

## Companion Animal Hospital Exotic Animal Care



### Asian Water Dragon Care

The Asian Water Dragon, *Physignathus cocincinus*, is a popular pet species native to the forests of Southeast Asia. Also called the Chinese, Thai, or Green Water Dragon, their name reflects a preference for living near streams or rivers in the wild. This lizard species can become quite acclimated to captivity and make a friendly, interactive pet when cared for properly, although wild caught adults are common in the pet trade and these individuals tend to do poorly in captivity. The Asian Water Dragon may live 10-15 years in captivity.

This is a medium-sized lizard species, reaching 0.6-0.8 m (24-30 in) in length. About two thirds of this total body length is the tail. Males tend to be larger than females, with a heavier body, large jowls, larger spines, and sometimes brighter colours.

#### 1. Environment: Enclosure

Water dragons are active lizards and require a relatively large enclosure with a lot of visual stimulation and cage furniture for exercise. The minimum recommended enclosure size for a single, fully-grown adult is at least 1.2 m long by 2 m tall by 1 m wide (3.6 x 6 x 3 ft), to allow for normal behaviours (including thermoregulation). Some glass and screen terrariums are commercially available for reptiles that are very suitable for water dragons, although custom-built enclosures of wood, screen, acrylic glass, and other materials are also common. Young water dragons may be housed in reptile terrariums or aquariums fitted with a secure screen lid while they are growing, gradually increasing the enclosure size as needed.

Like most reptiles, water dragons do best when housed alone. They can be housed in reproductive groups of one male to one or more females, or multiple females. Males are territorial and cannot be housed together due to aggression. If a mixed-sex enclosure is attempted, be prepared to monitor for reproductive difficulties, including male-female aggression during mating attempts, and egg-binding (dystocia). When multiple animals are housed together, the enclosure size must be increased appropriately: For every 1-2 additional lizards, double the enclosure size.

#### 2. Environment: Heating

Reptiles are ectothermic: They rely on external heat to maintain their bodies at a preferred temperature. All reptiles need an external heat source so that they may thermoregulate by shuttling within a heat gradient in their enclosure. Basically, when a reptile is too cool he will move to somewhere warm, and when he is too warm he will move somewhere cooler. Reptiles will move around in the gradient throughout the day to try to stay at a target body

temperature.

To create a thermal gradient in the enclosure, a primary heating device should be placed on one end. In some homes, a secondary heating device may be necessary to maintain temperatures warm enough. The primary heating device can be a heat lamp left on during the day. Heating pads make excellent secondary heating devices if needed at night. Ceramic heat emitters and radiant heat panels may also be used for nighttime heating as they do not produce light. Red coloured incandescent bulbs, sometimes called “infrared” bulbs, should not be used for nighttime heat as reptiles certainly see the red light, contrary to what they often advertise.

An overhead heating source, such as a heat lamp or radiant heat panel, is necessary to stimulate basking behaviours as this species is heliothermic (use sunlight to warm themselves in the wild). While secondary heat sources like heating pads can help increase the ambient temperature in a cool enclosure, they are not suitable as a primary heating device for this species. A basking spot that reaches 35 °C (95 °F) with a temperature gradient of 27-30 °C (80-86 °F) is required. Provide a drop in temperature at night to 21-25 °C (70-77 °F).

Monitoring the thermal gradient is critical: Use a thermometer both at the animal’s basking spot as well as at the cool end of the enclosure. It is not only important to ensure that your pet can get warm enough based on the species’ preferred body temperature, but also that the cool end allows for proper cooling when needed. Hyperthermia, or an excessively high body temperature, can kill a reptile or amphibian within minutes, and ensuring that your thermal gradient is appropriate at both ends is critical. We recommend the usage of either a digital thermometer with a probe that may be placed at the appropriate spot, or a noncontact infrared temperature “gun” that can be pointed at any location in the enclosure. Note that some thermometers are not very accurate and may be misleading when monitoring temperatures. “Stick-on” LCD and dial thermometers are generally quite inaccurate and we do not recommend their use.

### **3. Environment: Substrate and cage furnishings**

Substrate is the medium covering the floor of the enclosure. Generally, it is safest to use a substrate that cannot be accidentally eaten. Inappropriate and/or dangerous substrates that are commonly associated with gastrointestinal impaction include calcium carbonate sand, crushed walnut shell, crushed corn cob, wood chips, wood shavings, and gravel. Some “forest soil” mixes that contain a variety of textures like earth, coconut husk, moss, and some wood chips work great to help maintain enclosure humidity, and may be safer than any of the individual components alone. If you notice that your lizard is eating the substrate, or you notice that there is substrate in the stool, it is safest to switch to another substrate that cannot be eaten (such as reptile carpeting) before a gastrointestinal blockage occurs.

A number of sturdy branches should be provided to allow for climbing. Reptiles need hiding spots so that they may hide to feel secure. False plants are useful to help create hiding spots, as

these heavy-bodied lizards often destroy live plants inadvertently. There should be at least one refuge from sight at the warm end of the enclosure as well as the cool end, so that your water dragon may thermoregulate in hiding if needed.

#### **4. Environment: Water and humidity**

A large bathing area is required (at least as large as the lizard's body length), as these lizards enjoy swimming and soaking. As they will frequently defecate in the water it must be easy to clean and sanitize. Large cat litter boxes or dishwashing bins make great water dishes. In large, naturalistic enclosures, a fixed water bath with a drain installed is a possibility. In large setups, a filtration system can help to keep the water clean, but does not replace frequent water changes when the bin or bath is soiled.

A tropical, forest-like environment needs to be created in captivity to keep these lizards happy. Humidity levels of 60-80% need to be maintained with hand-misting or an automated fogger or mister, or increasing water movement in the water dish (like a bubbling air stone or filter powerhead).

#### **5. Environment: Lighting**

These lizards need a broad spectrum light source that provides UV-B radiation to allow for normal calcium metabolism, and UV-A to help with prey identification. Please see our handout on lighting for reptiles for more information.

#### **6. Nutrition**

These lizards are primarily insectivorous but as they grow they tend to be more omnivorous. A number of feeder invertebrates are commercially available:

- House Cricket, *Grylloides sigillatus* and *Acheta domestica*: Crickets are bred by the tens of thousands in commercial facilities, and are available in many pet shops in multiple size categories to feed to different species. Crickets are a good staple feeder and offer an opportunity for the gecko to exercise as they chase them. Crickets tend to be poorly fed in most pet shops and need gut-loading and supplementation to make them a more nutritionally complete meal.
- Mealworms, *Tenebrio molitor*: Mealworms are the larvae of a species of darkling beetle. They also need gut-loading and supplements to make them more nutritious.
- Superworms, *Zophobas morio*: Superworms are the larvae of a different species of darkling beetle. Although they are “meatier” and larger than mealworms, they still require gut-loading and supplements.
- Waxworms, *Achroia grisella* and *Galleria mellonella*: Two species of wax moths are commonly bred as feeders and bait. Their larvae, or caterpillars, are waxworms. These feeder insects are naturally calcium-rich, but also have a high fat content. They should be fed only occasionally to avoid obesity.

- Canadian Nightcrawlers, *Lumbricus terrestris*: This is a large species of earthworm (not an insect) that makes a great feeder treat as they are often high in calcium and protein. Please note that some earthworms that are harvested to use as fishing bait are caught using a detergent solution to force them to emerge from the soil, so check with your supplier to ensure that this is not the case as it may cause serious digestive upset to your lizard.
- Hornworms or Goliath Worms, *Manduca sexta*: These large, green caterpillars are becoming more commonly available as feeders. They are a great treat to offer lots of moisture and protein to your lizard, and their bright colour can stimulate even picky eaters to feed. Hornworms are commercially-raised on a special diet, so gut-loading with other foods is not possible. It is important to note that these caterpillars are the larvae of the Tobacco Moth, and wild-caught specimens are toxic because of their natural diet.
- Silkworms, *Bombyx mori*: Silkworms are the caterpillar of the Silkmother. They are bright-coloured and a great source of protein and moisture. Silkworms are raised on a mulberry foliage meal, and cannot be fed other gut-load diets.

As these lizards are diurnal, they should ideally be fed during the day when they are normally active. Water dragons may be fed daily as juveniles, and several times a week as adults, and any uneaten prey should be removed from the enclosure after a few hours to prevent escape and spoilage.

Please see our handout on insectivorous reptile nutrition for further information on gut-loading insects and using supplements.

Water dragons will often enjoy meals of vertebrate prey, such as pinkie mice and small fish (such as guppies). This prey must be fed sparingly, as they contribute to obesity in captive animals. Cyprinid fish (members of the carp family, such as goldfish) should not be fed regularly as they contain an "antinutrient" enzyme (thiaminase) that may cause vitamin B deficiency.

Adult water dragons will sometimes eat fruits and vegetables. Calcium-rich greens such as collards and dandelions may be offered, although these lizards often prefer sweet, brightly coloured fruits like melons, stone fruits (peaches, apricot, etc.), and berries. All produce should be washed and offered chopped or shredded.

## 7. Health

Good husbandry helps prevent most health problems in reptiles. As ectotherms, their immune system function is directly affected by both stress and their ability to thermoregulate, so proper environmental temperatures are critical. There are some other common health problems that you can avoid with the right precautions.

Parasites are unfortunately very common in captive reptiles due to overcrowded, stressful conditions and poor hygiene in pet stores and some breeding operations. Many parasites that affect water dragons have a direct life cycle, meaning that they require no other species to help transmit them. Parasites like this tend to accumulate in captive reptiles and cause disease. Fecal testing is required to determine what kind of parasites your lizard may have so that the appropriate medication can be prescribed.

These lizards may drop their tails when grabbed or otherwise startled, a defensive behaviour called caudal autotomy. The self-amputated tail will twitch with the purpose of distracting a predator so that the lizard may escape. Young water dragons may be more likely to autotomize their tail; this necessitates gentle handling. Never grab a lizard by the tail. Autotomized tails will regrow with a cartilaginous rod instead of bones, and the scale texture and colour will not be the same as the original tail.

Water dragons can become easily stressed by an inadequate environment, and "cage rubbing" is a common behaviour where the animal scratches or rubs its face incessantly at the cage walls. This may especially happen on transparent cage barriers like glass or even screen. Lizards will self-traumatize to the point of rubbing off flesh and causing bone infection if this behaviour is not corrected promptly. It is difficult to predict the exact cause, although an environmental deficiency is almost always the problem. Verifying that the temperature gradient is correct, adding more hiding spots, and considering that cagemates may be a source of stress are all things to consider. Covering the cage rubbing location does not always cure the problem, as many lizard seem to remember that the location was once transparent and will continue to rub or scratch there. If your water dragon is engaged in this behaviour, please consult with our staff if it cannot be corrected promptly.

Water dragons belong to the family Agamidae, which are partly characterized by their jaw and tooth structure. These lizards have an acrodont dentition, meaning that the teeth sit on top of the jaw bone and not in a tooth socket. While it is not entirely understood why, this anatomy predisposes them to periodontal disease as they age. Regular monitoring of your lizard's oral health is part of keeping them healthy.

## Companion Animal Hospital Exotic Animal Care



### Lighting for Reptiles and Amphibians

Some reptiles and amphibians require broad spectrum lighting that includes ultraviolet A and ultraviolet B radiation (wavelengths found in natural sunlight). Providing this special lighting in captivity is critical for the health of many common companion species.

#### 1. What is ultraviolet light?

Ultraviolet light is invisible to the human eye, but important to many members of the animal kingdom. There are three classifications of ultraviolet light:

- **Ultraviolet A:** UVA is also called long wave or "black light" ultraviolet radiation. This class of UV is important in regulating natural cycles in some reptiles, such as brumation ("hibernation") and reproduction.

Many species of reptile (Fleishman et al. 1993), insects (Salcedo et al. 2003) and birds (Cuthill et al. 2000) can see UVA light. It is important in helping to see members of the same species or even prey. It has been demonstrated that reptiles provided with UVA light generally do better in captivity, with increased levels of natural activities, greater reproductive success, and better appetites (Klaphake et al. 2004).

UVA is produced by the sun, by broad spectrum fluorescent bulbs and black lights (Gehrmann 2006).

UVA is definitely beneficial to diurnal species (species active during daylight hours). It may be most important in visually-oriented species, like members of the iguana (Iguanidae), agama or dragon (Agamidae) and true chameleon (Chamaeleonidae) families of lizards, as well as in turtle and tortoise species.

- **Ultraviolet B:** UVB is also called medium wave ultraviolet radiation, and is essential in vitamin D<sub>3</sub> production (the "sunshine vitamin"). Vitamin D<sub>3</sub> allows the body to use calcium from the diet. Some species can use vitamin D<sub>3</sub> from dietary sources (animal matter), but many species either cannot absorb dietary D<sub>3</sub> or do not encounter vitamin D<sub>3</sub> in their natural diet.

It is uncertain whether reptiles can see or detect UVB. It is produced by the sun, and by some broad spectrum artificial lighting (Gehrmann 2006).

UVB is important to provide for most diurnal lizards, chelonians and some amphibians. Herbivorous (plant-eating) animals absolutely need UVB lighting as they cannot use dietary vitamin D<sub>3</sub>. Without UVB lighting, calcium deficiency occurs and manifests as many health problems, including the metabolic bone diseases (a group of pathologies related to calcium metabolism).

There is a growing amount of research suggesting that species that we have not traditionally recommended UV-B lighting for can benefit from exposure. For example, some studies (Acierno et al 2008, Hedley and Eatwell 2013) have demonstrated that snakes can certainly use UV-B lighting. More investigation is needed to determine the health benefits of providing broad spectrum lighting to these species, however in the meantime it may be safest to allow for lighting that is as natural as possible for these captive snakes.

- **Ultraviolet C:** UVC, or short wave ultraviolet radiation, is produced by the sun but filtered by our atmosphere. Some lights will produce UVC radiation very close to the bulb surface. It is germicidal and used in air and water disinfection systems. Exposure to UVC radiation is harmful to the skin and eyes, and does not need to be provided to reptiles or amphibians in captivity.

## 2. Types of broad-spectrum lights

There are several types of commercial bulb available to provide your companion animal with broad spectrum lighting. Select a bulb according to the animal you have, and the type of enclosure you are using.

- Linear fluorescents are suitable for enclosures with a lot of floor space, as well as for long animals that have a large body area that needs UV exposure. Examples of brands include: **Exo Terra Repti Glo** by Hagen, **Iguana Light** and **Reptisun** by Zoo Med, **Desert Series 50** and **Tropical Series 25** by Zilla.



- Compact fluorescents are limited in their "spread" (place them horizontally towards the basking area, to increase surface area exposed) but have a greater relative irradiance closer to the bulb, so they are more suitable for small enclosures. Examples of brands include: **Exo Terra Repti Glo** by Hagen, **Reptisun** by Zoo Med, **Desert Series 50** and **Tropical Series 25** by Zilla.



- Mercury vapour lamps are only suitable for very large enclosures. They produce a large amount of heat as well as visible light, UVA and UVB (Baines et al. 2006). Users must be very

careful to avoid thermal burns, always test the environmental temperatures before introducing your pet to the enclosure when using a mercury vapour lamp.

Examples of brands include:

**PowerSun UV** by Zoo Med, **Exo Terra Solar Glo** by Hagen.



### 3. Using broad-spectrum lighting

Keep the following points in consideration when lighting reptile or amphibian enclosure:

- Always research recent current care information about what kind of lighting your species needs. Reptile and amphibian care and medicine is a field that is constantly evolving.
- Never allow a glass or plastic barrier to occlude your broad spectrum light. Glass and plastic filter 99-100% of UVB radiation, even if visible light may pass through (Baines et al. 2006).
- The amount of UV produced decreases with distance from the bulb. Most bulbs are effective at a distance of less than 30 cm (12") from the basking spot (but read the manufacturer's recommendations). However, because bulbs may also produce small amounts of harmful UVC radiation near the bulb's surface, keep a minimum distance of 10 cm (4") (Baines et al. 2006).
- Screen or mesh covers or enclosures will physically block some UV from reaching the animal (Baines et al. 2006). If you have mesh or screen between your broad spectrum bulb and the animal, ensure that your pet can get relatively close to the bulb, or add a reflector to increase how much UV is projected to the basking spot.
- Reptiles and amphibians are never in direct sunlight for the entire day. Always ensure that your pet can choose a location as a shelter from UV light exposure.
- Replace the light every 6-12 months, or according to the manufacturer's recommendations. The UV output of a bulb decreases over time, even if the light is still producing visible light (Klaphake et al. 2003).

- Consider using "high output" bulbs (with an 8.0 or 10.0 rating) with species that would be exposed to a lot of UV light (like desert animals) or in large enclosures, and mid-range output bulbs (5.0) with other species or in smaller enclosures. Low output bulbs (2.0) are probably useless in terms of UVB output.

Thank you for your trust in taking care of your reptile companion. If you have any questions or concerns about his or her care at home, please call the hospital to speak with our staff.

#### 4. Sources and further reading

- Acierno, MJ, MA Mitchell, TT Zachariah, MK Roundtree, MS Kirchgessner, D Sanchez-Migallon Guzman. 2008. Effects of ultraviolet radiation on plasma 25-hydroxyvitamin D3 concentrations in corn snakes (*Elaphe guttata*). *American Journal of Veterinary Research*, 69(2):294-297.
- Baines, F, A Beveridge, R Hitch and R Lane. 2006. UVGuide.co.uk. <<http://www.uvguide.co.uk>>
- Cuthill, IC, JC Partridge, ATD Bennett, ST Church, NS Hart and S Hunt. 2000. Ultraviolet Vision in Birds. In JBP Slater (ed.), *Advances in the Study of Behavior*. Vol. 29. Saunders Elsevier, St. Louis, U.S.A.
- Fleishman, LJ, ER Loew and M Leal. 1993. Ultraviolet vision in lizards. *Nature*, 365:39.
- Gehrman, WH . 2006. Artificial Lighting. In DR Mader (ed.), *Reptile Medicine and Surgery*. 2nd ed. Saunders Elsevier, St. Louis, U.S.A.
- Hedley, J and K Eatwell. 2013. The effects of UV light on calcium metabolism in ball pythons (*Python regius*). *Veterinary Record*, 173:345.
- Klaphake, E, E Adkins, T Driggers, G Ferguson, W Gehrman, Z Gyimesi, E May, M Ogle and T Owens. 2003. Roundtable: Ultraviolet Light and Reptiles, Amphibians. *Journal of Herpetological Medicine and Surgery*, 13:27-37.
- Salcedo, E, L Zheng, M Phistry, EE Bagg and SG Britt. 2003. Molecular Basis for Ultraviolet Vision in Invertebrates. *The Journal of Neuroscience*, 23:10873-10878.

### Companion Animal Hospital Exotic Animal Care



### Insect-eating Reptile and Amphibian Nutrition

Insectivores are animals that eat insects and other arthropods. Captive insectivores require special attention to their nutrition, as commercially-available insects do not match the nutrition that a wild animal obtains from eating hundreds if not thousands of different prey species.

#### 1. Gut-loading prey

Most commercially-raised insects are nutrient-poor until they have been fed a nutritious meal. This is partially for cost-effective insect breeding (they do not need optimal nutrition to breed in vast numbers), and partially because feeding nutrient-rich foods can affect their lifespan.

There are a number of gut-loading diets available commercially. Please consult with our staff for product recommendations. Most diets are recommended to be fed to insects for 24-48 hours before those insects are then fed to your reptile or amphibian.

Feeding cat and dog food as a gut-load is not recommended. While they are an excellent source of some nutrients, they are a significant source of cholesterol. Insects cannot synthesize their own sterol molecules (including cholesterol), and are not a common natural source of cholesterol unless they eat other cholesterol-containing animals. Dogs and cats need dietary cholesterol, but it can lead to serious health issues in insectivores that have not adapted to needing it in their diet.

Prey insects should always be kept in clean, well-ventilated containers to prevent mold growth. Feeding prey raised in moldy, unsanitary conditions will contribute to disease in your pet.

## 2. Supplements

Even with an excellent gut-load product, supplements are strongly recommended to ensure that your reptile or amphibian is getting balanced nutrition. Powdered supplements are dusted onto insect prey before they are offered to your pet. Because the powder can fall off in the enclosure, it is important to offer dusted insects when your reptile or amphibian is most active.

Arguably the most important supplement is calcium. Most insect species commonly fed as prey (including crickets, mealworms, superworms, and others) have very poor calcium content, and an inverted calcium-to-phosphorus ratio (Ca:P). This is the proportion of calcium and phosphorus in any food, an important value to consider as these two mineral nutrients have a close relationship. The target dietary Ca:P for insectivores is 1.5-2.0:1 (one and a half to twice as much calcium compared to phosphorus). Few commercial insects naturally have this calcium content, so supplements are necessary.

It is recommended that every insect meal with naturally poor calcium content be dusted with a calcium supplement, unless you are feeding a very high-calcium gut-load meal to your insects. Calcium carbonate is the most common supplement form, and there should be no added phosphorus or vitamin D<sub>3</sub>.

For insectivores that do not have any broad spectrum (UV-B) lighting, a calcium supplement with vitamin D<sub>3</sub> should be used regularly as this vitamin is necessary for calcium metabolism. Most reptiles and amphibians can manufacture their own vitamin D<sub>3</sub> from this special artificial light that replaces sunlight, and this is the safest way to provide vitamin D<sub>3</sub>. Oral vitamin D<sub>3</sub> supplements can be used cautiously; over-supplementation causes vitamin toxicity which will

lead to organ failure and death. There is very little data available on minimum vitamin D<sub>3</sub> requirements and how much is required to cause toxicity in the thousands of reptile and amphibian species. Using a calcium plus D<sub>3</sub> supplement is generally recommended every 5-10 meals; however this is only a general guideline. When UV-B lighting is available, there may be no need for oral supplementation. Note that no toxicity can occur from using UV-B lighting, and is much safer than “guessing” at oral D<sub>3</sub> supplementation.

A general multivitamin and mineral supplement can help ensure that your pet is not missing any micronutrients (nutrients that are needed in small quantities, and may not be found in every meal). Like with vitamin D<sub>3</sub>-containing supplements, over-supplementation can cause toxicities.

Unfortunately, there are many products available in the pet industry that do not offer a guaranteed analysis of the nutrient content. Please consult with our hospital staff for product recommendations.