



## Melissa Kaplan's Herp Care Collection

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# Reptile Housing: Size, Dimension and Lifestyle

Excerpted from master's thesis: Classroom Reptiles: A teacher's guide to their selection and care in the schoolroom

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A great deal of thought must go into a reptile's captive environment. The type of environment it needs will be based on how big the animal gets, how the animal lives in the wild, how it gets water, and its macro- and microclimate requirements. In other words, the captive habitat must contain the key elements of the reptile's habitat in the wild. Deciding what habitat to set up for a captive reptile depends upon:

- where in that wild habitat the reptile lives;
- when it is active; and
- what its habits are.

### **Commercial and Custom Enclosures and Materials**

To construct a habitat in captivity, we must consider the size and shape of the enclosure as well as the materials from which the enclosure will be constructed.

There are many different aquarium-type enclosures available commercially. The key thing to remember is that they are aquariums. Most do not have tops that have been made specifically for them. Some have been superficially adapted for the reptile trade by the inclusion of a part fixed screen, part hinged glass top. Some pet supply companies are making flat screens that can be placed on top of standard aquariums. The problem with these enclosures is that they are still based on a design that works well for fish, not for the varied needs of reptiles. These enclosures generally do not have the height that is required for arboreal reptiles. Their glass tops prohibit the proper use of ultraviolet B-producing fluorescents (as UVB is filtered out by glass and plastic). There is no safe way to mount heating equipment to them or install shelving inside them. Many factory-fitted and after-market tops fit so poorly or loosely that they are worthless in preventing a determined snake from escaping.

There are companies making wooden, melamine/pressboard, and molded plastic enclosures. Too often, however, these are modeled on the glass aquariums and so suffer from the same drawbacks of those enclosures. Many are built in a simple cube shape. Taller than the glass aquaria, they are usually not tall enough, and are rarely wide enough for the full grown lizard or snake for which they are being sold. Their large front-opening door makes it almost impossible to prevent a motivated lizard from escaping when you open the door. Melamine presents a problem in that, while the insides and outside of the enclosures look good, and they clean and disinfect well, the sides of the openings and doors are not finished on many of them. The exposed pressboard soaks up liquids (spilled water, urates, cleaning and disinfecting solutions), warping over time, often leaving escape-sized gaps or weakening the overall structure so that the enclosure inhabitant can push its way out.

Wire cages fabricated for mammals or birds are sometimes used. Unfortunately, these are impossible to heat and maintain the thermal gradients required by most reptiles without heating the room in which the cage sits. The wire poses a danger to reptiles as they can severely injure their snouts, toes, and tails by repeatedly rubbing, climbing, trying to claw out or squeeze through the openings, or when startled into a flight response.

Hobbyists and herpetoculturists are a creative group of people when it comes to modifying existing structures into reptile habitats. Old armoires, prefabricated shower stalls, jewelry or deli display cases, discarded television sets, and sturdy wooden book cases have been converted into reptile enclosures.

A common failing with many of these custom conversions, however, is the same as when you buy an enclosure that appears large enough, or large enough "for now": the reptiles too often rapidly outgrow them. Because of the work and expense that goes into converting a piece of furniture or buying a commercially produced enclosure, most reptile owners are unwilling to repeat their efforts one or two years down the line when the reptile has outgrown it.

Many people want to set up naturalistic enclosures, with interesting layered substrates, plants, branches, molded back and side walls, "ponds," etc. The problem with most is that, in trying to make it as attractive and 'natural' as possible, there is too often insufficient room for the intended inhabitant to properly move around, thermoregulate, access the necessary microclimates, or feed. At least 30-40% of the floor space should be left open for the reptile to easily move about, feed, water and defecate. There is no substitute for an appropriately sized enclosure, nor for not expanding or providing larger enclosures as required by the reptile's continued growth.

### **Determining Enclosure Size: Some rules of thumb**

Many reptiles do well in spaces smaller than what would be suitable for similarly sized mammals. However, space is very important for reptiles. The space must be large enough to permit a proper temperature gradient to be set up and maintained. Enough room must also be provided for the animal to move around, thermoregulate, feed, drink, bask, and sleep.

The following dimensions pertain to a single reptile being kept in a simply furnished enclosure. The dimensions must be increased by one-half for each additional animal housed together, with even more room provided for territorial species. Additional room also needs to be provided if a naturalistic habitat is being set up for the reptile(s), including leaving 30-40% of the floor space free for movement, feeding, and defecating.

When calculating a lizard's size for the purposes of determining enclosure size, you must include the tail in the total size. The tail is just as important in the thermoregulation and manufacturing of the precursors to vitamin D3 as the rest of the body. You may think the following dimensions are excessively large, so I will take this moment to note some herpetocultural and zoo sources specify sizes dimensions even larger than those shown below.

### **Lizards**

<b>Dimension</b>	<b>Snout-Tail Length</b>
Minimum length (side to side):	2-3 x
Minimum depth (front to back):	1-1.5 x
<i>Minimum height:</i>	
Terrestrial/Fossorial:	1-1.5 x
Arboreal/Scansorial:	1.5-2 x

As with lizards, snakes can be deceptive about their requirements. Some small, active snakes such as racers need more room, relative to body length, than do large, and largely lazy, pythons and boas. Terrestrial, arboreal, and scansorial snakes do not need to be able to stretch out full length in their enclosure. They should be able to stretch out enough, however, to allow most of their lung or lungs to extend full length. Semi-aquatic snakes require larger enclosures to provide a water area large enough for them to comfortably swim in and hunt for food, while the land area is large enough to for sleeping and basking.

Some herpetoculturists and commercial snake breeders say that many snakes get stressed when they are kept in large enclosures. Most of the people who say this keep their snakes in shoe-box or sweater-box sized enclosures. While it is true that snakes prefer a cozy hiding place, one in which they can feel two or more of the walls with their comfortably coiled body, they still need a reasonably large enclosure. There needs to be enough room for you to attain and maintain the species required thermal gradient, an adequately sized water bowl, a humidity retreat box, and a place to feed. Many of the enclosures at pet stores and breeders, and pictured in many snake books, have barely a few inches of exposed floor space, the rest of the enclosure being filled with the snake and its bowl.

## Snakes

Dimension	Total Length
Minimum length (side to side):	3/4 of total length
Minimum depth (front to back):	1/3 of total length
<i>Minimum height:</i>	
Terrestrial/Fossorial:	3/4 of total length
Arboreal/Scansorial:	1 x total length, max 6-8 ft

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## Aquatic And Semi-Aquatic Turtles

Dimension	Carapace Length
Minimum length (side to side):	4-5 x
Minimum depth (front to back):	2-3 x
Minimum height:	1.5-2 x total length plus 8-12" to prevent escapes

Aquatic and semi-aquatic turtles need both a land and water area. The water area must be large enough for them to swim freely through the water to catch their food. Those species whose natural habits include burrowing into the silt or sand at the bottom of their native lakes or rivers must have similar substrate layers in the bottom of their enclosure. This is in addition to the necessary depth and breadth of the water and the additional space above the water line to preclude escape. For some species of aquatic turtles, a haul-out place big enough for the tank inhabitants, or floating platform, may be all that is needed in an otherwise completely aquatic enclosure. Most Semi-Aquatic species will require a substantial land area as well as water area. The haul-out and land areas are used to bask, sleep, and laying eggs.

Use a good, strong aquarium or prefabricated tub. Aquatic turtle tanks are very heavy and there is tremendous pressure placed on the walls of the enclosure. Remember that the above dimensions are for a single turtle in an enclosure. If you are keeping more than one turtle, both the water and land areas will have to be increased by 1-2 times the total length of the largest inhabitant in each width and length.

## Terrestrial (Box) Turtles And Tortoises

Dimension	Carapace Length
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Minimum length (side to side):	5 x
Minimum depth (front to back):	3 x
Minimum height:	1.5-2 x to prevent escapes

Thanks to variations of the The Tortoise and the Hare fable, most people think of tortoises as slow-moving animals who do little with their time. As tortoise owners will tell you, however, a healthy tortoise housed in a proper environment is both active and quick. Box turtles are similarly wide-ranging and, well, speedy. Many tortoises and box turtles range widely throughout their habitat, with several sleeping and basking areas used every day. Most are burrowers and talented diggers, easily digging under outdoor pen walls and fences. They are also good climbers, especially tortoises. Escapes can be prevented when they are housed indoors by building the enclosure walls higher than they can stretch when they climb on the back of another inhabitant or on top of a rock, log, or hide box.

Tortoise and box turtle enclosures need pans of shallow water that the chelonian can easily walk into and drink from. Unlike the U.S. species of box turtles (*Terrapene*) those from China and Indonesia (*Cuora*) are more aquatic in their habits, and must have deeper, yet easily accessible, water in which to soak and feed.

### **Housing Different Species Together**

There are many problems associated with keeping members of different species, even orders, together. The primary problem is that the individual animals may have commensal or other organisms in or on their bodies with whom they have co-evolved. Having co-evolved together, the host animal has some natural immunity to the possible deleterious effects of the organisms. Exposing another reptile to these organisms, however, could be fatal to that reptile. This is especially true with animals from one continent being mixed with animals from another continent. Too often, people try to mix species together who have completely different habitat requirements. This will cause severe stress in the animal whose needs are not being met and may ultimately be fatal to it. Problems are also caused when housing predators with prey, even if that particular predator may not prey on that species of prey. An example is housing a bearded dragon and sand boa together. Not only are they from different continents (potential for transmission of deadly organisms) but even though the sand boa may not think of eating a large bearded dragon, the bearded dragon, who is preyed upon by snakes in its native habitat, will always be fearful, if not outright terrified, by the constant presence of the boa.

Basing your decision on what animals can be kept together cannot be made by looking at what is being done in most pet stores. Most stores tend to house different species or taxa together without regard for zoonotic transmission or habitat requirements. Thus it is not uncommon to see iguanas housed with tortoises, terrestrial turtles with aquatics, and temperate frogs with tropical lizards. You must complete your own research, using encyclopedias, atlases, and availing yourself of information resources through the local herpetological society, herpetoculture publications, and Internet resources.

### **Lifestyles of the Wild and Scaly**

#### ***Habitats***

The habitat is where the reptile generally lives within its ecosystem. Deserts, woodlands, temperate grasslands, savannahs, and tropical forests are the ecosystems from which most of the reptiles in the pet trade come. Habitats are a complex mix of temperatures, humidity levels, photoperiods, elevations, organic lifeforms, inorganic matter, and space.

#### ***Aquatic:***

Aquatic reptiles need large bodies of water in which to swim, feed, and thermoregulate. Some do haul out on land or rocks to sun themselves. The enclosure needs to be strong enough and waterproofed to hold the water, and provisions made for regular cleaning and disinfecting of the tank as well as the filtration systems needed to keep the enclosures clean on a daily basis. Care must be taken when supplying overhead heat sources that the reptiles in the enclosure cannot get to them and topple them into the tank. If submersible heaters are used to heat the water, they must be shielded so that the animal cannot come into direct contact with them.

### *Arboreal:*

Many species of lizards and snakes spend most or all of their time in trees, including anoles, water dragons, iguanas, various agamas and geckos, boas and pythons. Arboreal enclosures therefore need to be tall as well as have the necessary width. They must be outfitted with sturdy branches or, for the large lizards and snakes, shelves for basking and roosting. All fixtures in these enclosures must be securely fastened. The lighting and heating elements must be shielded as these reptiles will easily climb on and into them. If live plants are used in these enclosures, they must be sturdy enough to withstand the clawing and crushing they will get, or be easily removed and replaced with other plants when they get too damaged for continued use. Live plants will also require that a partial or complete drainage layer be used to catch the run-off when the plants are watered. They must, obviously, also be non-toxic and harmless.

### *Fossorial:*

Many snakes and lizards, and some chelonians, are burrows, spending some or all of their time covered by a few inches or more of substrate. Some, like sand boas, are rarely seen above ground; others, like some skinks, burrow away to sleep and digest. Enclosures for fossorial reptiles need to be strong enough to safely hold several inches of burrowable substrate over a drainage layer. They must also be tall enough to make it difficult if not impossible for the inhabitant to climb up-and out-of the enclosure. The same width and depth furnished to terrestrial reptiles must also be provided.

### *Scansorial/Saxicolous:*

Many lizards live in rocky crevices, basking and hunting for food on rocky walls and outcroppings. Rocks, cleaned and disinfected, can be arranged and cemented together with a non-toxic silicone cement to provide walls and outcroppings for such lizards. Caves and crevices can be built into these structures to provide some natural hiding and sleeping places. Walls need to be anchored to the back of the tank to prevent their toppling over and crushing the enclosure inhabitants. Outcroppings should be well balanced and partially buried in the substrate to ensure they are not toppled or shifted around during use. Scansorial enclosures need sufficient height and depth to be able to fit in the walls and outcroppings yet still keep the reptiles safely distant from overhead heat and light sources. They also need the width necessary for ample thermoregulation and food gathering.

### *Semi-Aquatic/Riparian:*

Some reptiles spend considerable amounts of time in the water swimming, feeding, and sleeping, as well as basking on dry land. These enclosures must provide ample room for the aquatic area setup as well as a terrestrial portion; both must be large enough for the inhabitants to use them for their intended purpose. As with aquatic enclosures, heating and lighting must be securely mounted to ensure that they cannot be accidentally toppled into the water.

### *Terrestrial:*

Terrestrial reptiles still make use of various irregularities in their environment, irregularities often being different microclimates. Terrestrial enclosures, then, must provide such irregularities. All type of terrestrial reptiles will make use of such features as hide boxes or caves, areas of higher humidity, and rocks, branches or shelves for climbing and sunning. Ample width and depth of enclosure are required to ensure enough room for the furnishings and adequate thermoregulation.

### **Naturalistic Habitats**

In creating habitats, you must begin to think of the interior space in three dimensions. You will need to consider not only the reptile's living spaces within the habitat but also your ability to easily get in to service and clean the environment. A natural habitat setup in captivity unfortunately does not include all the microorganisms found in the wild that would be busily engaged in breaking down plant and animal wastes. The more difficult or complicated an enclosure is to get into and service, the less likely it is going to be done as often as needed. If you cannot devote the time necessary to establish and maintain a complex environment, then consider making one that is a bit less complex. Less complex does not mean uninteresting. It can still be interesting and educational for you and the class, suitable and interesting for the reptile, and not require major disassembly and a full day to get in and clean!

Look at photographs of your reptile's native habitat, or go out looking on your own. Visualize each section of the scene by looking at it from the top down - down into the ground. Note the uneven surface of the ground itself, the different heights of the plants growing there, the fallen branches, leaves, the scattering of rocks or stones. If you are out in the wild, take a small spade or stick and dig into the ground a bit. Look at and feel the earth beneath the surface, the different textures, humidity, and temperatures. The features on top of the

ground constitute the topography of the habitat; those at and under the surface are the substrata.

Creating a habitat means recreating the key aspects of the topography and substrata. We begin constructing the habitat from the substrata up, starting with the different substrates, then building, layer by layer, the surface topography.

If you are using a glass enclosure, make sure it is sturdy enough to hold the weight of the contents. If you can find the older, metal-framed aquariums, they are stronger than the all-glass ones. Keep in mind that the enclosure, especially a large one, is going to be very heavy when you are done. It is best to set the enclosure in its place first, then begin constructing the interior. When buying or building enclosures, remember that the bottom several inches of the interior will be given over to substrata and ground cover so always buy or build taller enclosures than you might otherwise think you need.

Make a couple of sketches of the interior, both as it will be seen from the front and from the top. Begin to decide where you will make the high and low spots and place the plants and other furnishings, keeping in mind the reptile's habits and preferences for daytime basking, sleeping, feeding, and water use. Once you have these figured out, you then will know where you need to place the lights and heat sources. If you are limited by access to electrical outlets as to where the lights and heat can be, then you will have to design the interior based on where those lights must be placed.

### ***Artificial Habitats***

Artificial habitats differ from naturalistic habitats in that they are set up more simply. The needs of the reptiles for thermoregulation, lighting, humidity, security, etc., are still being met, but in an environment that does not particularly resemble the diversity of materials, elevations, etc., of their native habitat. Artificial habitats should always be used when animals are in quarantine prior to being introduced into their permanent individual or community enclosures.