

# Care and Husbandry of *Epiperipatus barbadensis*

Velvet Worms, or *Peripatus*, belong to the phylum *Onychophora* and are fascinating panarthropods. They are found throughout tropical and temperate areas of Asia, Africa, Australia, the Americas, and the Caribbean. Their unique appearance, hunting behaviors, and social structure create an appealing challenge for experienced hobbyists. And with the proper environmental conditions and care velvet worms will thrive and become an interesting addition to any menagerie.



An adult *Epiperipatus barbadensis* female

*Epiperipatus barbadensis* is a species with moderately difficult husbandry for the average invertebrate keeper due to its unique care requirements, but in comparison to other *onychophora* they are great beginner velvet worm. For those that have kept poison dart frogs, much of the basic care and the optional advanced terrarium setup is quite similar; they like it warm, humid, and a balanced environment. Velvet worms do great in groups as many species throughout the world thrive in familial units dominated by adult females. Social species share the same hiding places, take care of their young, and share large prey items with any nearby kin after subduing the prey with a jet of goo. The more of these elusive creatures one has the more hunting and social behavior one will witness.

## Trade Name(s)

Known only as *Epiperipatus barbadensis* this velvet worm is the first tropical species to successfully enter the hobby. With the Latin nomenclature of *Onychophora* still remaining relatively unfamiliar the common name 'Barbados Brown Velvet Worm' may be utilized. This could help differentiate between this variety and the periodically available New Zealand species (*Peripatoides spp.*). The two genera have drastically different care requirements regarding temperature and environmental controls.

## Family & Scientific Name

*Peripatidae*; *Epiperipatus barbadensis*

## Range & Origin

Barbados. Like many velvet worms, *Epiperipatus barbadensis* was not imported with any specific locale data. Collected from the island of Barbados, it is not known whether other specific colour/pattern morphs exist elsewhere in the region, or if this species of *Epiperipatus* is the only one present on the island. Until formally identified or provided with specific locale this care sheet will refer to this variety as 'Barbados Brown' and *Epiperipatus barbadensis*. Captive breeding projects with this variety began in 2017.

## Adult Size

Adult female *Epiperipatus barbadensis* typically measure about 7.5-9.0 cm or 3.0-3.5" long when outstretched, with males being slightly smaller. When at rest a velvet worm's soft body can constrict to less than half of their maximum length.

## Sexing

At the moment there are no known visible differences between male and female *Epiperipatus barbadensis*. With similar species in this genus females have equal to, or greater than, the amount of leg pairs as their male counterparts, but this has not yet been determined with *Epiperipatus barbadensis*. While size differences may also occur between sexes the only way to be sure of the sex of an adult is for an isolated female *Epiperipatus barbadensis* to birth live young.

## Breeding

The mechanism in which *Epiperipatus barbadensis* reproduces sexually is not known as the method of insemination differs between species and has yet to be witnessed with the Barbados Brown Velvet Worm. However many species of *Onychophora* need only be fertilized once in their lifetime to produce multiple offspring, sometimes even before sexual maturity; spermatophore can be transferred to a reservoir and the female remains viable for long periods of time.

*Epiperipatus barbadensis* gives birth to live young; the average size being 1.5 cm or just over half an inch long. Females can produce several offspring throughout the year. She will take care of her offspring and the young will stay relatively close to her or another cluster of Velvet Worms.



*Epiperipatus barbadensis* female with 3 young

## Life Span

The captive life span of *Epiperipatus barbadensis* is still unknown, but estimated to be more than 2 years. Other species have been estimated to live around 5 to 6 years, but until *Epiperipatus barbadensis* is actively kept in the hobby data remains limited. As of February 27, 2019, after nearly 2 years in the author's care, several wild-caught adult females continue to thrive.

## Enclosure

Velvet Worms are best kept in naturalistic vivaria with plants and little to no ventilation. This can present its own set of challenges though and should not be attempted until further knowledge and experience with planted terraria is acquired. However *Epiperipatus barbadensis* can be raised in a simplistic container with great success and it is strongly suggested that newly acquired specimens be acclimated in such a set up for several weeks before introduction to a more advanced environment.

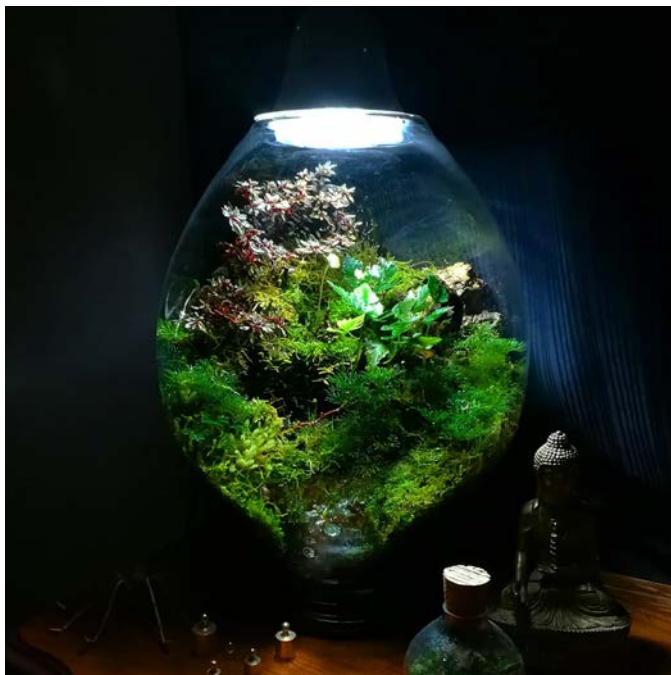
A basic permanent enclosure or quarantine can consist of a small tupperware container. A 17cm x 25cm or 7" x 10" container can host a small colony as long as a small ventilation hole is provided. With the above suggested container size this should be no more than 1cm or 0.6" wide by 7cm or 2.75" long with fine screen or nylon mesh across the opening. Based on how quickly the substrate dries out the size of the ventilation should be adjusted accordingly. Substrate should be 5cm or 2'

deep. With such a small space and the lack of a dynamic planted terrarium this ventilation and substrate will help keep mold at bay and regulate humidity levels. Small springtail species and mites may appear after being introduced by the addition of prey items. The springtails are usually harmless and help keep the environment clean. However explosive populations can harass and stress the Barbados Brown Velvet Worms when too numerous; the periodic substrate changes will keep populations in check. Mites should be removed on spot cleans and are usually found adhering to decaying prey items. Predatory mites may be introduced as well and with low populations are relatively benign; they feed on springtails, other mites, and decaying plant and animal material.

For a more advanced terrarium this can be achieved by using any size of glass vase or terrarium one wishes to maintain. However with increased floor space, the less likely one will be able to keep tabs on the velvet worms; they can be quite elusive at times.

**TIP:** The terrarium should have little to no ventilation and out of any direct sun or near drafty windows; avoiding drastic changes in temperature is crucial for long-term success.

*Epipteripatus barbadensis* hail from humid forest floors, so replicating this habitat is ideal. This can be achieved by creating a proper substrate mix, adding dead hardwood leaves like oak that have been boiled and rinsed, and a piece of cork bark or drift wood. Clumps of sphagnum moss provide humidity retention and easily replaced hiding spots.



An advanced 2 year-old terrarium

In more advanced terraria live plants should be used, and help to keep the environment clean while regulating humidity levels. Temperate mosses should not be utilized as they tend to introduce unwanted guests such as snails, while slowly rotting away in the long-term due to improper environmental conditions. Tropical mosses, liverworts, ferns, and micro violets work quite well in a Velvet Worm enclosure. Inspiration and care advice can be acquired from the poison dart frog hobby; this resource is a wealth of knowledge and experience for plant requirements and terrarium needs.

One should focus on shade to medium light plants that do well in low ventilation environments. Epiphytic plants work well when attached to logs and bark. Bromeliads should be avoided due to their high light requirements and their capacity to retain

water; *Peripatus* can get trapped in aquatic areas and drown. Other flora to avoid are carnivorous plants such as sundews, butterworts, and pitcher plants as the digestive enzymes they produce will harm Velvet Worms. Tropical terrestrial bladderworts however can be utilized as they passively feed off microbes in the soil. There are a large variety of plants available and helping them grow can be just as rewarding as providing for a thriving colony of *Epipteripatus barbadensis*.

When setting up a planted enclosure one should not introduce any velvet worms until it has been established for several months; some recent imports of plants may have been treated with toxic insecticides. Most of these toxic chemicals degrade and become ineffective 3 months after being exposure to oxygen and ultraviolet light. Many plants can be sourced from chemical free suppliers

and hobbyists. However all plants should be rinsed before use and kept in quarantine for a few months before introducing them to an established terrarium. Fertilizers are not needed as the micronutrients required by the plants are obtained through Velvet Worm and micro fauna excitement and waste. Small springtail species and mites are more likely to appear in this kind of enclosure after being introduced by plants or prey items; it is inevitable with a planted terrarium. They are usually harmless and help keep the environment clean. Explosive populations can harass and stress the Barbados Brown Velvet Worms, but in an established, properly maintained terrarium they will remain preoccupied with consuming mold, leaf litter, and waste; their numbers should remain in control while keeping the terrarium balanced. However the introduction of tropical pink springtails is highly undesirable, as these have an affinity for protein sources, harassing Velvet Worms by consuming skin tissue. They are visibly different than other more common hitchhiking species and move in a more erratic motion.

**TIP:** Education is key. Video platforms, groups, and forums will help establish a knowledge base and provide answers to imbalance issues and micro fauna identification.

### Substrate

In all Velvet Worm set ups a balanced and well-draining substrate is required. This can be identical to the Atlantic Botanical Garden mix, or contain a mixture of the following: small-grained orchid/Douglas Fir bark, peat moss to suppress mold growth, a handful of rinsed coconut fiber (rinsing removes retained salt content), milled sphagnum moss, and small chunks of activated carbon/charcoal. Tree fern fiber and finely crushed pieces of lava rock may be utilized if readily available. Avoid sand or any kind of commercially available soil as this will lead to the substrate being compacted over time.

Custom substrate should be  $\frac{1}{4}$  peat moss,  $\frac{1}{4}$  sphagnum,  $\frac{1}{8}$  orchid bark,  $\frac{1}{8}$  charcoal, and  $\frac{1}{8}$  coconut fiber, as well as  $\frac{1}{8}$  tree fern fiber and crushed lava rock if available. It must retain adequate moisture, yet not become water logged.

**TIP:** A simplified mix of peat moss, rinsed coconut fiber, and orchid bark may be utilized for substrate. However it requires more frequent changes and is unsuitable for a long-term terrarium.

This substrate should be prepared weeks in advance prior to being used. It should be moistened with distilled water, but not soaked. If one is utilizing a leaf litter, layer the surface of the substrate with dead hardwood leaves after they have been boiled and rinsed. Prepared substrate (with any leaves) should be kept in a sealed container in a dark, warm area, and opened every few days to ventilate. This allows for the establishment of a healthy soil environment and allows any fungal blooms to run their course. Initially adding a sprinkling of one or two crushed fish food flakes will mimic the introduction of waste from the Velvet Worms, establishing beneficial soil microbes at a faster rate. Mold will occur with this technique, but is part of the natural process; soil microbes, and substrate chemistry should bring it



Velvet Worms on mixed substrate

under control in time. Substrate with visible mold should not be utilized in any enclosure until the mold subsists.

**TIP:** A container of established soil should be kept on hand in case of scheduled or an emergency clean.

With naturalistic vivaria, substrate and drainage layers are required. This typically consists of a 5cm or 2" base layer of fired clay balls or small stones for drainage, followed by a substrate barrier such as fiberglass screen. Sand, finely crushed carbon/charcoal, or crushed lava rock can then be utilized as a secondary, fine-grade drainage layer. A second barrier of fiberglass screen may be used before adding the final layer of substrate. The substrate mix is then added in a 5cm or 2" layer. It should be patted down lightly, but not compressed. Leaf litter can then be placed on exposed substrate if desired.

**TIP:** Water or moisture should be present in the drainage layer of the terrarium; the water level should never go above this bottom layer. Depending on the humidity requirements of the substrate and enclosure the frequency and duration of misting should be altered accordingly; substrate should be moist and not wet.

## Temperature

Compared to other species *Epipteripatus barbadensis* have a relatively forgiving nature when it comes to temperature. The ideal temperature range is between 22°C and 27°C or 72°F and 80°F. However, the lower and upper extremes of 18°C and 32°C or 65°F and 90°F will be tolerable for short periods of time. A temperature drop in the evenings of a few degrees may be beneficial for this species and stimulate natural behavior.

## Moisture

Velvet Worms do not retain moisture well due to their permeable skin. They require humid environments and live in pockets of moist substrate, moss, and rotting wood. Many species are most active during or after light rainfalls. The ideal humid environment of 80-90% humidity can easily be achieved through periodic misting. Distilled water, or its equivalent, should be used to avoid the addition of any salts, heavy metals, nutrients, or chlorine present in untreated water. Spring, filtered, or bottled water should be avoided as a substantial concentration of minerals may still remain.

Terrariums with little to no ventilation do not need to be misted everyday as the humidity remains relatively stable. Inversely, enclosures with increased ventilation will require more misting. Lightly misting in the early morning or late evening simulates natural condensation cycles; if misted in the evening velvet worms are more likely to venture out from their hiding spots at night.

If an enclosure is too wet one should decrease the frequency of the misting; excessive water may lead to harmful bacterial blooms. The substrate is a great indicator of the moisture requirements in any terrarium; it must remain moist, but not wet to the touch.

**TIP:** If the soil is saturated one should remove the enclosure lid for up to two hours per day over the period of a week. Ensure the Velvet Worms have a moist retreat under moss or terrarium hardscape with this technique. If the substrate does not reach an acceptable level of moisture, or molds excessively, it must be replaced.

A water dish is not required; hydration is achieved through moisture from the environment and regular misting. A water feature is also not recommended in planted terrariums; if trapped in shallow

water velvet worms can drown. High levels of phosphates and nitrates/nitrites, nutrients that are produced through natural biological cycles, are also capable of burning their sensitive skin.

## Behavior

*Epiperipatus barbadensis* are a nocturnal species that is most active when stimulated by light rainfalls or foggy conditions. In the terrarium this occurs after a light mist in the evening. They are sensitive to light and will retreat if disturbed by bright lighting.

When at rest one will find them squeezed into tight spaces, under pieces of moss or wood, and usually clustered in small social groups. They cannot dig their own burrows, but will find small hollows within the substrate. As the substrate shifts with age, or the subtle flexing of the Velvet Worm's bodies increases the size of the cracks, an extensive network of cavities may be created; if an individual has disappeared it is likely sequestered in such an area. During the day and evening *Epiperipatus barbadensis* can commonly be observed against the glass in a dark corner while below the substrate surface.

*Epiperipatus barbadensis* grow by shedding their skin much like a snake. The days preceding this process may create an alarming appearance; they become less active and a white reflective layer with a soft texture will cover their skin. This should not be mistaken for a fungal infection. The Velvet Worm will become reclusive during this process, but when shedding, may do so in the open. They will hang onto a plant or piece of wood and slowly sluff off the skin; this will take several hours. The shed skin will resemble a tan or white ball of soft viscous fluid and should not be confused for either mold or an open wound. Once finished they will retreat for several days to recoup. Disturbing them in this process may result in an interrupted molt, excessive stress, and potential death.

Stressed, sick, or dying Velvet Worms will slowly become more lethargic and have patches of discoloured skin that appears wet to the touch. Portions of their body will become less responsive: antenna may not fully extend or appear glued together, various legs will stop reacting, and portions of their body will become sunken and immobile. One should isolate these individuals in a sterile container with moistened paper towel (use distilled water), and keep them in a warm, dark space. Many ailments are deadly for *Epiperipatus barbadensis*, but quick action may result in a full recovery. If all the individuals in a colony simultaneously react in a similar way this may be due to excessive bacteria build-up, non-visible fungal blooms, or imbalanced soil chemistry. Substrate should be changed immediately.

**TIP:** Lighter patches of dry looking skin are normal and reflect where pieces of skin have healed. Newborns and freshly molted individuals may appear glossy or wet to the touch for a limited period. A flake-like or characteristically hard-looking, glossy film with white blotches and edges may periodically appear on their skin, especially after hunting or being startled. This is usually the slime used to subdue their prey. It will degrade over time, be consumed by the Velvet Worm within hours, or be removed in a shed.

## Diet

*Epiperipatus barbadensis* are quite ravenous. When they smell or feel the vibrations of a prey item they will subdue it with a sticky slime they squirt from their oral papillae, effectively gluing it to the ground. This may be during a hunt as they wander, or when they peek out and subdue prey from their hiding place. Once captured the Velvet Worm will approach and ingest soft tissues through any accessible point of entry, usually while the prey item is still alive.

They are not picky eaters and varied diet of invertebrates can be supplied. However a regular staple of crickets will be suitable. *Epiperipatus barbadensis* will consume 1 cricket per individual every two weeks, with increased feeding increments during warmer periods. A 5 week-old or 'large' cricket

should be supplied to an adult, while 3 to 4 week-old crickets are best suited for juveniles and sub-adults. Infant velvet worms will feed on items their older counterparts have subdued, but are capable of hunting smaller prey if required. Other prey items include house spiders, harvestman (opiliones), flightless houseflies, small cockroaches, and isopods. These should be captive bred to avoid residual pesticides or parasites. A great secondary prey of choice is powdery blue isopods (*Porcellionoides pruinosus*); their soft exoskeletons allow for a more complete consumption of the body and they are easy to culture. If not consumed within the night they will act as temporary enclosure custodians, eating any available mold and waste. These can be used as small meals between the larger periodic feedings.

Velvet Worms expend a high amount of energy gluing their prey to the ground. They will consume the slime with their meal to retain energy. However if the prey item is too small more energy is expended than received. Pre-killing an item can be useful to reduce energy expenditure as Velvet Worms will readily accept freshly killed items. This is also useful to help track and view individuals in heavily planted terrariums, prevent injuries, and allow for easier clean-up of remaining exoskeletons to prevent mold.

**TIP:** One can provide small pieces of carrot or fish food for any prey items. This will help gut-load the prey should they survive the night, while preventing them from attacking a Velvet Worm for food. Remove any fish food or carrot once the prey is consumed to prevent mold.

Once fed velvet worms will retreat to various hiding spots while they digest their meal. This digestion process can take up to 18 hours. They may remain inactive for several days until they venture out for another meal or to find a mate.

### Cleaning

Spot cleaning should be done every day. This involves checking for decaying prey items and fungal growth. Any sources of mold should be removed immediately. If patches of mold keep growing in an established planted terrarium the substrate underneath should be removed and replaced. New pieces of wood may mold. One should remove these and keep them in a separate humid container until the mold runs its course and disappears.



*Epipeiripatus barbadensis* in temporary container for cleaning

Substrate in a simplistic or temporary container should be replaced every 2 to 3 months. If it becomes over-saturated with water, or mold cannot be controlled through spot cleans, it should be replaced immediately. Replacing substrate too often can be just as stressful for Velvet Worms as having imbalanced soil conditions; replenishing substrate should only be performed when required.

When cleaning the enclosure the Velvet Worms should be gently transferred to a small container containing a piece of clean paper towel that has been moistened with distilled water. They cannot climb plastic or glass, but a container with a depth greater than 15cm or 6" should be utilized with a secure lid to reduce water loss and potential escapes.

If *Epipeiripatus barbadensis* are housed in a naturalistic vivarium, very little cleaning is required. As long as the substrate does not become water logged or excessive patches of mold appear little care is required. Once every 3-5 years the substrate can be replaced. Smell is a great indicator of terrarium health. If it smells of vegetation and soil the terrarium is healthy. If it smells like rotting eggs or excessive decay an oxygen-free, anaerobic environment may have formed in the substrate or drainage layer. The problem must be addressed immediately. This may involve removing excess water from the drainage layer or restarting the planted terrarium from scratch.

Over time water marks can form on the glass due to condensation and nutrient migration through capillary action of the soil. This may cause the growth of green algae. One should use paper towel and distilled water (or its equivalent) to wipe-down the glass. Tap water should be avoided as this will produce mineral stains or potential glass etching. More extensive cleaning methods with vinegar water or lemon water are not recommended as they may harm the inhabitants of the terrarium.

### Handling

Velvet Worms best respond to being left to their own devices. However should handling be required one should wash hands extensively with soap containing no lotions or scents. This removes any natural oils that may be harmful to the sensitive, permeable skin of the *Epipeiripatus barbadensis*. Handling them with moistened paper towel (use distilled water), or unpowdered nitrile gloves, is preferable to bare skin. The Velvet Worm should be gently encouraged to walk onto the surface or substrate can be scooped from underneath to lift them out of the enclosure. If startled, they may slime any other surface they deem as a threat. This may result in the Velvet Worms adhering to skin, substrate, plants, or hardscape. Usually they will be able to gently remove themselves on their own. This will take time, but any aid may result in the Velvet Worm tearing their skin. One should not pull or pry them off the surface and spraying with water may result in the slime hardening more. If possible, one should place them back into their enclosure or place the surface they are adhered to into a closed container with moistened paper towel.



*Epipeiripatus barbadensis* young on a large piece of cocofiber

### Conclusion

*Epipeiripatus barbadensis* are an interesting and beautiful addition to any terrarium or collection. Although they may present a slight challenge, with education and diligence they will thrive in the care of an enthusiastic hobbyist. With no doubt their unique husbandry will help elevate the skills and enjoyment of any invertebrate enthusiast.