



# Masters of Disguise

## Natural History and Care of Australian Leaf-tailed Geckos

*Rob Porter, a Gecko specialist and one of Australia's most experienced reptile keepers, outlines the captive care requirements of these beautiful and cryptic lizards.*

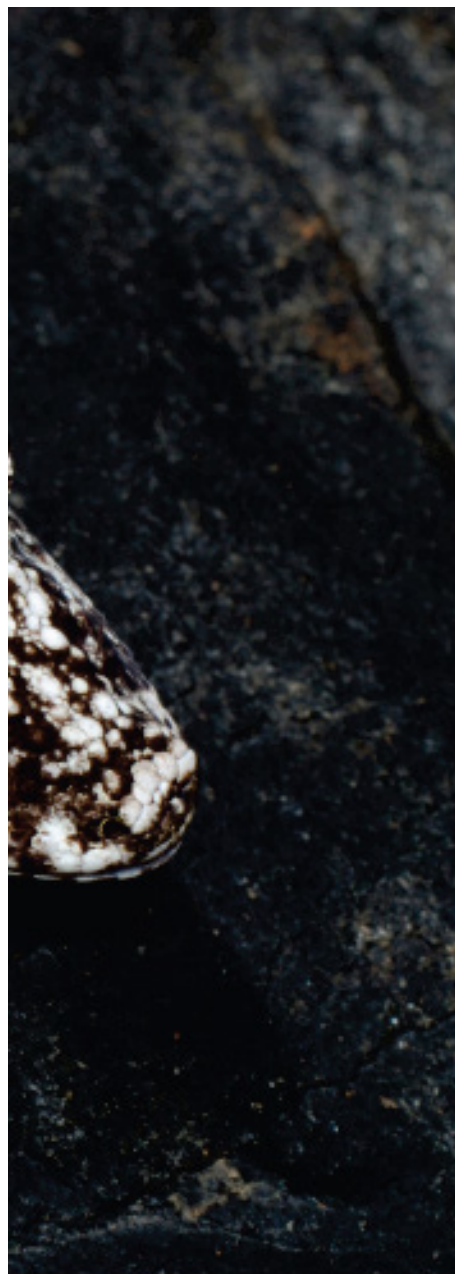
Nature really is a wonderful thing. Everywhere we look around us, animals and plants have developed amazing and bizarre adaptations through the forces of natural selection, to slightly increase their chances of survival over their relatives who lack these characteristics. Many of these features provide their owner an improved ability to avoid detection by predators, usually by some enhancement to their camouflage, allowing them to blend into their environment more efficiently. One group that is a true exponent of this art is the Leaf-tailed Gecko, the best known of which possess a broad, fleshy tail that is distinctly leaf-shaped and further ornamented with spines and tubercles to assist the gecko to disappear into the background. The effect of this is to break up the outline of the lizard and confuse any potential predator. In the event that the predator sees through the illusion, the gecko can revert to the tried and tested lizard escape tactic of dropping its tail as a distraction, although unlike some other species, leaf-tails only possess one fracture plane at the base of the tail so the whole appendage has to be shed and a complete new one regenerated. This regrown tail never has the same colour or ornamentation of the original but its distinctive shape is retained.

As well as assisting with concealment, the bizarre tail is also used as a threat and as a method of communication with other Leaf-tails. In the event of a trespass into its personal space, either by a predator or another Leaf-tail, many species will respond by arching the body towards the intruder and then raising the tail almost vertically and tilting it in the same direction. The wide, flat tail is then sinuously waved from side to side like a flag, exaggerating the size of the gecko and showing that it is ready to defend itself and its territory. If this technique is unsuccessful, the next step is to lunge at the opposition, often with back-up from the waving tail, and to complete with raspy squeaks as an additional deterrent.

There are currently 15 species of Leaf-tailed Gecko recognised in Australia, spread over three genera (see Table 1). *Saltuarius* contains six species confined to the east coast of Australia, from northern New South Wales to the southern part of Cape York. These are the biggest of the Australian species, with some specimens exceeding 140mm in snout-vent length and a total length of over 250mm. *Orraya* has only one species from the McIlwraith Range in far North Queensland. It is a strange gecko with a very elongated neck and oval shaped

tail. Finally, *Phyllurus* contains nine of the smallest species including the most commonly encountered of the group, the Sydney Broad-tailed Gecko (*P. platurus*), and a couple of species that are classed as Leaf-tailed Geckos but have a cylindrical tail more normally encountered in other lizard species. Several new species have been described in recent years and undoubtedly more remain to be named. Many of the new species are restricted to single mountains or small highland ranges isolated from their compatriots by changes in climate and vegetation during recent millennia.

The group as a whole is largely confined to moist, heavily forested habitats and are often associated with rock outcrops or boulder fields. Some, such as the Northern Leaf-tail (*S. comutus*) are predominantly rainforest inhabitants, while others such as the Sydney Broad-tail and the Granite Belt Leaf-tail (*S. wyberba*) are primarily associated with rock escarpments and outcrops of sandstone and granite. Like most geckos, they are totally nocturnal, emerging from their daytime retreats in hollow trees and rock crevices to lie in wait for unsuspecting prey to pass by. Typically, this ambush mode consists of the lizard's remaining motionless in a vertical position



Opposite page: *Saltuarius saltator*. Above from top: *Saltuarius saltator*, *Saltuarius cornutus*. Photographs by Gunther Schmidt.

almost invariably with the head down, possibly an indication that much of their diet consists of ground-dwelling invertebrates. The strike to capture the meal is rapid and powerful, so much so that lunges near rocks or other hard surfaces can cause injury to the gecko's jaw if its judgement is imprecise. Some species can be active at surprisingly cold temperatures, certainly lower than that usually associated with most reptile activity. The Granite Belt Leaf-tail, for example, has been observed actively moving around at night at temperatures as low as 10°C. Indeed, the group as a whole seems to have very low heat requirements for normal activity and metabolic functions. Most are very sensitive to high temperatures, especially the more southern species, which may succumb at temperatures that are in the mid-30°C for any length of time.

The general design of the leaf-like tail is evidently quite successful, as another group of unrelated geckos has developed the same feature, a process known as convergent evolution. The Leaf-tailed Geckos of Madagascar, off the east coast of Africa, are similar in many ways to the Australian species, including attaining large sizes and adopting the same ambush, head-down hunting posture.

Some have taken their camouflage techniques a step further though, with the smaller species having tails with a central leaf vein and even small areas missing as if leaf-eating insects had taken bites out of them!

#### Leaf-tails in Captivity

Although most Leaf-tail species are relatively easy to care for in captivity, their numbers have always been quite low and the range of available species very restricted. This is more a reflection of their secretive habits and restricted distribution ranges than a lack of interest from Australian hobbyists. The most common and easily accessible Leaf-tails such as the Sydney Broad-tail, the Southern Rainforest Leaf-tail (*S. swaini*) and the Rough-throated Leaf-tail (*S. saltator*) have become quite popular captive subjects in recent years and are bred on a regular basis. The Northern Leaf-tail (*S. cornutus*) and the small, round-tailed *Phyllurus caudimaculatus* are available from time to time but the other species including *Orraya* are almost non-existent in captivity. In general they are relatively undemanding captives; however, their main drawback is that some species can be very sensitive to heat and will need protection during extreme weather. As mentioned earlier,

the southern species, in particular, suffer when temperatures are in the mid to high 30s for any length of time. By comparison, the Rough-throated Leaf-tail is quite a hardy beast and will tolerate these temperatures with no ill effects.

As all species climb to some extent, a vertically orientated cage is preferred; around 40x35x50cm high would suit the smaller *Phyllurus* species, and 50x35x70cm high for *Saltuarius* species. All species require a relatively high constant humidity, so it is important that the enclosure be constructed out of resilient materials that can withstand moisture. Glass, 'Perspex', aluminium or galvanised steel are ideal but timber is also an option, as long as it is well protected. Stay clear of MDF or particle board as these always seem to suffer, and will deteriorate quickly with prolonged exposure to humid conditions.

Although a relatively high humidity is essential for most species of Leaf-tail, this must never be associated with poor ventilation. This combination is a recipe for disaster, as the stale, static moist air will accelerate the establishment and proliferation of potentially harmful bacteria and fungi. Theoretically, the more ventilation provided the better; however, there is a trade-off, as increasing the amount of air turnover

scales' feature



within the cage will make it difficult to maintain the levels of humidity at certain times of the year. A system incorporating small vents at the bottom and larger ones at the top will encourage a flow-through effect. As the warmer air escapes from the top, fresh, cooler air will be drawn in at the bottom. Make sure all vents are secure and covered with metal insect mesh, not the soft plastic or nylon type which tear very easily and through which food insects such as crickets will readily chew holes.

As rock or tree inhabitants, Leaf-tails require plenty of climbing accessories in their enclosure. The best options are tree bark and branches, preferably those with a rough texture to provide grip for these acrobatic reptiles. Several layers of bark standing vertically in the cage will serve both as climbing frames and also as secure refuges for the inhabitants that can squeeze themselves into the tight gaps between the strips. Pieces of flat rock also work well but can be extremely dangerous in enclosures if they are not secured in some way. Loose stone can shift suddenly crushing unsuspecting lizards, causing the loss of tails or limbs at best, and possibly even death.

Nocturnal inhabitants of rocky outcrops and dense forests, Leaf-tailed Geckos have fairly low requirements for both light and heat. It is important to provide some degree of daily light cycle, though no special ultraviolet lighting is required and a nearby window may be all that is necessary to ensure the geckos are exposed to natural light fluctuations. Their

sensitivity to heat is reflected in their general lack of thermoregulatory behaviour. They are reptiles, all of which require some source of heat to maintain their body at a temperature that permits them to carry out all of their normal metabolic functions. Consequently, it is advisable to provide some form of gentle heat source to allow them to raise their body temperature if they so desire. A small discreet 'hot-spot' of around 30-32°C should suffice in most cases, either as a heat pad or a low wattage light bulb, the latter preferably blue or red in colour as the lizards are less sensitive to these wavelengths. These bulbs can be left on 24 hours a day if necessary without stressing the geckos.

Much has been made above of the humidity requirements for most leaf-tail species. This is indeed the case, but it must be remembered that the amount of moisture in their captive environment is relatively high. In other words, it is more than that required by many other captive reptiles; bearded dragons, shinglebacks and most snakes, for example. This does not mean that Leaf-tails require an enclosure that is permanently damp, only that the relative humidity within the enclosure be regularly raised to an acceptable level and then gradually allowed to decrease over time. This scenario can be achieved in a couple of ways, the easiest being regular application of water over the entire enclosure, in a fine spray or mist from a pressure sprayer. The amount and regularity of the application is dependent on various



Opposite page: *Phyllurus caudimaculatus*. This page from top: *Saltuarius wyberba*, *Saltuarius swaini*, *Saltuarius wyberba*. Photographs by Gunther Schmida.

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*Saltuarius moritzii*. Photographs by Gunther Schmid.

factors including the species concerned, the time of year and the prevailing temperatures and humidity. During hot weather, two or even more applications per day may be required. However, normally a light spray every 2-3 days should suffice, reducing to twice a week during cooler periods when the lizards are less active. Regardless of these variables it is advisable that the enclosure be permitted to dry out for short periods of time between sprayings. Another more long lasting option is to provide a source of humidity within the enclosure. An open topped plastic container of moist sphagnum moss, or other type of moisture retentive medium, can be installed into the enclosure and moistened as required. Water in the medium will slowly evaporate providing a cooling effect as well as maintaining the humidity. The other benefit of this type of furnishing is that female geckos can use the medium as an egg-laying site when required, burying their eggs in a moist substrate to ensure they do not dehydrate. A small dish of clean, fresh water should also be supplied in the cage at all times.

Monitor the skin condition of leaf-tails very closely as this will be the best indicator that the captive environment is suitable. Pieces of retained skin after sloughing, particularly around the toes, head and tail, are usually the first indication that insufficient humidity has been provided. If this does occur, it isn't necessary to soak the lizards in an attempt to remove the old skin, just ensure that humidity levels are raised and old skin sloughed off at the next skin shed. If the cage is too moist, blistering of the ventral surface, or fungal infections of the skin will become evident, and will need to be treated by a veterinarian. Adjustments to the captive

environment will need to be made.

Most leaf-tails will accept a wide variety of invertebrate food items, including all the readily available commercially produced insects such as crickets, cockroaches, mealworms and grasshoppers. The larger species in the group can tackle quite substantial prey items such as the grasshoppers, cicadas, giant mealworms, etc. None of the species has a big appetite, probably a reflection of their relatively low activity and metabolic rates. Adults of most species will thrive on two feeds a week consisting of 4-5 appropriately sized prey items. This feeding rate can be increased to three times per week for breeding females and juveniles. As finely-tuned ambush hunters, Leaf-tails will usually have no problem locating live food items in their enclosure. However, training specimens to accept prey from forceps is a good habit to get into as it will enable a keeper to ensure all captives are receiving their fair share of food items. Dusting of food insects with calcium powder should be carried out once a week and a combination of calcium with D3 plus a multivitamin powder should be added to food items approximately every 7-10 days.

#### Captive Reproduction

Leaf-tailed Geckos are relatively slow growing compared to some other gecko species. The larger varieties in particular may take 3-4 years to reach reproductive size; the smaller *Phyllurus* species usually takes 2-3 years. Sexing is relatively straightforward, and is effected by examination of the underside of the base of the tail region. Males exhibit hemipenial swellings on each side and posterior to the vent. They are also generally less robust than females in all

species, especially around the abdominal area. Sexing is usually possible once juveniles reach 10-14 months of age.

All Leaf-tails can be maintained together in pairs, or trios of one male and two females, all year round. No separation is required to achieve successful reproduction. While males are less aggressive towards each other than some other gecko groups, if breeding is planned, it is not advisable to keep more than one male in an enclosure as this can cause some stress and disruption amongst the cage's occupants and possibly hinder mating activity. A winter cooling period is probably beneficial for stimulating breeding in most species and is essential in southern species such as the Granite Belt Leaf-tail (*S. wyberba*). Mating usually begins in early spring (August-September), with the first clutches of two eggs being produced by most species in late September-October. The developing eggs can be observed in the abdomen of smaller species but the thicker skin of the large *Saltuarius* species makes it harder to observe the eggs until they are fairly well formed. The group can be quite productive with females producing 3-4 clutches per season with a 28-40 day interval between clutches.

Like most Australian geckos, Leaf-tails produce a flexible parchment-shelled egg that will rapidly dehydrate and shrivel if not maintained in a moist, humid environment. To ensure eggs remain in good condition and thus viable, a suitable oviposition site should be provided at all times during the breeding season. The simplest way to do this is to provide an area of the enclosure where the substrate is 60-70mm deep and is kept constantly moist. Alternatively, a container of moist media such

as fine sand or a sand/coco peat mixture should be introduced into the cage and watered regularly to make sure it doesn't dry out. Care should be taken not to overdo the watering and saturate the mix; it only needs to be moist, not wet. Female geckos will locate this moist area and will sometimes dig a test hole 24 hours or so before the actual egg laying takes place. In some species, oviposition can be identified by the mounding up of the substrate over the egg laying site. In others, evidence is less obvious and it is a good idea to monitor the condition of the gravid female and look for a sudden loss of weight.

Once the eggs have been located, they should be removed to an incubation container to ensure they are not disturbed by the further digging of gravid females. Leaf-tail eggs can be incubated in a range of media including vermiculite, perlite or sphagnum moss as long as the moisture level is maintained throughout the incubation period. A 1:1 ratio (by weight) of substrate to water should be used for vermiculite and perlite, and a 1:8 ratio with sphagnum moss. Ideally, the whole container, including media and eggs, should be weighed when set up, and then reweighed several times through the incubation period. Any lost moisture should be added back to the system via the media. DO NOT pour water directly over the eggs themselves. Always add it to the surrounding substrate. The container should be sealed, but the lid should also be removed to allow air exchange for a short period every week. All Leaf-tail species require a relatively low incubation temperature. Most southern species, such as *S. swaini*, *S. montzi*, *S. wyberba* and *P. caudimaculatus*, require temperatures between 22 and 26°C, for successful incubation. Should the temperature rise higher than this for extended periods, the developing embryo will die in the egg. The northern species, plus the Sydney Broad-tail, seem to be able to tolerate slightly higher temperatures, although they should still be maintained between 24 and 28°C, which is lower than usual gecko incubation temperatures. These reduced incubation temperatures affect the length of egg incubation in the group, which in most species is around 80-110 days.

Hatchling Leaf-tailed Geckos are exquisite miniature replicas of the adults, complete with cryptic markings and their beautifully

*Saltuarius cornutus* and close-up. Photographs by Gunther Schmid.



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# Leaf-tailed Geckos make fascinating captive subjects

*Phyllurus  
caudiannulatus.*  
Photographs by  
Gunther Schmidt.

ornamented tails. Set hatchlings up in small containers initially to ensure they regularly come in contact with food items. A container around 20x20x25cm high is perfect for 2-3 hatchlings for the first 4-6 months. The furnishings should be similar in fashion to those in the adult enclosure, with vertical strips of bark to provide plenty of hiding spots. No water dish should be supplied initially as this will only serve as a drowning spot for feed insects. Instead, spray the cage regularly (3-4 times a week should be sufficient), allowing it to dry out between sprayings. Hatchlings usually aren't interested in food until they are 5-7 days old, at which stage small crickets are the ideal starting food.

Leaf-tails are not big eaters so don't provide too many food items at one time, otherwise they will be left to run around the cage and will rapidly lose their nutritional value. Instead, offer 2-3 crickets for each gecko, 2-3 times a week, dusting with a calcium/multivitamin powder once a week and with straight calcium powder at other feeds. Calcium is very important for growing Leaf-tails, and if it is not provided regularly, spinal deformities can develop as the gecko grows.

Leaf-tailed Geckos make fascinating captive subjects, and although some species do have a reputation for being a little delicate when it comes to heat and dryness, others are

hardy, easy care reptiles. In my opinion, the best of the bunch is the Rough-throated Leaf-tail, *S. salebrosus*. This species is large and spectacular, very easy to maintain and breed and is probably the toughest of the group when it comes to the captive environment. It is also a long-lived species, with a life expectancy in captivity probably exceeding 25 years. While availability is still low, small numbers are bred every year and they are well worth tracking down and acquiring. They are truly unique and amazing members of the Australian herpetofauna.

Table 1. List of currently described Australian Leaf-tailed Gecko species.

SPECIES	DISTRIBUTION
<i>Orraya occellus</i>	McIlwraith Ranges, North Queensland
<i>Phyllurus amnicola</i>	Mt. Elliot, North Queensland
<i>Phyllurus caudiannulatus</i>	Bulburin and Oakview State Forests, South-east Queensland
<i>Phyllurus championae</i>	Cameron Creek and Blue Mountain, Central eastern Queensland
<i>Phyllurus gulbaru</i>	Paluma Range, North Queensland
<i>Phyllurus isis</i>	Mt Blackwood and Mt Jukes, Central eastern Queensland
<i>Phyllurus kabikabi</i>	Oakview State Forest, South-east Queensland
<i>Phyllurus nephtys</i>	Clarke Range, Central eastern Queensland
<i>Phyllurus ossa</i>	Mt Ossa, Mt Charlton, Mt Dryander and Conway Range, Central eastern Queensland
<i>Phyllurus platurus</i>	Sydney sandstone basin from NSW Central Coast to Kiama in the south
<i>Saltuarius cornutus</i>	Rainforests of North Queensland from Cooktown to south of Cairns
<i>Saltuarius kaliae</i>	Richmond Ranges, North-east NSW
<i>Saltuarius moritzi</i>	North-east NSW from around Coffs Harbour south to Buladelah
<i>Saltuarius salebrosus</i>	Several scattered populations in Southern Queensland from Blackdown Tableland south to Bulburin State Forest
<i>Saltuarius swaini</i>	Rainforests of North-east NSW and South-east Queensland
<i>Saltuarius wyberba</i>	Granite belt of North-eastern NSW and South-eastern Queensland