ANIMAL CARE SHEET

Veiled Chameleon

Kingdom:	Animalia
Phylum:	Chordata
Class:	Reptilia
Order:	Squamata
Family:	Chamaeleonidae
Genus:	Chamaeleo Calyptratus

General

Veiled chameleons are one of about 80 species of Old World chameleons, also called true chameleons. They are aggressive and brightly colored. They have a casque, a helmet-like ridge, on top of their heads, which is a tiny swelling as a hatchling, but grows to two inches (5 cm) in height as the animal matures. As hatchlings, they are usually a pastel green, but as they mature they acquire bold bands of bright gold, green, and blue, mixed with yellow, orange, or black, that circle their body. The males are usually more strikingly colored than the females, which are usually shades of green mottled with shades of tan, orange, white, and sometimes yellow.

There is marked sexual dimorphism. Males have a larger body and casque when mature than females. Male body length can reach between 17 and 24 inches (43 to 61 cm) from head to the tip of the tail and they are usually thin in appearance. Females reach between 10 and 14 inches (25 to 35.5 cm) in length. The female's casque is smaller than the males, and they are more heavy-bodied.

A Specialized Lizard

Chameleons are specialized tree-living lizards that catching insect prey. Their bodies are flattened from side to side, and more or less leaf-shaped. They remain still and concealed for long periods of time and wait for their prey to come near. When they move, they do so slowly, and rock their bodies from side to side like a leaf in the wind.

Eyes

They have eyes that can move independently and look in two directions at once, as well as swivel nearly 180 degrees. They are therefore able to look in any direction, and even follow moving objects, without turning their heads or shifting body position. When a prey animal is spotted, both eyes will focus on the insect in order to perceive depth.

Hands and Tail

Chameleons are highly arboreal (tree-living). They have grasping hands that work much like human hands. Three fingers are fused together and face toward the inside. They also have a prehensile tail that they use as a fifth appendage.

Color Changes
Chameleons are famous for their ability to change color. The color change serves only partly for camouflage. Although chameleons at rest tend to assume colors similar to their surroundings, color change is most often used to signify emotional state. Many chameleons are some shade of green or brown at rest, but can become far more brightly colored when frightened, courting, or defending a territory against another chameleon. Veiled chameleons when startled or threatened may darken in color and "play possum."

Interaction with Mates
They are primarily solitary and males are very territorial. Males and females tolerate each other only during breeding.

Habitat

Veiled chameleons are native to Yemen and southern Saudi Arabia, and reside in an amazing variety of different habitats. They can be found in the dry plateaus, mountains, and river valleys. They are arboreal, preferring to live in trees, bushes, or shrubs. They prefer temperatures of 75° to 95°F (24° to 35°C) and can be found in elevations up to 3,000 feet (914 m).

Newly hatched veiled chameleon are small, and should be kept in enclosures small enough for the owner to keep a close watch on the health and activity of the animal. A one to three month old veiled chameleon can be housed in an enclosure the size of a standard 10 gallon aquarium. There is anecdotal evidence to support the idea that veiled chameleons benefit from cross-ventilation in their enclosures. To accomplish this, at least two sides of the enclosure should be made of mesh, or at the very least, have a screen top. Young veiled chameleons can be housed in a 10 gallon aquarium with a screen top, but there are other commercially available choices for veiled chameleon housing that may be better. There are some new commercially manufactured enclosures on the market that have two, three, or all sides made of screen. These enclosures are made specifically with chameleons in mind, and many models feature a vertical format. Veiled chameleons are an arboreal species, and as such, they prefer vertical space to horizontal space. These enclosures can be found in reptile specialty stores, or mail-ordered through companies that advertise in herpetological journals and magazines. Veiled chameleons grow at an astounding rate; a hatchling can be close to adult size in six to eight months. Adult veiled chameleons should be housed in enclosures with minimum dimensions of 3 x 3 x 4 ft (l x w x h), a larger enclosure is always preferable.

Once a suitable enclosure is acquired, it is important to furnish it properly. Veiled chameleons are highly adapted to their arboreal lifestyle, and require climbing and basking branches. The branches should be slightly larger in diameter than the chameleon's grip, so the animal can walk and perch comfortably. For baby chameleons, it is sometimes difficult to find small enough branches, but a trip to a local craft store can solve this problem quickly. Craft stores often sell grapevine wreaths, which can be torn apart to furnish small twigs. Place the branches or twigs inside the enclosure criss-crossing each other to form little "chameleon highways". Do not crowd the cage, but make sure the animal has enough branches for sleeping spots, basking spots, and eating perches. As the chameleon matures, gradually increase the diameter of the branches until the animal has reached its adult size. Branches large enough for adult chameleons can be purchased or collected. Lashing large branches together can be a chore, but there is a two dollar item that can relieve this problem. Cable ties can be used to lash large branches together in a sturdy climbing structure, but make sure to cut off the excess ribbon far enough so that the chameleon cannot scratch itself on the sharp edge. Hardware stores carry cable ties in many different colors and sizes. On the bottom of the cage, use butcher paper or newspaper cut to size. Do not use sand or other loose substrates because chameleons can ingest some should they attempt to consume a stray insect from the floor of the cage. Another important aspect of veiled chameleon housing is plant life.

Unlike many other chameleons, veileds will consume an appreciable amount of vegetable matter in their diet. Adult veiled chameleons consume more vegetable matter that babies or juveniles, but veileds of all ages should have access to vegetation at all times. One of the best, and most visibly appealing ways to provide for this need is to have a live plant in the enclosure. There is some debate about the suitability of ficus plants in veiled chameleon enclosures, because the plants have a milky, irritating sap that may cause eye infections. Many people have used ficus plants in veiled chameleon enclosures with no ill effects, but it may be best to err on the side of caution here. By far the best plant I have found for veiled chameleon enclosures is pothos. Pothos plants are attractive, hard to kill, non-toxic, and tasty to veiled chameleons. Some veiled chameleon enthusiasts have voiced concern over the rather high oxalate content of pothos because this can cause problems with calcium absorption. To deal with this possible problem, also offer the veiled chameleon some

fresh collard or mustard greens, which have a high calcium content. I use "veggie-clips", which are intended for use in aquariums, to clip a section of collard leaf to the side of the cage. I have found that my veiled will eat sections of this leaf rather than the pothos. I have not seen any problems with my animal consuming small amounts of pothos, so including the plant in the enclosure to provide cover is still a good idea. Be careful where the pothos is purchased however, because many nurseries spray their plants with pesticides, which can be harmful to the animal if consumed. Ask the employees about their pesticide use, and obtain a pesticide free plant if possible. Do not include toxic plants in veiled chameleon enclosures, the animal will try to eat them. If the toxicity of a plant is not known, contact someone at a herpetological society for advice. In any event, make sure to wash the leaves off with clean water before putting it in the enclosure. Make sure to also put some branches under the leaves of the plant; this provides hiding areas for the animals, and they will often choose to sleep in these areas.

Do not house more than one veiled chameleon per enclosure. When veiled chameleons are very young (under 3 months), it is possible to house some together without too much undue stress, but attempt to house them separately if possible. Veiled chameleons are extremely asocial creatures and do not tolerate the presence of other species very well. Male veileds are extremely combative and will fight if placed together. Male veileds can be easily identified from birth by the presence of a small, triangular, fleshy appendage that stems from the crux of the rear feet. This appendage is called a tarsal spur, and is a reliable method of sexing veiled chameleons. Housing a male and a female together can be done if the enclosure is very large, say the size of a greenhouse. If the enclosure is small, do not attempt to house even a male and female together. The constant presence of the male will stress the female severely. The only time veiled chameleons should be put together is during the brief time required for copulation, otherwise, keep them separate. The next important factor in veiled chameleon care is heating and lighting.

Heating & Lighting

Veiled chameleons like hot basking spots. It is not uncommon to see veileds basking even when the ambient temperature is 80 to 90 degrees F. It is critically important that the owner provide a heating lamp to create a basking spot of 90-105 degrees F at one end of the enclosure. The ambient air temperature in the rest of the cage should be 70's at nighttime, with a preferred rise to the 80's over the course of the day. Veiled chameleons who are not provided with appropriate basking spots will develop respiratory and/or digestion problems over time. By far the best way to provide the appropriate heating it to use a reflector lamp (also known as clamp or shop lights) and a heat bulb. Reflector lamps can be inexpensively purchased at hardware stores. The wattage of the heat bulb required to create a basking spot of 90-105 degrees F varies with the ambient temperature, but do not "guess" the temperature inside the enclosure. Purchase a good quality reptile thermometer and use it to determine the wattage needed. If for example, you purchase a 75 watt bulb, and it only raises the temperature under the basking spot to 85 degrees F, move up to a 100 watt bulb, which should raise the temperature to 90 or 95 degrees. Different types of bulbs produce different results. The best bulb for creating a really warm basking area is a spot bulb. Spot bulbs have a narrowly focused beam that raises the temperature higher than a different bulb of the same wattage. Any bulb that raises the basking spot temperature to the appropriate level is safe to use. The placement of the basking spot within the cage is rather important.

Reptiles, being ectothermic, do not manufacture their own body heat. In order to raise or lower their body temperature, reptiles rely on behavioral mechanisms. This is to say that when a reptile is too cold, it moves to a warmer area, such as a basking branch in the sun, and when the animal is too hot, it moves to a cooler area, such as a shaded branch. This behavioral mechanism is called thermoregulation. In captivity, we need to provide reptiles with a range of temperatures so that the animals may thermoregulate as they would in the wild. For veiled chameleons, that means one end of the cage should be the preferred ambient temperature, and one end should be at the basking temperature. If the enclosure is large enough, there may also be temperature differences at different heights. If you keep your veiled in a large enclosure, it is best to put the basking site at the highest point of the cage, so that the vertical temperature change mimics what occurs in nature. Once the heating requirements are met, it is time to provide for the lighting requirements. .

There is, as always, quite a controversy regarding correct lighting and chameleons. The current trend is to provide chameleons with full-spectrum fluorescent lighting that emits energy in the UVB wavelengths (290-315 nm). It is thought that when chameleons are irradiated with UVB, they create vitamin D3 under their skin from its precursor 7-dehydrocholesterol. Vitamin D3 is important for calcium absorption, and without appropriate amounts of vitamin D3, there is evidence to support the idea that chameleons will suffer from a calcium deficiency. However, there is a recent study that suggests that chameleons do not manufacture

vitamin D3 by the photochemical process described above. I have seen however, veiled chameleons kept under only plant grow lights develop symptoms of metabolic bone disease within a month. Whether what I saw was due to incorrect lighting, or incorrect dietary supplementation is difficult to say, as the person who had these sad chameleons had provided neither full-spectrum lighting nor calcium or vitamin D3 supplementation. What I can say unequivocally, is that the veiled chameleons I have raised under full-spectrum lighting with UVB, proper supplementation, and proper diet, have never developed symptoms of metabolic bone disease. Although the results of the Henkel and Heninecke study are interesting, one study does not a truth make, and as a result, I would still recommend using full-spectrum lighting with UVB in veiled chameleon enclosures as a precautionary measure. The best way to provide full-spectrum lighting with UVB in a captive situation is to have two fluorescent fixtures running the length of the enclosure. In one fixture, use a bulb that emits UVB, such as the ZooMed UVB 310 bulb. This particular bulb can cost a small herper fortune in a retail pet shop; the average retail price for this bulb is $40.00 each! However, there are ways around this. Mail order pet suppliers found in reptile and aquarist trade publications sell this bulb for almost half of the retail price. In the second fixture, use a full-spectrum fluorescent bulb such as a Vita-lite. Both of these bulbs must be replaced after 6 months, as their ability to emit true full-spectrum light diminishes over time. Although there may be full-spectrum light in the enclosure, it is still a very good idea to allow veiled chameleons access to unfiltered, natural sunlight as often as possible. Before taking a veiled chameleon outside, the ambient air temperature must be over 60 degrees F. Do not take a chameleon outside in a glass aquarium, as these heat up very quickly, even in cold weather, and can overheat the animal. Also be sure to provide a shaded area where the chameleon can cool off to avoid overheating. One of the best ways to provide access to natural, unfiltered sunlight is to construct or purchase a simple outdoor enclosure that can be used during the warm summer months. The outdoor enclosure can be identical to the indoor enclosure if they are both constructed out of screen, and with the exception of the added shade areas. The next important aspect of veiled chameleon captive care is proper diet.

Food/Diet

Veiled chameleons, as mentioned before, are primarily insectivorous but will take some plant matter in their diet. Providing feeder insects with the correct balance of calcium to phosphorus is of critical importance in the veiled chameleon captive diet. If reptiles are not provided with a balanced diet, they will develop a dietary deficiencies such as a condition called metabolic bone disease. Metabolic bone disease is a calcium deficiency that results from an improper diet, and may also be caused by the lack of vitamin D3. Veiled chameleons require a diet that has a 2:1 calcium to phosphorous ratio. To provide this, it is necessary to fortify the insects before they are fed to the animal. Domestic crickets are the staple of the veiled chameleon captive diet; however, crickets only have a 1:1 calcium to phosphorous ratio. There are several ways to improve the calcium content of crickets and other prey items. The first is a procedure called "gut-loading".

Gut-loading involves feeding the feeder insects a good, high calcium diet before they are fed to the chameleon. The reasoning behind this considers that predators not only consume the prey item, but they consume the intestinal contents of the prey as well. The intestinal contents of prey items plays an important role in providing a well balanced diet. Variety is extremely important in captive reptile diets, and as such, it is important to vary the gut-loading material fed to feeder insects as well. Here is a sample gut-loading regimen: week 1-Collard greens, oranges, tropical fish food flakes, week 2-Mustard greens, melon, crushed dry iguana diet, week 3-Crushed alfalfa pellets, carrots, crushed high quality cat food. This may seem rather elaborate and a pain, but it is important in providing the chameleon with as wide a variety of nutrition as possible. Varied diets lessen the chance of a dietary deficiency, and contribute greatly to the overall health of the animal. Other insects may be offered to the chameleon as well including: king mealworms, mealworms, nightcrawlers (yes, veiled chameleons will eat them, but it makes a mess!), cockroaches, waxworms, pill bugs, and houseflies. The first five insects on this list can be purchased from commercial breeders, bait shops, or pet stores, but the rest must usually be collected. It is difficult to provide enough variety in the veiled chameleon diet solely by relying on the stock kept regularly at pet stores or bait shops, so check around the classified section of herp magazines to locate some sellers of the more exotic insects. Another way to provide variety in veiled chameleon captive diets is to collect insects from a pesticide free area. I use a fine mesh net and sweep it through an area of tall grass. This "meadow plankton" can be a valued part of a captive diet. Do not feed veiled chameleons too many wax or mealworms, these insects have a very low Ca:P ratio and can cause problems. Offer two or three different insects at one feeding (provided that the insects will not kill each other in the food dish). Another very important aspect of veiled chameleon captive diets is calcium supplementation.

Although gut-loading improves the nutritional content of feeder insects tremendously, it is also important to ensure that the chameleon is getting enough calcium. Calcium supplementation is an easy way to provide for this necessity. High quality calcium supplements can be purchased at good pet stores, or through mail-order companies. After the insects have been properly gut-loaded, put some insects into a plastic bag and add a pinch of supplement. Shake the bag up and down like a shake-and-bake pork chop so the insects are completely coated. If one keeps a large amount of feeder crickets around at one time, it may be difficult to get some in the bag without inadvertently freeing a large number of extra crickets, which will soon end up in your bedroom chirping all night and driving you crazy. To avoid this annoying encounter, simply place a cardboard tube from a used roll of toilet paper or paper towels in with the crickets. A good number of crickets will always choose to hide in such areas, and the tube can be easily lifted, with the crickets inside, and shaken into the coating bag. The feeder insects should be coated with calcium supplement every day for young veiled chameleons, and every other day for adult veiled chameleons. Young veileds must be fed every day, twice a day if possible. The best starter food source for young veileds is small crickets, as young veileds tend to regurgitate other insects such as mealworms (Tremper, 1995). Adult veileds will eat every other day. The best way to offer feeder insects to veiled chameleons is in a raised dish. Use an opaque dish with smooth sides so the insects cannot crawl out, but the chameleon can easily locate its food. This prevents the insects from dispersing into the cage and irritating the animal while it sleeps. Variety and proper supplementation are the most important aspects of the veiled chameleon captive diet. Another important aspect of veiled chameleon captive diets is providing clean drinking water.

It is very important to provide veiled chameleons with clean water on a regular basis. Veiled chameleons, and many other arboreal lizards, will not drink from a standing dish of water (although I have heard they can be trained to do so). Veileds just don't seem to recognize water for what it is unless it is in motion. The best way to provide veiled chameleons with water is to set up a drip system. There are several ways to set up a drip system, but the easiest is to just place an ice cube on the top of the enclosure, with a cup at the bottom to catch the drips as the cube melts. It is best to place the water source so that it drips onto the side of a leaf, where the animal can easily lap it off. Other drip systems can be made from deli cups or medical IV tubing. Some companies are even selling large plastic containers with spigots on them as commercial chameleon drippers. Although these systems work well, they are expensive for what they are. Be careful with drip systems, they can quickly flood the animal's cage, creating an unhealthy situation. Misting the enclosure has an advantage over drip systems, it raises the relative humidity. The relative humidity in the enclosure should be kept around 50-60% most of the time, this can easily be accomplished by misting the enclosure once or twice during the day

Conclusion

The veiled chameleon is an impressive and challenging reptile to keep. Although the veiled chameleon is among the hardiest of its genus, it still requires rather specialized care. Anyone who is considering keeping veiled or other chameleons should seek out and read as much of the available literature as possible before purchasing the animal, do not purchase and then attempt to learn all that is required to keep these animals successfully. Learning what is required beforehand will reduce stress on both the keeper and the kept.