

# Chameleons

By Catherine Love, DVM

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## Natural History

Chameleons are a group of distinctive old world lizards known for their color changing abilities and unique appearances. There are at least 200 recognized species of chameleons, all with varying characteristics and habitats. This guide will cover three of the most commonly kept chameleon species; the panther, Jackson's, and veiled chameleon. Chameleons are arboreal animals that have feet adapted to grabbing and climbing rather than walking along the ground, along with prehensile tails that securely grip branches.

Panther chameleons (*Furcifer pardalis*) are native to the lowlands and tropical forests of Madagascar. There are different locales of panthers that have different color variations, but they are all considered the same species. The first wild caught panther chameleons brought into captivity had very poor survivability, but captive breeding efforts and better husbandry have helped this species fare better in captivity. Jackson's chameleons (*Trioceros jacksonii*) are native to Tanzania and Kenya and are invasive in parts of California, Hawaii, and Florida. They are sometimes referred to as three-horned chameleons. These chameleons are found in woodlands at elevations of ~5000-8000 feet. Veiled chameleons (*Chamaeleo calyptratus*), also known as Yemen chameleons, are native to the coastal mountain slopes and high deserts of Yemen and Saudi Arabia. Invasive populations have also been established in Hawaii and Florida. Veiled chameleons are fairly popular in the pet trade, but unfortunately often end up relinquished or improperly cared for due to their more difficult care requirements.

## Characteristics and Behavior

Chameleons are known for their color changing abilities, but they are not actually able to change color instantaneously to match their surroundings. Rather, chameleons change color to communicate information about health, sexual receptivity, and territoriality. Color change may also be involved in heat and light regulation. A chameleon's eyes are able to pivot and look in two completely different directions at the same time. Additionally, chameleons have sticky tongues that can extend rapidly to greater than their body length, allowing them to catch prey at a distance. Chameleons are truly extraordinary animals that have fascinated keepers worldwide. However, they are delicate, complex, and sometimes aggressive animals that are difficult to keep properly. In fact, chameleons don't tend to tolerate handling well and are generally considered a hands-off pet. Chameleons are very difficult to care for properly and should be considered an advanced species. Panthers tend to be a little more hardy, but

are still very difficult to care for. Jackson's are considered more difficult to keep than panthers or veileds.

## Lifespan

Unfortunately, many pet chameleons do not receive proper care and only live 2-3 years, whereas their lifespan should be closer to 5-7 years on average. Males tend to live longer than females.

## Adult Size

Panthers: 12-18 inches. Jackson's: 9-15 inches. Veiled: 18-24 inches. Males tend to be larger than females.

## Housing

Chameleons should always be housed alone, out of sight of other chameleons. They can become incredibly stressed by the sight of another chameleon, including their own reflection, so glass or other reflective surfaces should also be avoided. Chameleons do best in screen enclosures that are a minimum of 24"x24"x48" (LxWxH) but bigger is always better. Young chameleons, up to 6 months, can be kept in cages that are 16"x16"x20" but will need an upgrade as they are fairly active lizards. Branches, vines, logs, and twigs of varying sizes can all be used to create climbing structures for your chameleon. Plants (live or fake) provide excellent opportunities for cover that will help your chameleon feel more secure. There should be at least two hiding spots; one on the warm end of the enclosure, and one on the cool end, so the chameleon doesn't need to choose between thermoregulation and security. Avoid ropes as they can become frayed and wrap around your chameleon's toes. Reptiles can become stressed if they feel too exposed, so it is important to provide ample cover to make your chameleon feel more secure. Paper towels can be placed at the bottom of the enclosure, but otherwise substrate is not needed since chameleons spend their time off the ground.

## Lighting

Like all lizards, chameleons require UVB light to synthesize vitamin D3 in their skin. Vitamin D3 is needed for proper metabolism of calcium and prevention of metabolic bone disease. The Arcadia T5 12% Desert or Arcadia T5 6% Forest are both acceptable choices, depending on where you set up your chameleon's basking spot. Arcadia provides a guide as to where to place your UVB fixture in relation to your chameleon's basking spot. UVB fixtures should be roughly as long as  $\frac{1}{2}$ - $\frac{2}{3}$  of your reptile's enclosure length. It is important to note that UVB cannot penetrate glass, so natural sunlight through a window will not be sufficient for a lizard to synthesize vitamin D3. Allowing safe outdoor time is also an excellent source of UVB and visible light.

Chameleons taken outdoors should be kept in an escape-proof and predator-proof, non-glass enclosure. Provide shade and basking spots so your chameleon can regulate their temperature.

Sunlight is made of ultraviolet, near infrared (IR), mid IR, far IR, and visible light. It is our job as keepers to provide full spectrum lighting, which means as close to sunlight as possible. Unfortunately there is not one source for all of these components, so we must provide multiple types of lighting. For visible light, LED or halide bulbs should be provided.

UVB is NOT optional for lizards. Lack of proper UVB can lead to impaired skeletal, muscle, and immune function. Replace UVB bulbs every 6 months, as they can continue to give off light even when not producing UVB. Lights should be turned off at night to maintain normal day/night cycles. For this reason, red or black nightlights should not be used as they can disrupt normal day/night cycles.

Arcadia UVB guide: <https://www.arcadiareptile.com/lighting/guide/>

## Heat

Unlike mammals, reptiles cannot internally regulate their temperature and rely on their environment to heat and cool themselves. Therefore, it is important that we provide captive reptiles with a temperature gradient so they can warm up or cool down as needed. Reptiles have three temperatures to measure: basking spot, warm ambient, and cool ambient. The basking spot is the hottest area in the enclosure where they bask, the warm ambient is the air temperature on the warm side of the enclosure, and the cool ambient is the air temperature on the cool side of the enclosure. Ambient temperatures are best measured with digital thermometers (one on the warm end and one on the cool end), as analog thermometers are often inaccurate. Basking temperatures can be measured with a digital infrared thermometer.

Panther chameleons need a basking spot of 88-95F, a warm ambient of 80-85F, and a cool ambient of 72-75F. Night temperatures can drop to 65F. Veiled chameleons need a basking spot of 88-92F, a warm ambient of 80-85F, and a cool ambient of 72-78F. Night temperatures can drop to the low-mid 60s. Jackson's chameleons need a basking spot of 82-85F, a warm ambient of 75-80F, and a cool ambient of 68-72F. At night temperatures can drop as low as the mid 50s. All light emitting sources should be turned off at night to provide a normal day/night cycle. If needed, a non light emitting source like a ceramic heat emitter, radiant heat panel, or deep heat projector can be used to maintain temperature. Sunlight is made of UV, near IR, mid IR, far IR, and visible light. Flood tungsten-halogen bulbs are the most efficient at producing near IR,

which is the most abundant IR in sunlight, and they also produce significant mid IR and some far IR. Far IR is the least abundant in sunlight, but is most often produced in large amounts by sources like ceramic heat emitters, heat pads, and radiant heat panels. Tungsten-halogen bulbs should be the flood type to ensure a wide enough basking site. These heat producing bulbs can be found as reptile specific bulbs or at hardware stores. Avoid hot rocks as these can easily burn reptiles.

## Humidity

In the wild, chameleons live in high humidity environments that may reach 100% humidity. However, the humidity is not static and will fluctuate, particularly during the day when it can drop below 50%. Given the potential for mold build up and respiratory infections with excessively high humidity, keeping ambient humidity at a moderate level of 40-60% with humidity spikes may be the best method for keeping captive chameleons hydrated. The major difference between captive and wild chameleon habitats is air flow, which is difficult to replicate in captivity. Letting the enclosure “dry out” a little during the day can help prevent the build up of mold and mildew. The most natural times for humidity spikes are morning, evening, and night.

Humidity spikes can be accomplished with heavy misting in the morning and evening. Either hand misters or automatic misters can be used. Additionally, 1-2 hours with an automatic fogger (which is functionally a small humidifier) at night can provide a humidity spike as well as a drinking opportunity. A drainage system or removable collecting pan should be set up to avoid water collection at the bottom of the enclosure. This excess water needs to be removed daily. Humidity levels should be measured with a digital hygrometer.

## Feeding

Varied diets are important for enrichment and to prevent nutrient deficiencies in reptiles. The bulk of a chameleon’s diet should be gutloaded and calcium dusted insects. Insects are naturally deficient in calcium and low in nutritional value. In order to make them nutritious for reptiles, all insects should be gutloaded (fed a highly nutritious meal 24-48 hours before feeding). Repashy BugBurger or Arcadia InsectFuel are good choices for feeding feeder insects. Insects should also be dusted with calcium powder daily for juveniles and at every other feeding for adults. Calcium powders should be calcium carbonate based and should not have any phosphorus. If you are providing adequate UVB, calcium powder does not need to contain D3. Arcadia, Repashy, and ZooMed all have good products. Follow your brand’s recommendations to avoid overdosing. An elevated feed dish is ideal since these animals are arboreal. Chameleons may occasionally snack on plant matter so it is likely not detrimental to offer occasional veggies or flowers, but it also does not appear to offer any benefit.

Acceptable protein sources include: crickets, roaches, hornworms, phoenix worms, silkworms, locusts, and occasional mealworms, waxworms, and superworms. Young chameleons can also be offered flightless fruit flies and pinhead crickets. A multivitamin with vitamin A should be provided weekly. Remove all uneaten food to prevent spoilage, and to prevent feeder insects from snacking on your chameleon.

Hatchlings (<5 months) should be fed twice daily, juveniles (5-12 months) once daily, and adults (>12 months) every other day. Fattier foods (waxworms, mealworms, superworms) should all be fed in moderation. Chameleons will eat approximately 5-15 insects per meal, with juveniles needing more than adults. Insects should be no longer than the space between the chameleon's eyes.

## Water

Chameleons generally don't drink from water bowls but a small bowl of clean water can be provided anyway to provide the option of drinking and soaking. A dripper system should be set up to allow your chameleon to drink. In the wild, chameleons drink droplets of condensation off of foliage so ensure your dripper system is dripping onto plants and branches. This is another reason why regular misting is important. Waterfalls are generally not recommended as they are difficult to keep clean.

## Sexing

Sexual maturity is reached between 6-9 months of age. Adult male panthers tend to be larger and more colorful than females, with a prominent hemipenal bulge. As juveniles, male panthers have a line that runs along their underside to the base of their tail, while females have an indentation behind the vent. Male Jackson's are easily distinguished by their large horns, which make them resemble a triceratops. Male veiled chameleons have a distinctive structure called a "tarsal spur" on the back of the hind leg. Additionally, their casques (the crest on their head) tends to be taller.

## Zoonosis

Like other reptiles, chameleons can carry *Salmonella*. Always wash your hands after handling reptiles or items from their enclosure.

## Health

Husbandry related diseases including nutritional-secondary hyperparathyroidism (metabolic bone disease), stomatitis (mouth rot), respiratory infections, and dysecdysis (difficulty shedding) are common in chameleons. Female chameleons also often experience reproductive issues. Because of their protruding eyes, eye injuries are also

not uncommon. Never forcefully pull a chameleon off its branch, as this can be very stressful and potentially injurious. Healthy chameleons are bright, alert, and free of discharge. They should have a strong grip with their tail and feet. Bending casques or horns are signs of disease. Chameleons should be examined every 6-12 months by your veterinarian.

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