Aucuba japonica and honeysuckle in captivity. In Peru they are only known to exist in a region of less than 5 hectares, usually on volcanoes or mountains, but since their discovery they have become increasingly popular as pets worldwide due to their unusual colouration and they are now bred regularly in captivity.



It is a large and compact species, females can reach 5.5 cm and are larger than males, which measure 3.8 to 4.3 cm. They have a black body, yellow eyes and red/brownish mouth parts, with adults having bright red vestigial wings. When disturbed, adults of this species are able to spray a defensive liquid from glands at the rear of the head which can be irritating to the skin and eyes.

This insect is listed on the IUCN Red List as critically endangered and was last updated in May 2018. Since then, their population has been actively decreasing. While no direct conservation efforts have been made for the species themselves, they are known to inhabit at least three known protected areas that were created for the preservation of the endangered Marañon Poison Dart Frog. It is threatened due to the result of human activities such as habitat loss due to converting land for agriculture and livestock farming. There are also natural threats from wildfires.

Lord Howe Island Stick Insect *Dryococelus australis*

This phasmid is found on Lord Howe Island in Australia. It is also known as a "Tree Lobster"

It can measure up to 20cm (8 inches) in length and weigh 25 grams (1 oz), with males 25% smaller than females. They are oblong in shape and have sturdy legs. Males have thicker thighs than females.

It may be the rarest insect in the world and is possibly also the rarest invertebrate. The stick insects were once very common on Lord Howe Island, where they were used as bait in fishing. They were believed to have become extinct soon after the supply ship SS Makambo ran aground on the island in 1918, allowing black rats to become established. After 1920, no stick insects could be found. However, in 1964, a team of climbers visiting Ball's Pyramid, a rocky sea stack 23km (14 mi) south-east of Lord Howe Island, discovered a dead Lord Howe Island stick insect. During subsequent years, climbers found a few more fresh carcasses, but expeditions to find live specimens were unsuccessful.



In 2001, Australian scientists David Priddel and Nicholas Carlile hypothesized that there was sufficient vegetation on the islet to support a population of the insects, and, with two assistants, travelled there to investigate further. They scaled 120 m of grassy, low-angled slope, but found only crickets. On their descent, the team discovered large insect droppings under a single *Melaleuca* shrub growing in a crevice approximately 100 m above the shoreline. They deduced that they would need to return after dark, when the insects are active, to have the best chance of finding living specimens. Carlile returned with local ranger Dean Hiscox and, with a camera and flashlights, scrambled back up the slopes. They discovered a small population of 24 insects living beneath the *Melaleuca* shrub amongst a substantial build-up of plant debris.

In 2003, a research team from New South Wales National Parks and Wildlife Service returned to Ball's Pyramid and collected two breeding pairs, one destined for a private breeder in Sydney and the other sent to the Melbourne Zoo. After initial difficulties, the insects were successfully bred in captivity in Melbourne. The ultimate goal was to produce a large population for reintroduction to Lord Howe Island, providing that a project to eradicate the invasive rats was successful. In 2006, the captive population of insects numbered about 50 individuals, with thousands of eggs still to hatch. In 2008, when Jane Goodall visited the zoo, the population had grown to 11,376 eggs and 700 individuals, 20 of which were soon after returned to a special habitat on Lord Howe Island. As of April 2012, the Melbourne Zoo had reportedly bred over 9,000 of the insects, including 1,000 adult insects, plus 20,000 eggs. In 2012, the Budapest Zoo was the first zoo in the world to reproduce it.

In 2014, an unauthorized climbing team sighted live stick insects near the summit of Ball's Pyramid, in a thicket of sedge plants rooted in very thin soils at an altitude of 500m, suggesting that the insect's range on the island is more widespread than previously thought, and that its food preferences are not limited to *Melaleuca howeana*.

By the beginning of 2016, Melbourne Zoo had hatched 13,000 eggs, and had also sent eggs to the Bristol Zoo in England, the San Diego Zoo in the United States, and the Toronto Zoo in Canada, to establish distinct insurance populations.

A 2017 study comparing DNA sequences of phasmids originating from Ball's Pyramid with those from museum specimens from Lord Howe Island showed that the Ball's Pyramid sequences differ from those of Lord Howe Island by a degree comparable to variation within the museum specimens, despite some morphological differences between the two groups. This confirms that the two populations represent the same species. The genome was found to be very large in size (over 4 Gb) and is probably hexaploid.

In 2018 it was announced that the CEO of the Lord Howe Island Board had approved a plan to exterminate the black rat population on Lord Howe Island to

protect the island ecology and potentially reintroduce *D. australis*. As of 2023 plans are being made to reintroduce the insects to Blackburn Island, a smaller island offshore of Lord Howe Island, to test the potential for reintroduction to the larger island.

True Leaf Insect

Phyllium bilobatum

This phasmid is found in the Philippines and Malaysia. It grows to a length of about 7.4 cm (2.9 inches). Leaf insects are herbivorous, feeding mainly on the leaves of trees and shrubs. The female has a broad body while the body of the male is slender. The single pair of wings lie flat on the insect's back, and only the adult male can fly.



Young nymphs tend to hide in withered leaves, which at this stage they resemble more closely in color than they do green foliage. Both sexes of this species have glands on the prothorax, from which they spray an unpleasant-smelling defensive secretion when disturbed.

Jacobson's Leaf-insect

Phyllium jacobsoni

This phasmid is found in Nongkodjadar (Nongkejajar), East-Java (Jawa Timur). They are typically 6.4–7.5 cm long, while males are 4.3–5.7 cm long. Some female specimens may have a dark brown "eye spot" on their dorsal abdominal side. They prefer bramble (Rubus sp.) to feed on.



Special Thanks to...

....my betatesters Alisa and FlintHawk

Species Accuracy and Reference Materials

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

With the use of one generic model to create dozens of unique Phasmid 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 Phasmids 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>)
- **Phasmatodea** (<https://www.phasmatodea.com/>)
- **Phasmid Study Group** (<https://www.phasmidstudygroup.org>)