

Chameleon Enclosures: The Greatest Myth in Herpetoculture

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Chameleons have long been regarded as the holy grail of herpetoculture. The general wisdom is: “If you can keep chameleons you can keep any reptile.” Twenty years ago they were even thought of as almost impossible to keep alive for more than a few months. We have since learned that chameleons are not the delicate and fragile things that we used to see them as. In fact two species, the veiled chameleon (*Chamaeleo calyptratus*) and the panther chameleon (*Furcifer pardalis*), have become almost as widely available as bearded dragons, leopard geckos, and corn snakes. Other, more sensitive species are frequently being bred by dedicated hobbyists and professionals. There are several reasons for this major turnaround in success rates. The biggest change in husbandry that many people in the United States point to is the advent of the screen enclosure. In fact, in the reptile industry, the screen enclosure and the chameleon have become virtually synonymous. The first thing that any new chameleon keeper is urged to buy or build is, you guessed it, a screen enclosure. The reason why the screen cage is so advocated is because “chameleons require a great deal of fresh air”. This is also sometimes worded as “chameleons require a lot of air circulation”. According to the popular reptile culture there is no other group of reptiles, even those that come from the same environments, which require screen enclosures. I’m here to tell you something radically different: chameleons do not require any more air circulation than your average tropical lizard. Many people will strongly disagree with this and cry out “blasphemy”! However, I have never read any scientific studies that have proven or even hinted that chameleons are biologically different from other groups of reptiles in their need for “fresh air”. In over fifteen years of personally and professionally keeping chameleons I have been led to believe something else entirely.

How the Screen Cage Myth Came About

When people first started keeping chameleons they tried to keep them like they did the majority of reptiles kept at the time: in horizontal glass aquariums. These were the most widely available enclosures and hobbyists had had success keeping many reptiles this way. However, as opposed to most of the reptiles being kept at the time, most chameleons are arboreal specialists. In the wild you would almost never find a chameleon on the ground. There are exceptions to this. Some true chameleons are partially or primarily terrestrial (Ex. *T. cristatus*, *C. namaquensis*). Also, female ovoviparous chameleons will go to ground to lay their eggs. But these examples are in the significant minority. Therefore, keeping most chameleons in enclosures that are long and low (most aquariums) is opposite of how their enclosures should be structured. Your average chameleon kept in a long and low enclosure, regardless of its construction material, will be under a constant and unnatural level of stress. This type of stress was often the precursor to the many ailments that chameleons kept at that time were subject to. Also, in those early days practically 100% of the chameleons being kept were freshly caught imported animals. These animals had already undergone a very stressful and physically taxing ordeal during the capture and importation process. These animals usually arrived dehydrated, starved, stressed, and physically battered. When these animals were then placed into an enclosure that did not even come close to their natural environment most

quickly succumbed to disease and death. It is a testament to the chameleons hardiness as a group that any survived at all during these early years.

At that time a small group of dedicated hobbyists realized something very important: in order to get chameleons to survive they would have to try to replicate the animal's natural conditions. While many reptiles are extremely adaptable and are capable of surviving in extremely generalized conditions most chameleons are specialists that therefore require specialized conditions. These are the main points that the pioneering keepers perceptively realized:

- Chameleons are diurnal and are exposed to sunlight for the majority of their period of activity.
- Most chameleons are arboreal and spend practically all of their time in vegetation above the ground.
- Many chameleons patrol a large (relative to body size) territory.
- Most chameleons are solitary.
- Most chameleons come from tropical climates with warm temperatures and high humidity.

Luckily for them and their captives, most of the early keepers lived in California or Florida. They were able to address these five issues by building large enclosures and placing them outdoors. These large and mostly screen and wood-framed enclosures gave the chameleons plenty of space to move and allowed natural sunlight to enter without overheating the animals. In this new style of keeping the chameleons started to thrive. When keepers in other parts of the country learned of the success that their counterparts were having they started to duplicate their methods. But, of course, unless a chameleon keeper lives in a subtropical or tropical part of the world, the chameleons could only be housed outdoors for part of the year. Instead of placing the chameleons in aquariums during the cooler months the northern keepers simply brought their large screen cages indoors. Also, during this time people started to realize the benefits of natural sunlight on reptiles and the first ultraviolet-producing bulbs were entering the market. Most dedicated keepers added these bulbs to their enclosures when they were brought indoors. So, using these new large screen enclosures reptile keepers as a group experienced much greater success keeping chameleons. That has continued and improved up to this time. Now, many of the chameleons available to hobbyists are captive bred and are much more forgiving of husbandry mistakes than their imported cousins.

Somewhere along the way people started to equate the newfound success they were having with the increased ventilation the screen cages provided. Concurrently, people also started to attribute all of the woes they had previously experienced to the supposed "stuffiness" of their former enclosures, aquariums. The freshly imported chameleons did not get sick and die because of the so called "stuffiness" of the aquariums but because of their difficult journey and the fact that they were being housed in inappropriately sized and furnished enclosures. Over time, these theories became more and more accepted and dogmatic. And thus the greatest myth in herpetoculture was formed and it continues to persist today, over a decade later.

The Problems with Screen Cages

While these new screen cages solved some major problems with chameleon keeping they also created some new ones. However, I will admit that these problems usually only exist for people that live in

northern latitudes and keep their chameleons indoors for a large portion of the year. Keeping that in mind, these are the problems with screen cages.

Indoors, it is almost impossible to replicate the natural humidity and temperature conditions found in the chameleon's natural environment. For chameleons that come from humid areas (most commonly kept species) screen cages simply provide too much ventilation. Without the use of automated misting and fogging apparatus it is impossible to maintain appropriate humidity levels. I will even say that it is impossible or very difficult to do so consistently with these devices. Also, without keeping the chameleons in specially heated rooms, proper ambient temperatures are very difficult to replicate as well. The use of screen cages indoors gave rise to the second biggest chameleon myth. Chameleon myth number two is: "chameleons need to drink large quantities of water". Observing chameleons in their natural environments or in solid sided enclosures quickly dispels this myth. For reptiles, chameleons have extremely permeable skins. Meaning chameleons are capable of absorbing water through their skins as well as their mucous membranes. A chameleon living in an appropriately humid environment in turn will drink much less. The reason that chameleons living in screen enclosures drink so much is simply that they are often in a constant state of dehydration. Chameleons counter this by directly consuming more water than usual. Yet more proof that chameleons are not fragile and without flexibility.

The Real Reasons Why Screen Cages Work

Those of you that are still with me on my long-winded narrative are probably starting to think that I don't like screen cages and that I think they are unsuitable for use. This could not be further from the truth and in many cases they make good if not even the best enclosures for chameleons. Here are the real reasons why screen cages work well for chameleons:

- Most chameleons need large enclosures relative to body size. The easiest and cheapest way to provide this is by building or buying cages mostly made of screen.
- Most chameleons need enclosures that are taller than they are wide. Most commercially available solid-sided enclosures (Ex. aquariums) are the opposite.
- Taller enclosures allow the use of live plants and natural branches similar to those encountered by the chameleons in the wild.
- Screen cages can be moved outside or inside with ease.

Contradictions to the Myth

When I first started keeping chameleons some fifteen years ago the idea of using screen cages for chameleons was already firmly established. Like many new chameleon keepers I unquestioningly accepted this concept as fact. However, newborn chameleons were and are still recommended to be kept in aquariums or similarly constructed enclosures (Ex. PetPal's, Tupperware containers). I have raised many young chameleons this way as it is the easiest way to maintain small chameleons singly and ensure that they are eating. For example, according to Phillipe de Vosjoli, one of the pioneering chameleon keepers, panther chameleon "neonates will readily adapt to simple small indoor enclosures such as plastic pet habitats, gallon (3.8 liter) jars, or 2 gallon (7.6 liter) aquaria" (de Vosjoli and Ferguson, 1995). When the young chameleons outgrew their small aquariums I would then move them to larger screen cages.

After a few years of successful chameleon keeping I started to think independently about the subject. Do young chameleons not require the “fresh air” that adults do? Does their gas exchange apparatus change significantly as they mature? The longer I thought about this the more obvious the answer became: No! The reason why young chameleons can be kept in standard aquariums and most adults cannot is not because of the young need less “fresh air” but because of the relative size and orientation of the aquariums.

There are other myths that keep being thrown about to dissuade people from using glass enclosures with chameleons. One is that “chameleons are territorial and will see their reflections in the glass and will thus be constantly stressed.” Also, that “a chameleon kept in a glass enclosure will sit on the floor and constantly paw at the sides of the glass”. True reflections in glass only occur at certain angles and are uncommon in most cases. Second, if there are enough visual barriers in the enclosure (ie. Plants and branches), like there should be anyway, the glass panes are mostly concealed. I have never heard an actual first-hand account of a chameleon constantly presenting threat displays to its own reflection in glass. Next, the reason that some keepers saw chameleons pawing at the sides of their aquariums was simply that they were too small and structured improperly (ie. horizontal vs. vertical).

There is also a preponderance of information, seemingly ignored, in the literature supporting the use of solid sided enclosures for keeping chameleons indoors. Here, I will quote from a few:

- “The often expressed opinion that chameleons need a great deal of fresh air is true of only a few species. Poor ventilation often was used to explain away illnesses and errors in maintenance such as stress and excessive temperatures. For all chameleons it is essential that ventilation grating be present in the cover, the side, or the front so that the air cannot stagnate. If the size of the ventilation opening is increased the relative humidity falls.” (Schmidt, Tamm, Wallikewitz, 1994)
- “Terrariums for chameleons are mostly made of glass (except outdoor cages).” (Necas, 1999)
- “Ventilation is necessary to avoid extremely hot temperatures, but if the terrarium is over-ventilated it is almost impossible to obtain ideal humidity and temperature. Ventilation is fine, but make sure it is well regulated.” (Le Berre, 1995)
- “I provide ventilation apertures on the very top of my enclosures.” (Le Berre, 1995)
- “Rainforest dwellers, including most ground and leaf chameleons, need for their well being a humidity of 100 percent at night and 70 to 100 percent during the day. This can be achieved only in terraria built with small ventilation openings and sprayed frequently and thoroughly.” (Schmidt, Tamm, Wallikewitz, 1994)
- “The terraria we use for most of our chameleons are made of glass.” (Schmidt, Tamm, Wallikewitz, 1994)

It is simply false to say that a properly set up aquarium will provide inadequate airflow for reptiles, including chameleons. In my opinion and experience shorter aquariums (18” and under) with a screen lid will provide adequate ventilation for chameleons without any other ventilation methods. Aquariums that are over 18” tall can still be properly ventilated by the addition of other means. By adding a heat source, usually a light bulb, on one end of the enclosure a temperature difference is created. This temperature difference literally will pull air up from the bottom of the enclosure towards the top while at the same time sucking fresh air in from the opposite side of the screen lid. This is known as the chimney or stack

effect. This can be shown using smoke or fog in an aquarium or other similar enclosure. I actually show this to my freshman science students as a way to demonstrate the temperature/density relationship.

Also, this temperature difference created by the heat source is necessary anyway to provide a proper thermogradient inside the enclosure for the chameleon to thermoregulate. I will say however that the chimney effect does work best in terraria with small ventilation openings on the lower sides of an enclosure as well as the top. Examples of such terraria include the ExoTerra and ZooMed brands. However, it still works adequately in standard aquarium with screen lids. Very tall (30" and over) solid sided enclosures can also have ventilation fans sucking air out of the enclosures. I do not recommend fans blowing into the enclosure as this creates an extreme draft that will likely be harmful to the chameleon. Computer fans work very well for increased ventilation. These can be placed on the sides or the top (wherever the ventilation openings are present).

In my opinion any chameleon enclosure should be furnished with live plants. One of the many benefits that they will provide is the uptake of carbon dioxide and release of oxygen. Any enclosure furnished with an abundance of plants will also likely have an abundance of oxygen for the residents.

Choosing the Right Enclosure for You

I hope you have gathered from this article that I do not favor screen or glass enclosures over the other. I have wanted to write this article for several years now and my intended purpose is only to put to rest misinformation that has become thoroughly entrenched in this hobby that I love so much. Also, I want to encourage people to think independently. We should all think about what it is the animals in our care require and not just follow along with what other people are telling us. This will annoy a lot of the so called "experts" out there but you will actually learn more this way instead of just memorizing regurgitated information. But at the same time, make sure you keep an open mind, listen carefully to experienced and successful individuals, and don't hold on too strongly to your preconceived notions in the face of new information.

I think that screen and solid sided enclosures both have their place in chameleon keeping. Here are my closing recommendations to any chameleon keeper:

- Provide the absolute largest enclosure that you can for your chameleon.
- Perform independent research on where your chameleon comes from.
- Keep live plants, never fake, in your chameleon enclosure.
- If you can, keep your chameleon outdoors as much as possible. The chameleon's outdoor cage should be primarily made of screen to ensure it does not retain too much heat.
- If a chameleon's total length is six inches and under they can be kept in many standard size aquariums. This applies to young individuals of larger species and adults of very small species.
- If the relative humidity of your house is 60% or less the enclosure should have at least three sides that are solid in construction. At least one side should be made of screen to allow gas exchange.
- If you keep your chameleon in an enclosure that has three or four sides that are solid you need to make sure to do two things.
 - First, make sure it does not get too hot for the animal's particular needs.

- Second, do not water so much that standing water is allowed to develop. Condensation should completely evaporate between misting sessions. Usually one or two misting sessions of thirty seconds to one minute is adequate.
- If you keep your chameleon in a screen enclosure indoors make sure to compensate for the increased ventilation by watering your chameleon heavily. Usually this needs to be around ten to twenty minutes at a time, several times a day.
- Last, keep in mind that these are generalized recommendations and every situation is different.

With these recommendations in mind you should be equipped to make your own independent and well-informed decision on how to house your chameleon.

References

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