Introduction to UVB, part 2

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How to Use UVB in Your Reptile Enclosure

Guest post written by ReptiFiles for use by The Bio Dude

Over the course of millions of years of evolution, every reptile has specifically and remarkably adapted to a specific type of environment and lifestyle. Under ideal circumstances, we would all be able to keep our reptiles outdoors in the exact same environment that they evolved in and wouldn't have to artificially provide heat or UVB.

As pets, our beloved reptiles are far removed from their natural habitat in the wild and require our care. So it's up to us to recreate *all* aspects of the habitat that they evolved in: temperatures, humidity, UVB, substrate, diet, territory size, etc. When we succeed in this effort, we enable them to truly thrive (not just survive) in captivity.

Both UVA and UVB are present in all reptiles' natural habitats. However, the exact amount of UVB that is present varies from habitat to habitat. Different types of reptiles from different microclimates require different levels of UVB. There is no one-size-fits-all solution. You can't walk into a pet store, grab whatever UVB bulb looks good, and walk out. However, most reptiles fit into one of four categories:

Meet the Ferguson Zones

Dr. Gary Ferguson categorized the different levels of UVB need into 4 zones, and revolutionized the way we approach UVB provision for reptiles.

Zone 1describes crepuscular reptiles and shade-dwellers that thrive with a UV Index between 0.1-0.7.

- ball pythons
- corn snakes
- crested geckos
- leopard geckos

Zone 2describes partial sun and occasional baskers that thrive with an average UV Index of 0.7-1.0.

- red-footed tortoises
- green anoles
- Chinese water dragons
- boa constrictors

Zone 3describes open and partial sun baskers that thrive with an average UV Index of 1.0-2.6.

- red-eared sliders
- day geckos
- blue tongue skinks

Zone 4describes mid-day open sun baskers that thrive with an average UV Index of 2.6-3.5.

- bearded dragons
- uromastyx
- chuckwallas

**Note that these are all-day averages, not maximums or total gradient specifications.*

If you keep a reptile species that is not on this list, reference Frances Baines' UV Tool to find the Ferguson Zone categorization, recommended UVI, and optimal lamp for your pet's needs.

What are these numbers?

UV Index, or UVI, is how we measure UVB radiation. It was initially developed by the World Health Organization, United Nations Environment Programme, and the World Meteorological Organization as a way to raise awareness of the risks of excessive exposure to sunlight, and to alert people of when and where the sunlight is strong enough to cause skin damage.

Although initially created for human health, UVI is also very helpful for measuring the levels of UVB that wild reptiles expose themselves to and how much we're giving them in captivity. The *Solarmeter 6.5*, *Solarmeter 6.5R*, and *Zoo Med Digital UV Index Radiometer*are devices that can be used to measure the UVB output of the lighting anywhere in a reptile's enclosure. If you are serious about reptile keeping, it's a good idea to invest in one of these devices to fine-tune your husbandry.

Types of UVB bulbs

UVB bulbs generally fall into 3 different categories: linear fluorescents, compact/coil fluorescents, and mercury vapor bulbs.

Linear fluorescent UVB bulbs

Linear fluorescents come in two types: T8 and T5 HO. The number indicates the diameter of the fluorescent tube, as well as the power.

- **T8 bulbs**are older technology and produce less powerful UVB. They also tend to have shorter lifespans, lasting about 6 months before needing to be replaced.
- **T5 HO (high output) bulbs**are a newer technology and produce stronger UVB that penetrates further into an enclosure. They also last at least 12 months before needing replacement.

Linear fluorescents should be mounted inside a reflective light fixture appropriate to the size and power of the bulb for optimal output and lifespan. Reflective T5 HO fixtures aren't cheap, but they're an essential investment.

T5 HO UVB bulbs are the most popular type of UVB lighting in the reptile hobby because they work well with a variety of enclosure sizes and reptile species. They are also the preferred source of UVB lighting at reputable zoos.

The best linear fluorescent UVB bulbs in the US are made by Arcadia and Zoo Med.

Compact/coil fluorescent UVB bulbs

Compact and coil fluorescent UVB bulbs are like T5 UVB bulbs that have been folded and twisted around themselves to fit in a standard incandescent bulb socket. They are less powerful than T5 HO or even T8 linear bulbs at the same distance, but they can work well in small enclosures 12-18" tall and less than 24" wide. You will usually see them available in two sizes: 13w and 26w. Lifespan is between 6-12 months, depending on brand. For best results, use with a reflective fixture.

The best manufacturer of compact and coil fluorescent UVB bulbs in the US is Zoo Med.

Mercury vapor & metal halide bulbs

Mercury vapor and metal halide bulbs are unique because they produce heat, visible light, UVA, and UVB all in one bulb. This also makes them very appealing to most reptile keepers at first glance.

- **Mercury vapor bulbs (MVBs)**project intense UVB and heat further than many other types of UVB bulb, making them popular for particularly tall enclosures. But even the best MVBs tend to fluctuate in output from one bulb to the next, and use a relatively

short wavelength of UVB compared to other sources, which makes them potentially dangerous and distrusted by many experts. High quality bulbs can last 12 months or more.

- **Metal halide bulbs**are extremely bright and have a particularly high UVA output compared to other UVB bulbs. Some consider them to be the best sunlight simulators, although they must be positioned at a greater distance than other bulbs for safe use. They also require external ballasts and a fixture that can cope with their high-voltage ignition pulse. Unfortunately, UVB production decays fairly quickly in these bulbs.

Although they seem convenient, mercury vapor and metal halide bulbs tend to be extremely limiting because they don't allow for independent control of heat and UVB. This makes them a better fit for some reptiles rather than others, and requires the use of a Solarmeter and an accurate digital thermometer for safe positioning and use.

If you use mercury vapor or metal halide bulbs, you must use bulbs that were specifically designed for use with reptiles. Otherwise they can seriously harm your reptile. They also require lots of air circulation around the bulb to prevent overheating (no dome fixtures) and break easily when bumped during use.

The best mercury vapor and metal halide bulbs available in the US are by Arcadia and Mega-Ray.

Are brands other than Zoo Med, Arcadia, or Mega Ray okay to use?

At this point, the evidence is not strong enough for me to recommend other brands such as Zilla, Exo Terra, All Living Things, etc. Most are simply weaker than advertised or run out of UVB more quickly than higher quality options, or have inconsistent output. However, some (especially off brands you may be tempted to buy for cheap online) actually produce UVC radiation, which is VERY dangerous to your pet.

How to use your UVB bulb properly

Okay, now you know what UVB is, how it works, the different types of bulbs, and which brands are best. But if you don't use your bulb(s) properly, all of this money and effort will be wasted and you could end up hurting or even killing your pet. So here's how to do UVB *right*in your reptile's enclosure:

Placement is everything!

UVB bulbs should always be mounted on the ceiling of the enclosure, like the sun in the sky. But there's more to it. When figuring out where to put your UVB, ask yourself the following four questions:

1. **Is the bulb installed over or under the mesh?** Mesh blocks a significant amount of UVB.If your enclosure has a mesh ceiling, your UVB bulb and fixture should be installed on the underside of this mesh, not over it.
2. **Is there glass or plastic covering the bulb?**Glass and plastic block all UVB. Remove any protective glass or plastic bulb covers that the fixture may have come with before using.
3. **Are the heat source and UVB lamp on the same side of the enclosure?**Heat and UVB always go together. These two factors need each other for the reptile's body to make the vitamin D that it needs, and keep in mind that in the wild, sunlight delivers both heat and UVB wherever it is found. So for example if your heat source is on the far left side of the enclosure, the UVB should also be placed to the far left so its beam overlaps with the beam of the heat source.
4. **How far will the UVB bulb be from your reptile?** There is an inverse relationship between UVB strength and how far away your reptile is from the source. If closer, then the UVB it experiences will be stronger. If further, then the UVB it experiences will be weaker. Pay attention to the recommended distance listed on the bulb's packaging, and position your basking areas accordingly.

Use the right fixture

Each type of UVB bulb needs a specific type of fixture to work properly. Follow the directions on the bulb packaging, and don't try to take shortcuts. If the bulb is available in a kit that includes the fixture or the manufacturer offers a fixture that goes with the bulb, buy that one.

Don't forget the reflector

Fluorescent UVB bulbs must be used with a reflective light fixture, and preferably one that has been polished to a mirror finish. Otherwise 50% of the UVB produced will go into the fixture rather than getting reflected down into the reptile's enclosure.

Replace the bulb on time

UVB bulbs don't last forever. Almost from the moment you turn the bulb on for the first time, its UVB output will gradually decline until it's just an ordinary lightbulb. Don't try to save money by using the bulb for as long as it produces light — look at the manufacturer recommendations (usually 6-12 months), write the purchase date on the bulb, and be ready to replace it when it needs replacement.

Give your reptiles opportunities to escape the UVB

In the wild, reptiles will seek shade when the sun gets too strong or when they've had enough for the day. Similar to how they move between warmer and cooler areas to thermoregulate, reptiles also photoregulate by moving from sunlight to shade and everywhere in between.

Your UVB lamp should not span the entire length of the enclosure, but rather only part of its length. John Courteney-Smith of Arcadia Reptile calls this "the Light and Shade Method." The

exact ratio of light to shadow will vary from species to species — for example, a bearded dragon will need its UVB lamp to be about 2/3 as long as the enclosure, but a leopard gecko's lamp will only need to be 1/4 to 1/2.

Adjust your supplements

When you are using a UVB bulb at the correct strength for your reptile's species, its body makes all the vitamin D that it needs, so you don't need to supplement it in the diet. Use plain, D3- and phosphorous-free calcium powder for dusting on insects.

Conclusion

There will always be people who claim that UVB is "optional" or that certain species just "don't need it." But as our understanding of reptile health and husbandry improves, it is becoming increasingly clear that we must consider UVB not just a beneficial option, but a necessity, and included with heat, humidity, and other key elements as a requirement of adequate husbandry.

References and Resources:

These are the resources that I referenced while writing this mini-series. I was only able to skim the surface here, so I highly recommend reading through the following for more in-depth information on UVB and related subjects. However, pay attention to publication dates, as although these are great sources, some are more up-to-date than others.

- *How much UV-B does my reptile need? The UV-Tool, a guide to the selection of UV lighting for reptiles and amphibians in captivity*by Frances Baines et al.
- *Fire — The Sun: Its Use & Replication Within Reptile Keeping*by John Courteney-Smith
- *Evaluating the Physiologic Effects of Short Duration Ultraviolet B Radiation Exposure in Leopard Geckos (*Eublepharis macularius*)*by Amelia Gould et al.
- *Effects of ultraviolet radiation on plasma 25-hydroxyvitamin D3 concentrations in corn snakes (*Elaphe guttata*)*by Mark J. Acierno et al.
- *An In-Depth Look At UV Light And Its Proper Use With Reptiles*by Dr. Frances Baines, MA, VETMB, MRCVS
- com
- co.uk

About the author: *Mariah Healey has been passionate about animal research from a young age. Today, she is a reptile husbandry specialist and the author of ReptiFiles.com, where she publishes her findings on the best practices in modern reptile care. ReptiFiles is the most comprehensive, accurate source of reptile care on the internet, boasting 15 science-based guides to date, with two more in active development.*