



# SMITHSONIAN NATURE GUIDE



CROCODILE NEWT



TURQUOISE DWARF GECKO



LEOPARD TORTOISE



RED-EYED LEAF FROG

# SNAKES AND OTHER REPTILES AND AMPHIBIANS



THE WORLD IN YOUR HANDS





NATURE GUIDE  
**AND**  
**OTHER**  
**REPTILES AND AMPHIBIANS**







Smithsonian



NATURE GUIDE

# SNAKES AND OTHER REPTILES AND AMPHIBIANS

REPTILES AND AMPHIBIANS

Chris Mattison





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### CONSULTANT

**Jeremy F. Jacobs**, Collections Manager, Division of Amphibians and Reptiles,  
National Museum of Natural History, Smithsonian Institution

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## HOW THE SPECIES PROFILES WORK

order common name

profile information

family name

214 TURTLES | EMYDIDAE

**PROFILE**

- North America, and Central South America, where they are found
- Family: chelonians, emyids, and testudines
- Shell 40–50 cm (16–20 in)
- Egg laying
- 1–2
- Diurnal
- Leaf eaters

Yellow markings

Yellow stripes

Dark yellow plastron

Yellow markings on the carapace become darker with age

head and shell and jaw yellow

**Yellow-bellied slider**

*Trachemys scripta*

**YELLOW-BELLIED SLIDER**

This widespread turtle occurs in many different guises, some of which are recognized as subspecies. Aside from being smaller, male yellow-bellied sliders are also darker in color than the females and the claws on their front feet are much longer. They use these claws during courtship to tickle the female's chin and the sides of her head while swimming backward in front of her. Often seen basking, these turtles are so-called because of their habit of sliding into the water at the slightest disturbance. Breeding usually takes place in spring and summer. The time of nesting, however, depends on the climate at any given locality—the eggs of the northern populations may overwinter in the nest, whereas they hatch the same year further south.

**Similar species**

*Trachemys scripta*

**Red-eared turtle (E. elegans)**

The red-eared subspecies is identified by a prominent red stripe behind the eyes.

215 TURTLES | TESTUDINIDAE

**PROFILE**

- Madagascar
- 1–10
- Diurnal
- Critically Endangered
- Egg laying
- 1–10
- Diurnal
- Critically Endangered

Dark brown carapace with 10 broad, dark, wavy bands. The radiated tortoise carapace is extremely tough, making it difficult for predators to break into.

Dark brown carapace with 10 broad, dark, wavy bands. The radiated tortoise carapace is extremely tough, making it difficult for predators to break into.

Dark brown carapace with 10 broad, dark, wavy bands. The radiated tortoise carapace is extremely tough, making it difficult for predators to break into.

**Similar species**

*Astrochelys radiata*

**RADIATED TORTOISE**

The radiated tortoise is one of the most attractive species in the world. The heavily constructed high-domed shell is marked with striking pale lines that radiate from the center of each dark scute. At the end of the wet season, females lay their eggs in holes, and the eggs can take up to eight months to hatch. The hatchlings are very small, with more rounded shells than those of adults. This species feeds on succulent vegetation, including the pads of the introduced prickly pear, cactus, and can live for well over 100 years. It has, however, been hunted by people for food, and its present range is only a small portion of what it used to be. More recently, it has also been collected for the pet trade, despite being protected. Breeding programs in Madagascar and in other countries are helping to increase numbers, but releasing them into the wild will not be effective until adequate protection is in place.

### KEY

- Distribution
- Habitat
- Length
- Reproduction
- Number of broods or eggs
- Active
- Venomous
- IUCN Red List status

scientific name of the main species

subspecies or variation of main species

similar species









# INTRODUCTION

# WHAT ARE REPTILES AND AMPHIBIANS?

**Although reptiles and amphibians belong to two distinct taxonomic groups, they are traditionally studied together: they tend to be found in the same places, and methods for finding and collecting them are often similar.**

## THERMOREGULATION

Reptiles and amphibians depend on their surroundings for heat, and thermoregulation is key to understanding many aspects of their lives. They cannot, for example, feed, escape predators, or reproduce unless their body is at a suitable temperature.

Many reptiles shuttle from warm to cool places to maintain an even temperature in the range of 86–104°F (30–40°C); amphibians prefer cooler conditions and rarely bask. Both groups avoid extremes of temperature by hibernating during extended periods of cold or by estivating to avoid lethally hot temperatures. Aquatic and burrowing species adapt to the ambient temperature.



### Basking

Many reptiles, such as this young Australian water dragon, bask in the sun to regulate their body temperature. When warm, they retreat to the shade to stop themselves from overheating.

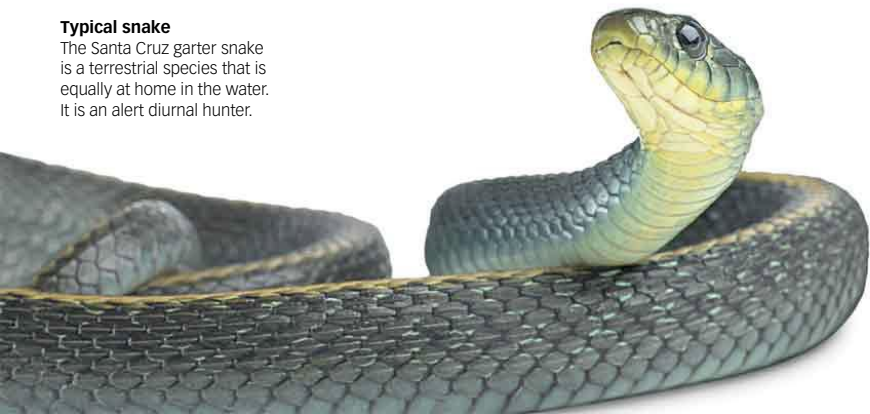
## CHARACTERISTICS OF REPTILES

Reptiles are tailed, scaly vertebrates with two, four, or no limbs. The scales may be smooth, keeled, or granular, and may overlap or be arranged next to each other. Turtles have a bony shell covered with modified scales, or scutes. All reptiles have ears but only some lizards and crocodilians have visible external ear

openings. Snakes and lizards use their tongue to pick up scent molecules from their surroundings and transfer them to the Jacobson's organ in the roof of their mouth. Some snakes also have heat-detecting pits. As a group, reptiles may be terrestrial, aquatic, arboreal, burrowing, or marine, and are globally distributed, aside from the poles.

### Typical snake

The Santa Cruz garter snake is a terrestrial species that is equally at home in the water. It is an alert diurnal hunter.



## CHARACTERISTICS OF AMPHIBIANS

Amphibians are moist-skinned vertebrates, closely linked to water. Most of them spend their larval stage in water and their adult stage on land. Amphibians rely partly on their moist skin for respiration, and they occupy a large range of damp, humid habitats, with the greatest diversity occurring in tropical rainforests. Some species, notably toads, have adapted to drier environments by having a thicker, less permeable skin. Their skin also contains pigments, which give each species its color and markings. The skin may also contain poison glands, which help protect it from predators. Most amphibians have four legs, but a few

salamanders have two and the caecilians have none. Frogs' feet may be webbed for swimming or for gliding and the toes may have adhesive toe pads for climbing. Burrowing species, however, often have hardened blade-shaped tubercles on their heels for digging.



### Moist skin

The skin of an amphibian, such as this golden mantella, is thin, lacking a protective outer layer, and is often moist.

## CLASSIFICATION

Scientifically, reptiles and amphibians are grouped into categories that are arranged at different levels, so that each species, genus, family, and order can be placed somewhere on the evolutionary tree. As more information is gathered, changes

occur at every level, so the classification of any group is never fixed. Furthermore, because the scientific names reflect the relationship between species, they too are subject to change if a species or genus is reclassified. This is particularly true of reptiles and amphibians.

## REPTILES

### CLASS Reptilia

Reptiles are divided into four orders, of which the Squamata contains 96 percent of all species. This order is further divided into

three suborders: Sauria (or lizards), Amphisbaenia (or worm-lizards), and Ophidia (or snakes).

### ORDER

### FAMILIES

### SPECIES

Turtles (Testudines)

14

328

Tuataras (Rhynchocephalia)

1

1

Snakes, lizards, and amphisbaenians (Squamata)

69

9,556

Crocodylians (Crocodylia)

3

25

## AMPHIBIANS

### CLASS Amphibia

Amphibians are unevenly divided into three orders, with the order Anura accounting for

nearly 90 percent of all species of amphibians.

### ORDER

### FAMILIES

### SPECIES

Newts and salamanders (Caudata)

9

671

Caecilians (Gymnophiona)

10

199

Frogs and toads (Anura)

55

6,337



# HABITAT AND DISTRIBUTION

Reptiles and amphibians are found throughout the world except the most northern and southern latitudes, where the climate is too cold for them. The presence or absence of reptiles and amphibians in a region is due to an interplay of climate and habitat.



## Desert

Reptiles and, to a lesser extent, amphibians have colonized the world's deserts with great success. They are able to survive in such inhospitable places due to their low energy requirements.



## Tropical forest

Due to the warm, even temperature, a multitude of hiding places, and plenty of food, rainforests harbor the most diverse range of reptiles and amphibians.



## Mountain

Since montane species must be able to adapt to long periods of cold weather, only some specialized salamanders, frogs, lizards, and snakes, notably vipers, inhabit the mountains.



## Wetland

Wetlands are home to many frogs and salamanders, as well as reptiles, notably the crocodilians and freshwater turtles. Terrestrial amphibians often return to swamps, ponds, rivers, and lakes to breed.



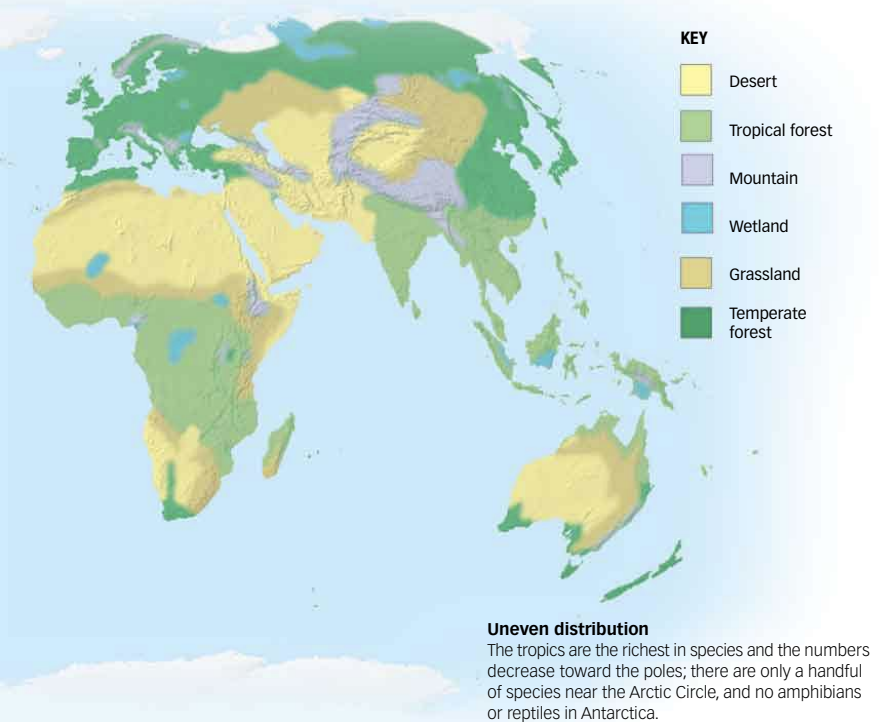
### Grassland

Many species of frogs live in humid grasslands or grasslands that are prone to flooding. Burrowing reptiles also occur in this habitat but numbers depend on climate; temperate grasslands do not support such a diverse range as tropical ones.



### Ocean

The oceans are inhabited by just one species of lizard, several sea snakes, and seven marine turtles. A few species of freshwater turtles, crocodilians, lizards, and snakes may tolerate brackish or salt water for short periods, but there are no amphibians.



### Uneven distribution

The tropics are the richest in species and the numbers decrease toward the poles; there are only a handful of species near the Arctic Circle, and no amphibians or reptiles in Antarctica.



### Temperate forest

Seasonal climatic changes and shade favor amphibians over reptiles in this habitat, although many turtles, snakes, and lizards live in forest edges or sparse woodland where they can bask. Most temperate species hibernate in winter.



### Towns and cities

Some geckos, frogs, and snakes have benefited from urbanization by feeding on animals that accompany people. In addition, parks and gardens provide refuge to species that have been forced out from elsewhere.

# FEEDING

Reptiles and amphibians have a varied diet. Some species are exclusively carnivorous, whereas others are herbivorous. While most species are generalized hunters, some highly specialized species, such as the African egg-eating snakes, feed on only one type of plant or animal.

## SALAMANDERS AND NEWTS

All salamanders and newts are carnivorous and mainly eat small invertebrates. Their larvae are also carnivorous, feeding on a wide variety of small aquatic invertebrates.



### Carnivorous diet

The Mandarin salamander can swallow worms nearly as long as itself.

## CAECILIANS

Caecilians prey on invertebrates such as earthworms and termites. Larger species may feed on small vertebrates.

## CROCODILIANS

Crocodilians are carnivores and do not tend to specialize, eating whatever they can catch; small species and juveniles largely feed on invertebrates.

## FROGS AND TOADS

Frogs and toads are almost exclusively carnivorous, preying on insects and other invertebrates. Larger species feed on small vertebrates, including smaller frogs and toads; some are cannibalistic in their feeding habits. Their larvae, or tadpoles, can be herbivorous, eating algae, aquatic plants, or plant detritus; or they may be carnivorous, feeding on small aquatic invertebrates. Some feed on other tadpoles, including those of their own species.



### Catching prey

Most frogs and toads are sit-and-wait predators, lunging with their mouth open.

### Ambush predator

Crocodilians use various techniques when hunting, but the most common is to lie in wait at the edge of rivers or lakes and attack prey as they come within range.





## TURTLES AND TORTOISES

This group of reptiles may be carnivorous or herbivorous. Large land tortoises mostly eat vegetation, although some species are known to eat the feces of predatory mammals and bones from carcasses. Small tortoises may feed on insects. Freshwater turtles often start life as insectivores, eating small aquatic invertebrates, but gradually incorporate increasing amounts of vegetable material into their diet. Sea turtles may be herbivores, omnivores, or carnivores. Some turtles are also specialist feeders; the leatherback turtle mainly feeds on jellyfish; the hawksbill turtle's diet consists of sponges; and the alligator snapping turtle is a fish-eater.



### Herbivore

The Galapagos tortoise grazes on grass and other low-growing plants and shrubs. It feeds continuously throughout the day.

## SNAKES

All snakes are carnivores, eating a wide range of prey, from insects and worms to large mammals. A number of snakes are specialized feeders, preying, for instance, on venomous arthropods such

as scorpions and centipedes, apparently immune to their venom. Depending on the size of their prey, snakes may simply grab and swallow it, kill it by constriction, or use venom to subdue the victim.



### Constriction

The boa constrictor kills its prey by tightening its coils around its victim until it stops breathing, and then swallows it whole.

## LIZARDS

Most lizards are carnivorous, feeding on prey appropriate to their size; while small lizards mainly eat insects, larger ones may feed on mammals. Some specialist feeders have developed adaptations to suit their diet. For instance, ant-eating lizards are rotund with large stomachs so that they can eat hundreds of ants in a single sitting, and species that feed on mollusks have powerful jaws and blunt teeth for crushing shells.

### Stalking prey

A chameleon locates its prey by sight and then strikes by flicking its long tongue with its sticky adhesive tip.



# DEFENSE

**Reptiles and amphibians are eaten by a variety of predators. A great deal of their energy is, therefore, directed toward staying alive. For some species, this is simply a matter of fighting back, while others have developed specific strategies for defense.**

## COLOR

The best defense is to escape notice altogether. Most reptiles and amphibians are colored to match their surroundings, and as a result are predominantly either green or brown. Superimposed on this background color are markings, such as dark or light spots, stripes, or bars, which are designed to break up their outline. Most camouflaged species freeze if they sense danger, as movement tends to attract attention, making the camouflage less effective.

Several species are brightly colored, often contrasted with black, which

warns predators of poisonous secretions or other danger. This is known as aposematic coloration; a number of harmless species may mimic the colors and patterns of dangerous species in order to benefit.

Some reptiles and amphibians even combine camouflage on the upper body with warning colors on the underside. They remain concealed for as long as possible and only display the bright warning colors once they think they have been noticed. In frogs, this defense mechanism is known as unkenreflex.



### Camouflage

The Asian horned frog is difficult to see when it crouches among dead leaves on the forest floor.



### Mimicry

The coloration of the harmless milksnake is similar to that of the venomous coral snakes that live in the same region.



### Warning color

Poison dart frogs secrete powerful toxins from their skin and advertise this fact with their bright coloration.

## USEFUL TAIL

Many lizards, including geckos, skinks, and glass lizards, can discard their tail if grasped by a predator; a process known as caudal autotomy. The broken tail continues to writhe, giving the lizard time to escape. A new tail grows in its

place, but it is usually shorter and different in color.

Some reptiles may also engage in a display that involves raising the tail to attract the predator's attention while it hides its head. In some species, the tail is brightly colored in contrast to a dull head and body.



### Shed tail

In an attempt to escape from a predator, this emerald tree skink has shed its tail. It can take a number of months for a new tail to grow to its full length.

## FEIGNING DEATH

Some predators are stimulated by the movement of prey. So species such as the grass snake (p.82) and the plains hognose snake (p.88) flip over and pretend to be dead. This method is also adopted by some frogs, notably the mossy frog (p.333).

In reptiles, this pretence may be accompanied by the production of a foul-smelling fluid from the anal glands.

### Defense tactic

The non-venomous grass snake often feigns death when threatened. It becomes limp and rolls out its tongue in an attempt to put off its predator.



### Spiky appearance

Native to Australia, the spiny devil relies on its intimidating array of sharp spines to deter a predator.

## ARMOR PLATING

Tortoises and turtles are well protected inside their bony shells; some species can even close up completely using a hinge on their carapace. Crocodilians and a few lizards have tough bony plates, called osteoderms, below the thick scales on their back. Some, such as the rough-scaled plated lizard (p.173), have thick, closely overlapping scales, while the girdled armadillo lizard (p.172) can form an impenetrable hoop if threatened. Other species may have an intimidating appearance or armored tails with which to block the entrance to their burrows.

## SOUND

Another means by which some reptiles defend themselves is through sound. Rattlesnakes have a unique structure at the end of their tails, known as a rattle, which they shake rapidly to produce an audible warning sound to advertise their presence. Some snakes and lizards hiss when threatened. A few vipers, such as the saw-scaled viper (p.120) and the desert horned viper (p.118) have specialized scales on their flanks which, when rubbed together, produce a loud rasping sound. The common egg-eater (p.55), although harmless, has similar modified scales to imitate this sound.



### Rattle

The western diamondback rattlesnake raises its tail in a defensive posture, producing a loud rattling or buzzing sound by shaking its rattle.

# REPRODUCTION

**Reptiles and amphibians can be divided into species that lay eggs and species that give birth to live young. The diversity of reproductive behavior is enormous and depends on a combination of family traits and the selective pressure under which the species have evolved.**

## SALAMANDERS AND NEWTS

Most salamanders and newts have internal fertilization, and lay their eggs in the water. Some lay their eggs on land, however, and others retain their eggs in their body until they can release them as well-grown larvae or fully developed salamanders. The larvae have large external gills and their limbs develop early. Some species retain their larval features throughout their lives; a process known as neoteny.



### Jelly covered egg

Newts lay their eggs enclosed in a layer of protective jelly to deter predators. The larva breaks through the jelly when it is ready to become free-swimming.

## FROGS AND TOADS

This group of amphibians may have a breeding season that ranges from a few nights to several weeks. Males call loudly either singly or in a large chorus to attract females. The eggs are laid in water or moist soil, although a few species attach them to leaves overhanging water into which the tadpoles drop as they hatch; others carry their eggs in their mouth or

in the pouch on their back. Tadpoles develop over a period that ranges from a few weeks to more than a year. Some species skip the free-living larval stage altogether and lay eggs with tough capsules that contain the developing tadpole, which hatches after it has metamorphosed. A few frogs have evolved internal fertilization and give birth to fully formed froglets.



### Mating

In order to mate, the male climbs on to the female's back in a position known as amplexus, so that he is ideally placed to fertilize the eggs as they are laid.



## CAECILIANS

As far as is known, fertilization is internal in caecilians. While some species lay eggs that hatch into free-swimming larvae, for others, development takes place inside their egg. A third group retains the eggs inside their bodies, with the females nourishing the developing young in their oviduct for up to a year before giving birth.

## CROCODILIANS

All crocodilians lay eggs, often in specially constructed nests that are guarded by one or both parents. Parental care may extend for several months after the eggs have hatched. Even so, predation rates can be high.



### Parental care

When the female crocodilian hears the newly hatched chirping from inside the nest, she digs them out and gently carries them to the water.

## TURTLES AND TORTOISES

All turtles and tortoises lay eggs, typically burying them in flask-shaped chambers dug by the female. Marine species return to beaches to lay eggs and sometimes this occurs en masse.



### Hatchlings

Hatching in sea turtles is synchronized; all the offspring emerge together so that predators are unable to eat them all.

## LIZARDS

Most lizards lay eggs and leave them to incubate at ambient temperatures. Monitors often choose to lay their eggs in termite nests where the temperature and humidity are regulated by the insects, which provides a stable environment. Some skinks stay with their eggs to guard them throughout incubation. A few lizards give birth to live young, and there is evidence of parental care among some species of girdled lizards.

## SNAKES

Most snakes lay eggs, and reproductive trends tend to follow taxonomic relationships. For example, all boas give birth to live young, as do most garter snakes, water snakes, vipers, and pit vipers, although there are exceptions. A few species guard their eggs, including the king cobra and egg-laying vipers. Pythons coil around their eggs to guard them and, in some species, to raise their temperature and therefore speed up their development.

### Breaking out

Young snakes, which are coiled tightly inside the egg, break out of their shell using a sharp, temporary egg tooth.



# CONSERVATION

**Reptiles and amphibians are under considerable threat in many parts of the world. Amphibians, in particular, are becoming extinct at an alarming rate. Scientists estimate that about three in every 10 species are in danger of extinction in the near future.**

## CHYTRID FUNGUS

The chytrid fungus disease was identified in the 1990s and is now known to be responsible for many extinctions and population crashes in frogs, especially those that live at high

altitudes in North, Central, and South America, and Australia. There is no known cure for the disease, but efforts are directed toward preventing its spread to places that are still unaffected.



## POLLUTION

Reptiles and amphibians require clean environments to breed in. Chemical pollution from agricultural spraying and run-off and acid rain are harmful to many species.

### Contaminated river

Water pollution affects both animal and plant life in many ways. Amphibians are especially vulnerable to water pollution during the aquatic stages of their lives, as they absorb chemicals through their skin.

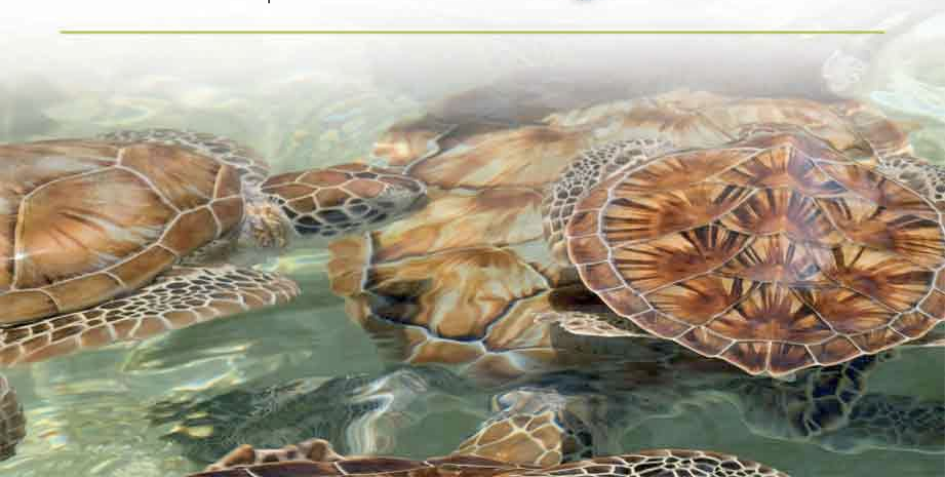
## COMMERCIAL EXPLOITATION

Millions of reptiles are killed every year to supply the skin trade and to be used for souvenirs in the tourism industry. Some crocodilians are now farmed, although snakes and lizards are not. Other species are collected for the pet trade.



### Skin trade

Reptiles are skinned and the hide is stretched, dried, and tanned to make consumer products, including belts, bags, and shoes.







## HABITAT CHANGE

Land development for industry, agriculture, and the expansion of cities has changed and fragmented many areas where reptiles and amphibians were formerly common. These animals are not very mobile compared to birds, for instance, so once a population is cut off, its long-term future is bleak.

### Path to extinction

The deforestation of the large swathes of Amazon rainforests in Brazil and elsewhere have had a detrimental effect on the frog population across the world.

## PROTECTION

Measures are in place to attempt to slow down or reverse the trend toward extinction. CITES (the Convention on International Trade in Endangered Species) regulates trade in some species by either banning trade altogether or by monitoring numbers. The IUCN (International Union for Conservation of Nature) helps to identify species that may be in need of protection, and in response a number of zoos and scientific institutions have set up captive-breeding programs for species that are considered at risk. Most of these conservation efforts, however, are

directed toward high profile species; some less conspicuous amphibians and reptiles probably go extinct before we even learn of their existence. Scientists agree that what is needed is more protection for whole ecosystems rather than piecemeal conservation of individual species.

### IUCN RED LIST

The IUCN has compiled a report that lists the status of each species. Seven categories (listed below) have been created, but many reptiles and amphibians have not yet been assessed.

- Extinct**
- Extinct in the wild**
- Critically Endangered**
- Endangered**
- Vulnerable**
- Near Threatened**
- Least Concern**

### Captive breeding

Young green turtles swim in a breeding pond at a turtle conservation facility in the Cayman Islands.









REPTILES

# SNAKES

**All snakes have a similar body plan with a head, a tail, and a cylindrical body, but there is enough variation for over 3,400 species to be recognized. They occupy a whole range of different habitats, from deserts to rainforests and oceans.**

## ANATOMY

All snakes are limbless, although members of some of the older families still have pelvic girdles and vestigial limbs in the form of small spurs on either side of their cloaca. Snakes may be long and slender, or short and squat, depending partly on their feeding habits; slender snakes chase down their prey, whereas heavy-bodied snakes tend to wait for prey to come to them. Other variations include aquatic species, especially sea snakes, which have their tails flattened from side to side to aid in swimming, and some tree snakes with laterally compressed bodies that allow them to maintain a rigid posture when they stretch out between branches.

Swallowing large prey is achieved by temporarily dislocating the jawbones and allowing the mouth to stretch to a remarkable degree, so that a large python, for example, can swallow a deer and a pencil-thin egg-eating snake can swallow a chicken egg. About 20–30 percent of snakes

ORDER	SQUAMATA
FAMILIES	18–27
SPECIES	3,432



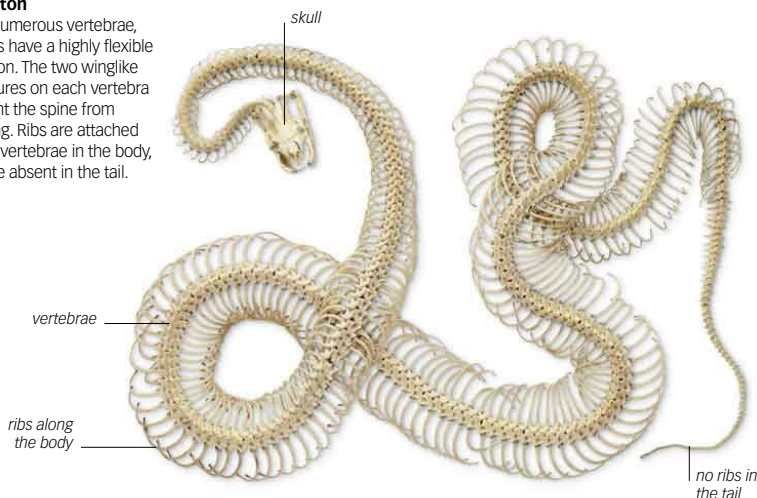
### Shedding skin

Like all reptiles, snakes periodically shed their outer layer of skin, usually in one piece. They secrete an oily substance during this process, which turns their eyes milky and dulls their markings.

use venom to subdue their prey. Venom-injecting fangs may be located at the rear of the mouth or at the front. Front-fanged snakes may have fixed fangs or, as in the case of vipers, hinged fangs that can be folded back when not in use, allowing them to be longer.

### Skeleton

With numerous vertebrae, snakes have a highly flexible skeleton. The two winglike structures on each vertebra prevent the spine from twisting. Ribs are attached to the vertebrae in the body, but are absent in the tail.

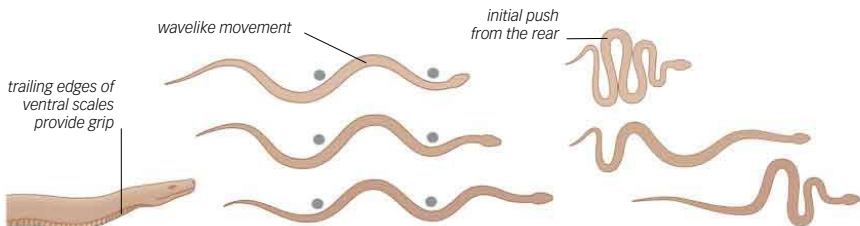


## MOVEMENT

With about 120–500 vertebrae, snakes are highly flexible, which is apparent when they move over ground, in water, in trees, or when constricting prey.

Snakes use three principal types of locomotion, which vary according to

the kind of terrain they are moving across; each type requires a complex arrangement of muscles. The size of a snake also plays a part; large, heavy-bodied snakes, such as the puff adder and some pythons, usually move forward in a straight line.



### Linear progression

Waves of muscle contractions travel along the length of the snake's body, pushing it directly forward. The edges of its large ventral scales provide the grip.

### Lateral undulation

This is the most familiar and common type of movement. The snake moves forward by pushing the sides of its body against rocks or other fixed irregularities on the ground. Water snakes use the same method to push against the water.

### Concertina movement

In a narrow space the snake moves forward by bunching up its muscles in turn, first at the rear as it extends its front, and then at the front as it pulls up the rear.

## FAMILIES OF SNAKES

The arrangement of snakes into families is not stable at present. For instance, the largest family, the Colubridae, can include up to 2,138 species (over 60 percent of all snakes), depending on which scheme of classification is followed. Specialists agree that this family represents many different lineages, and these will inevitably be divided into separate families once consensus is reached. This book follows a conservative approach and all the relevant species have been included within Colubridae, but species that have obvious affinities and which are likely to remain together after the family is

revised have been placed together. Similarly, the boas (Boidae) probably represent two distinct lineages: the giant boas on the one hand (subfamily Boinae), and the sand, rosy, and rubber boas on the other (subfamily Erycinae). Hence, entries for each subfamily are next to each other for the purposes of this book. Finally, within the viper family, the Viperidae, the pit vipers (subfamily Crotalinae) have been dealt with first, followed by true vipers (Viperinae).

### Distinct lineage

Although both these snakes are vipers, the eastern diamondback rattlesnake is a pit viper, whereas the Orsini's viper is a true viper and has no heat-sensitive pits. They belong to different subfamilies.



EASTERN DIAMONDBACK RATTLESNAKE

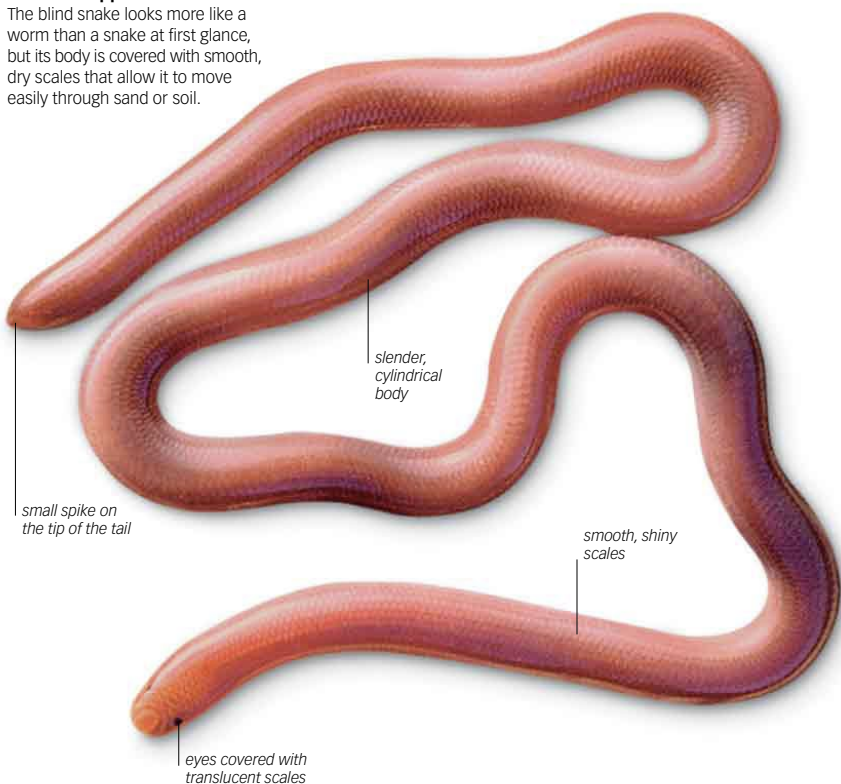


ORSINI'S VIPER



**Wormlike appearance**

The blind snake looks more like a worm than a snake at first glance, but its body is covered with smooth, dry scales that allow it to move easily through sand or soil.

**PROFILE**

-  S.E. Europe and parts of W. Asia
-  Open, dry places
-  12–16 in (30–40 cm)
-  Egg-laying
-  4–8
-  Nocturnal and diurnal
-  Not assessed

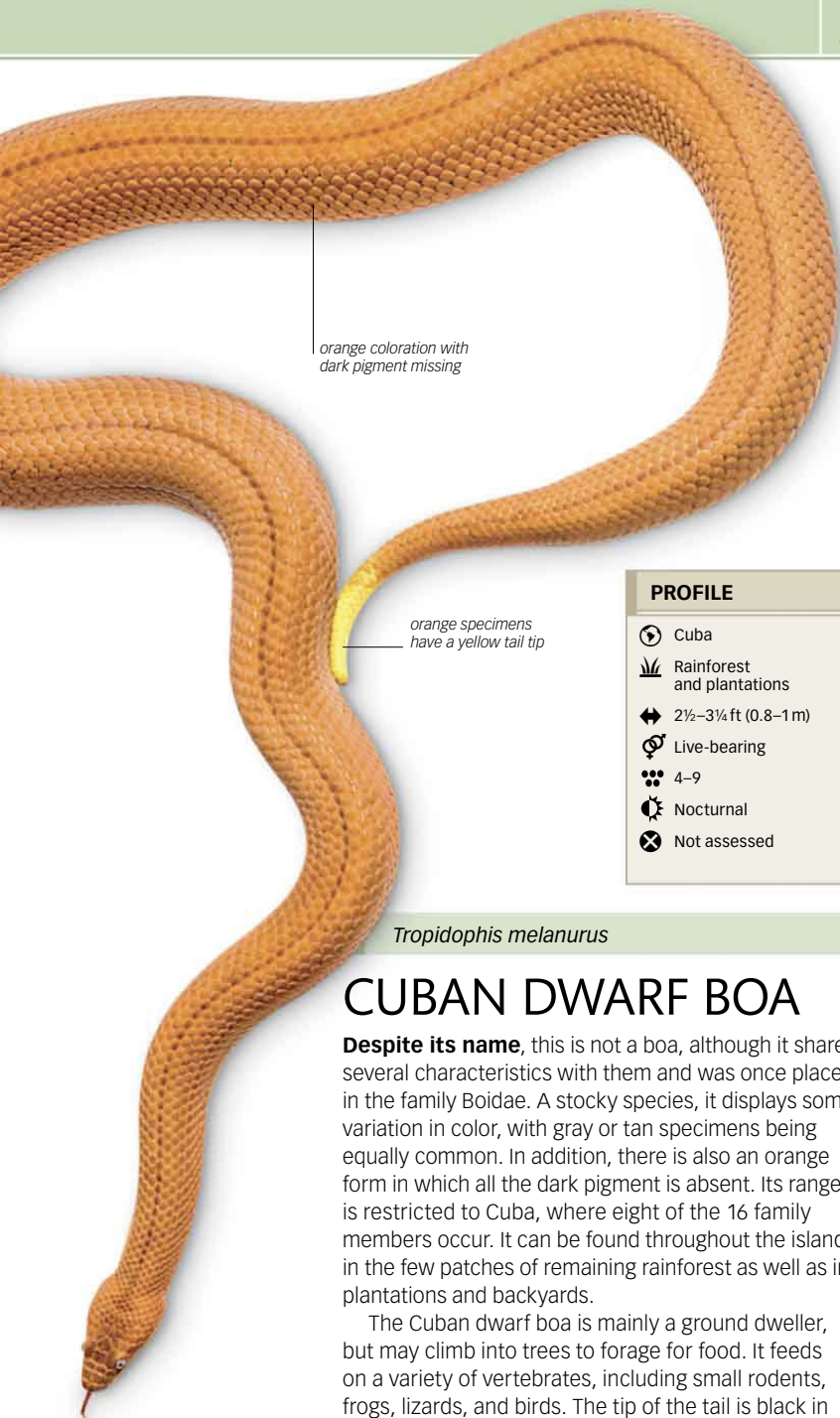
*Typhlops vermicularis*

## EURASIAN BLIND SNAKE

**This small snake lives underground**, emerging to the surface only when driven out by flooding. It has a cylindrical body, small head, and tiny eyes that are covered by translucent scales, making them look like small black dots. This species, like all blind snakes, spends most of its time beneath the surface, burrowing in soil to create a system of underground tunnels through which it travels in search of food. Where the tunnels surface under a rock, the snake may rest there to absorb heat, but it rapidly retreats down the tunnel if exposed. A small spine on the tip of its tail helps to give it purchase when pushing through soil.

Blind snakes feed on small invertebrates, especially ants and their pupae, but sometimes they may eat other small insects. Almost nothing is known about the breeding behavior of this species, but its eggs are elongated with a point at each end.





orange coloration with  
dark pigment missing

orange specimens  
have a yellow tail tip

#### PROFILE

-  Cuba
-  Rainforest and plantations
-  2½–3¼ ft (0.8–1 m)
-  Live-bearing
-  4–9
-  Nocturnal
-  Not assessed

*Tropidophis melanurus*

## CUBAN DWARF BOA








**Despite its name**, this is not a boa, although it shares several characteristics with them and was once placed in the family Boidae. A stocky species, it displays some variation in color, with gray or tan specimens being equally common. In addition, there is also an orange form in which all the dark pigment is absent. Its range is restricted to Cuba, where eight of the 16 family members occur. It can be found throughout the island, in the few patches of remaining rainforest as well as in plantations and backyards.

The Cuban dwarf boa is mainly a ground dweller, but may climb into trees to forage for food. It feeds on a variety of vertebrates, including small rodents, frogs, lizards, and birds. The tip of the tail is black in gray or tan individuals, whereas it is yellow in those that are orange. It may use the it to lure prey. A powerful constrictor, the dwarf boa is particularly adept at hunting in small spaces, where it crushes its prey against a solid surface.

#### Rare color

The Cuban dwarf boa has a stout, muscular body and a small head. There are several color forms, of which plain orange is one of the rarest.

## PROFILE

- |   |  |
|---|--|
|  Central America     |  2–4          |
|  Tropical dry forest |  Nocturnal    |
|  3¼–4½ ft (1–1.4 m)  |  Not assessed |
|  Egg-laying          |  |

**Speckled body**

The neotropical sunbeam snake is usually brown with irregular patches of white scales that develop with age.



## SIMILAR SPECIES

smooth,  
iridescent scales


**Asian sunbeam snake**  
*(Xenopeltis unicolor)*

Similar, but not related;  
found in forests, parks,  
and backyards, usually  
beneath objects

*Loxocemus bicolor*

# NEOTROPICAL SUNBEAM SNAKE

**The neotropical sunbeam snake** is the only member of its family. Although it has a pelvic girdle and a pair of vestigial hind legs in the form of spurs, it lacks other characteristics that would place it in the python family. Found in Central American forests, it is a secretive, semi-burrowing species that is rarely seen.

This snake feeds on small mammals and reptiles, and specializes in raiding iguana and sea turtle nests for eggs. It excavates them using its pointed snout, turning its head and neck into a loop to drag sand or soil out of the burrow. It swallows turtle eggs whole after forming a coil around them. Once it finds a nest, it eats large numbers of eggs; some individuals have been found with the shells of more than 30 iguana eggs in their stomach. Captive specimens usually eat rodents and frogs.

### Small python

This small Australian python is a brown or reddish brown snake with faint traces of spots along its flanks; hatchlings have darker markings but these fade as they get older.



### PROFILE

-  N. Australia
-  Woodland and rocky outcrops
-  2¼–3¼ ft (0.7–1 m)
-  Egg-laying
-  6–15, rarely up to 25
-  Nocturnal
-  Not assessed

### SIMILAR SPECIES



**Spotted python (*Antaresia maculosa*)** Slightly larger; has many irregular dark blotches on its body

### *Antaresia childreni*








## CHILDREN'S PYTHON

**This python is named after** an English naturalist, John Children; its name does not indicate its suitability as a pet. It is one of the smallest pythons in the world and indigenous to Australia. During the breeding season, females coil around their eggs. Not only does this completely hide the eggs from view and therefore make them less vulnerable to predation, but by loosening and tightening her coils the mother is able to exert some control over their temperature and humidity. The eggs hatch after about 50–60 days.

A slender snake with a small head, its prey is limited to small animals, especially bats. It often lives in caves, where it ambushes the bats, catching them in mid-air as they make their way out through the entrance at night. The heat pits allow the python to accurately detect the position of its prey and target it with deadly accuracy, even in total darkness. The python also feeds on rodents, nestlings, and reptiles.



## PROFILE

-  N. Australia
-  Dry woodland and rocky outcrops
-  Up to 8½ ft (2.6 m)
-  Egg-laying
-  5–10
-  Mainly nocturnal
-  Not assessed

## Distinctive species

The black-headed python has a cream or reddish brown body with dark crossbands, and a jet-black head and neck.

irregular dark crossbands



## SIMILAR SPECIES

**Woma (*Aspidites ramsayi*)**

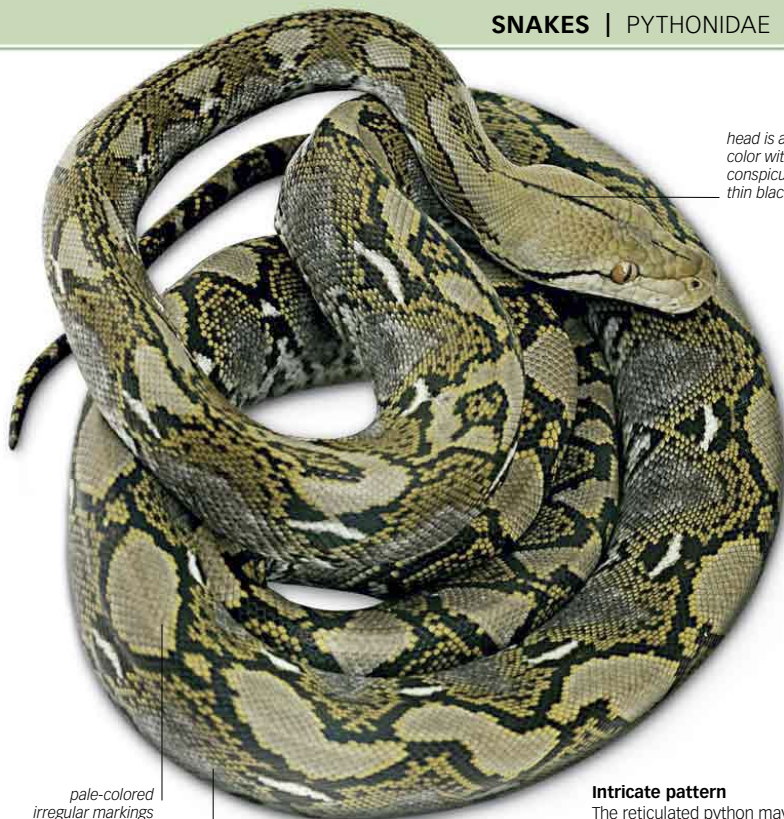
Lacks the black head and neck; also from Australia but occurs further south than the black-headed python

*Aspidites melanocephalus*

## BLACK-HEADED PYTHON

**The black-headed python** is a slender-bodied snake with a relatively small head. It has no heat pits in the face, which distinguishes it from all other pythons except the closely related woma, *A. ramsayi*. The absence of heat pits may be a result of its preference for cold-blooded prey. It feeds mostly on other reptiles, including venomous snakes, but occasionally takes small mammals and birds.

This is a ground-dwelling species, using rock crevices, hollow logs, and abandoned animal burrows to hide in. Although mainly nocturnal, it may emerge during the day in cool weather. Females lay eggs under logs or roots, and in chambers underground. Like most pythons, they coil around the eggs to protect them and regulate their temperature until they hatch, which takes 60–80 days.



head is a uniform color with a conspicuous thin black stripe

pale-colored irregular markings along its flanks

large diamond-shaped markings on its back

#### Intricate pattern

The reticulated python may be gray or olive-green with a complex netlike pattern of black, yellow, and light gray.

#### PROFILE

-  Southeast Asia
-  Rainforest and plantations
-  20–26 ft (6–8 m)
-  Egg-laying
-  30–60, rarely up to 100
-  Nocturnal
-  Not assessed

*Broghammerus reticulatus*

## RETICULATED PYTHON

**This is the largest python** and probably the world's longest snake, although the anaconda (p.44) is often heavier. Despite its immense size, it is difficult to detect in its rainforest habitat due to its mottled coloration and markings. It preys on mammals, and can easily overpower and swallow a deer or monkey. In areas where it occurs around villages, it feeds on domestic birds, pigs, goats, and dogs, and has been known to eat people on several occasions. A large meal may take many days to digest, during which time the snake rests in a secluded place. Young specimens climb well, and often coil in trees overhanging rivers and streams, but they become more terrestrial as they grow larger.


Females lay large clutches of white eggs, coiling around them for protection, and to create and maintain a suitable temperature for incubation. The eggs take about seven weeks to develop and the hatchlings measure about 2–3¼ ft (0.6–1 m) in length. Once the eggs have hatched, the mother plays no further role in their upbringing.


**Northern form**


A slender snake with an elongated head, the white-lipped python from the northern region is bronze or copper in color, with a black head and black and white lip scales.

**PROFILE**


 New Guinea and neighboring islands, and Indonesia


 Rainforest

 6–7½ ft (1.8–2.4 m)

 Egg-laying

 8–15

 Nocturnal

 Not assessed

*Leiopython albertisii*

## WHITE-LIPPED PYTHON

**Also known as D’Albertis’ python**, this snake varies in color and size; white-lipped pythons from the north of the range are brown or bronze in color with a contrasting head and lip coloration, while those from the south of the range are iridescent dark brown with a cream underside. There is a great deal of confusion about the status of this species, especially the populations of isolated island groups. Some experts consider that it should be divided into five distinct species—the differences between them often being poorly defined.

The white-lipped python usually lives near water, and may retreat into it if disturbed. A non-venomous snake, this species kills its prey by constriction. It feeds mainly on small mammals and birds; juveniles also eat lizards and frogs. Females lay 8–15 eggs and coil around them; hatchlings emerge after about two months of incubation. This is a nervous snake that can rarely be tamed in captivity, always being unpredictable and likely to lunge and bite.



**Lustrous scales**

This snake gets its name from the iridescent, amethystlike sheen that overlays the dorsal pattern, which may be pale brown or yellowish brown.

**PROFILE**

📍 New Guinea and neighboring islands, and Australia (Queensland)

🌿 Woodland

↔ Up to 16 ft (5 m), rarely larger

🥚 Egg-laying

••• 5–21

🌙 Nocturnal

⊗ Least Concern

*Morelia amethystina*

## AMETHYSTINE PYTHON

**The amethystine python** is a large, slender snake with a variety of markings, but is usually pale brown or yellowish brown with darker, irregular crossbands. A secretive species, it is rarely active in the day but may be seen crossing roads after dark. This agile python climbs well and also swims with ease. It usually feeds on relatively small mammals such as fruit bats, rats, and possums, and occasionally wallabies. After a large meal the snake may bask in the open to speed up its digestive process.

This species often occurs near human dwellings, attracted by rats and other pests, but its presence often goes undetected. It is known as the scrub python in Australia, where it is sometimes considered to be a separate species, *M. kinghorni*. It occurs on many Indonesian islands, and some of these forms differ significantly from the mainland forms, and may represent separate species.

## PROFILE

-  Australia and New Guinea
-  Grassland, forests, and rocky outcrops
-  6½–9¾ ft (2–3 m)
-  Egg-laying
-  10–52
-  Mostly nocturnal
-  Not assessed

**Bold pattern**

This species is the most widespread python in Australasia. It has a dark body boldly patterned with irregular paler markings. The black and yellow form shown here is from Queensland.



triangular head is covered in minute scales

irregular markings



FULL VIEW

*Morelia spilota*

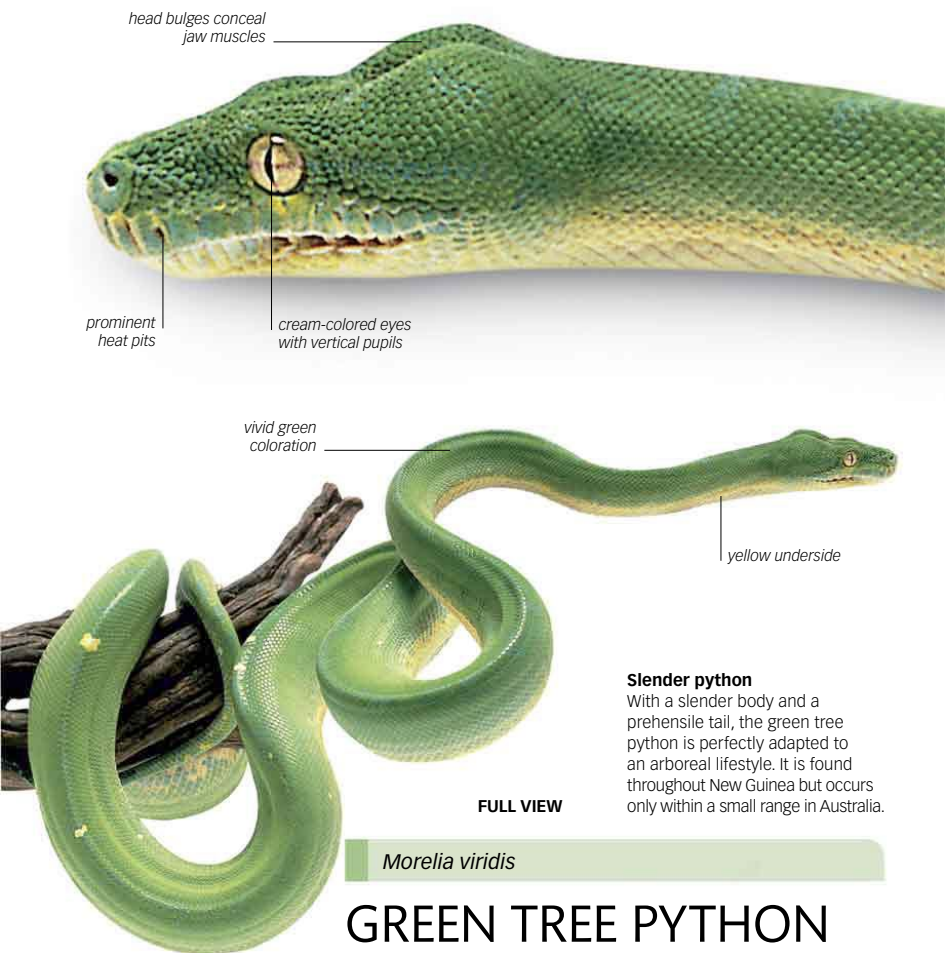
## CARPET PYTHON


**Diamond python**  
*(M.s. spilota)*

Darker than other forms of carpet pythons, the diamond python is black with whitish spots on each scale.

**A long, slender snake**, the carpet python is a highly variable species, displaying many color forms and patterns. Several subspecies are recognized, including the jungle carpet python, *M.s. cheynei*, the coastal carpet python, *M.s. mcdowellii*, and various other color forms. The diamond python is also a form of the carpet python and comes from the cooler areas in the south of Australia.

Carpet pythons usually feed on mammals, including bats, and birds, although juveniles also eat lizards. They are powerful constrictors. Like most pythons, carpet pythons also have heat-sensitive pits located on their upper and lower lips, which help them detect prey in the dark. These pythons are found in a wide range of habitats. They are good climbers, and may be found in trees, on rock faces, or in caves. They are common around old buildings, where they climb up into the rafters and are useful in controlling rodent pests.



#### Slender python

With a slender body and a prehensile tail, the green tree python is perfectly adapted to an arboreal lifestyle. It is found throughout New Guinea but occurs only within a small range in Australia.

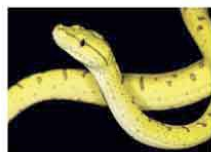
FULL VIEW

*Morelia viridis*

## GREEN TREE PYTHON

**A very distinctive and attractive python**, this species is bright green with a yellow underside and variable white markings on its body; juveniles are yellow or red, and acquire the green coloration by the time they are a year old. This python also has very conspicuous heat pits on its snout and lip scales.

An arboreal species, the tree python rests during the day by draping several coils of its body over a tree branch, with its head in the center of the coils; a posture that is also adopted by the emerald tree boa (p.41). It strikes at prey from this position, grasping the victim with its teeth before coiling itself around it. The species is popular among snake enthusiasts and breeds readily in captivity, although it has specialist requirements.



#### Juvenile coloration








Young tree pythons are bright sulfur-yellow or red with dark-edged white spots on the back.

#### PROFILE

-  New Guinea and Australia (Queensland)
-  Rainforest
-  3¼–5 ft (1–1.5 m)
-  Egg-laying
-  6–30
-  Nocturnal
-  Least Concern

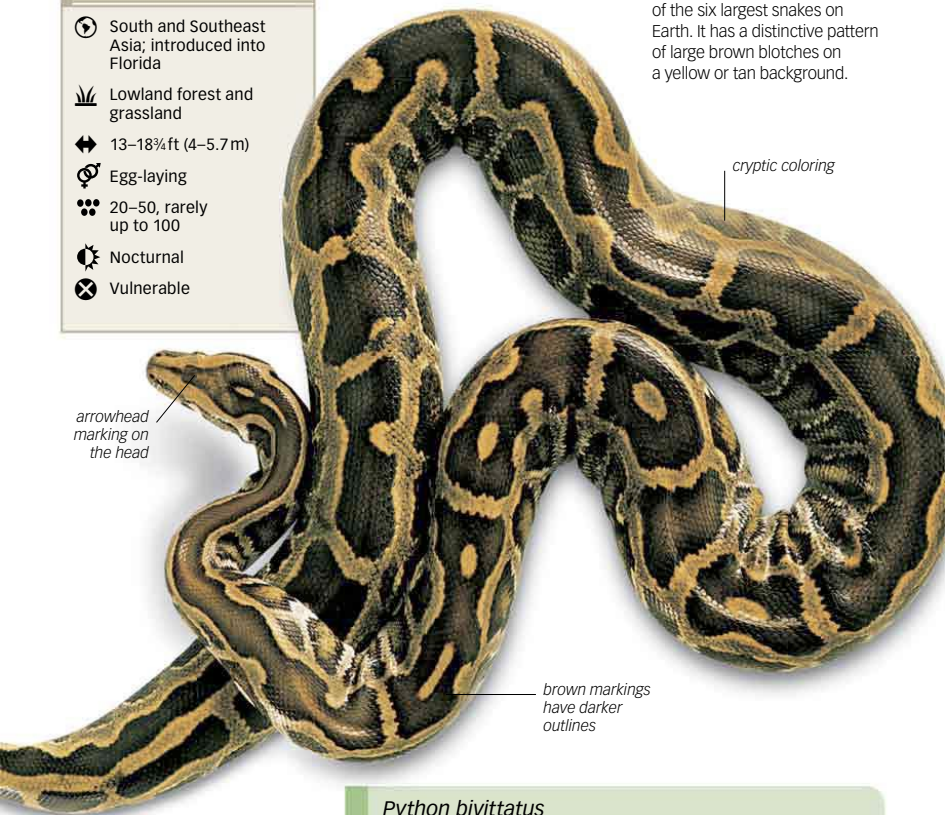


## PROFILE

-  South and Southeast Asia; introduced into Florida
-  Lowland forest and grassland
-  13–18½ ft (4–5.7 m)
-  Egg-laying
-  20–50, rarely up to 100
-  Nocturnal
-  Vulnerable

## A giant

The Burmese python is one of the six largest snakes on Earth. It has a distinctive pattern of large brown blotches on a yellow or tan background.

*Python bivittatus*

## BURMESE PYTHON

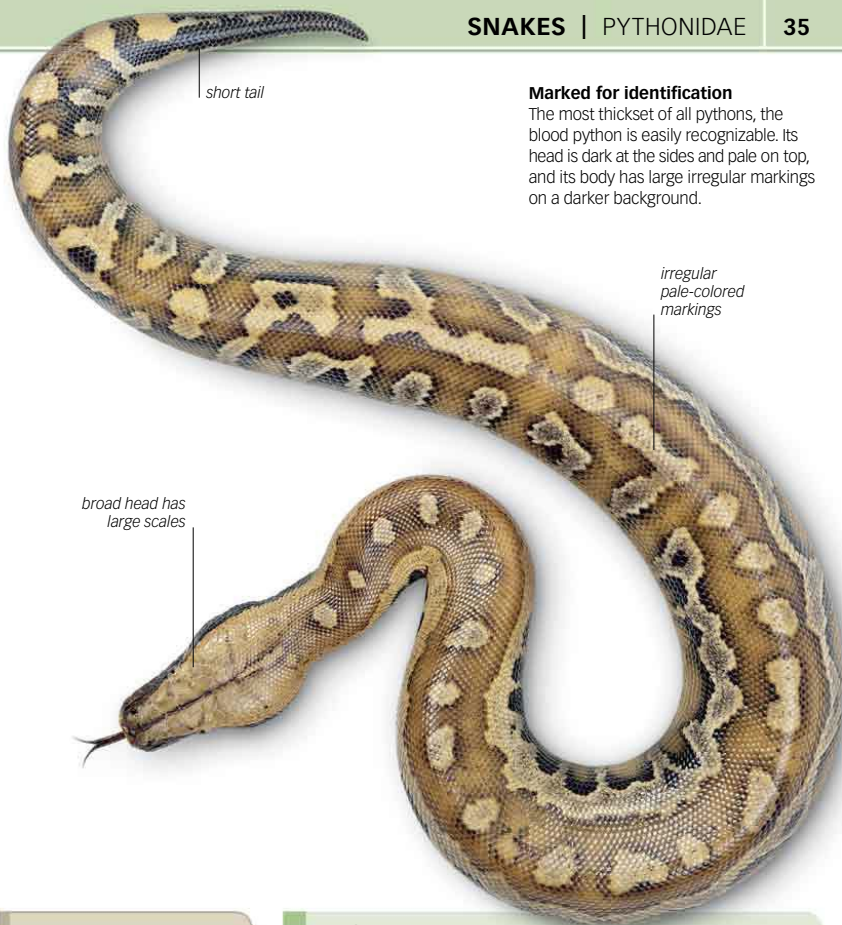
**This large and powerful python** is found in a variety of habitats, often near water. An ambush predator, it can eat mammals up to the size of antelopes, but its normal diet includes monkeys, rodents, and birds. Where it occurs around villages and the outskirts of towns, it also eats poultry, dogs, and goats, but the number of cases where people have been attacked is small. This snake has been introduced to Florida, where it has become established and is now officially an invasive species, threatening native wildlife. Several thousand have been captured and killed. Conversely, wild populations have been reduced through habitat destruction, capture for the skin and pet trades, and wanton killing.

Female Burmese pythons lay clutches of large eggs. They gather them into a conical pile and coil around them, hiding them from view. If the temperature falls, they contract their muscles spasmodically, so that they appear to twitch. This produces metabolic heat, which is transferred to the eggs, and speeds up their development.







## Albino form

Burmese pythons are selectively bred in captivity to produce various color forms, including albinos.

**Marked for identification**

The most thickset of all pythons, the blood python is easily recognizable. Its head is dark at the sides and pale on top, and its body has large irregular markings on a darker background.

**PROFILE**

-  Southeast Asia
-  Wet tropical forest
-  5–6 ft (1.5–1.8 m)
-  Egg-laying
-  6–12, rarely more
-  Nocturnal
-  Least Concern








*Python curtus*

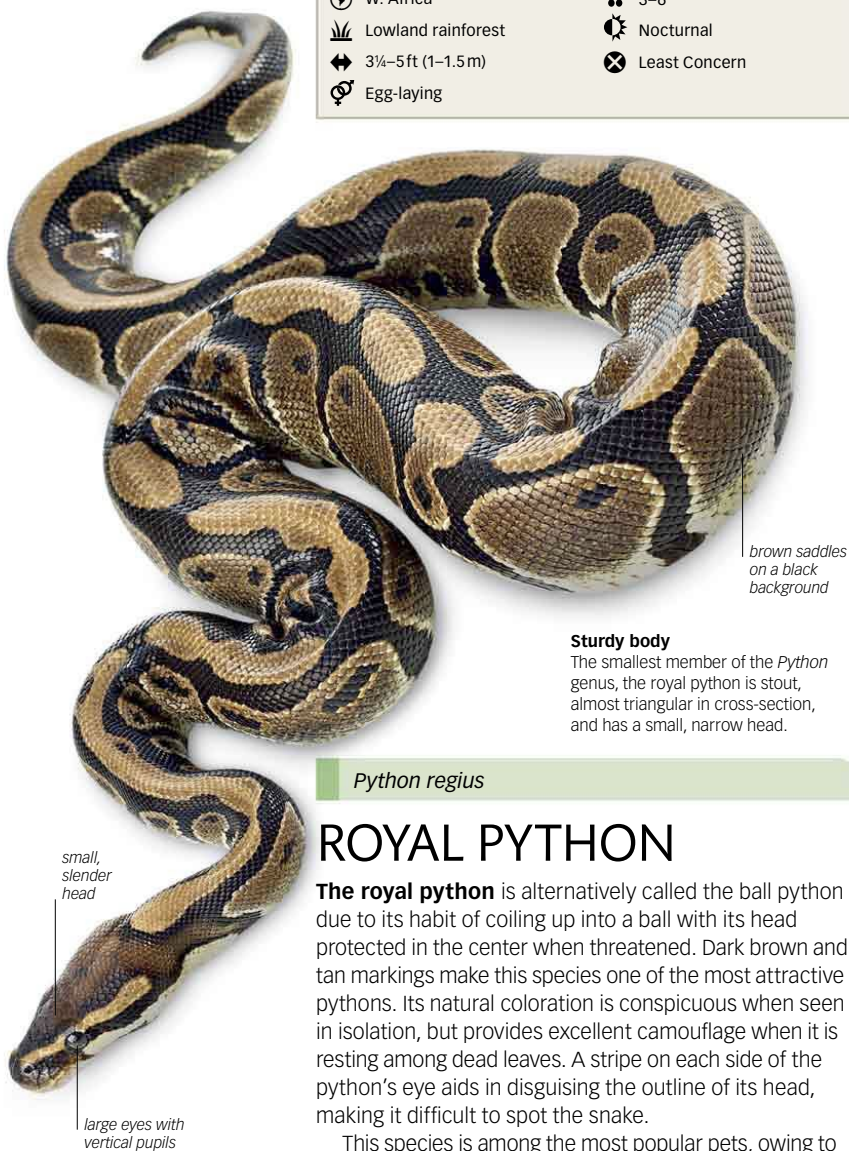
## BLOOD PYTHON

**This is a very heavy-bodied python**, with a variety of colors and markings. The blood python is also called the short-tailed python due to the fact that its tail accounts for only about 10 percent of its total length. Its eyes are small and the irises are orange. There are several geographical forms and some experts consider them to be full species; these include the Borneo blood python, *P. brongersmai*. Blood pythons from some regions are suffused with red, providing this snake with its common name.

The blood python lives at low elevations on the banks of streams, and in marshes and inundated forests. An ambush predator, it remains hidden in leaf litter until prey comes within range. Then, using its heavy body as an anchor, it lunges and strikes with lightning speed, gripping the prey in its jaws while it throws one or two coils around it. This species can be aggressive by nature and quick to bite. Blood pythons lay up to 12 very large eggs and the female coils around them throughout the incubation period. The eggs hatch after about 60 days.

## PROFILE

- |  |   |
|--|---|
|  W. Africa          |  3–6           |
|  Lowland rainforest |  Nocturnal     |
|  3¼–5 ft (1–1.5 m)  |  Least Concern |
|  Egg-laying         |   |

**Sturdy body**

The smallest member of the *Python* genus, the royal python is stout, almost triangular in cross-section, and has a small, narrow head.

*Python regius*

## ROYAL PYTHON

**The royal python** is alternatively called the ball python due to its habit of coiling up into a ball with its head protected in the center when threatened. Dark brown and tan markings make this species one of the most attractive pythons. Its natural coloration is conspicuous when seen in isolation, but provides excellent camouflage when it is resting among dead leaves. A stripe on each side of the python's eye aids in disguising the outline of its head, making it difficult to spot the snake.

This species is among the most popular pets, owing to its small size and calm temperament. Many were exported from Africa until recently, but captive-bred animals are now freely available. In addition, a number of color forms have arisen from captive strains, and these have been selectively bred to provide a variety of colors and patterns. Many of these are given fancy names to increase their saleability, with some of the more unusual morphs commanding a premium price in the pet trade.





body has a series of brown markings along the back and sides

muscular body for constricting prey

triangular head has a distinctive V-shaped pattern

#### Giant constrictor

This is the largest snake in Africa, and is light brown or tan with irregular brown saddles and blotches. It is a powerful constrictor, suffocating its prey by coiling around it.

#### PROFILE

-  Africa (south of the Sahara)
-  Grassland, open woodland, and rainforest
-  15–20 ft (4.5–6 m)
-  Egg-laying
-  20–60, rarely up to 100
-  Nocturnal
-  Not assessed








*Python sebae*

## AFRICAN ROCK PYTHON

**The African rock python** is found in a variety of habitats, often among rocks near water. An ambush predator, it can eat mammals up to the size of antelopes, but its normal diet consists of monkeys, rodents, and birds. It may also take crocodiles, ambushing them from beneath the surface of a water hole or swamp. The python is often found near human habitation, however, where it feeds on poultry and domestic animals. It is very useful in controlling cane rats, and for this reason, is protected in South Africa.

The female lays her eggs in a cave, termite mound, or aardvark burrow. Unlike the Burmese python (p.34), the African rock python does not produce heat through muscle activity. Instead, she basks on sunny days, raising her body temperature by more than 10 degrees, and then returns to her eggs and transfers the heat by coiling tightly around them, maintaining an ideal incubation temperature of about 82°F (28°C) until the eggs hatch 65–80 days later.

## PROFILE

-  Central and South America, and West Indies
-  Varied, from rainforest to dry woodland
-  6½–13 ft (2–4 m)
-  Live-bearing
-  15–50
-  Mainly nocturnal
-  Not assessed

**Camouflaged predator**

The common boa is a large predator with markings that allow it to blend in with its habitat.

narrow head is covered in small scales

dark stripe behind each eye

elasticlike skin on the throat and neck

large reddish brown saddles on a lighter background

*Boa constrictor*

# COMMON BOA

**Arguably the world's** most famous snake, the boa constrictor has a reputation for size and ferocity that is often exaggerated. A widespread species, specimens are variably colored. However, all have saddle markings. There is also considerable variation in size and behavior.

The common boa typically preys on small and medium-sized mammals and birds. Usually a forest species, this snake lies in wait for its prey to pass by before ambushing them. It strikes rapidly, grasping the prey in its jaws before throwing two or more coils around the victim. It holds on and tightly squeezes the prey until it is dead, and then swallows it whole. It may bite people in defense, but is probably too small to

attack and eat them. In places where its prey congregates, such as parrot clay-licks, one or two boas will reside in the area permanently to take advantage of the constant supply of food.

Females give birth to litters of live young, but litter size varies from one population to another depending on the locality and climate.

Ten subspecies of the common boa have been described, based mostly on coloration.

Some, however, have been described based on characteristics that are inconsistent. In addition, many color morphs have also arisen in captivity.

**Albino form**

The albino common boa is just one of many captive-bred color forms.



FULL VIEW

pale brown or buff oval spots along the back



## HABITAT

The common boa is very much at home in rainforests. Juveniles often climb into trees, but as they grow they become too heavy-bodied and spend most of their time on the forest floor.



## Adaptable snake

Although often found in rainforests, common boas easily adapt to drier habitats, including woodlands and scrub.

## Night vision

Common boas are mainly nocturnal, and like most species that are active at night, have vertical pupils.



## Remnant limbs

This snake has vestigial limbs, known as spurs, on each side of its cloaca. The spurs are more obvious in males.

## Tongue flicking

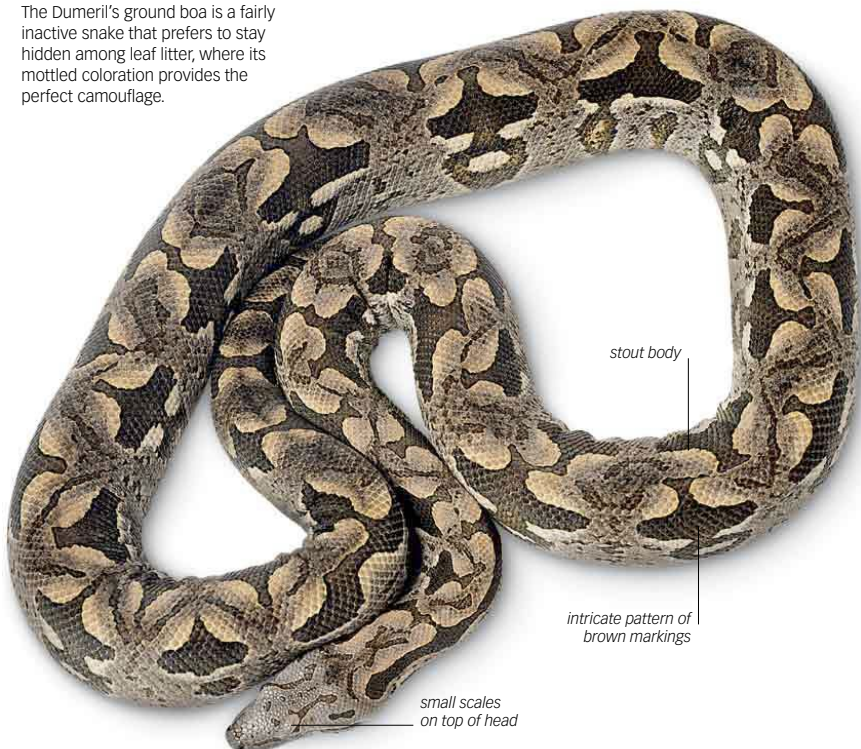
Like all snakes, boas use their tongue, in conjunction with the Jacobson's organ, to detect scent molecules in the air.





**Mottled skin**

The Dumeril's ground boa is a fairly inactive snake that prefers to stay hidden among leaf litter, where its mottled coloration provides the perfect camouflage.

**PROFILE**

-  S.W. Madagascar
-  Dry forest
-  8¼–9¾ ft (2.5–3 m)
-  Live-bearing
-  6–13
-  Nocturnal
-  Least Concern

*Acrantophis dumerili*

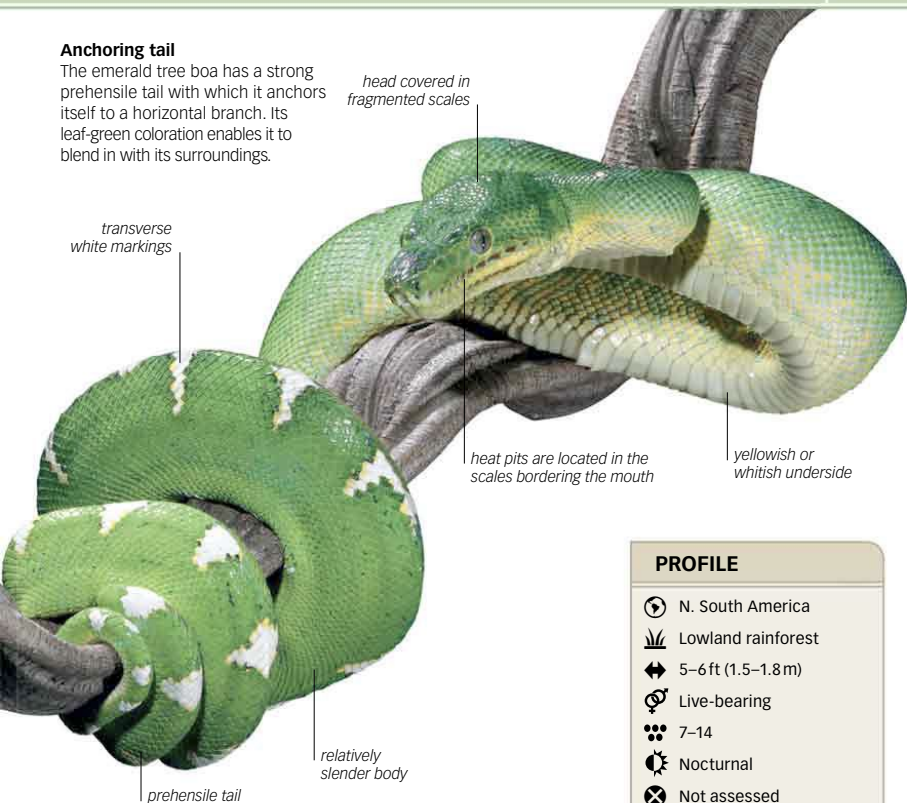
## DUMERIL'S GROUND BOA

**This species is intricately marked** with red-brown, pinkish brown, or brown patterns. The boa bears a superficial resemblance to the common boa of South America (pp.38–39) and, like that species, lacks the heat-sensitive facial pits; both species are thought to have descended from a common ancestor at a time when the South American and African continents were still joined.

An ambush predator, the Dumeril's ground boa feeds mostly on warm-blooded prey such as lemurs and bats. It is also found around villages, where it preys on chickens, making it unpopular with the local people. Females give birth to relatively large offspring after a period of 7–8 months; the juveniles are frequently suffused with pink. This species is often bred in captivity, but its trade is restricted under CITES regulations.

### Anchoring tail

The emerald tree boa has a strong prehensile tail with which it anchors itself to a horizontal branch. Its leaf-green coloration enables it to blend in with its surroundings.



### PROFILE

- 📍 N. South America
- 🌿 Lowland rainforest
- 📏 5–6 ft (1.5–1.8 m)
- 👶 Live-bearing
- 👶 7–14
- 🌙 Nocturnal
- ❌ Not assessed



### Juvenile coloration

Young emerald tree boas are brick-red or orange at birth, changing to green after about a year.

### *Corallus caninus*

## EMERALD TREE BOA

**This bright green boa** is highly arboreal and is similar to the green tree python (p.33). In many ways, this is an example of convergent evolution, where unrelated organisms evolve similar body forms, coloration, and behavior. The emerald tree boa lives in the Amazon Basin and the Guiana Shield region, in wet rainforest, where it is well camouflaged when coiled in the branches of the canopy.

The emerald tree boa has little need to come down to the ground, as it feeds largely on arboreal mammals and birds that are caught with its long, curved teeth. It is imperative that the prey is grasped efficiently otherwise it falls to the ground and is lost to the snake before it can be constricted. Swallowing also takes place from a suspended position; the snake gradually pulls the prey out from its coils as it swallows it. This species has a low metabolism, and it probably feeds only a few times a year under natural conditions. Juveniles feed on frogs and lizards at first and switch to mammals and birds as they grow larger.

**Coiled on a branch**

The garden tree boa often coils around branches overhanging water, and can be very aggressive if disturbed.

large eyes with  
vertical pupils

**PROFILE**

-  N. South America
-  Rainforests near water
-  5–6½ ft (1.5–2 m)
-  Live-bearing
-  2–12
-  Nocturnal
-  Not assessed

prehensile tail

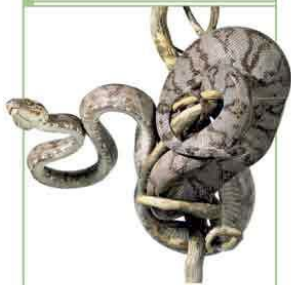
**SIMILAR SPECIES**

*Corallus hortulanus*

## GARDEN TREE BOA

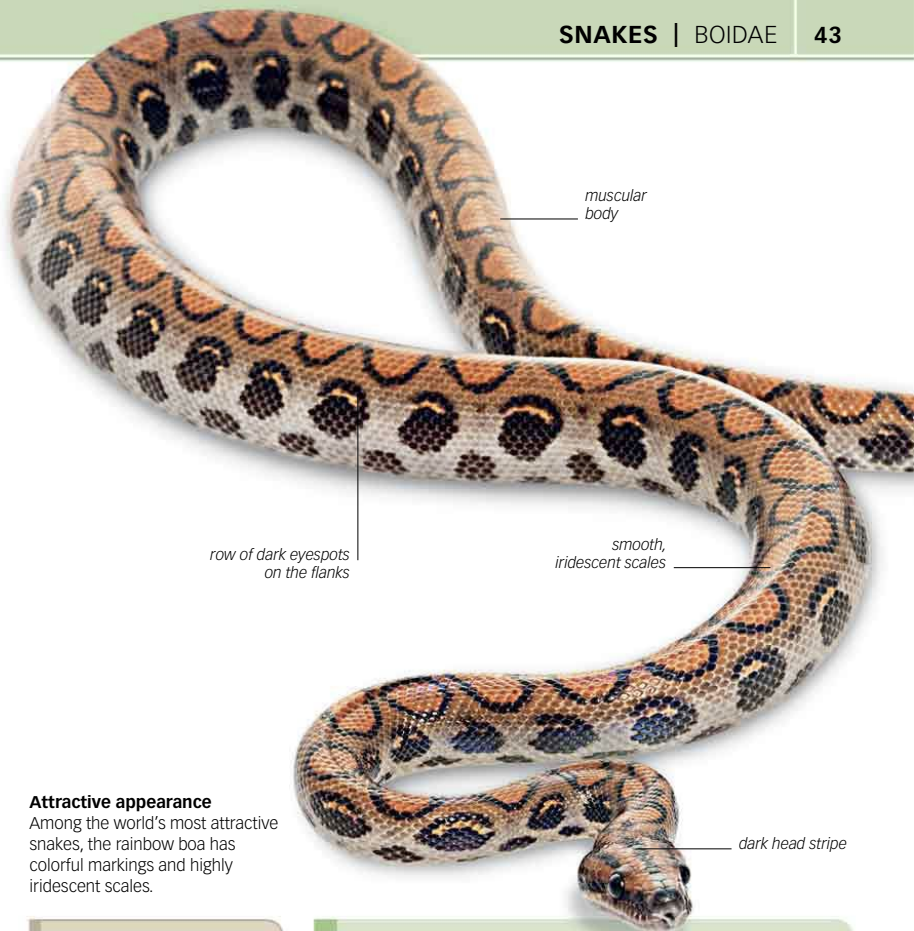
**This species displays** more variation in color and markings than any other boa; even within the same litter, individuals may be yellow, orange, red, brown, or gray, and with or without markings in the form of crossbars, spots, or saddles. Males and females are similar in size and markings. Garden tree boas also have slender bodies and necks, so that the head appears broad by comparison; the neck and body are flattened from side to side in cross-section, helping the snake remain rigid when reaching between branches. This is an adaptation to its arboreal lifestyle, and the snake is rarely seen on the ground. It often hangs down to snatch lizards and birds from lower branches.

Breeding takes place during the cooler months of the year, and the young are born after a gestation of 6–8 months. Newborns feed on small frogs and lizards before graduating to mammals and birds.



**Cook's tree boa (*Corallus cookii*)** Apparently restricted to the island of St. Vincent, Caribbean; lacks the variation in color and markings





#### Attractive appearance

Among the world's most attractive snakes, the rainbow boa has colorful markings and highly iridescent scales.

#### PROFILE

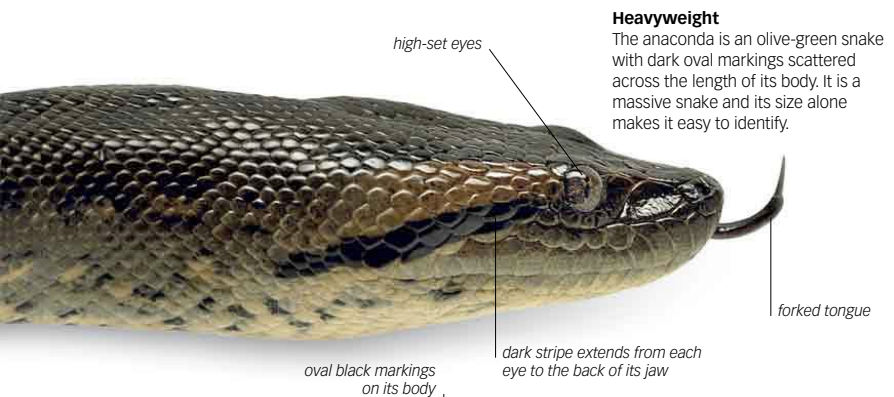
-  South America
-  Rainforest and forest clearings
-  5–6½ ft (1.5–2 m)
-  Live-bearing
-  10–30
-  Nocturnal
-  Not assessed

*Epicrates cenchria*

## RAINBOW BOA

**The rainbow boa** gets its name from the highly iridescent nature of the outer layer of its scales. This is especially noticeable when it has recently shed its skin. Although there is some variation, this species is typically dark red or orange with a series of dark-edged orange oval spots down its back. It has a distinctive wedge-shaped head marked with a black stripe down the center and two more black stripes running from each eye back to the neck.

Even though the rainbow boa can climb, it is more terrestrial than many South American boas. A generalist hunter and a powerful constrictor, it feeds on mammals, birds, lizards, and frogs. In the past, it had been divided into nine subspecies, but most of these are now considered separate species. The rainbow boa makes a popular pet as it is colorful, has a calm temperament, and adapts well to captive conditions.

**Heavyweight**

The anaconda is an olive-green snake with dark oval markings scattered across the length of its body. It is a massive snake and its size alone makes it easy to identify.

**PROFILE**

-  N. South America
-  Rainforest and in swamps and rivers
-  Up to 26 ft (8 m), possibly more
-  Live-bearing
-  20–40, rarely up to 100
-  Nocturnal
-  Not assessed

**SIMILAR SPECIES**

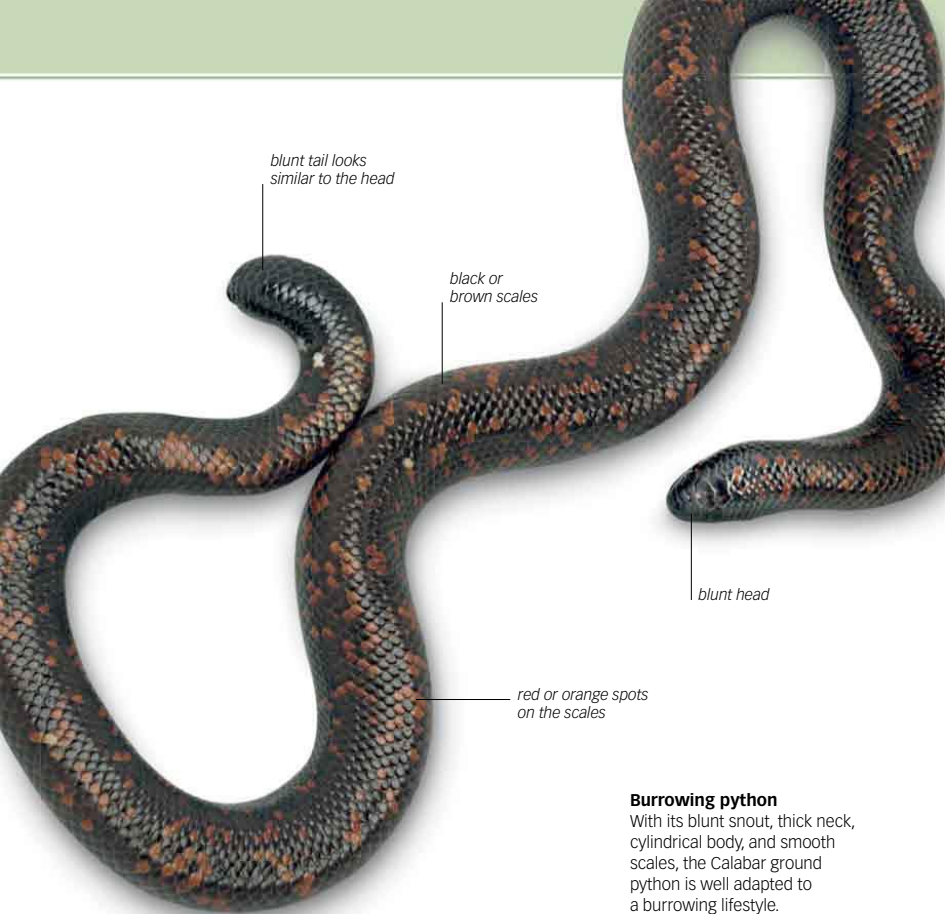
**Yellow anaconda**  
(*Eunectes notaeus*) Smaller, growing to about 13 ft (4 m); aquatic species; occurs in South America

*Eunectes murinus*

# ANACONDA

**Arguably the world's heaviest snake**, anacondas can weigh up to 440 lb (200 kg). Native to South America, it is a semi-aquatic species, and adults are rarely seen out of water; large individuals find it cumbersome to support their heavy bodies on land. Anacondas prey on mammals, including capybaras and deer, and caiman, and are powerful enough to kill people. They often lie in wait in shallow water with just their eyes showing above the surface, and ambush animals that come to the water's edge to drink, coiling their bodies around them and killing by constriction or drowning.

Males are smaller than females, and have large pelvic spurs, which they use during courtship. Mating takes place in the water, where up to 10 males often form a mating ball in their efforts to impregnate a single female. The young are born in water, and are relatively large, measuring 28–32 in (70–80 cm) in length.



#### **Burrowing python**

With its blunt snout, thick neck, cylindrical body, and smooth scales, the Calabar ground python is well adapted to a burrowing lifestyle.

#### **PROFILE**

-  W. Africa
-  Rainforest and plantations
-  3–3½ ft (0.9–1.1 m)
-  Egg-laying
-  1–4
-  Nocturnal
-  Not assessed

*Calabaria reinhardtii*

## CALABAR GROUND PYTHON

**The Calabar ground python** is a secretive species, and usually lives below the ground. When threatened, it defends itself by hiding its head in its coils and raising its tail, which is shaped and colored like its head. This defense mechanism serves to deflect a predator's attack toward the tail.

Rarely seen on the surface, the Calabar ground python probably feeds on nestling mice and other rodents, which it finds in burrows. It kills its prey by constricting or squeezing them against the walls of the burrow, and may eat a whole litter at a sitting. It has a small mouth that is not suited to swallowing large prey. At the end of the dry season, the females lay 1–4 relatively large eggs, and do not stay with them during incubation.



**Silky smooth**

A small, stout snake, the rubber boa has dark brown, tan, or olive coloration with many small, smooth, glossy scales.

**PROFILE**

-  W. North America
-  Grassland and open woodland
-  12–23½ in (30–60 cm), rarely up to 32 in (80 cm)
-  Live-bearing
-  2–9
-  Mainly nocturnal
-  Least Concern

*Charina bottae*

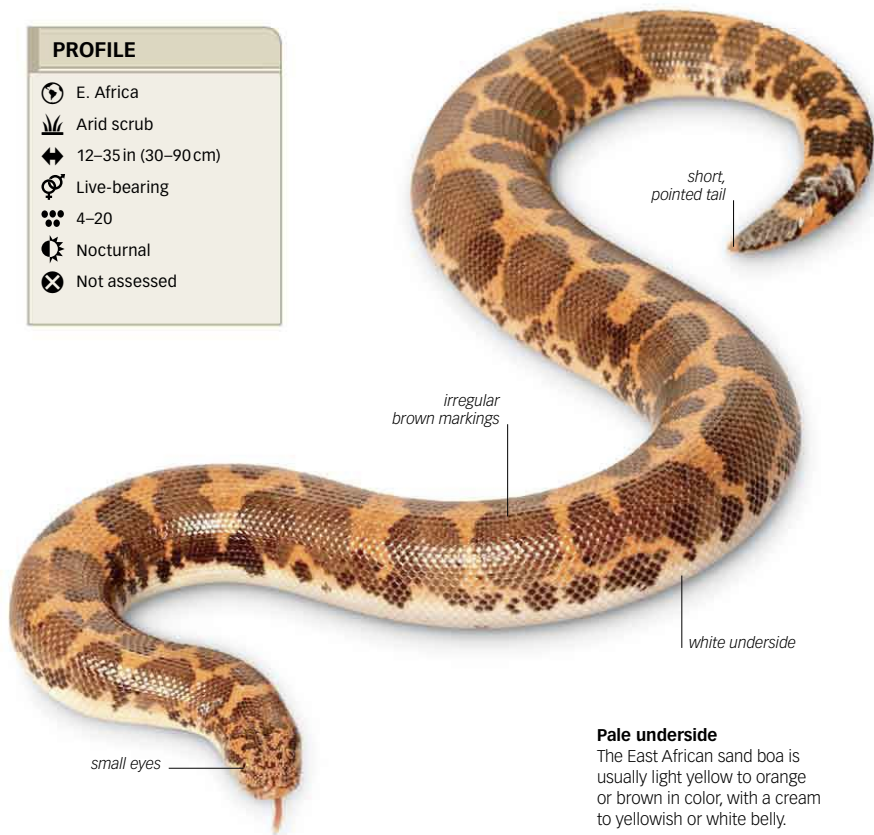
## RUBBER BOA

**One of the smallest boas in the world**, the rubber boa derives its name from its smooth, rubberlike texture. The head and tail are both blunt, and may be hard to tell apart. If threatened, the snake may raise its tail and wave it around like a false head. This species lives in cool habitats, often in mountains or foothills, under logs, stones, and loose slabs of bark on the woodland floor.

A burrowing species, the rubber boa is rarely seen on the surface and hunts for its food underground. It mainly eats nestling mice or voles, and tends to remain in the rodent's nest, eating the whole litter once it has located them. It may then go several weeks without feeding again. The newborn young are very small, only about the diameter of a pencil, and may feed on hatchling lizards at first. In cold parts of its range, females may only produce a litter only every three or four years. The young measure about 6 in (15 cm) in length, and are at first pinkish or tan in coloration.

## PROFILE

-  E. Africa
-  Arid scrub
-  12–35 in (30–90 cm)
-  Live-bearing
-  4–20
-  Nocturnal
-  Not assessed



### Pale underside

The East African sand boa is usually light yellow to orange or brown in color, with a cream to yellowish or white belly.

## SIMILAR SPECIES

*Eryx colubrinus*



**Rough-scaled sand boa**  
(*Eryx conicus*) Larger, with rough scales; found in India and Sri Lanka

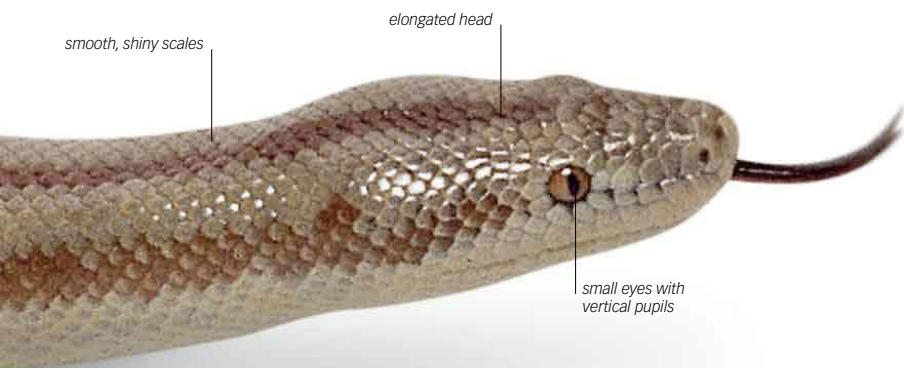
# EAST AFRICAN SAND BOA

**This species is well adapted** to a burrowing lifestyle with its stout, cylindrical body, short tail, and a wedge-shaped head. The scales are small and smooth over most of the body, but are strongly keeled toward the tail. The sand boa may hunt in burrows during the day, and is rarely seen on the surface except at night. An ambush predator, it lies in wait in loose soil or sand and suddenly emerges on to the surface when a small mammal or lizard comes within range. It is a powerful constrictor, and may pull the prey under the surface before swallowing it whole.

Females give birth to live young, whose markings are often bolder than those of the adults. Coloration varies between different populations, probably as a result of different colored soils; individuals from Kenya, where the soil is orange, are brighter than those from further north.

**Striped pattern**

A small, thick-bodied snake, the rosy boa usually has a pattern of three wide longitudinal stripes running down its back and sides.








**FULL VIEW**

smooth, shiny scales

elongated head

small eyes with vertical pupils

**PROFILE**

-  W. North America
-  Rocky desert and scrub
-  2–3½ ft (0.6–1.1 m)
-  Live-bearing
-  3–12
-  Mainly nocturnal
-  Least Concern

*Lichanura trivirgata*

## ROSY BOA

**Rosy boas vary in color** and markings according to their origin, and may have dark brown, orange, or reddish brown stripes on a cream or gray surface. The stripes are sometimes ill-defined, as in the coastal form of the species. The rosy boa has smooth scales, and the head is covered with many small scales.

Unlike many of its close relatives, this boa is not a burrowing species; it spends most of its life in crevices, and is also a good climber. The boa is rarely found in open desert, being much more at home in rocky canyons and outcrops. It is nocturnal in summer, but may be active in the evening at cooler times of the year. It feeds almost exclusively on small mammals such as mice and pack rats, but also eats birds occasionally. Rosy boas are docile and usually adapt well to captivity, making them an ideal choice for reptile enthusiasts.



**Rough skin**

File snakes are unusual snakes with small, pointed scales that give their skin a rasplike texture, hence their common name. They also have a prominent fold of skin along the center of their belly.

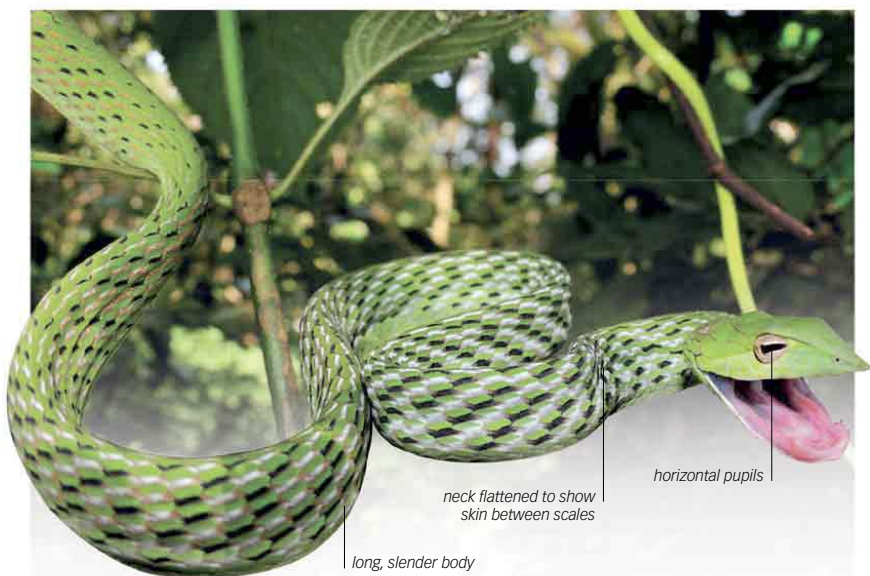
**PROFILE**

-  Southeast Asia, New Guinea, and N. Australia
-  Coastal waters and estuaries
-  Up to 5¼ ft (1.6 m)
-  Live-bearing
-  Up to 25
-  Nocturnal
-  Least Concern


*Acrochordus granulatus***LITTLE FILE SNAKE**


**The little file snake is brown**, often with orange or whitish crossbands. A completely aquatic species, it lives in coastal seas and moves into estuaries and other brackish habitats. During the day, it stays hidden among submerged roots, mangrove stilts, or under overhanging banks, and actively hunts during the night, feeding exclusively on fish; when a fish touches any part of its body, the snake reacts by rapidly throwing a coil or a loop of its body around the fish. The pointed scales, with their bristly tips, allow the file snake to grip its prey before being transferred into its mouth.


The file snake is a graceful swimmer, but it is almost helpless on land. Although it is completely harmless and never attempts to bite, the banded pattern on its body may be intended to imitate the venomous sea kraits (p.100), thus giving it some protection from predators.




## PROFILE


 South and Southeast Asia


 Rainforest, secondary forests, and plantations

 3¼–4 ft (1–1.2 m)

 Live-bearing

 3–23

 Diurnal and nocturnal

 Not assessed

## Notable features

This slender green or brown snake has an elongated head, pointed snout, and “wraparound” pupils. If disturbed, it flattens its neck, exposing the white skin between the scales, and opens its mouth.

## SIMILAR SPECIES



### Green vine snake (*Oxybelis fulgidus*)

Green or brown arboreal snake from Central America; resembles a long-nosed whipsnake, but has round pupils

## *Ahaetulla nasuta*

# LONG-NOSED WHIPSNAKE

**The long-nosed whipsnake** has extremely good vision. Its eyes are large and the pupils are horizontal, bending around the circumference of the eyes. In front of each eye is a groove running along the snout and this, coupled with the shape of the pupils, allows the snake to see forward. As the field of vision of each eye overlaps, the snake can judge distances accurately, allowing it to strike at prey such as arboreal lizards and frogs. It is one of only a handful of snakes that have this arrangement.

This snake is beautifully camouflaged when resting or traveling through bushes and trees, and it sways as it moves to simulate the motion of twigs in the breeze. It is mildly venomous to people and has enlarged fangs toward the rear end of its mouth, which are used to chew into the prey and allow venom to enter the wound.



FULL VIEW

## PROFILE

-  S.C. North America
-  Rocky desert
-  2¼–5¼ ft (0.8–1.6 m)
-  Egg-laying
-  3–8
-  Nocturnal
-  Least Concern

*Bogertophis subocularis*




# TRANS-PECOS RATSLAKE

**The Trans-Pecos ratsnake** is unmistakable in appearance. It is clear yellow or tan in color with either one of two patterns: two black lines running down its back and joined together with crossbands; or widely spaced round blotches of gray down its back and no longitudinal lines. It has been found among the roots of cacti and agave plants, and in the many caves and crevices that riddle the limestone mountains and canyons in its range. Most specimens, however, are found crossing roads at night. This is a slow-moving snake that rarely attempts to bite even if it is handled. When threatened by predatory mammals and birds, it emits a foul-smelling musk.

A very secretive snake, it is usually seen in late spring, mostly only males even then, presumably moving around in search of a mate. Females lay eggs later than most other North American snakes and they often hatch in fall or early winter.



## PROFILE

- |   |  |
|---|--|
|  Southeast Asia                 |  4–15         |
|  Rainforest and riverine forest |  Nocturnal    |
|  6½–7½ ft (2–2.3 m)             |  Venomous     |
|  Egg-laying                     |  Not assessed |

## Yellow bands

One of the biggest catsnake species, the mangrove snake has large glossy black scales with vibrant yellow bands; these vivid markings may act as a warning to predators.



## SIMILAR SPECIES



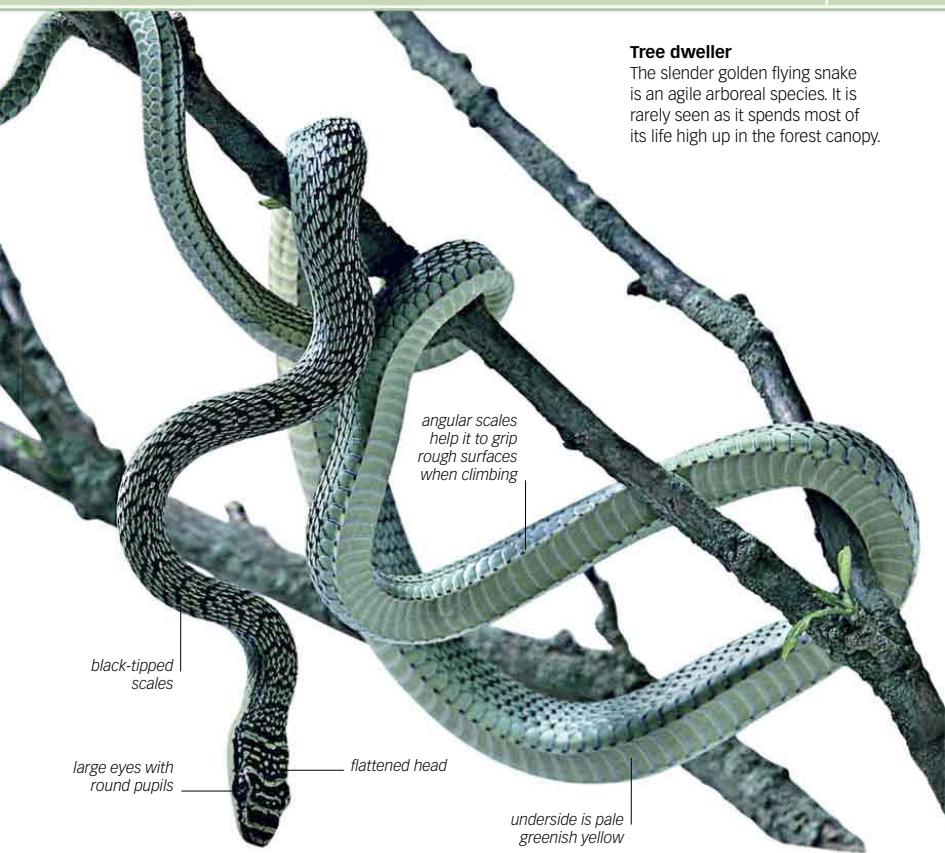
**Green catsnake (*Boiga cyanea*)** Similar distribution; adults are uniform green or green with blue heads; juveniles are brown with green heads

*Boiga dendrophila*

## MANGROVE SNAKE









**The mangrove snake is a large,** arboreal forest snake, often seen coiled in the boughs of trees and shrubs along the banks of rivers. It is also known as the gold-ringed catsnake, or cat-eyed snake. This species has large glossy scales, and a distinct ridge that runs down the center of its back. It has a broad and triangular head, and its body is slightly flattened from side to side, especially in the neck region. This gives it extra rigidity, like a girder, and allows it to reach out to span the gaps between branches.

When threatened, the mangrove snake flares its yellow lip scales and flattens its neck, bending it into an S-shaped loop, ready to strike. This is a rear-fanged species, and its venom can produce painful symptoms, although it is rarely life-threatening to people. A stealthy nocturnal hunter, it feeds on mammals, birds, lizards, and frogs. Females lay their eggs in leaf litter, rotting stumps, or tree holes.

**Tree dweller**

The slender golden flying snake is an agile arboreal species. It is rarely seen as it spends most of its life high up in the forest canopy.

**PROFILE**

-  Southeast Asia
-  Rainforest and plantations
-  3¼–4 ft (1–1.2 m)
-  Egg-laying
-  5–8
-  Diurnal
-  Venomous
-  Not assessed








*Chrysopelea ornata*

## GOLDEN FLYING SNAKE

**An elegant, slender species** from the open forests of Asia, the golden flying snake has a striking pattern of black-edged green scales over its body. It is completely at home in the canopy, where its ability to glide enables the snake to move to lower levels to escape predators. It uses the angular scales along its flanks to grip rough bark and climb vertical tree trunks.

When the golden flying snake launches itself from a high position, it spreads its ribs to make itself flatter and draws up the underside until it is concave. This produces wind resistance and slows its fall. The snake can steer itself slightly by altering the position of its body, and may be able to land as far as 330 ft (100 m) from the tree it left. An active hunter, it mainly feeds on lizards that share its arboreal habitat, grasping and holding the prey until the venom takes effect. A rear-fanged species, the flying snake has a powerful bite, but its venom is not particularly harmful to humans.

## PROFILE

-  Europe and the Middle East
-  Heathland, dry grassland, and rocky places
-  20–28 in (50–70 cm)
-  Live-bearing
-  2–16
-  Diurnal
-  Not assessed

## Spotted and striped

This smooth snake can be gray, brown, or reddish in color, with dark spots along its back and a stripe running through each eye.

scales lack keels,  
giving a smooth appearance

distinctive eye stripe



## SIMILAR SPECIES



**False smooth snake**  
(*Macropododon cucullatus*)

Also called the hooded or cowl snake; has dark markings at the rear of its head

*Coronella austriaca*

## SMOOTH SNAKE

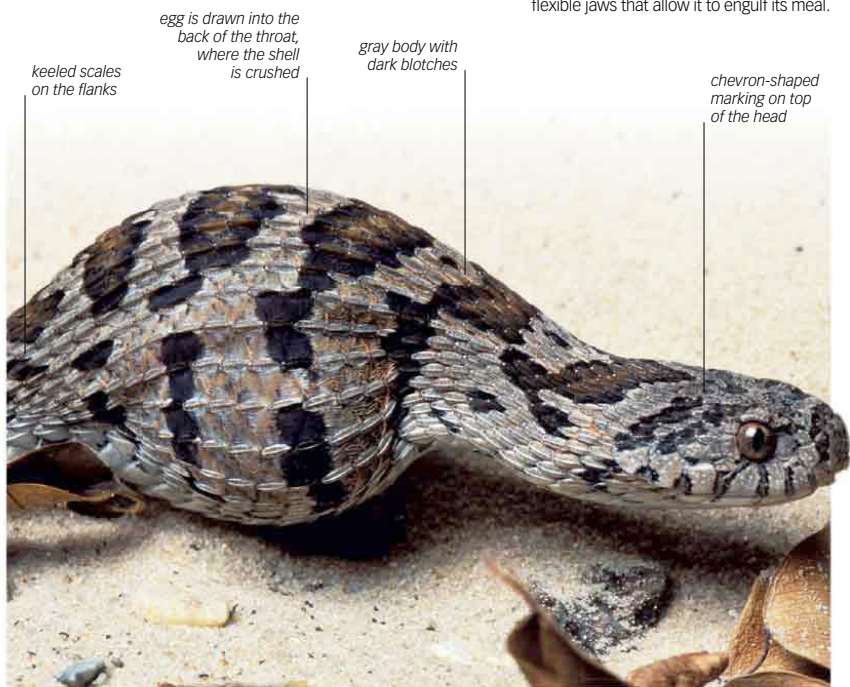
**Although the smooth snake** is Britain's rarest reptile, it is common throughout other parts of its range. A secretive species, it often basks under the cover of vegetation or beneath flat rocks or pieces of garbage, especially discarded sheets of tin, although it sometimes climbs into low-growing bushes such as heather. It also favors south-facing slopes, including railroad cuttings. In the north of its range, females breed every two or three years, but in the warmer south they breed every year. The young are born live as an adaptation to the cold environment in which they occur.

The smooth snake feeds on lizards, especially common and wall lizards, nestling mammals, and small snakes. It hunts by smell, seeking out its prey when they are hiding in burrows and constricting them only if they struggle. This snake often bites if it is handled; although it may draw blood, the bite is not dangerous.



### Egg diet

The egg-eater has a narrow head with a rounded snout. Its coloration is variable, ranging from gray to brown or olive with irregular dark blotches. It has extremely flexible jaws that allow it to engulf its meal.



### PROFILE

-  Africa (south of the Sahara)
-  Desert, scrub, and open woodland
-  2–3½ ft (0.6–1.1 m)
-  Egg-laying
-  6–25
-  Nocturnal
-  Least Concern

*Dasypeltis scabra*

## COMMON EGG-EATER









**A common species**, this snake eats nothing but the eggs of birds, and has several adaptations to accommodate its diet. It has minute teeth that play no role in feeding. The mouth has a huge gape, which enables the snake to swallow eggs three times the diameter of its head. When the egg is swallowed, it is moved back and forth in the throat, where specialized vertebrae with long downward extensions saw through the shell. Once the top of the shell collapses, the contents are swallowed and the shell, folded lengthwise, is regurgitated.

Adults are capable of swallowing eggs up to the size of chicken eggs, but juveniles, which are about 8 in (20 cm) long, can only manage smaller eggs, such as those laid by finches and weaver birds. Common egg-eaters feed heavily during the bird breeding season so that they can survive without food for the rest of the year. When threatened, the egg-eater mimics the saw-scaled viper (p.120) by rubbing the oblique scales on its flanks to produce a rasping sound.

**Conspicuous eyes**

The boomslang has a long, slender body with a distinctive wedge-shaped head and exceptionally large eyes. Males are generally bright green with black dorsal scales (shown here); females are greenish brown.

**PROFILE**

-  Africa (south of the Sahara)
-  Open woodland and thorn scrub
-  5–6½ ft (1.5–2 m), rarely up to 9¼ ft (2.8 m)
-  Egg-laying
-  10–14, rarely up to 25
-  Diurnal
-  Dangerously venomous
-  Not assessed

*Dispholidus typus*

## BOOMSLANG





**This is a slender-bodied arboreal snake** from Africa; its name means “tree snake” in Afrikaans. Boomslangs have slightly elongated, nearly teardrop-shaped pupils that give them some degree of binocular vision. This helps them to judge distance, an important asset when hunting among branches. Juveniles usually have bright green irises.

Boomslangs hunt actively during the day, using their excellent vision to find lizards, chameleons, and birds. A fast-moving species, they chase down their prey and grip it in their mouth, using the long rear fangs to introduce fast-acting venom. Only when the prey stops moving do they swallow it. If threatened, boomslangs inflate their throat to expose the brightly colored skin between the scales. This species is one of the few colubrid snakes that can potentially kill people. Its rear venom-delivering fangs are very long and the venom is extremely toxic, so even a relatively small amount can be fatal. However, they are shy by nature and only bite if held or provoked.

**Smooth-scaled**

The eastern indigo snake is bluish black with large, glossy scales, relieved only by a small patch of reddish orange on its chin and throat.

**PROFILE**

-  S.E. US
-  Woodland, swamps, and forests
-  6½–9½ ft (2–2.9 m)
-  Egg-laying
-  4–6
-  Diurnal
-  Least Concern

*Drymarchon couperi*

## EASTERN INDIGO SNAKE

**This is the longest North American snake.** It typically basks in a loose coil on elevated dry land near water. It usually rests among dry leaves and, if disturbed, vibrates the tip of its tail making a sound that is similar to that of a rattlesnake. This snake rarely bites, but even long-term captives are nervous and seem to dislike being handled.








The eastern indigo snake is active throughout the day, even during winter months. It feeds on a wide range of prey, including mammals, birds, eggs, frogs, and other snakes. Even venomous cottonmouths and rattlesnakes are part of its diet; the eastern indigo snake is immune to their venom. It does not constrict its prey but simply grasps it and begins to swallow; it may also use its body to press the victim against the ground or the side of a burrow before swallowing it. This species used to include several Central and South American forms, but they have recently been classified as five distinct species.



**Slender snake**

The crowned dwarf snake is a slender, sandy-colored species with a prominent crownlike crossband behind its head.

**FULL VIEW****PROFILE**

-  Middle East
-  Dry rocky hillsides and fields
-  Up to 23½ in (60 cm)
-  Egg-laying
-  3–7
-  Crepuscular
-  Least Concern

*Eirenis coronella*

## CROWNED DWARF SNAKE

**This species, like all other dwarf snakes,** lives a secretive life in places where there is plenty of cover, hiding beneath stones, rocks, or dry clay rubble. Although dwarf snakes are similar to each other, the crowned dwarf snake is distinguished by the dark area behind its head and the thin, pale crossbands along its body. The species feeds mainly on spiders, but also eats centipedes, scorpions, and insects; it is apparently immune to the venom of scorpions and centipedes. An active hunter, it pokes its head under stones and into crevices in search of prey. When it finds something suitable, it simply grasps and swallows it.

Females lay a small number of relatively large, elongated eggs. The newly hatched young are very small, measuring only about 4–4¾ in (10–12 cm) in length, and are thinner than a shoelace.



dark line runs from each eye to the back of the jaw

lightly keeled scales give a rough appearance

## PROFILE

-  S. and S.E. Europe
-  Open woodland and rocky places
-  5–8½ ft (1.5–2.5 m)
-  Egg-laying
-  4–16
-  Diurnal
-  Near Threatened

### Large snake

Four-lined snakes are some of the largest snakes in Europe, with adults reaching considerable lengths.



### Young snakes

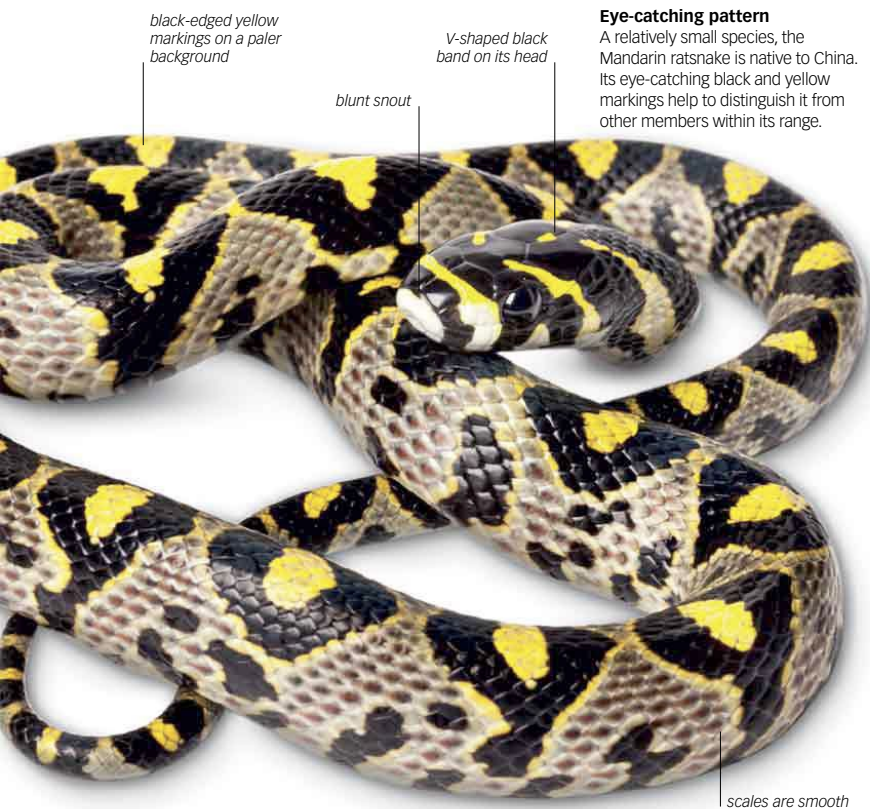
Juveniles are pale gray with bold dark blotches on their back. These fade with age and four dusky longitudinal stripes appear.

*Elaphe quatuorlineata*

# FOUR-LINED SNAKE

**The four-lined snake** is a fairly heavy-bodied snake with a wide head. There is some variation in color and size depending on its origins. Juveniles are completely different from adults, being pale gray with spots, and acquire the stripes as they mature. Snakes of an intermediate age show traces of both blotches and stripes.

Four-lined snakes are usually seen in the evening, especially on warm, overcast days, hunting on rocky, overgrown hillsides. They prey mainly on rodents and small rabbits, but modern agricultural practices have largely eliminated these in all areas except the most rural. Juveniles also eat lizards. These snakes are powerful constrictors, but have a gentle temperament and rarely attempt to bite. The species is becoming rare due to habitat destruction for development, intensive agriculture, and wanton killing.

**Eye-catching pattern**

A relatively small species, the Mandarin ratsnake is native to China. Its eye-catching black and yellow markings help to distinguish it from other members within its range.

**PROFILE**

-  S. China and E. Asia
-  Montane woods, fields, and scree
-  3¼–4 ft (1–1.2 m), rarely up to 5¼ ft (1.6 m)
-  Egg-laying
-  3–8
-  Nocturnal
-  Least Concern

*Euprepophis mandarinus*

## MANDARIN RATSNAKE

**The Mandarin ratsnake** has a unique color and pattern that makes it instantly identifiable, although there is some variation in the shape of the yellow dorsal blotches and the intensity of the colors. Individuals from some parts of its range may have reddish centers on the gray scales.








This is a very secretive snake, and for many years it was thought to be a rare species. The Mandarin ratsnake spends most of its life underground, among rocky scree, beneath rocks, or in burrows. It prefers cool temperatures and moist conditions, and hibernates for several months in the winter. The ratsnake feeds on small mammals, probably before they have left the nest, constricting or pressing them against the walls of the burrow. It may eat several small animals in a single sitting, even clearing a nest of a complete litter; its narrow head prevents it from eating larger prey. This species is popular among amateur snake keepers, but they can be difficult to take care of.

### Colorful tail

The red-tailed green ratsnake's tail can be orange, gray, yellowish brown, or almost any color, but despite its name, the tail is hardly ever red.



### PROFILE

-  Southeast Asia
-  Rainforest, especially near water, and plantations
-  5¼–6¼ ft (1.6–1.9 m), exceptionally to 7¾ ft (2.4 m)
-  Egg-laying
-  5–8
-  Diurnal
-  Least Concern

smooth, shiny scales

tail is a contrasting color

### SIMILAR SPECIES



striped lower half of the body

#### Common trinket snake (*Coelognathus helena*)

Native to south-central Asia; tan and dark brown, with a checkered pattern on the front half of its body

### *Gonyosoma oxycephalum*

## RED-TAILED GREEN RATSNAKE

**Also known as the red-tailed racer**, this ratsnake is a long, slender species, with a narrow head, plain green body, and a long tail. Occasional specimens have green heads and gray bodies and tails (shown below). It is an arboreal species, usually seen coiled in the lower branches of forest trees bordering rivers, where its bright green color provides excellent camouflage. An active hunter, the red-tailed green ratsnake forages for small mammals, bats, and birds, striking very quickly from a coiled position.

Little is known about the breeding behavior of this species in the wild, but captive snakes lay cylindrical eggs that hatch after 3–4 months.










### Defense strategy

If alarmed, this snake opens its mouth wide, flattens its neck, and pulls its head back into an S-shaped curve, in readiness to strike.

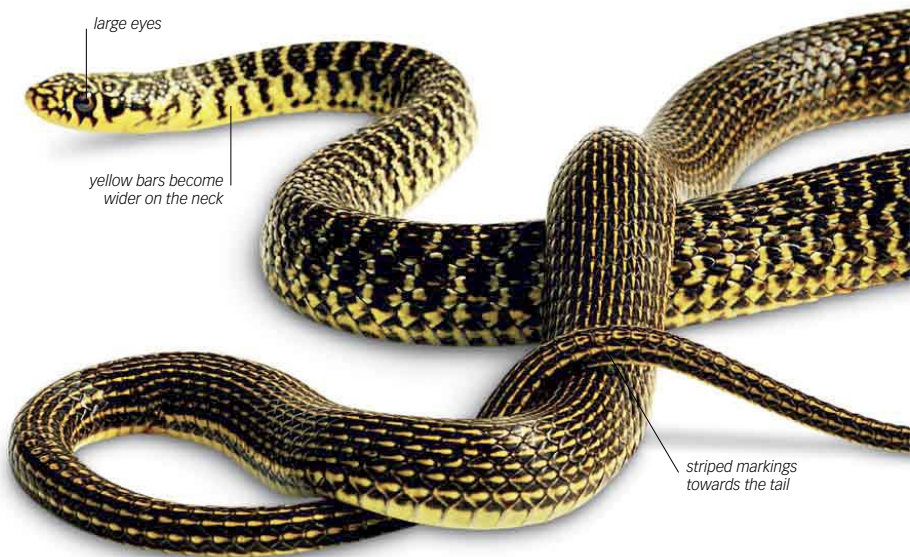


## PROFILE

- |   |   |
|---|---|
|  Europe   |  Egg-laying    |
|  Dry open woodland, hillsides, and ruined buildings |  4–15          |
|  Up to 5 ft (1.5 m)                                 |  Diurnal       |
|   |  Least Concern |

## Fast-moving

Common over much of its range, the green whipsnake is an alert, fast-moving snake with a small head, slender body, and a long, tapering tail.



## SIMILAR SPECIES



**Large whipsnake**  
(*Dolichophis caspius*)

Can grow up to 6½ ft (2 m); has a more uniform coloration



**Balkan whipsnake**  
(*Hierophis gemonensis*)

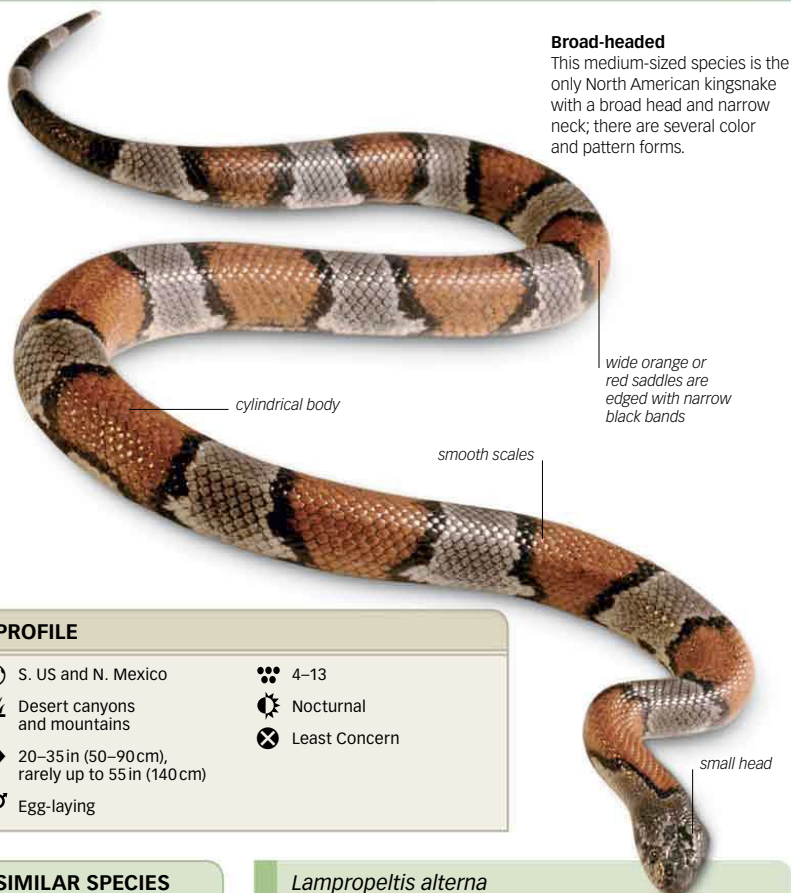
Spotted body; occurs in eastern Europe

*Hierophis viridiflavus*

## GREEN WHIPSNAKE

**This slender snake** may be yellow and black, or uniform black. Black individuals are larger, and absorb heat more quickly due to their color, but are not as well camouflaged and may be more likely to be found by predators. An extremely fast and agile species, especially when warmed up, it bites viciously if held. It hunts by sight, feeding mostly on lizards, and occasionally on small mammals, birds, and other snakes. It may constrict larger prey, but normally grasps them and begins swallowing right away.





Sometimes, large numbers of green whipsnakes hibernate together, before dispersing in the spring. Females lay elongated eggs that hatch in a relatively short time of about six weeks. The hatchlings are pale gray or brown with brightly patterned heads and necks, but plain bodies. They take about four years to develop full adult coloration.



### Broad-headed

This medium-sized species is the only North American kingsnake with a broad head and narrow neck; there are several color and pattern forms.

### PROFILE

-  S. US and N. Mexico
-  Desert canyons and mountains
-  20–35 in (50–90 cm), rarely up to 55 in (140 cm)
-  Egg-laying
-  4–13
-  Nocturnal
-  Least Concern

### SIMILAR SPECIES



#### Mexican kingsnake (*Lampropeltis mexicana*)

Roughly the same size, with variable dark red markings on gray; occurs in northeast Mexico

### *Lampropeltis alterna*

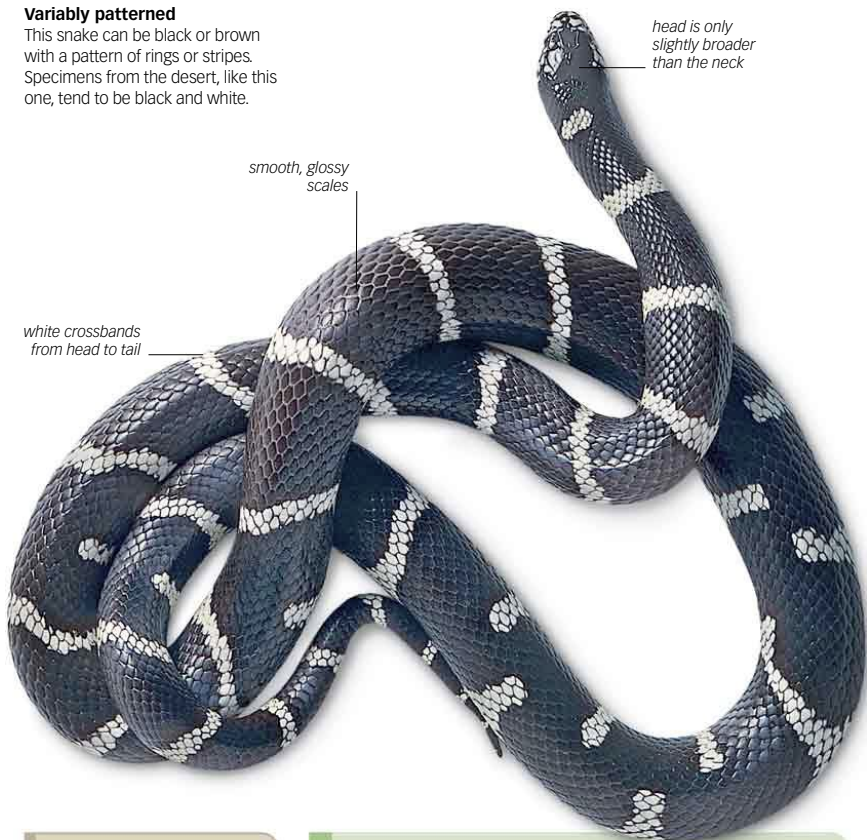
## GRAY-BANDED KINGSNAKE

**A highly variable species**, the gray-banded kingsnake may be either gray with darker gray bands, or gray with wide red or orange bands. The shade of gray and orange may also vary, creating a kaleidoscope of possibilities. This snake inhabits the less visited parts of the Chihuahuan Desert that straddles the Mexico-US border, and is rarely seen because of its secretive nature. It lives in rock piles and scree, but retreats deep underground into limestone crevices to shelter from the hot, dry summer.

Males are most active in the spring, when they are searching for a mate, and are sometimes seen on the surface of the few roads that cross the region. Gray-banded kingsnakes feed on small rodents, lizards, and other snakes, which they root out from their hiding places. They rarely attempt to bite, but may smear the foul-smelling contents of their musk glands over anyone who handles them.

**Variably patterned**

This snake can be black or brown with a pattern of rings or stripes. Specimens from the desert, like this one, tend to be black and white.

**PROFILE**

-  W. North America
-  Desert and coastal scrub
-  2½–5¼ ft (0.75–1.6 m)
-  Egg-laying
-  2–24
-  Mostly nocturnal
-  Not assessed




*Lampropeltis californiae*

## CALIFORNIA KINGSNAKE

**A well-known species**, the California kingsnake makes a popular pet among amateur snake keepers because of its docile nature and attractive appearance, which is highly variable. Individuals from inland desert regions are jet-black with pure white bands, whereas those from some coastal locations are mid-brown with yellowish cream bands. There are some intermediate forms, many of which can be traced to a particular region. A proportion of snakes from certain parts of the range have a single white line down the center of their back instead of bands; striped and banded hatchlings may be produced from a single clutch of eggs.

California kingsnakes are ground-dwelling constrictors that feed on small mammals, lizards, and other snakes. They are immune to the bites of venomous snakes that inhabit their range, including rattlesnakes. Widely bred in captivity, a number of mutant color forms have arisen and are being selectively bred.

## PROFILE

-  S.C. North America
-  Dry montane woodland
-  1½–3¼ ft (0.5–1 m)
-  Egg-laying
-  3–7
-  Mainly nocturnal
-  Least Concern

## Striking similarity

The slender-bodied Sonoran mountain kingsnake closely mimics the coloration of the venomous coral snakes except for the order of its colored bands.



alternating red, black,  
and white crossbands

smooth and  
shiny scales

prominent white snout

## SIMILAR SPECIES



black  
snout

**California mountain  
kingsnake (*Lampropeltis  
zonata*)** Similar, but  
usually has a black snout

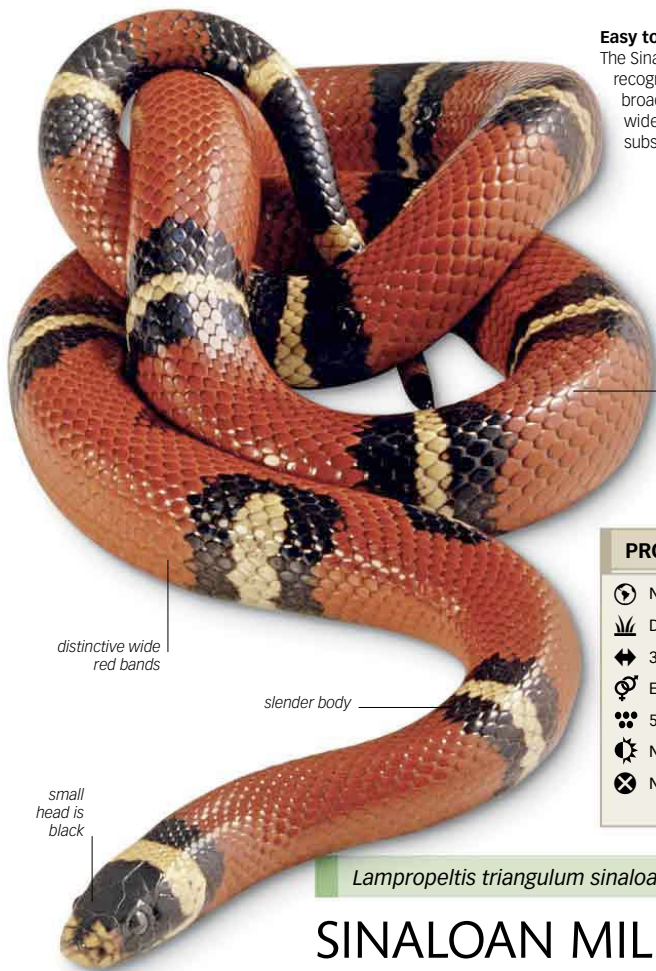
*Lampropeltis pyromelana*

# SONORAN MOUNTAIN KINGSNAKE

**This tricolored kingsnake** lives in mountain ranges in the southern US and northern Mexico. It prefers rocky places scattered with trees and often near streams, and is sometimes found at the bottom of scree slopes. It may occasionally be seen out in the open during late afternoon and evening. Its body is covered with rows of smooth scales, with red, white, and black crossbands. There is variation in the width of the black bands, and whether they meet across the back; three subspecies are recognized from different groups of mountain ranges, but this species always has a white snout.

The Sonoran mountain kingsnake feeds on lizards, small mammals, and probably other snakes, constricting the prey before swallowing it. Females lay small clutches of elongated eggs toward the end of summer, which hatch after 8–9 weeks. The hatchlings are about 12 in (30 cm) long.



**Easy to recognize**

The Sinaloan milksnake is easily recognized because of its very broad red bands, which are wider than in most other subspecies of *L. triangulum*.








smooth, shiny  
scales

distinctive wide  
red bands

slender body

small  
head is  
black

**PROFILE**

-  N. Mexico
-  Dry scrub
-  3–4 ft (0.9–1.2 m)
-  Egg-laying
-  5–12
-  Nocturnal
-  Not assessed

*Lampropeltis triangulum sinaloae*

## SINALOAN MILKSLAKE

**The milksnake is divided** into many subspecies (about 24 have been identified), and the Sinaloan form is one of the most attractive. It has wide red bands separated by triple bands of black-white-black, an arrangement thought to mimic the pattern of the venomous coral snakes, some of which occur in the same range. This is known as Batesian mimicry, in which a harmless species imitates a dangerous one so that predators avoid it.

Milksnakes rarely bite, although they dislike being handled and constantly attempt to escape. Nighttime hunters, they prey on a variety of animals, including rodents, amphibians, and reptiles. They have also been known to eat birds and their eggs. Females lay up to two clutches in a single year, and the eggs take about nine weeks to hatch. The Sinaloan milksnake is widely kept in captivity, along with several other subspecies; selective breeding of milksnakes has produced colorful strains, as well as albinos and other unnatural color forms.



**Pueblan milksnake**  
(*L. t. campbelli*)

This subspecies has red, white, and black bands of about equal width on its body.



FULL VIEW

long, slender  
brown body

overhanging scale  
above the eyes

nostrils



### Menacing expression

The Montpellier snake has distinctive large eyes with raised eyebrowlike ridges above, which give this snake a menacing appearance.

### PROFILE

-  S. Europe
-  Dry, bushy places, fields, and open woodland
-  Up to 7¼ ft (2.4 m), usually less
-  Egg-laying
-  4–20
-  Diurnal
-  Least Concern

*Malpolon monspessulanus*

## MONTPELLIER SNAKE

**Potentially the largest European snake**, this is a fast-moving and aggressive species. Adults are usually uniform in color, which is variable, but juveniles are spotted, the markings fading as they mature. This species has overhanging scales above its large eyes and a large gland on each side of the snout, opening into the nostrils. The gland produces an oily fluid that the snake wipes over its body, which appears to waterproof its skin and reduce water loss.

The Montpellier snake travels at great speed over rough, rocky terrain and through vegetation. It bites readily if caught; the venom acts quickly on its prey, which includes lizards, snakes, and mammals up to the size of rabbits. The fangs are situated at the rear of its mouth, and are unlikely to be effective against humans. If cornered, the snake may flatten its neck and make a loud, prolonged hiss.

bright green  
coloring with  
no markings

long,  
slender body

relatively large  
eyes with  
round pupils

#### Perfect camouflage

The rough green snake is mostly found in the lush growth around water bodies. Its bright green color is perfect for an arboreal existence.

FULL VIEW

#### PROFILE

-  E. North America
-  Damp woodland and meadows
-  30–39 in (75–100 cm)
-  Egg-laying
-  1–14
-  Diurnal
-  Least Concern

*Opheodrys aestivus*

## ROUGH GREEN SNAKE

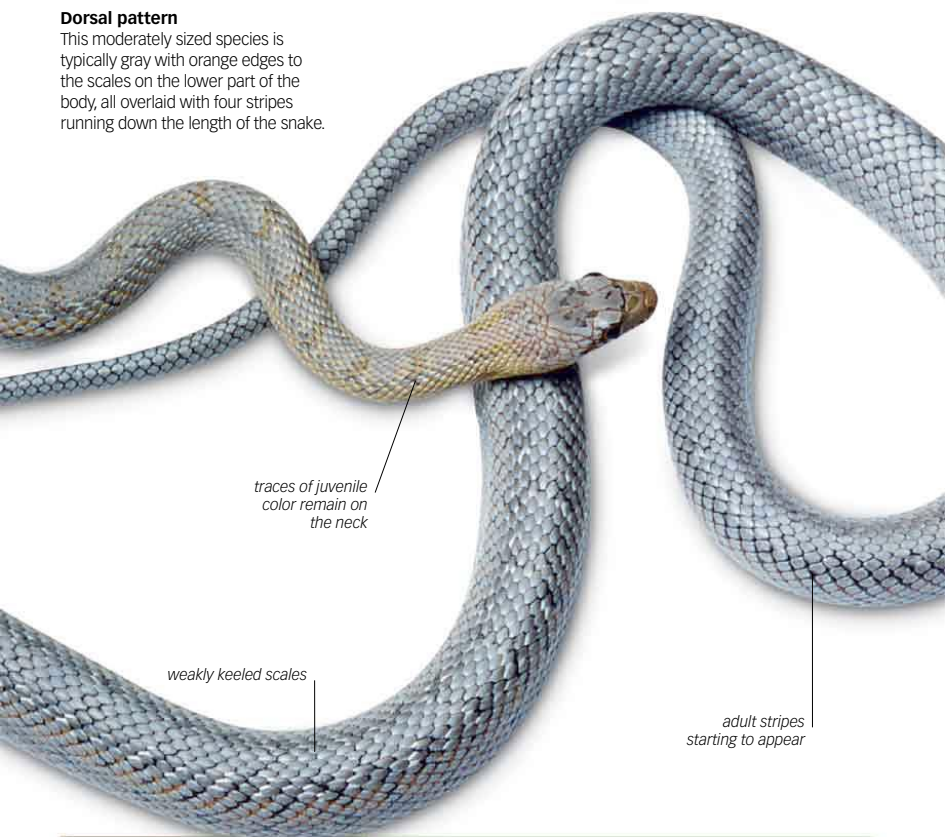
**The rough green snake is bright green** with a paler green underside. It has keeled scales, which differentiate it from the smooth green snake, *Opheodrys vernalis*.

A good climber, this snake spends most of its time in the branches of trees or shrubs, basking or hunting during the day and sleeping there at night. It eats invertebrates, including caterpillars, grasshoppers, and beetles, which it locates by sight; it ignores prey that are still. When hunting, this snake moves along branches and twigs, gliding smoothly to disturb the leaves as little as possible. Once it has located its prey, the snake approaches stealthily until it is within range, and then strikes quickly, swallowing its prey head-first.

Individuals do not stray far from their home territory, which is usually a narrow strip of vegetation bordering a river or lake. Females lay their eggs in rotting stumps, tree holes, and under rocks; sometimes a number of them use the same site. The eggs may hatch after only 30 days, but usually take longer.

### Dorsal pattern

This moderately sized species is typically gray with orange edges to the scales on the lower part of the body, all overlaid with four stripes running down the length of the snake.



traces of juvenile color remain on the neck

weakly keeled scales

adult stripes starting to appear

### PROFILE

-  S.C. US (Texas) and N. Mexico
-  Rocky woods and hillsides
-  3¼–5 ft (1–1.5 m)
-  Egg-laying
-  4–15
-  Nocturnal
-  Least Concern

*Pantherophis bairdi*

## BAIRD'S RATNAKE

**A powerful and muscular species,** Baird's ratsnake lives in rocky habitats, including boulder-strewn hillsides and wooded canyons. It has rarely been seen in its habitat, most having been captured on roads at night, and so its natural history is largely unknown. This slow-moving species climbs well and hunts in rock crevices and caves. It feeds on birds, bats, and other small mammals; juveniles often eat lizards. In captivity, the snake readily eats rats and mice.

Females lay relatively large eggs that hatch after about nine weeks. The hatchlings measure about 12 in (30 cm) and are gray with short dark gray crossbars across the top of their back; these markings fade as the snake grows and are replaced by a pair of dusky stripes.



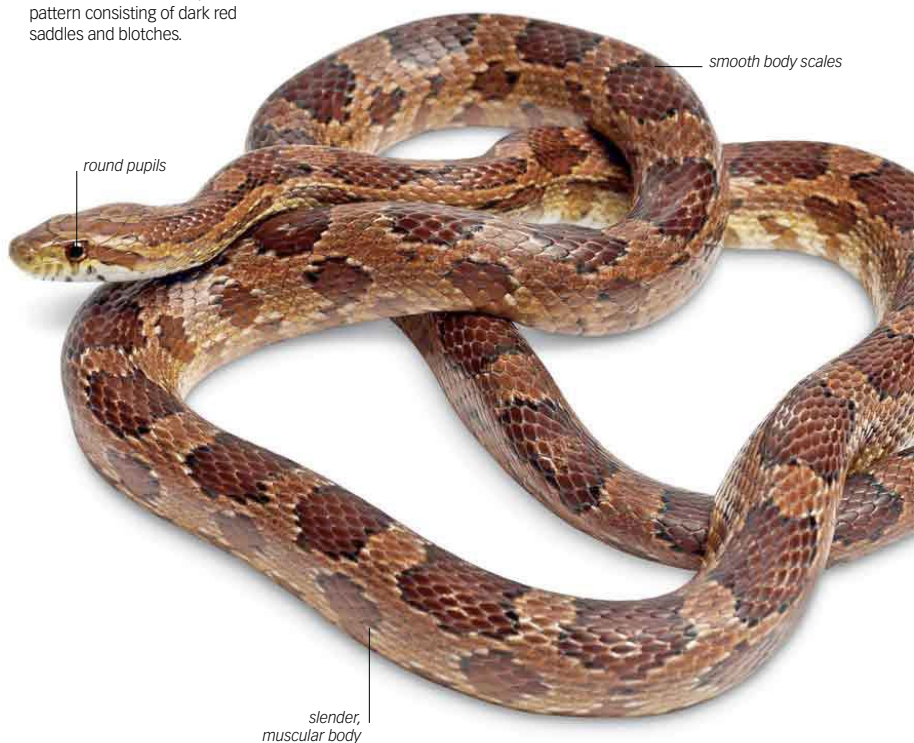
### Mexican form

Baird's ratsnakes from parts of Mexico have yellowish bodies and pale gray heads.



**Red ratsnake**

The corn snake is an attractive relative of the ratsnakes, with a pattern consisting of dark red saddles and blotches.

**PROFILE**

-  S.E. US
-  Woodland, scrub, and fields
-  5–6 ft (1.5–1.8 m)
-  Egg-laying
-  3–40, rarely up to 50 or more
-  Mostly nocturnal
-  Least Concern

*Pantherophis guttatus***CORN SNAKE**







**A slender snake** with a calm temperament, this is a popular species among snake-keepers. In addition, a kaleidoscope of different color forms have arisen in captivity and are selectively bred, resulting in a huge range of choices. Within its natural habitat, the corn snake is variable and may have saddles of orange or deep red on a gray or straw-colored background.

The corn snake is very common over much of its range, and is often found around dumps on the outskirts of towns and abandoned buildings—places that attract mice and rats, its main prey. A powerful constrictor, it also feeds on reptiles as well as mammals. When threatened, corn snakes rapidly vibrate their tails and may rear up, ready to strike.

**Selectively bred**

As a result of years of selective breeding, captive-bred corn snakes display an array of colors and patterns.

## PROFILE

-  E. North America
-  Swamps, open woodland, grassland, and farmland
-  3¼–6 ft (1–1.8 m), rarely up to 8¼ ft (2.5 m)
-  Egg-laying
-  4–44
-  Nocturnal and diurnal
-  Least Concern

## Color variation

Although hatchling rat snakes begin life looking much the same as each other, as they grow their markings change, and several subspecies, are recognized.



**Yellow ratsnake**  
(*P.O. quadrivittata*) This subspecies is yellow with no spots and four dark longitudinal stripes. It is found in Florida and the Atlantic coastal plain.








## *Pantherophis obsoletus*

# WESTERN RAT SNAKE

**The Western rat snake** is one of the largest and most widespread snakes in North America. A good climber, it is often seen in trees or the rafters of abandoned barns and other buildings; the scales on its underside are sharply angled, enabling it to grip rough surfaces. An opportunistic hunter, it climbs in search of any small animal, including squirrels and birds' nests, and can be a nuisance where nest-boxes are set out for birds. It is also a good swimmer.

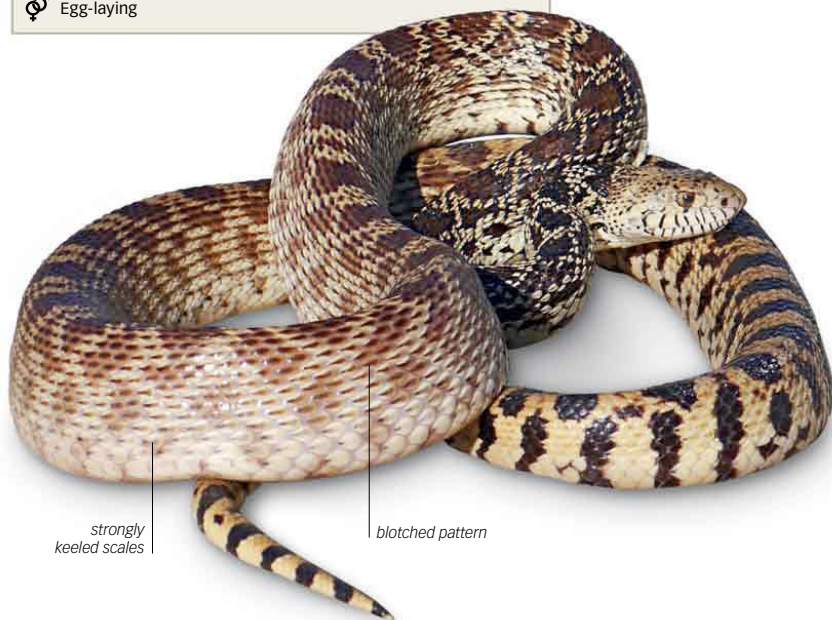
Individuals tend to stay in the same area and hibernate within their home range. Males, however, move further away than females, presumably in search of mates. They engage in combat dances during the breeding season, where each snake tries to force its rival's head to the ground. Females lay their eggs in early summer in hollow logs, piles of rotting vegetation, or in cavities under rocks. The eggs hatch after about 60–70 days. The hatchlings are pale gray with darker blotches or saddles down their backs.

## PROFILE

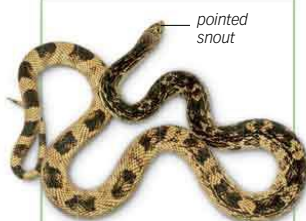
-  W. North America
-  Grassland, desert canyons, woodland, and cultivated fields
-  3¼–8¾ ft (1–2.7 m)
-  Egg-laying
-  2–24
-  Nocturnal and diurnal
-  Least Concern

**Blotched pattern**

This thickset, powerful constrictor may be pale yellow to brown, with large dark blotches down its back. Striped and albino individuals are also known to occur in the wild.



## SIMILAR SPECIES



**Pine snake (*Pituophis melanoleucus*)** Variable coloration, ranging from uniform black to cream or yellowish with irregular dark blotches

*Pituophis catenifer*

## GOPHER SNAKE

**A large, slender species**, the gopher snake lives in a variety of habitats and varies in color and markings from place to place. Its scales are strongly keeled, it has a pointed snout, and it may be cream, pale yellow, or brown, with many large brown or reddish brown blotches down its back. The overall coloration tends to match the soil on which it lives. It is a terrestrial species that also burrows, using its pointed snout to force a way through soil and then bending its neck and moving backward to scoop out the loose soil. It also takes over the abandoned burrows of rodents, and occasionally climbs into bushes and small trees.








It feeds mainly on small mammals, especially mice and rats, but also on a variety of other species, including rabbits, ground squirrels, and gophers. It hunts actively, poking its head into crevices and burrows, and moving through burrows in search of prey. It may constrict its prey, but often pins it against the side of a tunnel or the ground until it is dead. If threatened, it inflates its body, vibrates its tail, and hisses so loudly that it can be heard over a great distance.



**Black and red markings**

The long-nosed snake has a pattern of black saddles with varying amounts of red on the scales between them.

**PROFILE**

-  W. North America
-  Desert or scrub
-  2–3¼ ft (0.6–1 m)
-  Egg-laying
-  3–11
-  Crepuscular and nocturnal
-  Least Concern

*Rhinocheilus lecontei*

## LONG-NOSED SNAKE

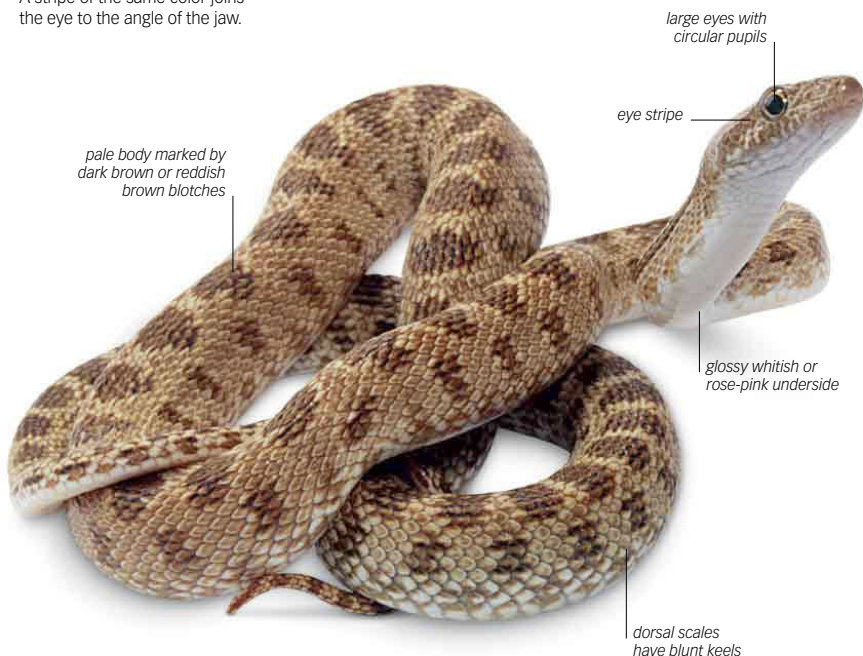
**As its name suggests**, this species has a long, pointed snout with a prominent rostral scale, which it uses for burrowing. It spends much of its time below ground, sheltering from the heat during the day and searching for food at night.








The long-nosed snake is an active hunter, poking its head under logs and rocks, or exploring burrows in search of food. It appears to hunt largely by smell and will follow the scent trails of potential prey until it finds them. This snake feeds mainly on lizards, although juveniles eat invertebrates and large adults may eat small mammals. Prey is not usually constricted; it is pressed against the ground or the walls of a burrow. The long-nosed snake rarely bites. Its main defense is to seek shelter but, if cornered, it will tilt its body so that the red and black pattern is displayed. This is probably to imitate the poisonous coral snakes from the region.



**Spotted snake**

The diadem snake is variable in color but always has a row of dark brown spots along its back. A stripe of the same color joins the eye to the angle of the jaw.

**PROFILE**

-  N. Africa, Arabia, and E. Asia
-  Desert and dry grassland
-  3–4¼ ft (0.9–1.3 m)
-  Egg-laying
-  3–6
-  Nocturnal and diurnal
-  Least Concern

*Spalerosophis diadema*

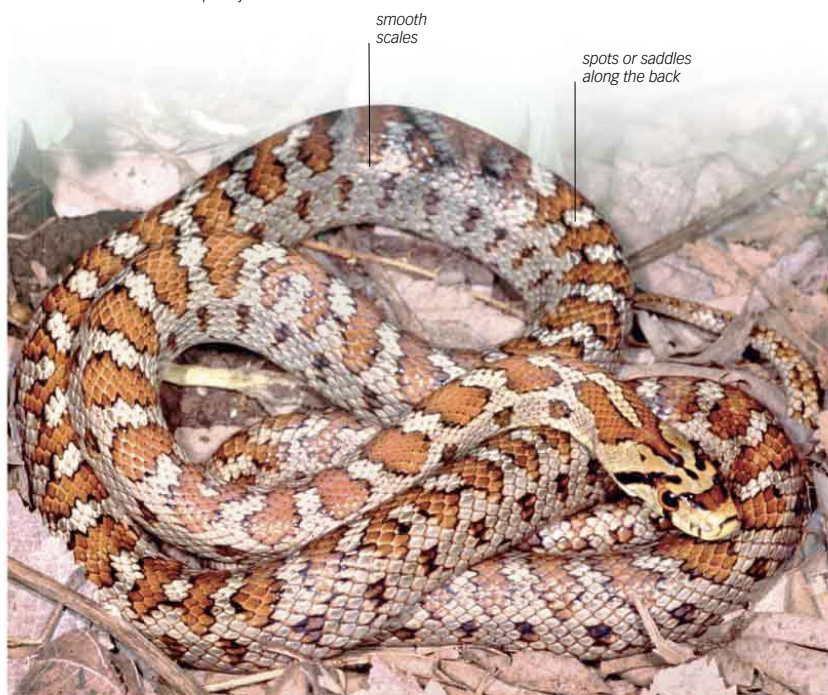
## DIADEM SNAKE

**The diadem snake** gets its name from a pattern of markings on its neck and head that resembles a crown or diadem. An adaptable species, it lives in dry gravel plains, foothills, and mountain plateaus. It can also be found around human dwellings and farms, attracted there by mice and rats. It has proven effective in controlling vermin, especially in North Africa, where it occurs in high densities and has had a significant impact on rodent populations. Hatchlings eat lizards and nestling mice.







Diadem snakes are most active in the evening, but can be seen in the open at any time of the night or day. A fast-moving species, they hunt by chasing down their prey before constricting them. If cornered, diadem snakes face their aggressors by pulling their heads back into a striking position, and may bite if necessary, but they are considered harmless.

### Popular pet

This species is popular among snake-keepers because of its bright coloration, small size, and its readiness to breed in captivity.



### PROFILE

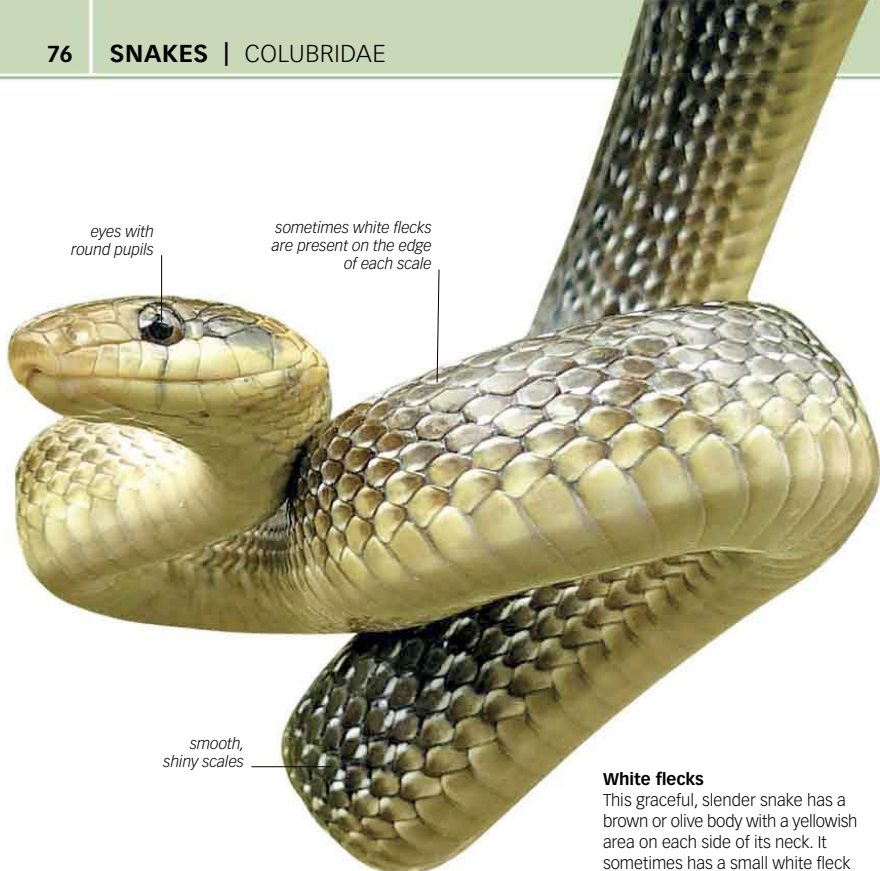
-  S. Europe and parts of W. Asia
-  Rocky places, especially fields and hillsides
-  Up to 3¼ ft (1 m)
-  Egg-laying
-  2–6, occasionally up to 8
-  Diurnal, crepuscular during hot weather
-  Least Concern

*Zamenis situla*

## LEOPARD SNAKE





**Although the leopard snake** may have variable markings, it is typically cream, gray, or buff with a series of black-edged reddish spots along its back and smaller spots on its flanks. Sometimes the dorsal spots are narrow in the center, like dumbbells, or completely separated into two rows of smaller spots. In some parts of its range, the spots are replaced by a pair of black-edged red longitudinal stripes. The head is boldly marked with a black bar across the snout and further black markings below and behind the eyes.

Inhabiting rural areas as well as scrubland, the leopard snake is greatly beneficial to farmers; it hunts mainly underground, searching out rodents' nests. Females in some parts of the range breed every other year, using the non-breeding year to build up food reserves for the next clutch. Although they lay small numbers of eggs, each egg is relatively large.

**White flecks**

This graceful, slender snake has a brown or olive body with a yellowish area on each side of its neck. It sometimes has a small white fleck on the edge of each scale, which is more obvious in juveniles.

**PROFILE**

-  Europe and parts of W. Asia
-  Open woodland and fields, dry-stone walls, and old buildings
-  4½–6½ ft (1.4–2 m)
-  Egg-laying
-  4–12, occasionally more
-  Mostly diurnal; crepuscular during hot weather
-  Least Concern

*Zamenis longissimus*

## AESCULAPIAN SNAKE

**The Aesculapian snake** is named after the Greek god of medicine, Asclepius, and is still used as a symbol of the medical profession in the form of a serpent entwined around a staff. This species is a good climber, and is often found in bushes and trees. An efficient hunter, it preys on small rodents as well as lizards and nestling birds.

Some populations of the Aesculapian snake include melanistic individuals, in which the body is suffused with a pewter-gray coloration and the underside is dark gray. The southern Italian population of this snake is slightly smaller, with a pair of dark lines running along the back; in 2002, it was elevated into a separate species, *Z. lineatus*.

**Ridged body**

An angular ridge runs along each side of its body, where the flanks meet the underside. This enhances the snake's ability to grip.

**Distinctive snout**

This species is easily distinguished from other snakes by the unique pair of soft, fleshy tentacles on the tip of its snout.

**PROFILE**

-  Southeast Asia
-  Freshwater ponds, swamps, and lakes
-  2¼–3¼ ft (0.7–1 m)
-  Live-bearing
-  5–13
-  Unknown
-  Least Concern

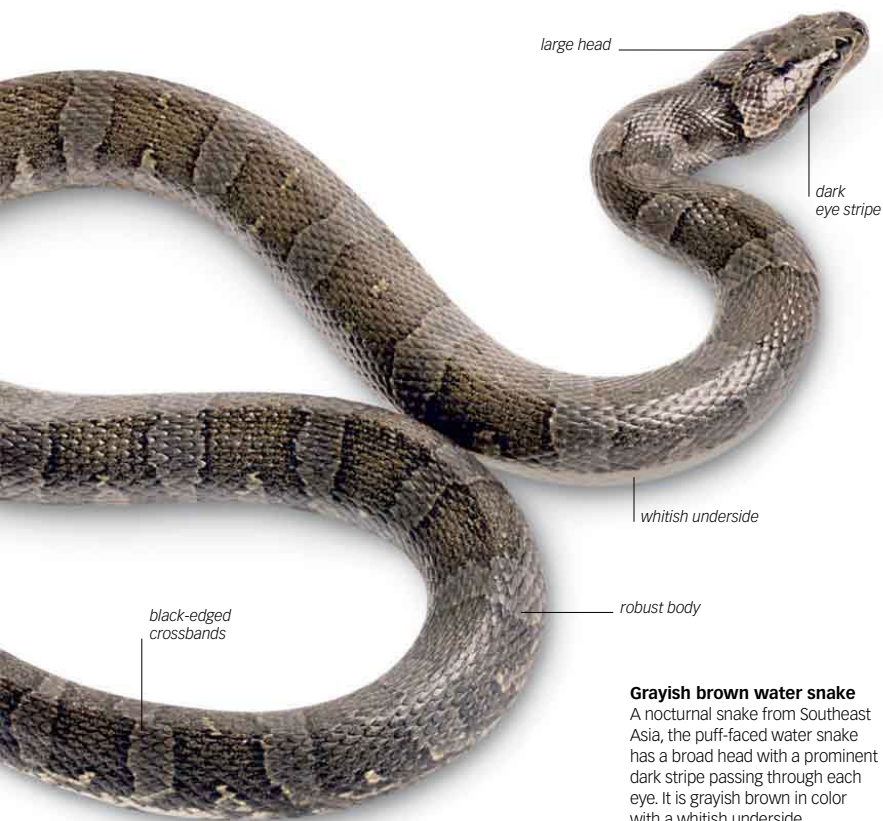
*Erpeton tentaculatum*

## TENTACLED SNAKE

**This water snake** is unlike any other. Its body is almost rectangular in cross-section and its heavily keeled scales form parallel ridges along its back. The ventral scales are reduced in size, forming a thin line along the underside. The tentacles on the tip of its snout are thought to break up the outline of the snake and enhance its camouflage, but there are also suggestions that they act as lures, enticing fish to swim within range for a closer inspection. It lurks motionless in weedy water, with its body pointing upward and its head curled over and pointing down. When a fish swims into the area between its head and the loop of its body, the tentacled snake uses its body to scare the fish toward its mouth. This species is mildly venomous, but its venom is specific to fish and is of no danger to people.

Like all strictly aquatic species, the tentacled snake gives birth to live young so it has no need to leave the water to find an egg-laying site. If it does need to move across land, it travels during heavy rains and floods.



**Grayish brown water snake**

A nocturnal snake from Southeast Asia, the puff-faced water snake has a broad head with a prominent dark stripe passing through each eye. It is grayish brown in color with a whitish underside.

**PROFILE**

-  Southeast Asia
-  Rivers, swamps, and ponds
-  2½–3½ ft (0.8–1.1 m)
-  Live-bearing
-  Unknown
-  Nocturnal
-  Least Concern

*Homalopsis buccata*

## PUFF-FACED WATER SNAKE

**This water snake** is common over a large part of its range, and can be found in almost all types of water bodies, including brackish swamps. It is tolerant of human activities, and is attracted to fish farms where it occurs in such large numbers that it is considered to be a pest. The species is collected extensively for human consumption, for food on crocodile farms, and for the snakeskin trade; millions of its skins have been imported into the US and China.

The puff-faced water snake hides in mud burrows during the day, and emerges at night to feed, preying mainly on fish. It belongs to a group of water snakes that are venomous, but the venom fangs are small and located well back in its mouth. In addition, it is not inclined to bite, and poses no danger to people.

## PROFILE

-  S. Africa
-  Varied (from grassland to cities)
-  2½–4½ ft (0.8–1.3 m)
-  Egg-laying
-  6–16
-  Nocturnal
-  Not assessed



### Uniform appearance

This is a plain brown snake with a pearl-like sheen on its underside, and two pale yellow or cream streaks on the side of its head that help to identify the species.

## SIMILAR SPECIES



### Lined house snake

**(*Boaedon lineatus*)** From West and Central Africa; has a distinct pale line running along its flanks

## *Boaedon fuliginosus*

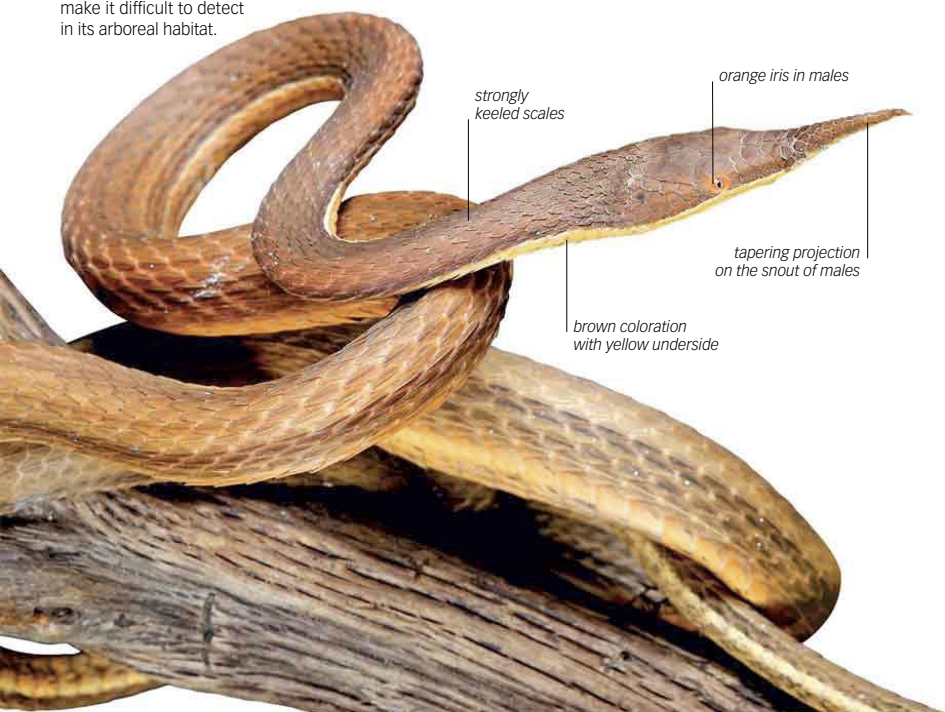
# BROWN HOUSE SNAKE








**The brown house snake** is named for its tendency to gravitate toward human dwellings and farm outbuildings, where it does a good job of controlling rodents. For this reason, the snake is tolerated or even encouraged by farmers who understand its value. It is a common species found almost everywhere in southern Africa, although what was formerly regarded as a single species is now divided into several species, each with a separate range. Occasional xanthic (yellowish) individuals are found, due to a genetic abnormality.

The brown house snake is a powerful constrictor and throws several coils around its prey, squeezing tightly until it stops breathing. The snake has a large gape, and often tackles prey that, at first glance, would appear to be too large for it. The generic name of this snake, *Boaedon*, refers to its teeth which, like those of boas, are long and curved. House snakes breed throughout the summer, and females may store enough sperm from a single mating to lay two or more clutches of eggs.

**Forest camouflage**

This unusual-looking snake is extremely long and slender, and its shape and color make it difficult to detect in its arboreal habitat.

**PROFILE**

-  Madagascar
-  Forest
-  Up to 3¼ ft (1 m)
-  Egg-laying
-  8–11
-  Mainly diurnal
-  Least Concern

*Langaha madagascariensis*

## MADAGASCAN LEAF-NOSED SNAKE

**The characteristic that sets** this snake apart from other snakes (with the exception of two closely related species) is the appendage at the tip of its snout; males have a long, tapering, spearlike proboscis, whereas females have a more elaborate arrangement with a flattened and serrated structure. The purpose of these appendages or why they differ between the sexes is unknown. This species displays considerable sexual dimorphism; males have orange irises and are brown above and yellow below, while females have brown irises and are grayish brown with a faint mottled pattern.








The natural history of all the three species in the genus *Langaha* is poorly known as they are rarely seen, largely due to their near-perfect camouflage.

**Female**

The female Madagascar leaf-nosed snake has a serrated snout that resembles a laterally compressed fir cone.

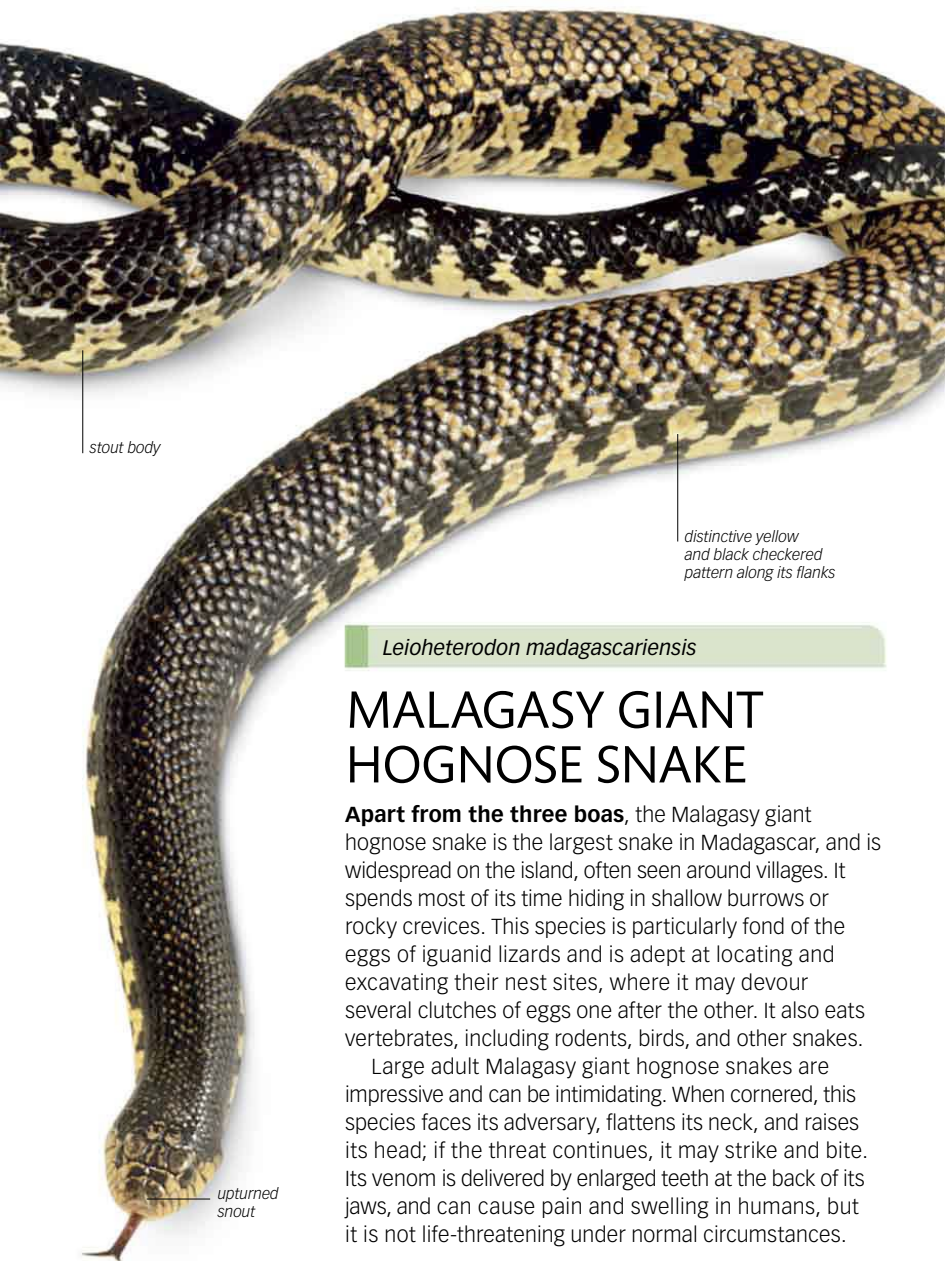


## PROFILE

 Madagascar	 10–15
 Open woodland and fields	 Diurnal
 Up to 5 ft (1.5 m)	 Least Concern
 Egg-laying	

### Hoglike nose

This snake has a characteristic upturned scale on the tip of its snout, which it uses for digging in sand, soil, or leaf litter in search of food.



stout body

distinctive yellow  
and black checkered  
pattern along its flanks

*Leioheterodon madagascariensis*

## MALAGASY GIANT HOGNOSE SNAKE

**Apart from the three boas**, the Malagasy giant hognose snake is the largest snake in Madagascar, and is widespread on the island, often seen around villages. It spends most of its time hiding in shallow burrows or rocky crevices. This species is particularly fond of the eggs of iguanid lizards and is adept at locating and excavating their nest sites, where it may devour several clutches of eggs one after the other. It also eats vertebrates, including rodents, birds, and other snakes.

Large adult Malagasy giant hognose snakes are impressive and can be intimidating. When cornered, this species faces its adversary, flattens its neck, and raises its head; if the threat continues, it may strike and bite. Its venom is delivered by enlarged teeth at the back of its jaws, and can cause pain and swelling in humans, but it is not life-threatening under normal circumstances.

upturned  
snout



**Conspicuous collar**

The grass snake is also known as the ringed snake because of the yellow or white collar around its neck.

**PROFILE**

- |   |               |
|---|---------------|
| 📍 Europe, N.W. Africa, and W. Asia              | 🥚 Egg-laying  |
| 🌿 Moist fields and woodland                     | 👥 2–100       |
| ⬆️ Up to 4 ft (1.2 m), rarely up to 6½ ft (2 m) | 🕒 Diurnal     |
|   | ⚠️ Lower Risk |

dark markings along its flanks

olive or greenish body

characteristic yellow neck collar

head is usually a uniform color

prominent black patches behind the neck collar

**SIMILAR SPECIES**

**Viperine snake (*Natrix maura*)** Lives in southwestern Europe; may be spotted or marked with a zigzag pattern; not venomous despite its name

*Natrix natrix*

# GRASS SNAKE

**A semi-aquatic species**, the grass snake is found only near water or in damp meadows, where its preferred prey, frogs and toads, are found in abundance. A good swimmer, it can be seen crossing lakes and ponds with its body submerged and its head breaking the surface, hunting for prey. The grass snake often escapes into water if it feels threatened but, if cornered, it may feign death by turning over on to its back and allowing its tongue to loll out of its open mouth. At the same time, it produces a foul-smelling fluid from its anal glands.

This is the most common snake over much of its large range. It occurs further north than any other egg-laying snake, and because of this the female has to search for a suitable egg-laying site, such as a compost heap, where the warmth of decaying vegetation helps to incubate the eggs. Several females may choose the same site, resulting in communal nests that contain more than 1,000 eggs. The hatchlings are 5½–8½ in (14–21 cm) long. Males take three years to reach maturity, while females take four years.



wide, irregular  
dark crossbands

narrow head with large  
eyes and round pupils

## PROFILE

-  S.E. US
-  Freshwater lakes and rivers
-  3–3½ ft (0.9–1.1 m), rarely up to 5¼ ft (1.58 m)
-  Live-bearing
-  6–83
-  Nocturnal and diurnal
-  Least Concern

*Nerodia fasciata*

# BANDED WATER SNAKE

**Also known as the southern water snake**, this is a highly aquatic species, living in a variety of habitats, including oxbow lakes, ponds, and swamps, as well as larger bodies of water. It sometimes ventures into brackish water, but cannot survive if the concentration of sea water is too high. This species swims with just its head and neck above the surface, while the body propels it forward; its heavily keeled scales increase its surface area and help it to push against the water.

The activity pattern of this snake depends on the temperature and location, so it is nocturnal in some areas and diurnal in others. It preys on fish and frogs, but will also eat carrion. In turn, it is eaten by alligators and other snakes, especially cottonmouths (p.102). This snake defends itself by flattening its head and making repeated lunges, as well as spraying musk and biting. Bites from a large adult are painful and may cause swelling, but are not dangerous.

### Stripes and spots

Common garter snakes have long bodies and tails. There may be black spots between the stripes on the body, but these are hard to see in dark forms. The red-spotted garter snake, *Thamnophis sirtalis* *concinus*, is shown here.

red coloration  
is mostly between  
the scales

*Thamnophis sirtalis*

## COMMON GARTER SNAKE

**This widespread snake** occurs in many different forms and up to 13 subspecies are recognized. While some of the subspecies are quite common, others, such as the San Francisco garter snake, are very rare.

Although their colors vary, all common garter snakes have a central dorsal stripe and additional stripes on each flank. Spots or bars of various colors are nearly always present between the stripes. There are also populations of all-black (melanistic) garter snakes.

Common garter snakes living in the southern part of the species' range may be active throughout the year, whereas those from the north, especially Canada, hibernate for several months, often congregating in huge numbers in favored hibernation sites. They have a varied diet

that includes invertebrates, fish, amphibians, small mammals, and birds, but frogs form the majority of their prey.

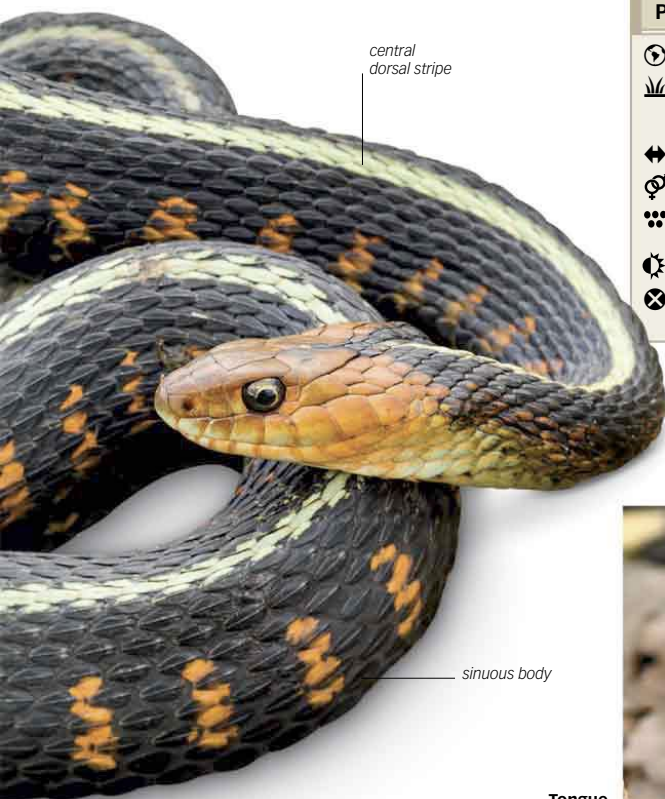
Breeding takes place only every two or three years among populations that inhabit the cold parts of the range, but occurs yearly in the warmer southern parts. The number of young born depends on the size and condition of the female and, to some extent, the subspecies to which she belongs.



**San Francisco garter snake (*T.s. tetrataenia*)**

Found in areas around the San Francisco peninsula, this brightly colored garter snake is threatened due to habitat loss.





## PROFILE

-  North America
-  Damp woods and grassland, marshes, and swamps
-  2–4 ft (0.6–1.2 m)
-  Live-bearing
-  1–101 (depending on size and subspecies)
-  Diurnal
-  Least Concern



## Tongue

An eye-catching feature, the red tongue with its black forked tip is typical of garter snakes.



## SIMILAR SPECIES

The Santa Cruz garter snake is a distinctive subspecies of the Pacific coast aquatic garter snake, *Thamnophis atratus*. It occurs south of San Francisco, CA, and lives in damp places. It also lives on the coast in places where streams flow into the sea. Its dark coloration, interrupted by a yellow or orange mid-dorsal line, is very distinctive and it cannot be confused with other garter snakes. It eats large numbers of slugs as well as mice, lizards, and salamanders.



## Santa Cruz garter snake (*Thamnophis atratus atratus*)

This is an attractive, short, and stocky garter snake.



## Scales

Like all garter snakes and closely related semi-aquatic species, this snake has strongly keeled scales.

## Rounded pupil

Garter snakes' pupils are round, in keeping with their diurnal habits.



**Varied forms**

Western terrestrial garter snakes can be found in a range of different habitats. They have been divided into six subspecies, which vary mainly in coloration. Shown here is the subspecies *T.e. terrestris*.

distinct yellowish  
stripes along the  
whole body

round pupils

black checkered spots on  
a reddish background

**PROFILE**

-  W. North America
-  Meadows, marshes, and ditches
-  2½–3¼ ft (0.75–1 m)
-  Live-bearing
-  3–27
-  Diurnal
-  Least Concern

*Thamnophis elegans*

## WESTERN TERRESTRIAL GARTER SNAKE

**This garter snake typically lives** a short distance from water, especially ponds, small lakes, and marshes, into which it flees if disturbed. However, some populations also occur in drier habitats such as meadows and grasslands. It probably has a wider range of prey than any other garter snake and, although it feeds primarily on frogs and tadpoles, there are records of it eating shrews, bats, chipmunks, nestling birds, and birds' eggs, including those of gulls, cormorants, and crows. The snake also eats crabs and leeches, and scavenges the remains of dead fish left by fishermen.




As soon as the garter snake catches prey, it is forced to the back of the mouth, where enlarged teeth grip it tightly. If the prey struggles, it is held until the snake's toxic saliva takes effect. Bites are not dangerous to humans, however, unless the snake is allowed to chew for a considerable time, in which case some mild, local pain may occur.



### Contrasting coloration

This slender snake has a distinctive yellow, orange, or red underside and neck ring, contrasting with its dark body coloration. Young ringneck snakes have the same coloration and markings as the adults.

### PROFILE

-  North America
-  Woodland, fields, and scrub
-  10–32 in (25–80 cm), depending on subspecies
-  Egg-laying
-  1–10
-  Usually nocturnal
-  Least Concern

*Diadophis punctatus*

## RINGNECK SNAKE

**This species displays some variation** in color and size, and 13 subspecies are recognized, some of which may eventually be reclassified into full species. All of them have a distinctive yellow or orange neck ring. The ringneck snake may be velvety gray or black, and its underside is the same color as the neck ring. A secretive snake, it is usually found under pieces of bark, flat rocks, or cowpats. In areas where it is common several individuals may be found together.

This species mainly feeds on invertebrates, but some of the larger forms also eat salamanders, lizards, and other snakes; different populations vary in their food preferences. If disturbed, the snake releases a strong musk and then coils the latter half of its body and tail into a tight spiral, exposing its brightly colored underside. It is considered to be mildly venomous; the enlarged fangs, however, are very small and located too far back in its mouth to penetrate human skin.

**Uniform pattern**

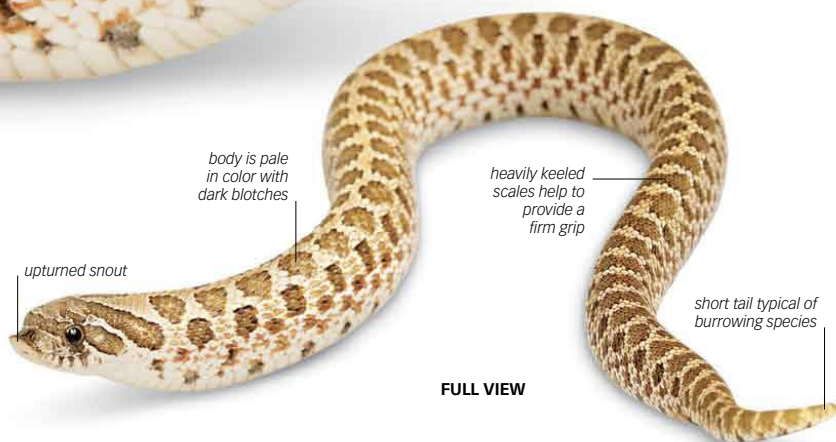
The color of the plains hognose snake varies from brown to orange, olive, or gray, but the pattern of blotches on its back and sides is fairly consistent.



dark band stretches across the snout

**PROFILE**

- C. North America
- Grasslands and fields
- 2–5 ft (0.6–1.5 m), females are much larger than males
- Egg-laying
- 2–24
- Diurnal
- Least Concern



body is pale in color with dark blotches

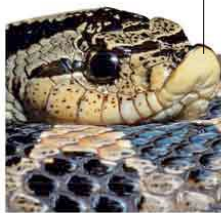
upturned snout

heavily keeled scales help to provide a firm grip

short tail typical of burrowing species

**FULL VIEW****SIMILAR SPECIES**

rostral scale at the tip of the snout



**Southern hognose snake (*Heterodon simus*)** Similar, but slightly smaller and feeds almost exclusively on frogs and toads

*Heterodon nasicus*

## PLAINS HOGNOSE SNAKE

**The plains hognose is a stout snake** with an upturned snout, consisting of a single scale with a sharp edge. It uses this unusual rostral scale to dig into sand or soil in search of toads, its preferred prey. It also eats rodents and birds, and is one of the few snakes that appears to make no attempt to swallow their prey head-first.

This species uses scent to find prey, even if they are buried. It has a wide gape and enlarged teeth at the back of its mouth, which it uses for gripping and, in the case of toads, to puncture their skin and deflate them so that they can be swallowed. The snake can rotate its long rear fangs downward for feeding; the fangs create a wound into which venom can enter. Although this species is not life-threatening to humans, its bite can be painful.

### Night vision

The blunt-headed tree snake has distinctive large bulbous eyes, which protrude from the sides of the head, enabling it to look downward. Its vertical pupils are typical of nocturnal predators.



bulbous eyes with vertical pupils

thin neck



long prehensile tail

wide, flat head

FULL VIEW

series of brown markings on a tan background

### PROFILE

-  Central America and N. South America
-  Rainforest
-  3¼–4 ft (1–1.2 m)
-  Egg-laying
-  1–3, rarely up to 8
-  Nocturnal
-  Not assessed

*Imantodes cenchoa*

## BLUNT-HEADED TREE SNAKE

**Arguably the most slender snake** in the world, the blunt-nosed tree snake has an arboreal lifestyle. It has an extremely light body that enables it to climb on to twigs and leaves while stalking sleeping lizards, which constitute its main diet, although it also eats frogs. The body is flattened from side to side, supporting the snake when bridging wide gaps between branches; the enlarged scales on the back add to its structural rigidity. During the day, it coils up in bromeliad plants, hollow trees, or vines.









Owing to its extremely slender body structure, this tree snake lays only small clutches of eggs; each egg is elongated so that it can fit into the female's body cavity. Females probably breed throughout the year, laying multiple clutches. Hatchlings are about 12 in (30 cm) in length.



**A typical cobra**

Despite its small size, the way this species raises the front of its body when threatened is typical of members of the cobra family.

**PROFILE**

-  S.W. Africa
-  Rocky outcrops in dry plains
-  20–28 in (50–70 cm)
-  Egg-laying
-  3–11
-  Nocturnal
-  Venomous
-  Not assessed

*Aspidelaps lubricus*

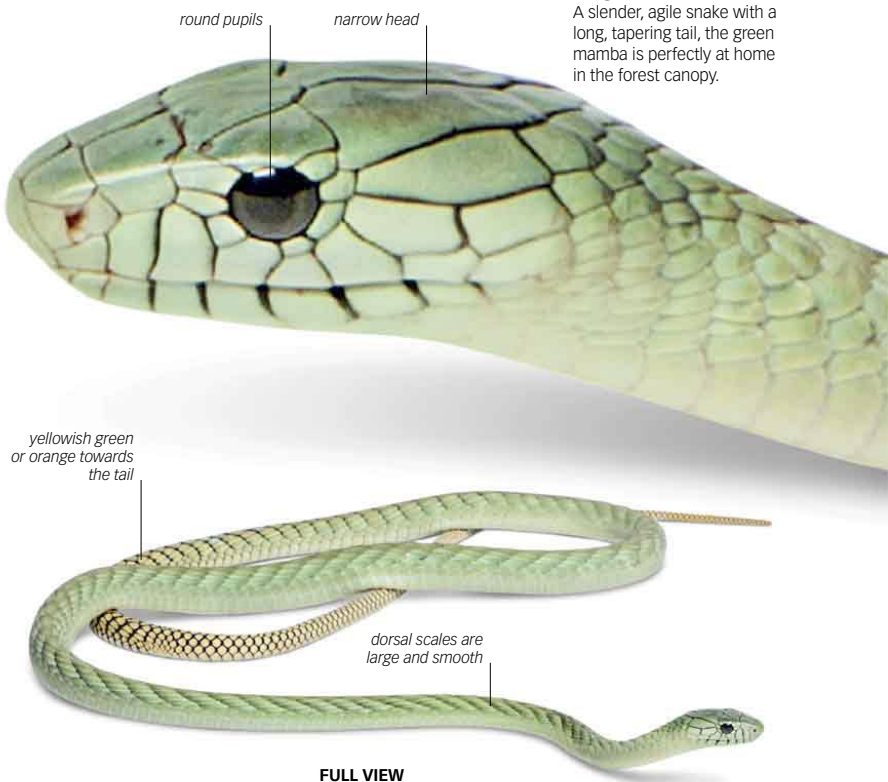
## CAPE CORAL SNAKE

**The cape coral snake** is brightly colored, with black and red rings that warn predators of its venom. It is a bad-tempered species, quick to turn toward its enemies, raising its head off the ground and spreading its narrow hood. It puffs up its body, hisses continuously, and will strike if its tormentor comes within range, but this is often a bluff and the snake may strike with its mouth closed. Bites do occur, however, but do not usually result in serious symptoms, although there have been human fatalities.

This species is very common in some areas, and can often be seen crossing roads where these pass through suitable habitat. It spends the day in burrows or under large rocks, and emerges in the evening to hunt small lizards and snakes as well as rodents; captive specimens also eat fish, a prey that they would never normally encounter in the wild.









### Long and thin

A slender, agile snake with a long, tapering tail, the green mamba is perfectly at home in the forest canopy.



FULL VIEW

### PROFILE

-  W. Africa
-  Rainforest and secondary forests
-  5–6½ ft (1.5–2 m)
-  Egg-laying
-  Unknown
-  Mostly diurnal
-  Dangerously venomous
-  Least Concern









*Dendroaspis viridis*

## WEST AFRICAN GREEN MAMBA

**This is the largest** of the arboreal mambas; only the black mamba, which lives on the ground, is longer. A strikingly marked snake with a bright green head and body, fading to yellowish-green towards the tail, it has large black-edged scales on its back. It feeds on small mammals and birds, catching most of them among trees, although it also descends to the ground to hunt if necessary. It kills its prey by injecting it with venom before swallowing it.

A shy species, green mambas normally attempt to climb up a tree or bush to evade danger. However, if cornered, they strike and bite repeatedly. Green mambas are greatly feared, as a bite from this species can lead to death within an hour. Although bites are rare, these snakes are increasingly likely to come into contact with humans, as their preferred habitat of rainforests are being cleared for settlement and agriculture.

## PROFILE

- |   |   |
|---|---|
|  S.W. North America        |  2–6                       |
|  Rocky and gravelly desert |  Crepuscular and nocturnal |
|  20–26 in (50–65 cm)       |  Venomous                  |
|  Egg-laying                |  Least Concern             |

## Ring arrangement

The pattern of white-red-white-black rings sets this species apart from milk snakes and most other “false coral” snakes, in which white bands are sandwiched between two black bands.



## SIMILAR SPECIES



**South American coral snake**  
(*Micrurus lemniscatus*)

Highly venomous; has a pattern of black and white bands on a red background









*Micruroides euryxanthus*

## SONORAN CORAL SNAKE

**This is one of the two coral snakes** that lives in the US. Sometimes found crossing a quiet desert road, this species is not commonly seen, as it emerges from its daytime retreat only in the evening. It preys largely on small burrowing snakes, particularly the blind *Leptotyphlops* species, which it hunts in their underground tunnel systems. The venom of the Sonoran coral snake is neurotoxic, affecting the nervous system, and acts quickly on reptiles, but the small mouth and short fangs make it difficult for the snake to pierce human skin. However, bites have been recorded, usually connected to ill-advised handling, its venom is very potent and bites can be serious.

If disturbed, the snake hides its head in its coils and raises its tail, turning it over to show the underside and waving it around so that the tail imitates its head. It may also make popping sounds by expelling air from its cloaca.

## PROFILE

-  N. Africa and Arabian Peninsula
-  Dry grassland and scrub
-  5–7½ ft (1.5–2.4 m)
-  Egg-laying
-  10–20
-  Diurnal and nocturnal
-  Dangerously venomous
-  Least Concern

## Formidable adversary

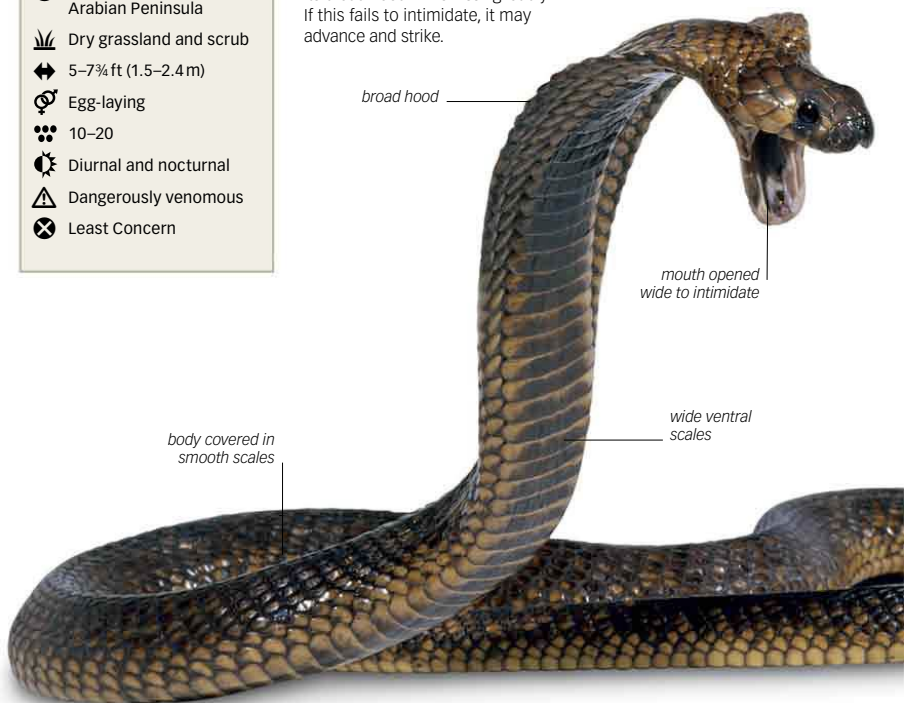
If threatened, this cobra raises one-third of its body and spreads its broad hood while hissing loudly. If this fails to intimidate, it may advance and strike.

broad hood

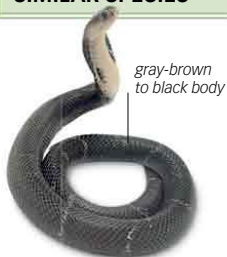
mouth opened wide to intimidate

wide ventral scales

body covered in smooth scales



## SIMILAR SPECIES



gray-brown to black body

### Chinese cobra (*Naja atra*)

Darker, with a variable light marking on its hood



**Monocled cobra (*Naja kaouthia*)** Has a monoclelike marking on the back of its hood

## *Naja haje*

# EGYPTIAN COBRA

**A large, stout-bodied cobra**, this highly venomous species is found over a far wider area than its common name would suggest. It occurs in dry grassland all around the edges of the Sahara Desert and parts of the Arabian Peninsula; it does not live in sandy deserts. This species varies throughout its range and several subspecies are recognized, some larger than others. The body color ranges from yellow to black, but the rounded head is nearly always black.









An active hunter, the Egyptian cobra glides over rocks and bushes in search of food. It seems to prefer toads to other prey, but also feeds on rodents, birds, and other reptiles. It is primarily a nocturnal species, but can occasionally be seen basking in the early morning sun. This cobra figures in ancient Egyptian mythology and is represented by the cobra-headed goddess Meretseger.



**Regional coloration**

The cape cobra may be black, yellow, or brown, depending largely on the region it inhabits.

**PROFILE**

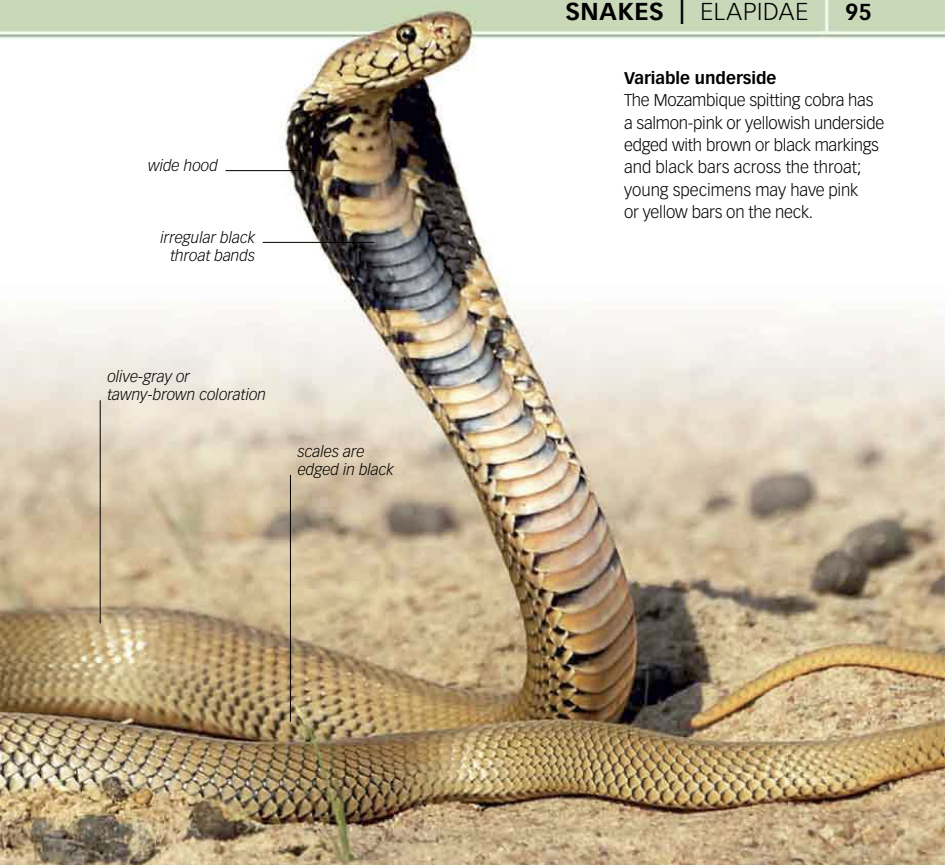
-  S. Africa
-  Dry desert and scrub
-  4–4½ ft (1.2–1.4 m), rarely up to 6 ft (1.8 m)
-  Egg-laying
-  8–20
-  Diurnal
-  Dangerously venomous
-  Not assessed

*Naja nivea*

## CAPE COBRA








**A relatively small and slender species**, the Cape cobra favors dry river beds and is common in suitable habitats in its range. It hides in termite mounds, rodent burrows, and rock crevices, and is often seen around farms, attracted by the presence of rodents. It also feeds on other snakes as well as birds and their eggs. The cobra climbs into trees to raid nests, including those of colonial weaver birds, where it moves from nest to nest clearing eggs and nestlings. Having eaten its fill, it may coil up in one of the nests to digest its meal, oblivious to the mobbing parents.

If disturbed by humans, the Cape cobra rears up and spreads its wide hood, rarely backing off. Its venom is considered to be highly toxic and bites are very serious, usually resulting in death due to respiratory failure unless treatment is given immediately. Cape cobras are preyed upon by meerkats, mongooses, birds of prey such as secretary birds and snake eagles, and other snakes.

**Variable underside**

The Mozambique spitting cobra has a salmon-pink or yellowish underside edged with brown or black markings and black bars across the throat; young specimens may have pink or yellow bars on the neck.

**PROFILE**

-  E. and S. Africa
-  Grassland and forest clearings
-  3¼–5 ft (1–1.5 m)
-  Egg-laying
-  10–22
-  Mainly nocturnal
-  Not assessed

*Naja mossambica*

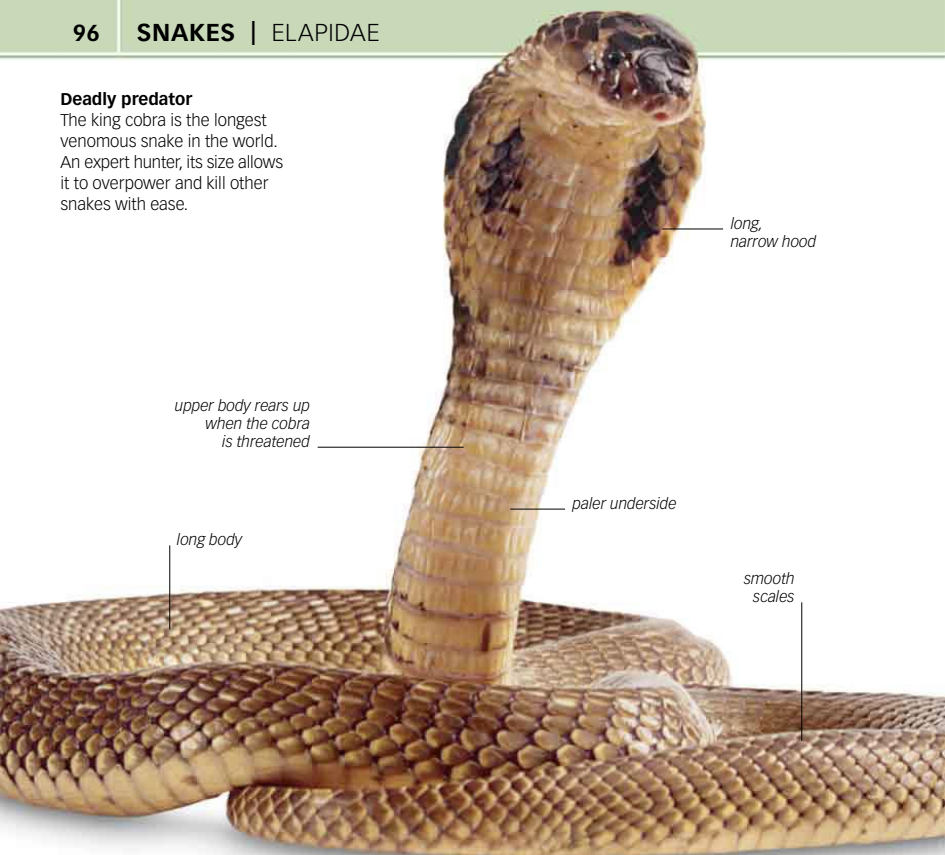
## MOZAMBIQUE SPITTING COBRA








**This dangerous species** is often found around houses and farm buildings at night in search of rodents; it also feeds on lizards and toads. It has benefited from forest clearance and the conversion of land to agricultural use as it prefers open countryside to closed forest. Although a nocturnal species, it occasionally basks during the day.

If disturbed, the Mozambique spitting cobra raises its head, spreads its hood, and spits. This is exclusively a defense action as it does not spit at its prey. The fangs are specially modified for spitting; the canals that carry the venom down each fang are bent at right angles near the tip so that they emerge through a small aperture in the front of the fang. When the venom is forced through the canal under pressure, it passes through these openings at high speed and sprays out toward the intruder. The snake aims for the eyes, where the venom causes intense pain; it may also bite, but bites are rarely fatal.

**Deadly predator**

The king cobra is the longest venomous snake in the world. An expert hunter, its size allows it to overpower and kill other snakes with ease.

**PROFILE**

-  S. and S.E. Asia
-  Forests and plantations
-  9¾–16 ft (3–5 m)
-  Egg-laying
-  20–50
-  Diurnal and nocturnal
-  Dangerously venomous
-  Vulnerable

*Ophiophagus hannah*

## KING COBRA

**Most adult king cobras** have uniform olive or tan coloration, but the juveniles have a series of bold black and yellow, chevron-shaped bands on their necks. When threatened, the cobra raises up to one-third of its body off the ground and spreads a narrow hood, while hissing loudly. However, it is not aggressive by nature. The cobra is primarily found in deep forests and has limited contact with humans. As a result, very few human fatalities have been recorded; most of them have involved captive snakes and keepers who may have taken one chance too many.

The king cobra preys almost exclusively on other snakes. Males and females remain together after mating and build a nest from leaf litter, in which the female lays her eggs. Heat from the decaying vegetation helps to speed up the development of the eggs, and the nest is guarded by both parents until the eggs hatch 2–3 months later. The species is protected in India, but is declining in many parts of its range due to habitat destruction.

## PROFILE

- |   |   |
|---|---|
|  E. Australia                    |  10–38                 |
|  Dry grassland and open woodland |  Diurnal and nocturnal |
|  Up to 7¼ ft (2.2 m)             |  Dangerously venomous  |
|  Egg-laying                      |  Not assessed          |

## Blunt-headed

The eastern brown snake can be any shade of brown, with light-colored individuals having darker flecks randomly scattered over their body. Its small, blunt head is usually paler than its body and tail.



## SIMILAR SPECIES



**Collett's snake** (*Pseudechis colletti*) Smaller, with orange, red, or pink markings; lives in grasslands, but is rarely seen

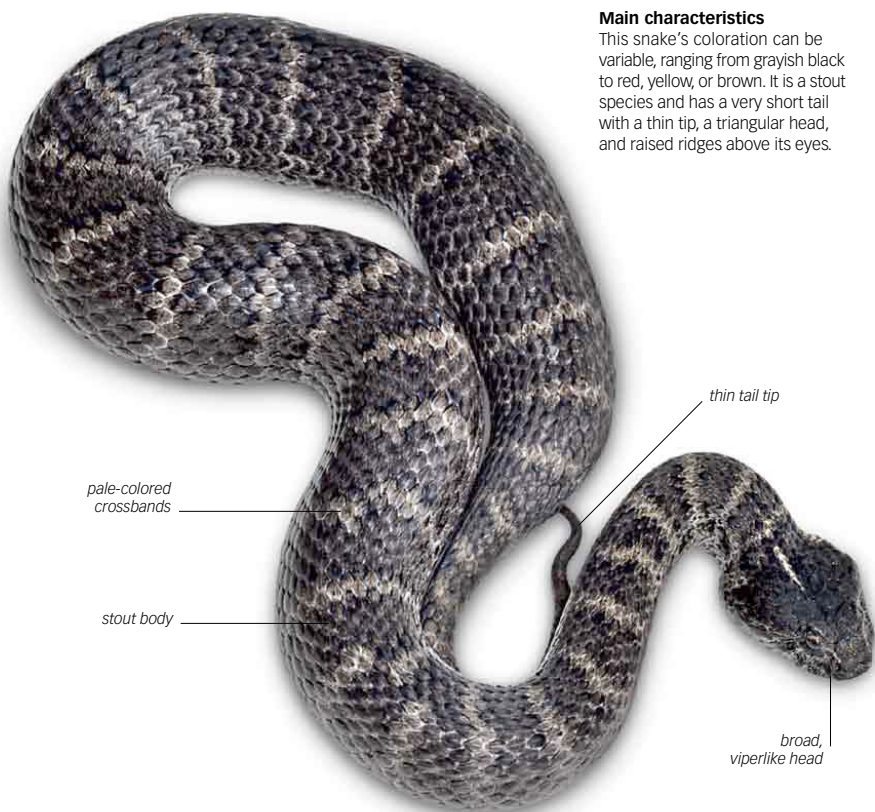
*Pseudonaja textilis*

# EASTERN BROWN SNAKE

**Found in a variety of habitats**, the eastern brown snake is responsible for most snakebite fatalities in Australia, where it seems to have benefited from large-scale land clearance. It feeds on small mammals, particularly rodents; the introduction of the house mouse to Australia has been advantageous to this species, drawing it to agricultural and urban areas. A fast-moving and alert snake, it is often seen crossing roads during the day.

If threatened, this snake raises its head and forms an S-shaped loop, in readiness to strike. In spring, rival males engage in a combat dance, in which the snakes rear up and try to force their rival to the ground. The loser moves out of the area and the winner mates with any nearby females. Clutches of eggs are laid by females in late spring or early summer.





### Main characteristics

This snake's coloration can be variable, ranging from grayish black to red, yellow, or brown. It is a stout species and has a very short tail with a thin tip, a triangular head, and raised ridges above its eyes.

### PROFILE

-  N. Australia and New Guinea
-  Dry grassland and rocky outcrops
-  20–28 in (50–70 cm)
-  Live-bearing
-  86–20
-  Nocturnal
-  Dangerously venomous
-  Not assessed

*Acanthophis praelongus*

## NORTHERN DEATH ADDER

**Despite being a member** of the cobra family, northern death adders bear a striking resemblance to members of the viper family, both in appearance and behavior. Death adders are particularly dangerous; their coloration and markings enable them to blend in with their environment and they do not move out of the way of humans, resulting in a large number of serious snake bites in Australia.

The adder ambushes its prey by hiding among leaf litter or low vegetation, holding its tail close to its head. If the adder senses prey nearby, it twitches its tail, which may be a different color from the rest of its body and resembles a grub or caterpillar. As the prey is lured within range, the adder strikes rapidly. Its fangs are relatively long compared with other members of the cobra family, and its venom contains a powerful neurotoxin, so death occurs very quickly.

### Unique markings

Although all sea snakes have flattened, oar-shaped tails, this species cannot be confused with any other due to its bold yellow and black markings.



### PROFILE

-  Tropical and subtropical seas, except the Atlantic and the Mediterranean
-  Open oceans
-  Up to 3¼ ft (1 m)
-  Live-bearing
-  Up to 6
-  Diurnal and nocturnal
-  Dangerously venomous
-  Least Concern

*Hydrophis platurus*

## PELAGIC SEA SNAKE

**Also known as the yellow-bellied sea snake,** this species is the most widely distributed snake in the world, occasionally straying as far south as Tasmania (Australia) and New Zealand and north as Siberia. It lives in large groups, often around floating debris that attract pelagic fish, which are its prey. It sometimes accumulates barnacles on its skin, but these are discarded when the snake sheds its skin. Shedding can occur in open water; the snake ties itself into knots and strips the old skin off by forcing its body through a tight loop.









Pelagic sea snakes are normally only seen by fishermen or when an occasional individual is washed up on a beach. Commercial fishing is responsible for the death of many thousands of pelagic sea snakes; they become trapped at the bottom of the nets and are crushed to death by the weight of the catch.

**Banded body**

The yellow-lipped sea krait is bluish gray with equal-sized black bands encircling its smooth-scaled body. It has a characteristic yellow upper lip and snout.



**PROFILE**

-  Pacific Ocean (from India to N. Australia)
-  Coastal waters and reefs
-  3¼–6½ ft (1–2 m)
-  Egg-laying
-  7–13
-  Diurnal and nocturnal
-  Dangerously venomous
-  Least Concern







*Laticauda colubrina*

# YELLOW-LIPPED SEA KRAIT

**The yellow-lipped sea krait** is also called the banded sea krait due to the numerous black bands covering its body. It has a flattened, paddle-shaped tail for swimming, and lives on rocky and coral outcrops around coastlines or islands. It hunts for fish, especially eels, by actively exploring reefs, poking its small head into holes and crevices. Once it has fed, it comes ashore to bask, drink fresh water, and to shelter in hollow logs and holes in rocks. It also sheds its skin on land.

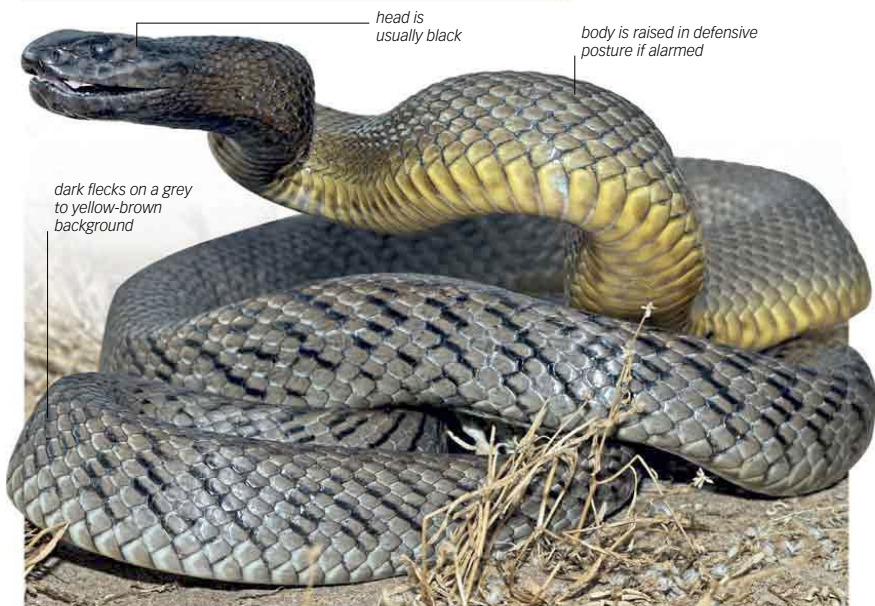
Courtship takes place at the high-tide line, where males intercept females coming ashore and attempt to mate with them; several males may be entwined around one female. The females lay their eggs in sea caves, crevices, or soil. The sea krait's venom is very potent but it is often reluctant to bite. However, bites have been recorded, mainly on fishermen clearing them from their nets, and the species should be regarded as dangerously venomous.

## PROFILE

 Australia	 10–24
 Dry plains	 Diurnal
 Up to 2 m (6½ ft)	 Dangerously venomous
 Egg-laying	 Not assessed

## Black-headed

Like other black-headed snakes, the inland taipan can warm up quickly by exposing its head and neck to the sun, while keeping the rest of its body under cover.



## SIMILAR SPECIES



**Coastal taipan (*Oxyuranus scutellatus*)** A highly venomous snake; usually brown, and sometimes has a pale head

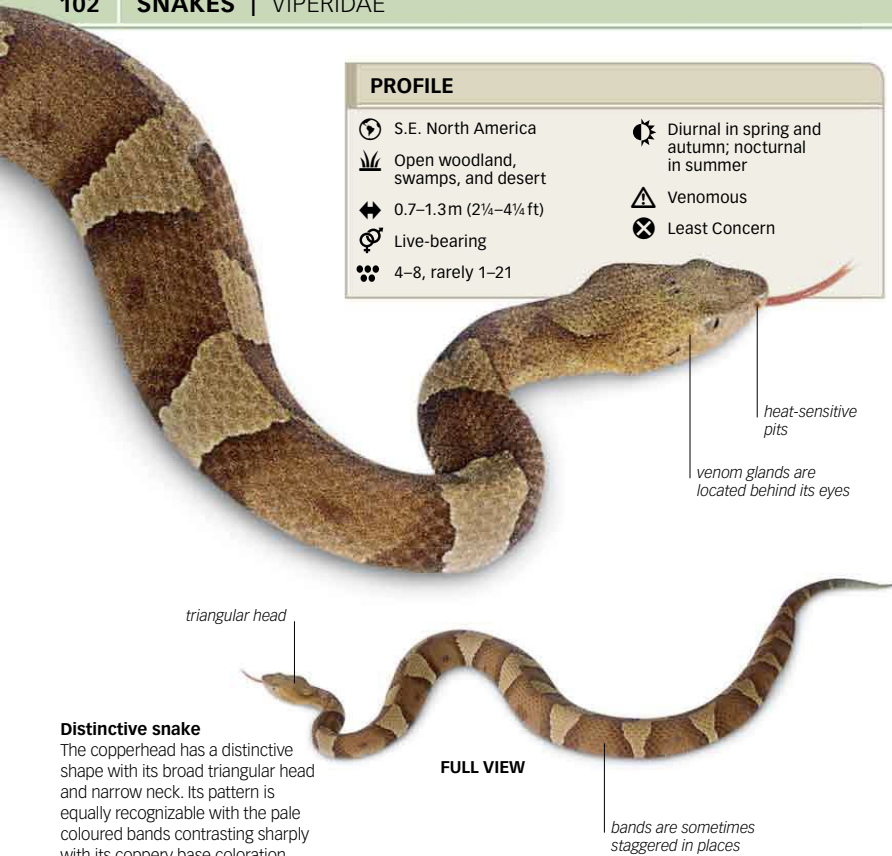
*Oxyuranus microlepidotus*

# INLAND TAIPAN

**Also called the fierce snake** or the small-scaled snake, this species is often considered to be the most venomous terrestrial snake in the world; its venom is highly toxic and the snake delivers it in huge quantities. It is one of the few Australian snakes that specialize in eating mammals, such as rats, and as a result its venom has evolved to be most effective on warm-blooded animals, including people. To avoid being bitten by its prey, this snake strikes quickly and releases it immediately. The venom acts so fast that its prey dies within minutes, or even seconds, allowing the snake to find and eat it without any risk of injury.

Despite their potentially lethal venom, taipans are shy, and prefer to retreat and hide rather than confront a human, even when provoked. As a result, there are no known human fatalities associated with this species. Although not assessed by the IUCN, the inland taipan is rare in Queensland and extinct in New South Wales and parts of Victoria; habitat change is the most significant factor behind this decline.





## PROFILE

- S.E. North America
- Open woodland, swamps, and desert
- 0.7–1.3 m (2¼–4¼ ft)
- Live-bearing
- 4–8, rarely 1–21

- Diurnal in spring and autumn; nocturnal in summer
- Venomous
- Least Concern

heat-sensitive pits

venom glands are located behind its eyes

triangular head

## FULL VIEW

bands are sometimes staggered in places

## Distinctive snake

The copperhead has a distinctive shape with its broad triangular head and narrow neck. Its pattern is equally recognizable with the pale coloured bands contrasting sharply with its coppery base coloration.

## SIMILAR SPECIES



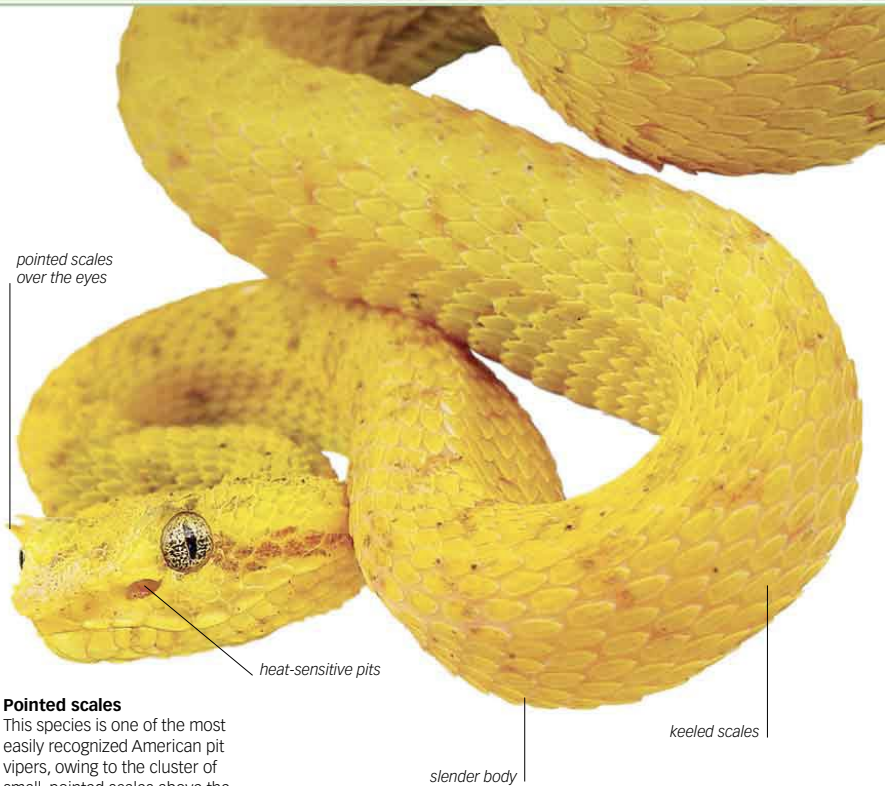
**Cottonmouth (*Agkistrodon piscivorus*)** Larger, darker in colour, and not as placid as the copperhead; bites are more serious

*Agkistrodon contortrix*

## COPPERHEAD

The copperhead's pinkish tan head and wide reddish brown bands over a tan background are very distinctive, although there is some variation in its colour and pattern. The colouring enables this stout-bodied snake to blend in with its surroundings, making it easy to overlook. As a result, bites on people are fairly common. However, fatalities are rare and usually involve young or elderly people.

Copperheads are mainly terrestrial, but they can swim and climb well. They hibernate in caves, crevices, or hollow logs, and a number of them may share the same site. These snakes bask in the spring and autumn, before and after they enter hibernation, and courtship takes place at these times. Females that mate in the autumn store the sperm over winter and fertilization is delayed until the following spring. This species feeds primarily on small mammals, but also eats a variety of other vertebrates. The juveniles have bright yellow tails, which they use to lure frogs within range.



#### Pointed scales

This species is one of the most easily recognized American pit vipers, owing to the cluster of small, pointed scales above the eyes, which give the impression of eyelashes.

#### PROFILE

-  C. and N. South America
-  Rainforest and secondary forest
-  50–80 cm (20–32 in)
-  Live-bearing
-  6–19
-  Nocturnal
-  Dangerously venomous
-  Not assessed

*Bothriechis schlegelii*

## EYELASH PIT VIPER

**The eyelash pit viper** gets its common name from the cluster of small, spiny scales above its eyes. This species occurs in a number of distinct colour forms, all of which may be present in a single litter. The most common colour forms are a green and brown phase that looks like lichen, a plain brown phase, and a plain yellow phase (as shown above). The latter colour form is known as the oropel, meaning “gold skin”, and is also the Spanish word for glitter.

An arboreal species, the eyelash pit viper is active at night and usually found coiled among vegetation or trees by day. As it often rests about 1–1.5 m (3¼–5 ft) above the ground, it is responsible for many bites to humans, especially on the face, arms, and upper body. Although deaths are rare, bites can result in permanent damage. Eyelash pit vipers feed on a variety of small animals, including lizards, frogs, bats, and mice. Juveniles have brightly coloured tips to their tails, which they dangle in front of potential prey to entice them closer.



## PROFILE

-  Central America
-  Lowland forest and plantations
-  0.8–1.5 m (2½–5 ft)
-  Live-bearing
-  10–86
-  Nocturnal
-  Dangerously venomous
-  Not assessed

**Lethal venom**

This grey or brown viper is widespread in Costa Rica, and about half the snakebites in the country are attributed to it; the species is also responsible for most deaths.

## SIMILAR SPECIES

**Terciopelo (*Bothrops asper*)**

Found in southern Central America and northern South America; common name means “velvet skin” in Spanish

*Bothrops atrox*

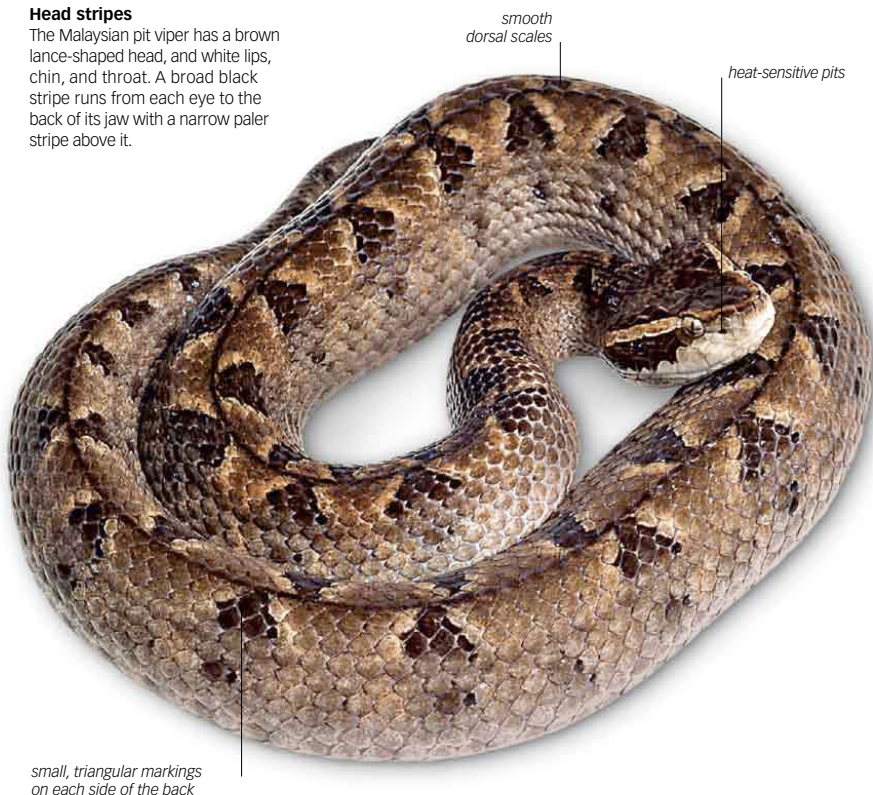
## COMMON LANCEHEAD VIPER

**A common and greatly feared snake** of Central America, this species is mostly seen in forest clearings, plantations, and around farms. It uses the yellow tip of its tail to lure small mammals, especially rodents, which make up the largest proportion of its diet. Juveniles also eat frogs and lizards, sometimes climbing into low bushes to hunt.

Two separate populations are found in Central America: one on the west and the other on the east, separated by mountains that form a barrier. Females from the eastern (Atlantic) population give birth to about twice the number of young as those from the Pacific side of the mountains; the reason for this is unknown. This species relies on camouflage for hunting, and prefers to coil in open places such as footpaths and the edges of plantations, where it is often trodden on inadvertently with serious results.









### Head stripes

The Malaysian pit viper has a brown lance-shaped head, and white lips, chin, and throat. A broad black stripe runs from each eye to the back of its jaw with a narrow paler stripe above it.



small, triangular markings  
on each side of the back

### PROFILE

-  Southeast Asia
-  Dry woodland and plantations
-  0.7–1 m (2¼–3¼ ft)
-  Egg-laying
-  20–40
-  Nocturnal
-  Dangerously venomous
-  Least Concern

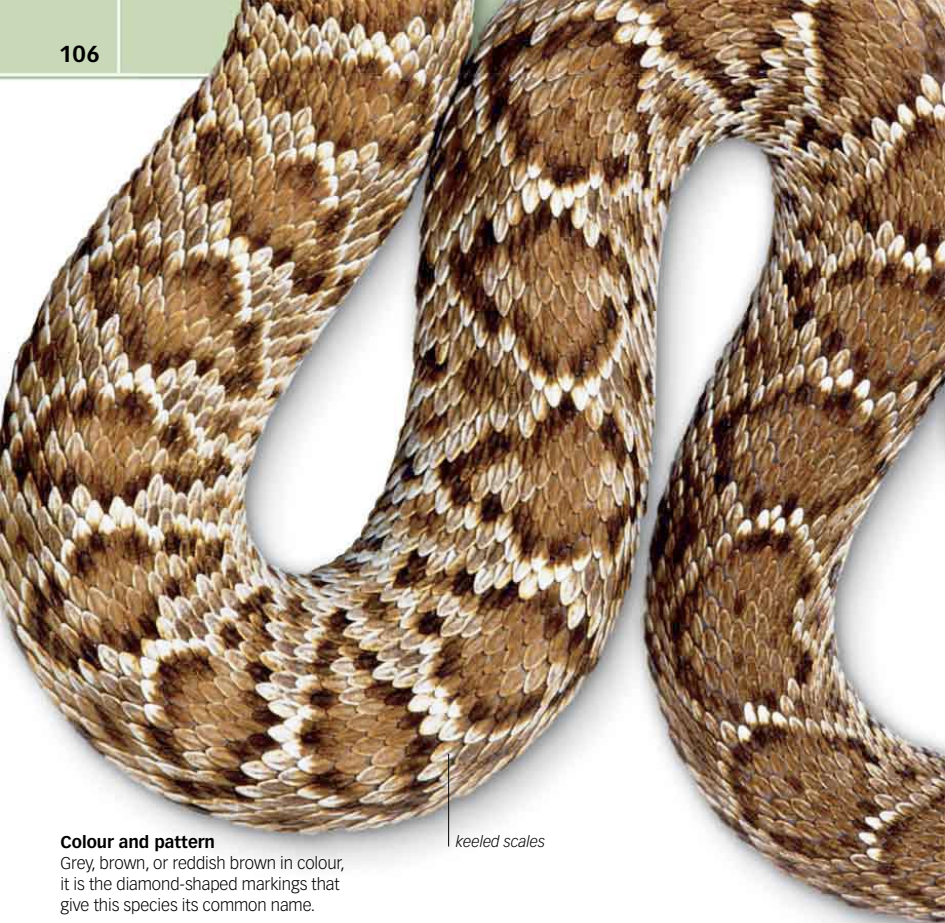
*Calloselasma rhodostoma*

## MALAYSIAN PIT VIPER

**The Malaysian pit viper** is the only member of its genus. It is a stocky snake, with a pointed, upturned snout and conspicuous heat pits. An ambush predator, this species often remains in the same place for days on end, coiled among dead leaves where it is difficult to spot. It preys on small mammals, lizards, and frogs. The Malaysian pit viper is one of the few pit vipers that lays eggs. The female coils around the clutch to guard them during the incubation period: a behaviour that is thought to be common to all other egg-laying pit vipers.

The viper's natural habitat is dry woodland and bamboo thickets but, like several tropical American pit vipers, it is common around farms and plantations, where there is an abundance of rodents. It often comes into contact with workers in these areas, and hundreds of bites are reported annually but, although serious, only a small proportion result in death.



**Colour and pattern**

Grey, brown, or reddish brown in colour, it is the diamond-shaped markings that give this species its common name.

keeled scales

*Crotalus atrox*

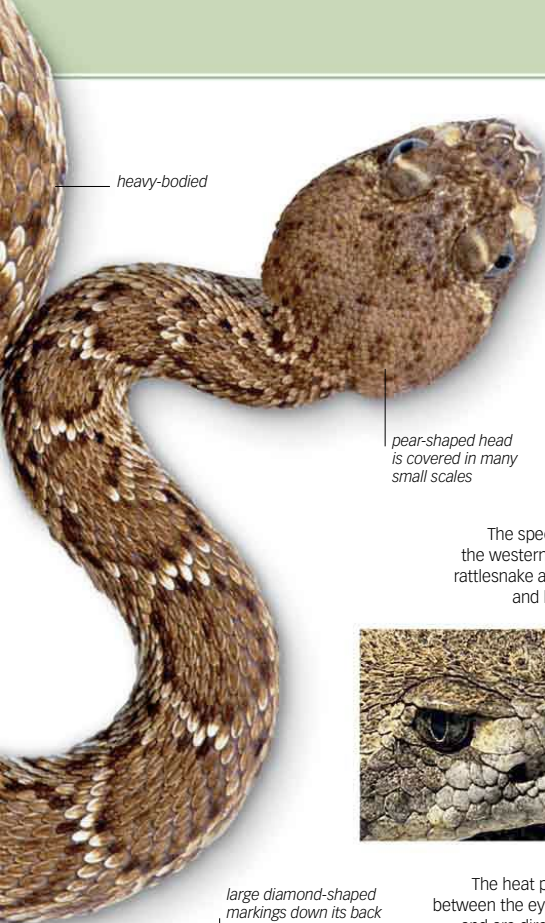
## WESTERN DIAMONDBACK RATTLESNAKE

**This is the second largest** venomous snake in the USA, after the eastern diamondback (p.108). For such a large snake, this species is surprisingly hard to see, as its coloration often matches that of the soil or rock on which it lives. Large adults are impressive and feed almost entirely on mammals up to the size of squirrels, prairie dogs, and rabbits, although smaller mammals, such as voles and pocket mice, form the bulk of its prey. On rare occasions, they eat birds and lizards, and may also feed on carrion if the opportunity arises.

The rattlesnake's most important sense organs are the heat-sensitive pits situated between its eyes and nostrils, which can detect the presence and location of a heat

source extremely accurately. When hunting actively, it uses its tongue to pick up scent trails and track prey, but as it nears the victim, the heat-detectors take over and the snake strikes accurately, even in total darkness. Unless the prey is small, the snake releases it immediately after striking and then follows its trail using its tongue until it arrives at the dead or dying victim. When employing ambush tactics, it positions itself alongside a rodent trail and waits for its prey to pass within striking distance.





Females breed every second year, using the intervening year to rebuild their body weight. The young are born alive and may remain with their mother for up to a week.



heavy-bodied

pear-shaped head is covered in many small scales

## PROFILE

-  S.W. North America
-  Desert and dry grassland
-  1–1.5 m (3¼–5 ft), rarely up to 2.3 m (7½ ft)
-  Live-bearing
-  2–25
-  Diurnal in spring; nocturnal in summer
-  Dangerously venomous
-  Least Concern

## Scales

The speckled scales of the western diamondback rattlesnake are overlapping and heavily keeled.



## Heat pits

The heat pits are located between the eyes and nostrils and are directed forwards.

large diamond-shaped markings down its back



black and white banding on the tail

FULL VIEW

## Fangs

The rattlesnake uses its fangs to stab rather than bite its victim, delivering a large quantity of venom that kills its prey within seconds.

original tail tip has broken off

## BEHAVIOUR

If it feels threatened, the western diamondback rattlesnake raises the front of its body and arranges it into an S-shaped coil, following the movements of its aggressor and constantly flicking its tongue. At the same time, it raises its tail off the ground and vibrates its rattle for several seconds. It remains in this position, rattling occasionally and making no attempt to retreat or advance, until it feels safe again.



## Fierce posture

A large rattlesnake in defensive mode is a formidable sight.

parallel segments are typical of older individuals

## Rattle

The rattle consists of the remains of previously shed skins, which form loosely interlocking segments.











**Colour pattern**

The diamond-shaped markings and about six brown and white rings around its tail distinguish the eastern diamondback rattlesnake from other rattlesnakes in its range.



**PROFILE**

-  S.E. USA
-  Grassland and open woodland
-  1–2.5 m (3¼–8¼ ft)
-  Live-bearing
-  4–29
-  Diurnal
-  Dangerously venomous
-  Least Concern

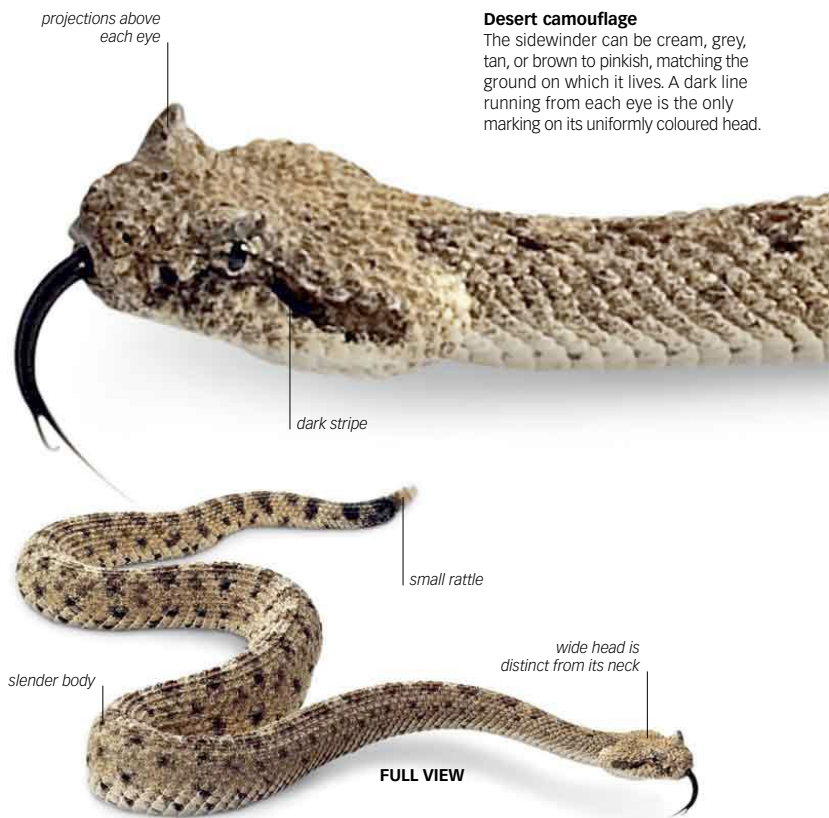
*Crotalus adamanteus*

# EASTERN DIAMONDBACK RATTLESNAKE

**The longest and heaviest** venomous snake in the USA, this species can weigh more than 7 kg (15 lb), although most adults weigh considerably less than this. The eastern diamondback rattlesnake is active most of the year due to the warm climate in the places it lives, but retreats into mammal or tortoise burrows during cold weather, and may remain there for several weeks if such conditions persist. An individual may use the same retreat for several years and hunt in the surrounding area.

This species feeds on small mammals such as rabbits and squirrels, tracking them using scent cues or ambushing them from a concealed position. Males are territorial and engage in bouts of combat, especially during the breeding season. They rear up and try to push their rival to the ground to establish dominance. This rattlesnake's bite is very serious, and almost half the injuries result in death unless treated immediately.













### Desert camouflage

The sidewinder can be cream, grey, tan, or brown to pinkish, matching the ground on which it lives. A dark line running from each eye is the only marking on its uniformly coloured head.

### PROFILE

-  S.W. North America
-  Deserts with loose, wind-blown sand and gravel flats
-  50–60 cm (20–23½ in)
-  Live-bearing
-  1–20
-  Mostly nocturnal, diurnal in spring
-  Venomous
-  Least Concern

*Crotalus cerastes*

## SIDEWINDER

**A small rattlesnake**, the sidewinder can be instantly recognized by the pair of pointed, horn-like scales over its eyes. A confirmed desert dweller, it moves rapidly across the surface of loose sand by throwing its body sideways in a series of loops, at an angle of about 45 degrees – a motion known as sidewinding. Active mostly at night, sidewinders often flatten their bodies on to tarred desert roads, absorbing the heat stored there from exposure to the sun. They rest during the day, shuffling down into the sand, often at the base of a shrub.

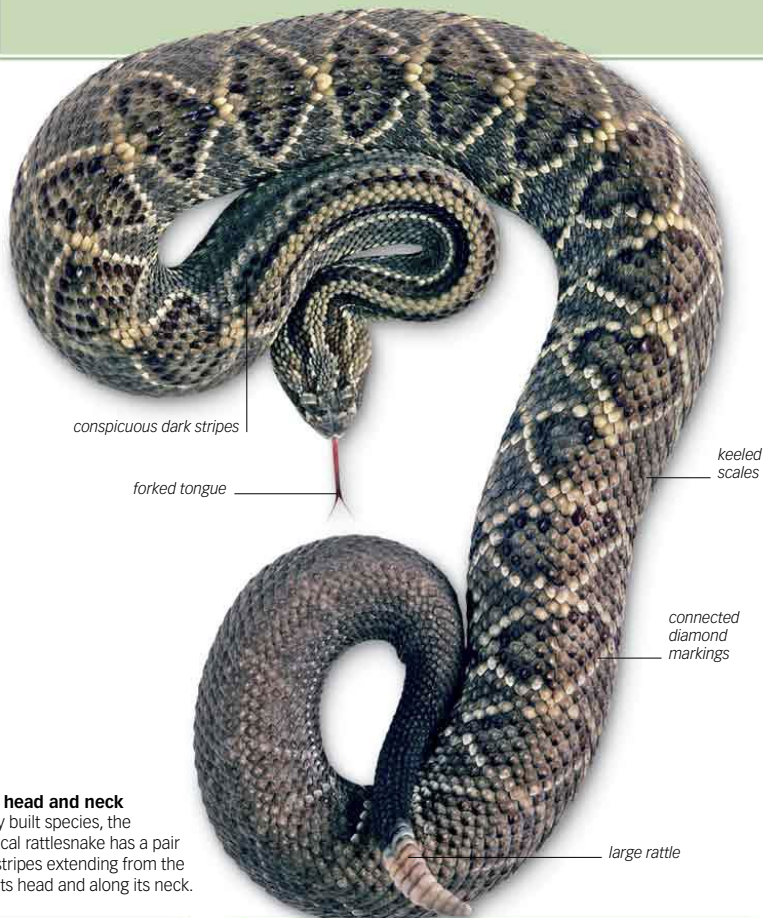
Sidewinders feed on lizards and small mammals, and occasionally small birds. Their venom is relatively mild, but human fatalities have occurred.



### Sidewinding

Sidewinders leave a trail of J-shaped tracks as they move across the sand.





#### Striped head and neck

A heavily built species, the neotropical rattlesnake has a pair of dark stripes extending from the back of its head and along its neck.

#### PROFILE

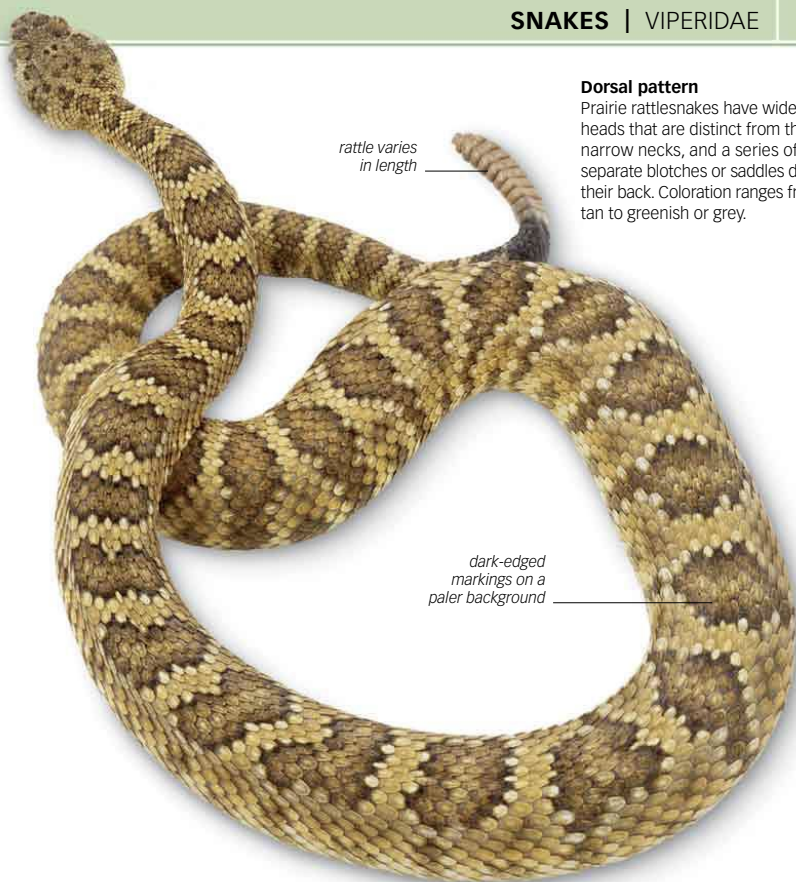
-  Mexico and Central and South America
-  Dry tropical forest and grassland
-  1–1.5 m (3¼–5 ft)
-  Live-bearing
-  2–47
-  Nocturnal and diurnal, depending on the season
-  Dangerously venomous
-  Least Concern

*Crotalus durissus*

## NEOTROPICAL RATTLESNAKE

**Occurring from Mexico to Argentina**, this species is by far the most widely distributed rattlesnake and the only one in South America. However, it is not found in closed canopy forests, leading to large gaps in its distribution, notably in the Amazon Basin. There are 14 known subspecies – all varying in colour and pattern – of which the Aruba Island rattlesnake, *C.d. unicolor*, is critically endangered.

The composition and effectiveness of venom from different populations vary. The subspecies *C.d. durissus* from Mexico produces venom that acts on the blood cells (haemolytic), causing swelling and haemorrhaging, whereas the venom of *C.d. terrificus* from South America acts more on the nervous system (neurotoxins), resulting in paralysis, among other symptoms. Both types are extremely dangerous, but the venom from *C.d. terrificus* acts faster and is more likely to result in death.



### Dorsal pattern

Prairie rattlesnakes have wide heads that are distinct from their narrow necks, and a series of separate blotches or saddles down their back. Coloration ranges from tan to greenish or grey.

### PROFILE

-  W. North America
-  Woodland, scrub, grassland, desert, and rocky outcrops
-  Up to 1.6 m (5¼ ft)
-  Live-bearing
-  2–25
-  Nocturnal in summer; diurnal or crepuscular in spring and autumn
-  Dangerously venomous
-  Least Concern

*Crotalus viridis*

## PRAIRIE RATTLESNAKE

**This species has a large** geographical range and two subspecies are recognized, varying in colour and pattern. Its behaviour is also geared to its distribution, with populations in the north hibernating for longer than those in the south. The prairie rattlesnake lives in a variety of habitats, but a suitable place for hibernation is essential, so it is rarely found far from rocky outcrops or underground burrows. Like many rattlesnakes, it often remains near the hibernation site in early spring when it first emerges, before moving off to its feeding range, which may be several kilometres away.

This species eats a wide variety of small mammals, including young ground squirrels and cottontail rabbits. When hunting, it attempts to strike at the head or chest of the prey, causing it to die quickly.

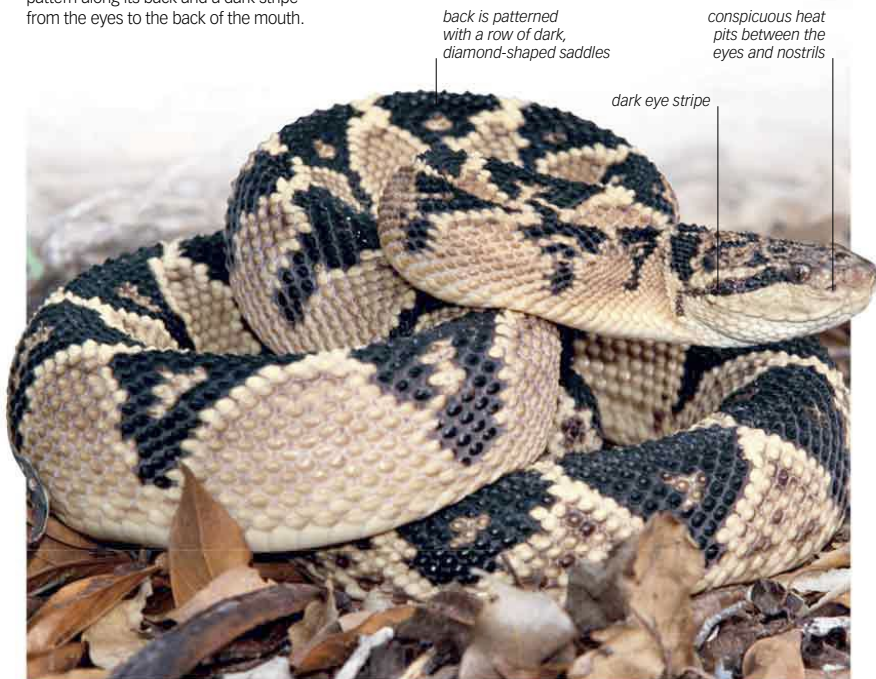








### Southern Pacific rattlesnake (*Crotalus oreganus helleri*)

This snake is often found in coastal and mountainous habitats in southern California.

**Notable markings**

The South American bushmaster ranges from reddish brown to tan, and has heavily keeled, conical scales. It has a distinctive diamond-shaped pattern along its back and a dark stripe from the eyes to the back of the mouth.

**PROFILE**

-  N. South America, and Trinidad and Tobago
-  Rainforest and plantations
-  2–3.5 m (6½–11 ft)
-  Egg-laying
-  5–18
-  Nocturnal
-  Dangerously venomous
-  Not assessed

*Lachesis muta*

## SOUTH AMERICAN BUSHMASTER

**The South American bushmaster** is the largest pit viper and the largest venomous snake in the Americas. Its body is roughly triangular in cross-section and its scales are heavily keeled, giving the snake a rough appearance. The scales on the top of its head are small. The four species of bushmasters are the only American pit vipers to lay eggs.

This is a secretive and shy species that is rarely seen. A sit-and-wait predator, it often waits for weeks before a meal strays into its path. After feeding, it moves to a resting place until it is ready to hunt again. The snake's venom is not as strong as those of some other vipers, but it is delivered in large quantities, and people that are bitten have only a small chance of survival, even if treated. For this reason, it is usually killed on sight. Although the conservation status of this species has not been assessed, the population from the Atlantic coast of Brazil is endangered due to the gradual clearance of its forest habitat.



### Swamp rattler

Also known as the swamp rattlesnake, the Massasauga is pale grey or brown, and has longitudinal rows of dark spots.

irregular dark spots run down the length of the body

small rattle

bluish eyes indicate that the skin will be shed shortly



### PROFILE

-  C. North America
-  Swamps and grassland
-  50–100 cm (20–39 in)
-  Live-bearing
-  2–20
-  Mainly diurnal
-  Venomous
-  Least Concern

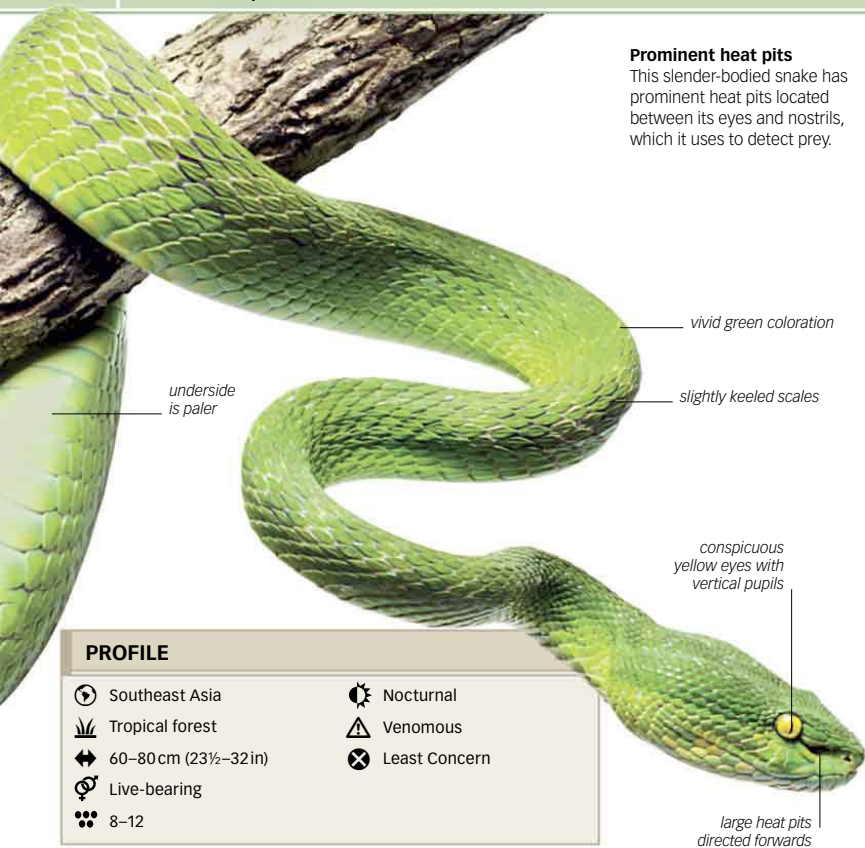
*Sistrurus catenatus*

## MASSASAUGA

**One of the smaller rattlesnakes**, the massasauga has a very small rattle, which produces a soft buzzing noise more similar to that of an insect than a rattlesnake. Massasaugas from the north of the range prefer damp habitats and tend to be dark in colour, sometimes completely suffused in black, whereas those from the south are paler, with distinct dark blotches. Adult massasaugas eat mainly small mammals, especially voles, but the young eat frogs, which they lure by waving the lighter-coloured tip of their tail.

These snakes hibernate for up to six months in crayfish or rodent burrows, rotten logs, or rock crevices. They emerge from hibernation during spring and migrate to feeding areas, usually in drier habitats. Males fight over females and mate with them in spring or autumn. If mating occurs in autumn, the females store the sperm until the following spring, and the young are born in late summer or early autumn.

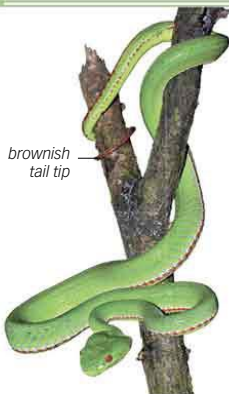


**Prominent heat pits**

This slender-bodied snake has prominent heat pits located between its eyes and nostrils, which it uses to detect prey.

**PROFILE**

- |                      |               |
|----------------------|---------------|
| Southeast Asia       | Nocturnal     |
| Tropical forest      | Venomous      |
| 60–80 cm (23½–32 in) | Least Concern |
| Live-bearing         |               |
| 8–12                 |               |

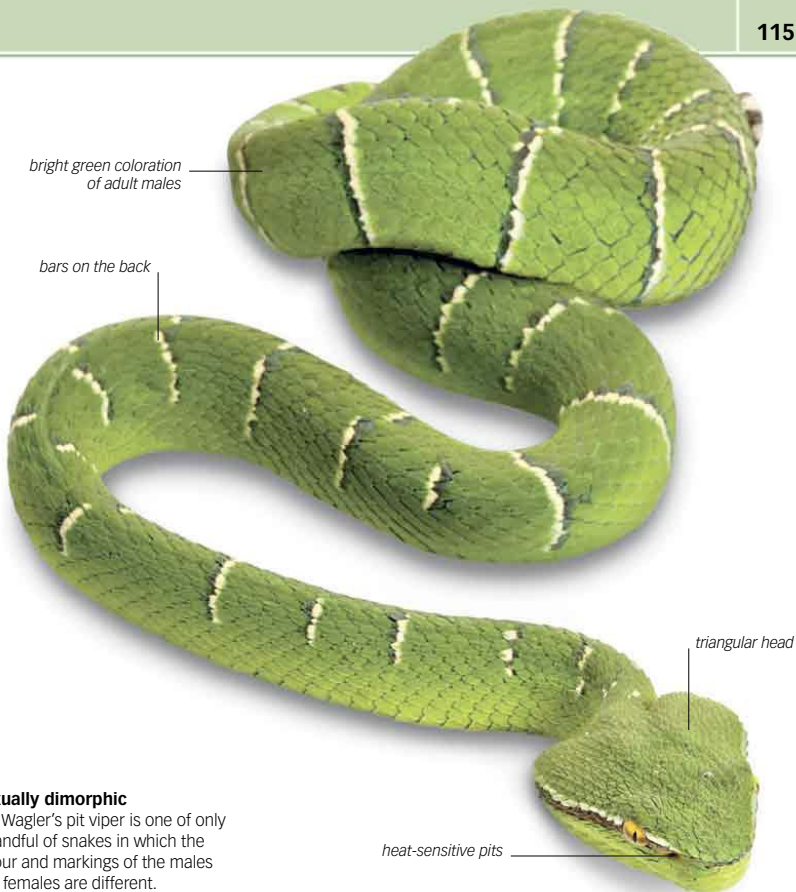
**SIMILAR SPECIES****Pope's bamboo pit viper (*Trimeresurus popeiorum*)**

Green above with pale green underside; found at higher elevations

*Trimeresurus albolabris***WHITE-LIPPED PIT VIPER**

**This arboreal species** lives among the thick forest understorey or in plantations. A nocturnal hunter, it uses its prehensile tail to hold on to a branch or vine with its head and body hanging down and coiled into a series of S-shapes. The head is within striking distance of the ground; when a small mammal passes underneath, the snake strikes downwards, using its heat pits to locate the prey. It may take up exactly the same position for several nights in a row, retreating to a less conspicuous place during the day. It may also use its dull red tail to lure prey; juveniles, which feed on small frogs, probably use this method of hunting more than adults.









This species is sexually dimorphic: males are smaller than females and have an unbroken white line running down their flanks, whereas females are plain green. Bites from these vipers are quite common among plantation workers, but they are rarely serious.



### Sexually dimorphic

The Wagler's pit viper is one of only a handful of snakes in which the colour and markings of the males and females are different.

### PROFILE

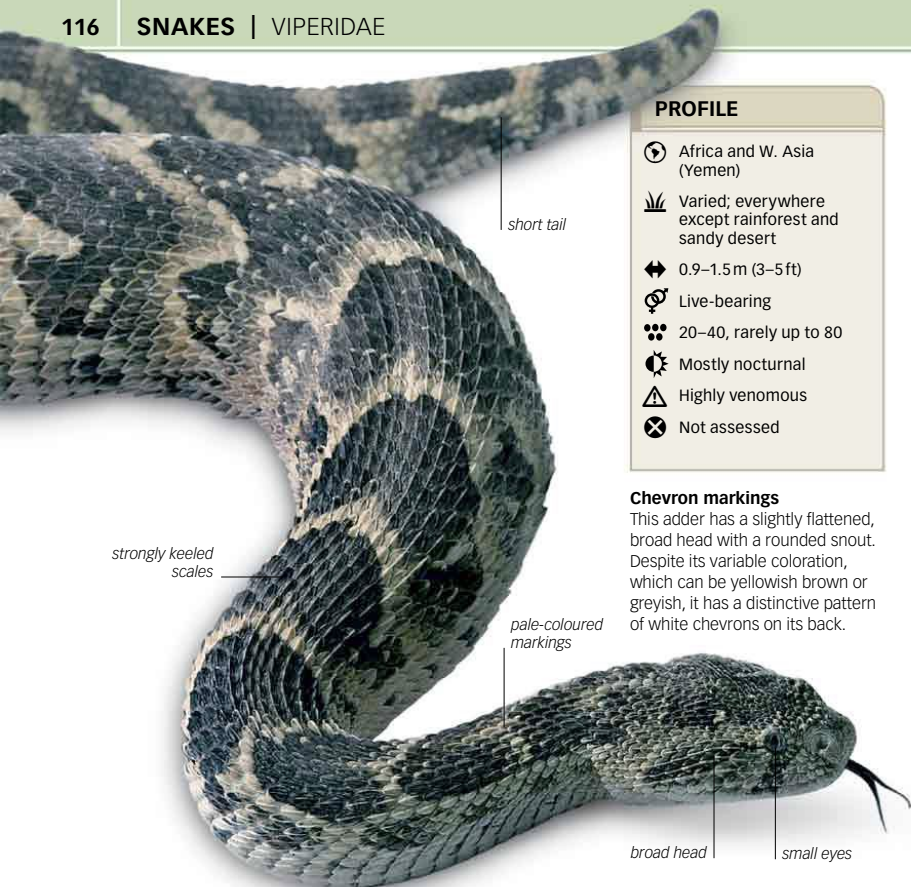
-  Southeast Asia and Philippines
-  Forests and plantations
-  0.6–1 m (2–3¼ ft), females are much larger than males
-  Live-bearing
-  15–25
-  Nocturnal
-  Dangerously venomous
-  Least Concern

*Tropidolaemus wagleri*

## WAGLER'S PIT VIPER

**This is the famous temple viper** of Penang, Malaysia, which is draped over plants and statues in the Snake Temple; the fangs of some individuals have been removed so that they can be handled safely by tourists. The species is highly variable in pattern, and different forms may occur in different parts of their range with several possible permutations. Adult males and juveniles are bright green, with short white bars on their sides; some also have brick-red spots (next to the bars). Adult females are black with bars and spots of yellow and green.

Wagler's pit vipers are extremely lethargic snakes; an individual found coiled around a branch or vine is likely to remain in exactly the same place, day and night, for days, weeks, or even months. It conserves its energy in this manner while it waits for potential prey to pass by. The viper feeds mainly on rodents and birds, which it detects using heat-sensitive pits located on either side of the head. It has a powerful venom, and bites can be fatal to humans if not treated.



## PROFILE

- 🌐 Africa and W. Asia (Yemen)
- 🌿 Varied; everywhere except rainforest and sandy desert
- 📏 0.9–1.5 m (3–5 ft)
- 👶 Live-bearing
- 👨‍👩‍👧 20–40, rarely up to 80
- 🌙 Mostly nocturnal
- ⚠️ Highly venomous
- ❌ Not assessed

## Chevron markings

This adder has a slightly flattened, broad head with a rounded snout. Despite its variable coloration, which can be yellowish brown or greyish, it has a distinctive pattern of white chevrons on its back.

## SIMILAR SPECIES



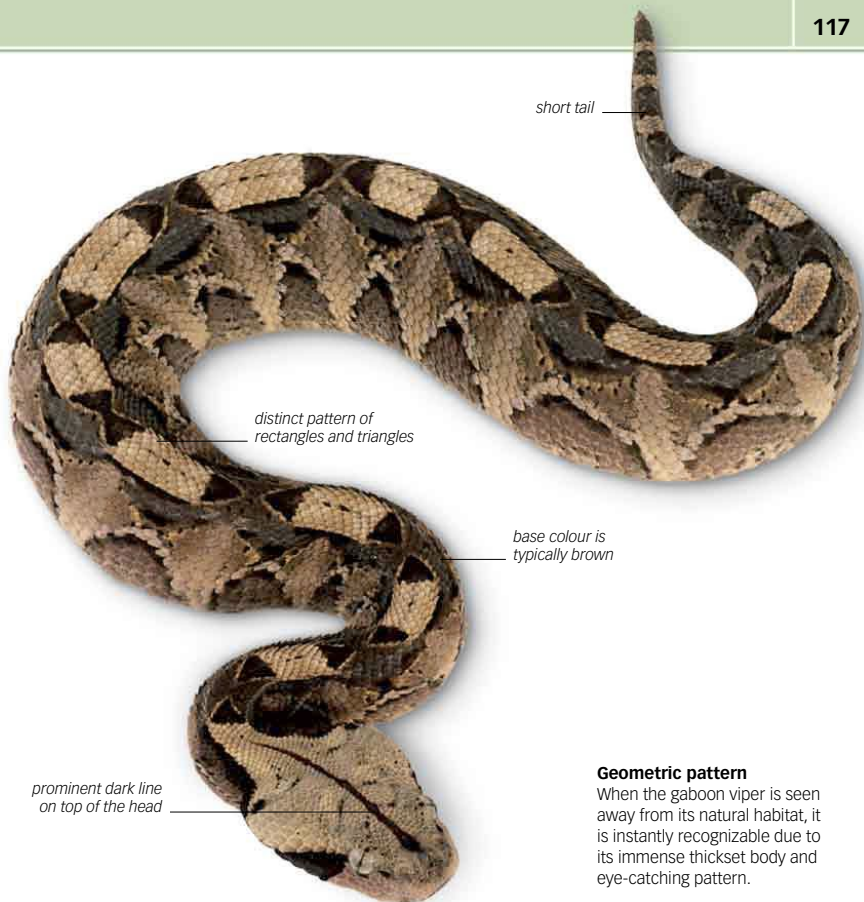
**Perringuey's adder (*Bitis peringueyi*)** A small, side-winding viper from the Namib Desert

*Bitis arietans*

## PUFF ADDER

**The puff adder** is one of Africa's most feared snakes and causes more deaths than any other species, due to its wide distribution, its tendency to occur near human dwellings, and its sluggish disposition that makes it likely to be trodden on. This species is large and bulky, with cryptic markings that vary in shade according to where it lives. For instance, individuals from the desert are much paler. Its head is broad, to accommodate the large venom glands and, like all vipers, its fangs are hinged and very long.

The puff adder eats most vertebrates; rodents make up the bulk of its diet, but it also preys on other snakes and even young tortoises. If cornered, the adder puffs up its body, hisses loudly, and may strike. On a smooth surface its strike can be so vigorous that the whole snake slides forward. Large adults move in a straight line in a caterpillar-like crawl.



#### Geometric pattern

When the gaboon viper is seen away from its natural habitat, it is instantly recognizable due to its immense thickset body and eye-catching pattern.

#### PROFILE

-  Tropical Africa
-  Rainforest
-  0.9–2 m (3–6½ ft)
-  Live-bearing
-  16–30, rarely up to 60
-  Nocturnal
-  Dangerously venomous
-  Not assessed

*Bitis gabonica*

## GABOON VIPER

**The gaboon viper** is the longest and heaviest African viper with weights of up to 10 kg (22 lb) recorded. Its fangs can be up to 5 cm (2 in) long, and the markings on its body consist of intricately arranged geometric shapes in buff, purple, and pink. Slow-moving and sedentary, it sits in wait for its prey and strikes rapidly, its heavy body anchoring it to the ground. Having struck, the viper releases its prey and returns to its former position, waiting for the prey to stagger away and die, before tracking it down and swallowing it.

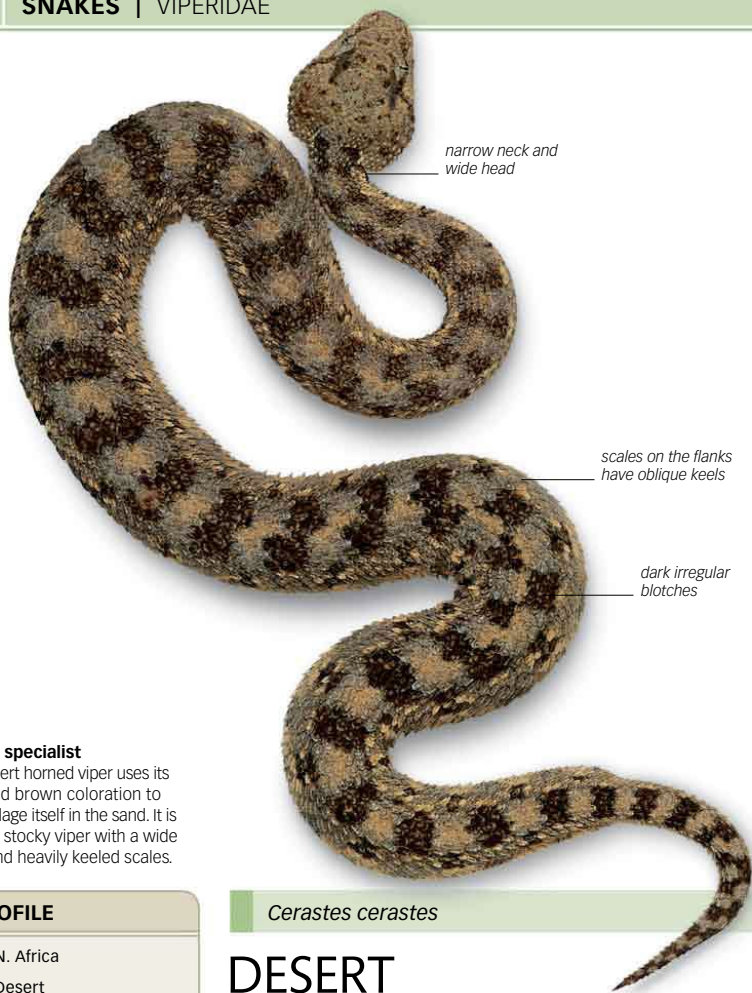
This species feeds on hares, porcupines, and small monkeys, but smaller rodents are its main prey. Although bites from gaboon vipers are often fatal, they are rare because the viper is not often found around human dwellings and has a rather placid disposition.



#### Camouflage

In the wild, its coloration and patterning provide excellent camouflage, making the gaboon viper extremely difficult to detect.



**Desert specialist**

The desert horned viper uses its grey and brown coloration to camouflage itself in the sand. It is a short, stocky viper with a wide head and heavily keeled scales.

**PROFILE**

-  N. Africa
-  Desert
-  50–80 cm (20–32 in)
-  Egg-laying
-  10–23
-  Nocturnal in summer; diurnal in spring
-  Not assessed

*Cerastes cerastes*

## DESERT HORNED VIPER

**The most distinctive characteristic** of the desert horned viper is a pair of horn-like scales over its eyes, although not every individual has these. A true desert species, it moves across the sand with a sidewinding movement. It is absent from areas of extensive dunes, and is more likely to occur on sandy hillsides, areas of sand between rocky outcrops, and near oases, where it can find food. This snake hides by shuffling down into the sand with only its eyes and horns showing, and ambushes its prey from this position, feeding on lizards, small birds, and rodents. By burying itself into the sand, it can also avoid being detected by predators.

When threatened, the viper coils its body, rubbing together the keeled scales on its flanks. This produces a loud, rasping sound. Saw-scaled vipers belonging to the genus *Echis* and egg-eating snakes of the genus *Dasyeltis* employ the same defence strategy.

**Constant pattern**

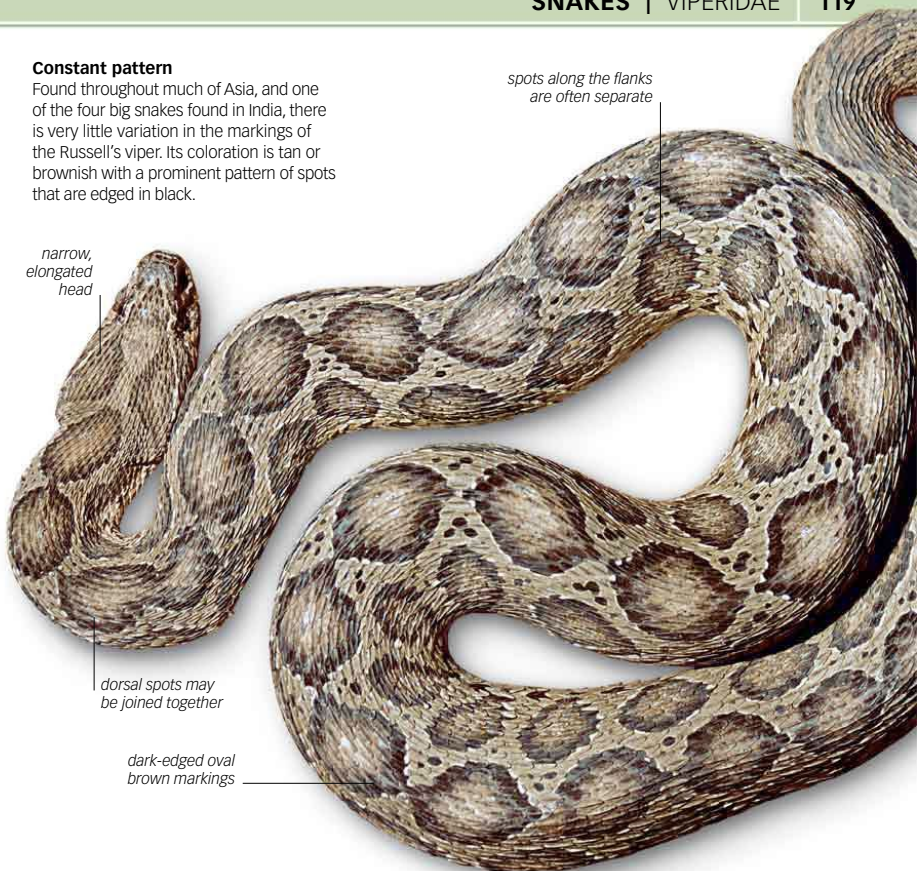
Found throughout much of Asia, and one of the four big snakes found in India, there is very little variation in the markings of the Russell's viper. Its coloration is tan or brownish with a prominent pattern of spots that are edged in black.

*spots along the flanks are often separate*

*narrow, elongated head*

*dorsal spots may be joined together*

*dark-edged oval brown markings*

**PROFILE**

-  South and Southeast Asia
-  Grassland, sparse woodland, plantations, and farms
-  1–1.5 m (3¼–5 ft)
-  Live-bearing
-  5–50, rarely up to 65
-  Mainly nocturnal
-  Dangerously venomous
-  Least Concern

*Daboia russelii*

## RUSSELL'S VIPER

**The most common venomous snake** in southern Asia, the Russell's viper is responsible for more than half of the serious snakebites in the region. These can be lethal unless treated, and survivors may suffer permanent damage and disfigurement. The Russell's viper's venom contains a clotting agent, and is sometimes used medically to test for blood clotting under laboratory conditions.

Adults feed mainly on rodents, often gravitating towards farms and villages to look for prey, while juveniles eat lizards. Russell's vipers are ambush predators, relying on their pattern and colour to camouflage themselves while they lie in wait for unsuspecting prey. This also makes them very prone to be trodden on by field and plantation workers. Although they do not possess the heat-sensitive pits of the pit vipers, Russell's vipers are able to detect changes in temperature, probably through a system of nerve endings in their face.

## PROFILE



Middle East, India,  
and Sri Lanka



Desert and dry grassland



35–70 cm (14–28 in)



Live-bearing



5–11



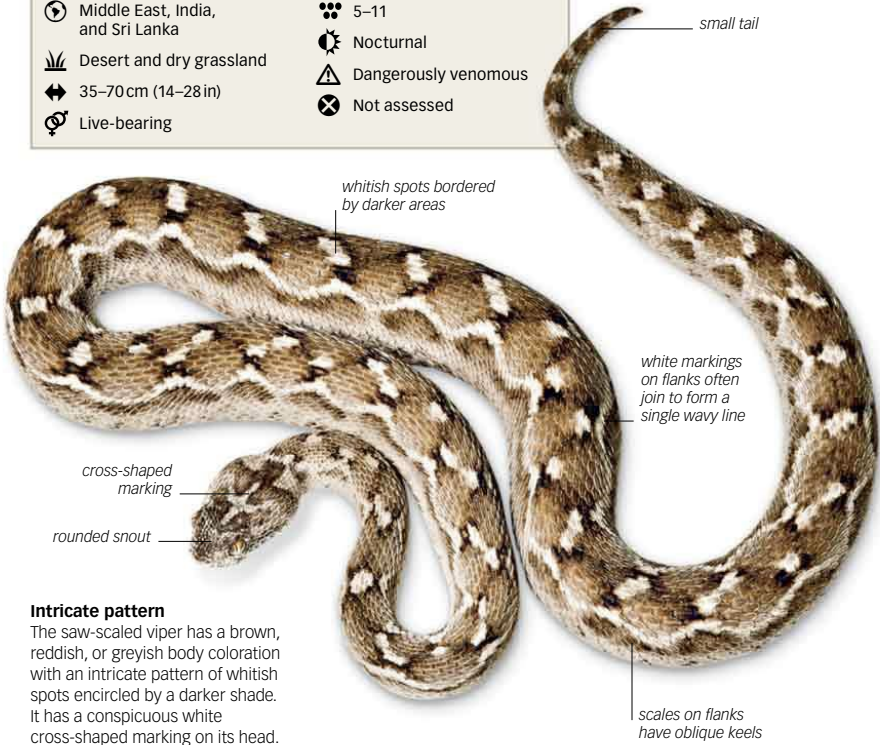
Nocturnal



Dangerously venomous



Not assessed



## Intricate pattern

The saw-scaled viper has a brown, reddish, or greyish body coloration with an intricate pattern of whitish spots encircled by a darker shade. It has a conspicuous white cross-shaped marking on its head.

## SIMILAR SPECIES



**African saw-scaled viper (*Echis ocellatus*)** Similar; is a common cause of snakebites in West Africa

*Echis carinatus*

## SAW-SCALED VIPER

**The saw-scaled viper's common name** derives from the rows of heavily keeled, serrated scales on its flanks, which are arranged obliquely to the direction of the row. When the snake is coiled in its characteristic horseshoe-shaped position, these keels are in contact with each other so that when the snake rubs its coils together, they produce a loud rasping sound. It is thought that this enables the snake to warn off predators without the need to hiss. Some other desert species also produce sounds in this manner.

The saw-scaled viper lives in stony or sandy deserts with scattered vegetation. It is also found in agricultural regions, where it can be a hazard to field workers who often inadvertently tread on it, with serious consequences. An ambush predator, it attacks its prey from a concealed position and does not shuffle down into the sand in the same way as other desert vipers. It mainly feeds on mice.





#### Alluring feature

Some forms of the nose-horned viper have yellow or green tips to their tails, which are thought to lure small animals, including rodents and lizards.

#### PROFILE

-  S.E. Europe and W. Asia
-  Rocky slopes, scrub, and farmland
-  65–90 cm (26–35 in)
-  Live-bearing
-  4–15
-  Diurnal and nocturnal
-  Dangerously venomous
-  Least Concern

*Vipera ammodytes*

## NOSE-HORNED VIPER

**This is the only European snake** with a short, fleshy horn on the tip of its snout. Several subspecies are recognized; although they may vary in colour, they all have the characteristic zigzag marking down their back. Nose-horned vipers are fairly common in suitable habitats and occur on many small islands in the Adriatic region, where they are sometimes significantly smaller than mainland forms, with a maximum size of about 35 cm (14 in).

Nose-horned vipers often live near human dwellings, especially where there are dry-stone walls, and may be active by day or at night, according to the season. Its bite can be serious if not treated, and the venom is collected and used to produce anti-venom that is effective for all European vipers.



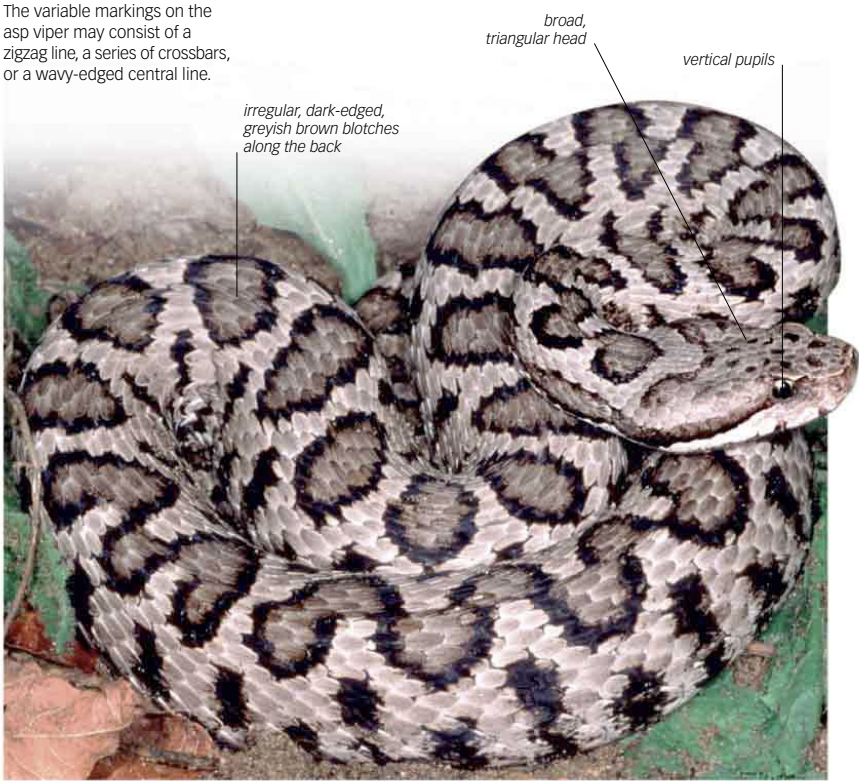
#### Nose horn

The viper's nose horn is short and composed of 10 or more small scales.



### Different patterns

The variable markings on the asp viper may consist of a zigzag line, a series of crossbars, or a wavy-edged central line.



### PROFILE

-  W. and C. Europe
-  Dry woodland, scrub, and mountain slopes
-  50–60 cm (20–23½ in), rarely up to 90 cm (35 in)
-  Live-bearing
-  5–22
-  Mostly diurnal
-  Venomous
-  Least Concern

*Vipera aspis*

## ASP VIPER

**The asp viper can be found** in a number of different habitats, at altitudes ranging from sea level to as high as 3,000m (9,845 ft). This snake is more slender than the other European vipers. It has a triangular head and an upturned snout, but no nose horn. It is mainly diurnal, except during hot weather when it may be active in the evening or at night. Adult asp vipers feed mainly on mice and voles, but also eat birds and lizards; juveniles mainly eat lizards. The venom is more powerful than that of the adder (p.123), but it varies from place to place; asp vipers found in parts of southern France contain a higher proportion of a fast-acting neurotoxic venom. Deaths have occurred when the bites have not been treated.

Female asp vipers are larger than males and become even more heavy-bodied when they are pregnant. The young are born inside a thin membrane but break free within a few minutes.



zigzag pattern down the centre of the back

## PROFILE

- |   |   |
|---|---|
|  Most of Europe, C. and E. Asia                  |  3–18          |
|  Heathland, grassland, marshes, and scrub        |  Diurnal       |
|  50–65 cm (20–26 in), rarely up to 90 cm (35 in) |  Venomous      |
|  Live-bearing                                    |  Least Concern |

## Zigzags and spots

The adder is a small snake and has a narrow head with a V- or X-shaped marking. But by far the most distinctive feature is the zigzag pattern on its back bordered by a series of dark spots.

row of small spots along the flanks

## SIMILAR SPECIES



**Orsini's viper (*Vipera ursinii*)** Smaller species; unusual in eating mainly grasshoppers and other invertebrates

## *Vipera berus*

# ADDER

**A remarkable snake**, the adder's distribution is more extensive than that of any other terrestrial species – it occurs well into the Arctic Circle in Scandinavia and northern Russia. There is some variation in the colour, and completely black examples are not uncommon in places. The greatest variation is between the sexes; males are silver-grey with a black zigzag pattern, whereas females are brown or reddish brown with darker brown markings.

Breeding takes place in the spring, immediately after hibernation. Males compete with each other for females, raising the front halves of their bodies and intertwining them, while trying to push their rival to the ground. The victorious male usually mates with the female soon afterwards.



## Female

Female adders are brown in colour with less contrast in their markings.

# LIZARDS

**Lizards are the largest group of reptiles in terms of the number of species. They have the greatest geographical distribution, and the greatest diversity of shape, size, and behaviour.**

## ANATOMY

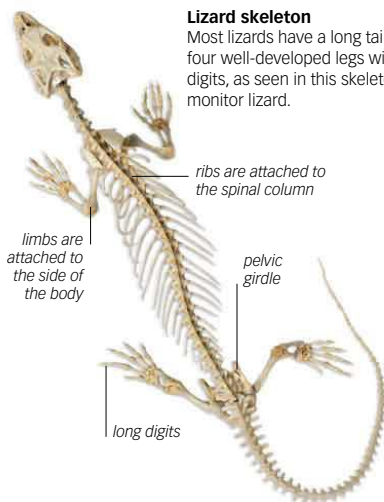
All lizards are covered in scales but, other than this, no generalization can be made about this group of reptiles. They may have four, two, or no limbs; where they are present, the limbs assume a variety of forms, depending to a large extent on the species' lifestyle. In addition, many members of this group have crests, dewlaps, or other ornamentation. Sexual dimorphism is present in a number of families, such as the Agamidae, Chamaeleonidae, and the iguana group of families.

Some lizards, notably the geckos, have large eyes, vertical pupils, and a repertoire of vocalizations that enable them to communicate. They are well adapted to life in the dark and nocturnal in their habits. Many species are also diurnal.

ORDER	SQUAMATA
FAMILIES	36
SPECIES	5,796

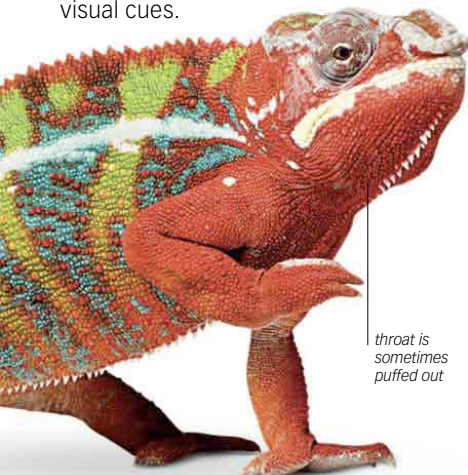
### Lizard skeleton

Most lizards have a long tail and four well-developed legs with long digits, as seen in this skeleton of a monitor lizard.



## VISUAL DISPLAY

Lizards belonging to some families, notably the chameleons, agamas, and iguanas, are colourful animals that communicate mainly via visual cues.



Males are often brightly coloured and may have elaborate crests and dewlaps with which they display to rivals and potential mates.

In species that breed at certain times of the year, males' colours are intensified during the breeding season, but they often change colour most dramatically in response to a rival. Male chameleons, for instance, can summon up a dazzling array of colours in a few seconds. Many agamas and iguanids bob their heads, do press-ups, or erect their dewlap to advertise their territory, and competition between males can escalate into violence if neither individual will back down, resulting in injury or even death.

### Changing colour

Chameleons do not change colour according to their surroundings, but according to their mood. The most vibrant colours are reserved for territorial or courtship displays.

### REPRODUCTION VARIATION

Lizards may either lay eggs (oviparous) or give birth to live young (viviparous). The eggs of most species are covered with soft, parchment-like shells, but geckos and a few other lizards lay hard-shelled, calcareous eggs.

Live-bearing species may be of two types. In ovo-viviparous species, the eggs are retained inside the female's body until they are ready to hatch. This allows her to hasten their development by basking and raising their temperature; the embryo obtains nourishment from a large yolk. In truly viviparous species, however, there is a well-developed placenta and the embryo is not enclosed in a shell; nourishment is provided directly by the female and the yolk is very small.

The skink family, Scincidae, includes species with all three reproductive modes. The method of reproduction

usually follows family trends. For example, all girdle-tailed lizards (Cordylidae) are live-bearers, whereas all monitors (Varanidae) are egg-layers.



**Live-bearing species**  
The Australian pink-tongued skink, *Hemisphaeriodon gerrardii*, gives birth to live young. Other skinks, however, lay eggs.

## WORM LIZARDS

**Worm lizards, sometimes called amphisbaenians, are the least known of all reptiles, living secretive lives underground. They are often overlooked even in places where they are common. Most are pink or purplish brown in colour, but a few are more colourful.**

Worm lizards live underground in tunnels that they create themselves, pushing their reinforced skulls through hard soil and using movements of their head and body to widen the tunnel and pack the sides. They are all legless, except for three members of the genus *Bipes* from Mexico, which have front limbs located just behind the head.



ORDER	AMPHISBAENIA
FAMILIES	6
SPECIES	184

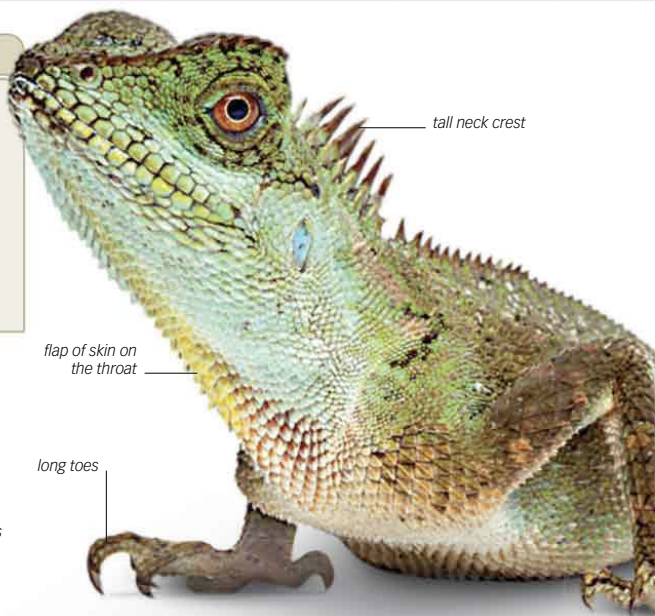
Worm lizards feed mostly on invertebrates and live in a wide range of habitats in South and Central America, Florida, Africa, the Arabian Peninsula, and Iberia. They all lay eggs, with the sole exception of the chequered worm lizard, *Trogonophis wiegmanni*, which is live-bearing. Of the 184 species of worm lizards, 167 belong to a single genus, *Amphisbaenia*.

**Annular scales**  
Worm lizards have dry scales that are arranged in rings around their body. These superficially resemble the annuli (ringed grooves) of earthworms.



## PROFILE

-  Southeast Asia
-  Rainforest
-  30cm (12in)
-  Egg-laying
-  Unknown
-  Diurnal
-  Not assessed



flap of skin on  
the throat

tall neck crest

long toes

orange eyes  
with round pupils



FULL VIEW

**Suitably coloured**

These lizards live in the shade of the rainforest canopy, where their olive-brown and green coloration helps them escape detection from predators.

## SIMILAR SPECIES



neon green  
markings

**Green-striped tree dragon  
(*Japalura splendida*)**

Often listed as the neon tree dragon; it lays small clutches of eggs, burying them in moist soil








*Acanthosaura crucigera*

BOULENGER'S  
PRICKLENAPE

**This species and others in its genus** are known as pricklenape lizards owing to the row of elongated scales on their neck, separated from those on the back by a small gap. In this species, males also have spines over their eyes.

The Boulenger's pricklenape lizards are sit-and-wait predators, typically clinging to a tree trunk in a vertical position and remaining motionless. In the dappled light of the rainforest, this makes them difficult to see and their strategy is to sit tight as long as possible, often allowing a very close approach before they make a bolt up the trunk and out of reach. They are highly arboreal and rarely come down to ground level, although the female descends to lay her eggs, which are deposited in a shallow burrow in the ground.

## PROFILE

-  E. Africa
-  Grassland and scrub
-  20–35 cm (8–14 in)
-  Egg-laying
-  5–9
-  Diurnal
-  Not assessed

## Dramatic coloration

During the breeding season, the male rainbow lizard (shown here) develops dramatic coloration, with its reddish or orange head and turquoise-blue body.



## SIMILAR SPECIES



**Mwanza flat-headed agama (*Agama mwanzae*)**

More brightly coloured male, with a pink head and bright blue body and tail



**Desert agama (*Trapelus mutabilis*)** Comes from the dry plains of North Africa and lives on the ground

*Agama agama*

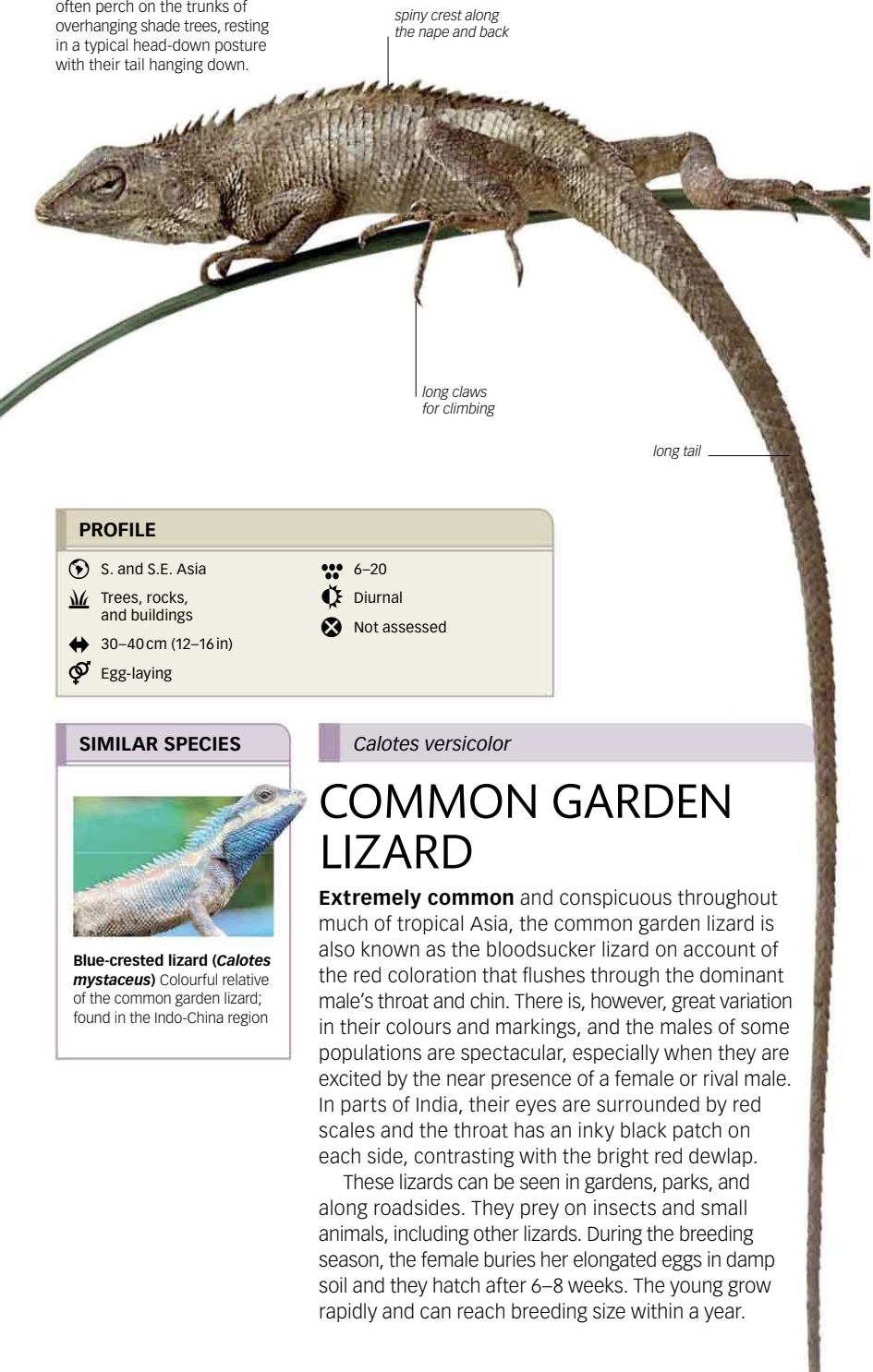
## RAINBOW LIZARD


**A familiar lizard** in the drier parts of East Africa, the rainbow lizard lives in colonies on small rocky outcrops or around buildings, including game lodges. Dominant males have reddish or orange heads. They survey their territories from piles of rocks, prominent stumps, or the tops of walls, bobbing their heads and doing “press-ups” if another rainbow lizard comes within view. Subordinate males are less colourful and try to remain inconspicuous to avoid being attacked. Females are brown, although they may develop orange flanks when they are carrying eggs.


Birds of prey, snakes, and mongooses are the main predators; if alarmed, rainbow lizards scatter, often leaping large distances from rock to rock, and retreat into cracks. Many individuals have damaged tails, either as a result of close encounters with predators or through fighting. They eat most small insects, including ants, and some plant material. The eggs are laid at the beginning of the rainy season and hatch after about two months.


**In the shade**


Common garden lizards often perch on the trunks of overhanging shade trees, resting in a typical head-down posture with their tail hanging down.

**PROFILE**

 S. and S.E. Asia


 Trees, rocks, and buildings

 30–40 cm (12–16 in)

 Egg-laying

 6–20

 Diurnal

 Not assessed

**SIMILAR SPECIES**

**Blue-crested lizard (*Calotes mystaceus*)** Colourful relative of the common garden lizard; found in the Indo-China region

*Calotes versicolor*

## COMMON GARDEN LIZARD

**Extremely common** and conspicuous throughout much of tropical Asia, the common garden lizard is also known as the bloodsucker lizard on account of the red coloration that flushes through the dominant male's throat and chin. There is, however, great variation in their colours and markings, and the males of some populations are spectacular, especially when they are excited by the near presence of a female or rival male. In parts of India, their eyes are surrounded by red scales and the throat has an inky black patch on each side, contrasting with the bright red dewlap.

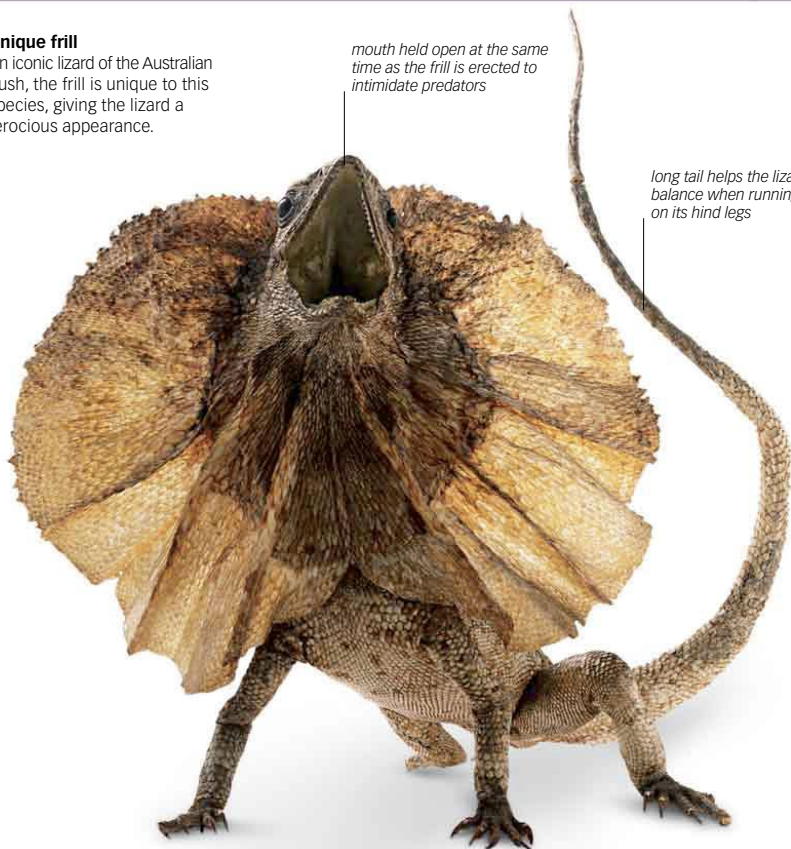
These lizards can be seen in gardens, parks, and along roadsides. They prey on insects and small animals, including other lizards. During the breeding season, the female buries her elongated eggs in damp soil and they hatch after 6–8 weeks. The young grow rapidly and can reach breeding size within a year.

**Unique frill**

An iconic lizard of the Australian bush, the frill is unique to this species, giving the lizard a ferocious appearance.

mouth held open at the same time as the frill is erected to intimidate predators

long tail helps the lizard balance when running on its hind legs

**PROFILE**

-  N. Australia and S. New Guinea
-  Subtropical forest
-  60–90 cm (23½–35 in)
-  Egg-laying
-  6–25, but usually less than 10
-  Diurnal
-  Least Concern

*Chlamydosaurus kingii*

## FRILLED LIZARD

**The only member of its genus**, the frilled lizard is a very distinctive species due to its frill – a large ruff of skin supported by elongated spines of cartilage that are attached to its jaws. The scales on the frill may be bright orange, red, or grey, depending on the origin of the individual. When threatened, or during courtship and territorial displays, the spines are raised, causing the ruff to open like an umbrella. Breeding takes place during the wet season; the females bury their eggs and these take about three months to hatch. The juveniles have frills as soon as they hatch.

Frilled lizards rely on camouflage for safety, resting in a vertical position on grey tree trunks. If approached, they quietly move around to keep the tree trunk between them and the observer. If surprised on the ground, they erect the frill, gape their mouth, and hiss. When this fails, they turn and run for the nearest tree, picking up speed until their small front legs leave the ground so that they are propelled by their hind legs only.



bright yellow  
dewlap in males

## PROFILE

-  Southeast Asia
-  Rainforest
-  15–20 cm (6–8 in)
-  Egg-laying
-  1–5
-  Diurnal
-  Not assessed

distinctive dark-coloured  
spots along the inner  
edge of the wings

### Colourful lizard

The flying dragon has conspicuous coloration. Its flattened body is often mottled greenish brown, while the dewlap is bright yellow in males (as shown here); the female has a smaller bluish grey dewlap.

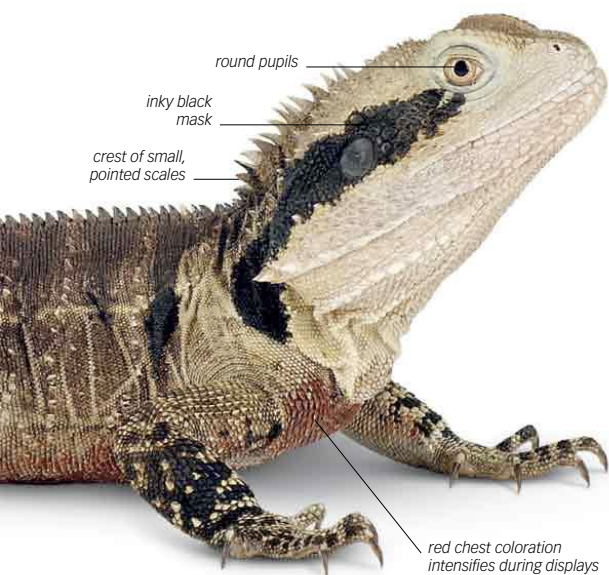
*Draco volans*

# COMMON FLYING DRAGON

**This species lives in open rainforest**, where there is clear space for it to glide between tree trunks. It rests with its head pointing up until it is ready to move to another tree. As it launches itself, it turns around so that its head is pointing downwards and extends its wings, which consist of a membrane of skin stretched between elongated ribs, and are often brightly coloured. It lands vertically and runs a short distance up the trunk.

Males control a territory containing a number of large trees and each territory may have several resident females. The males display by flashing a bright dewlap and may also partially extend their wings. In areas where different species occur together, each has a uniquely coloured dewlap and wings. This enables them to display to the correct species. These lizards eat small invertebrates, which they find in the trees. Although they do not usually descend, females climb down to the ground to lay their eggs in moist soil.

long,  
slender tail  
is used for  
steering

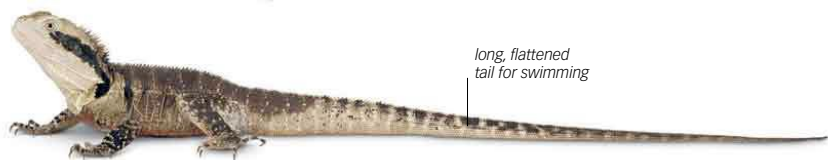


## PROFILE

- Australia
- Forests bordering waterways
- 75–100 cm (30–39 in)
- Egg-laying
- Up to 20
- Diurnal
- Not assessed

**Black mask**

The black mask and red chest indicate a male Eastern water dragon. Females have more sombre coloration.



FULL VIEW

## SIMILAR SPECIES

large, pointed scales

**Boyd's forest dragon**

*(Hypsilurus boydii)* Occurs in tropical forests in Queensland

comb-like crest of spines

**Borneo forest dragon**

*(Gonocephalus bornensis)*  
Normally seen resting on vertical vines and branches

*Intellagama lesueurii*

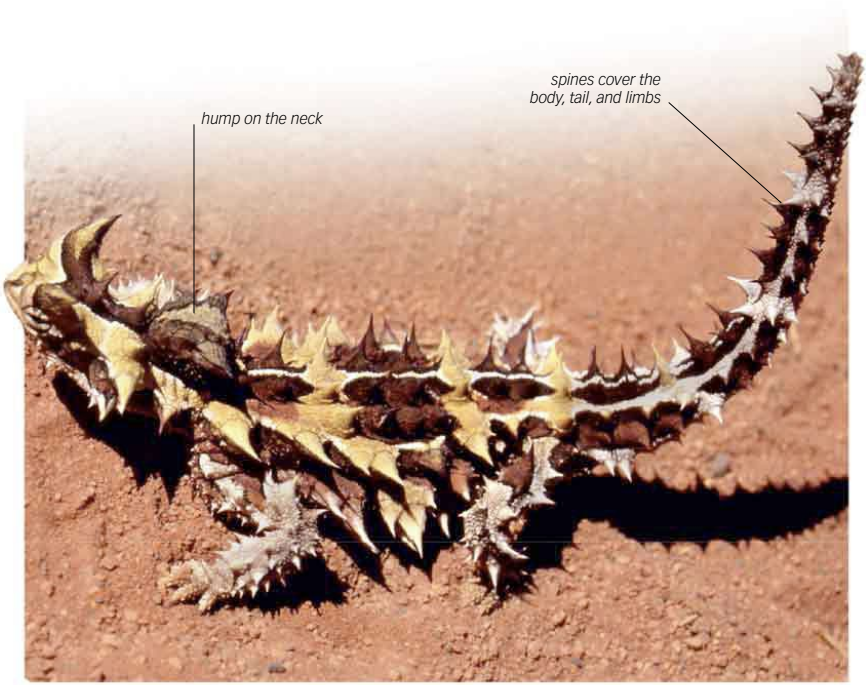
## EASTERN WATER DRAGON

**This large, dragon-like lizard** is semi-aquatic and semi-arboreal. It is usually found resting on branches of trees near or overhanging waterways. If disturbed, the lizard drops into the water and swims off using its powerful tail. Males of some forms have pink chests and a black "mask" behind their eyes, but this is lacking in individuals from the southern parts of its range. This species has adapted to urban life and occurs in large parks in cities such as Canberra and Sydney.

Males are territorial and display by bobbing their head vigorously, exposing the red chests where they are present, and paddling their arms rapidly. Females and submissive males respond by waving their arms slowly. Breeding takes place in the spring after a period of hibernation, and the females bury their eggs in soil. The sex of the hatchlings is dependent on the temperature at which the eggs are incubated.

**Peculiar walk**

A slow-moving lizard, the thorny devil walks with a rocking gait. It is suitably camouflaged in shades of brown and tan.

**PROFILE**

-  Australia
-  Desert
-  20 cm (8 in)
-  Egg-laying
-  3–10
-  Diurnal
-  Not assessed

*Moloch horridus*

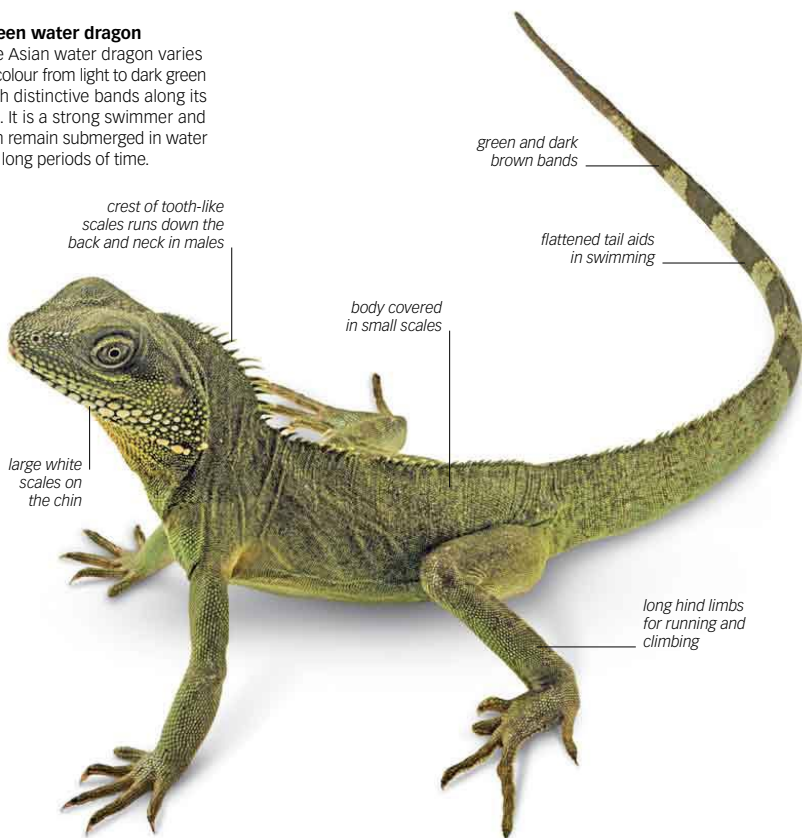
## THORNY DEVIL

**An unmistakable lizard**, the thorny devil is completely harmless despite its fearsome appearance. The spines that cover its body are designed to break up its outline and make it more difficult to spot. They also make it unpalatable to predators if all else fails. When attacked, the lizard lowers its head between its front legs and the strange hump on top of its neck may act as a false head.

The thorny devil's coloration matches the red sands of the Australian deserts, where it forages among *Spinifex* and other drought-resistant plants. The lizard feeds almost exclusively on ants, eating up to 5,000 in a single sitting. It obtains most of its water from fog that condenses on its scales. The fog is channelled to the corners of its mouth by a network of grooves, known as hygroscopic grooves, between its spines. Females lay up to ten eggs in a burrow in the sand, which hatch after 3–4 months. The thorny devil's diet and habits are similar to those of the American horned lizards, *Phrynosoma* species (p.151).

### Green water dragon

The Asian water dragon varies in colour from light to dark green with distinctive bands along its tail. It is a strong swimmer and can remain submerged in water for long periods of time.



#### PROFILE

-  S.E. Asia
-  Forests bordering rivers
-  70–90 cm (28–35 in)
-  Egg-laying
-  5–20
-  Diurnal
-  Not assessed

*Physignathus cocincinus*








## ASIAN WATER DRAGON

**The Asian water dragon** is a brightly coloured lizard from the dense forests of Southeast Asia. Males are larger than females, and become more colourful in the breeding season. They acquire a pink or purple flush to their throats, which they display by extending their dewlap and vigorously nodding their head. Females bury their eggs in a hole in soil or leaf litter. The young hatch after about 50–60 days and grow quickly, reaching breeding size after 12–18 months.

Asian water dragons are good climbers and spend most of their time clinging to branches that overhang lowland rivers. They tend to remain motionless and are difficult to see. When threatened, they drop into the water to escape, using their flattened tail to swim below the surface with just the head showing. A predominantly insectivorous species, they also eat some vegetation.

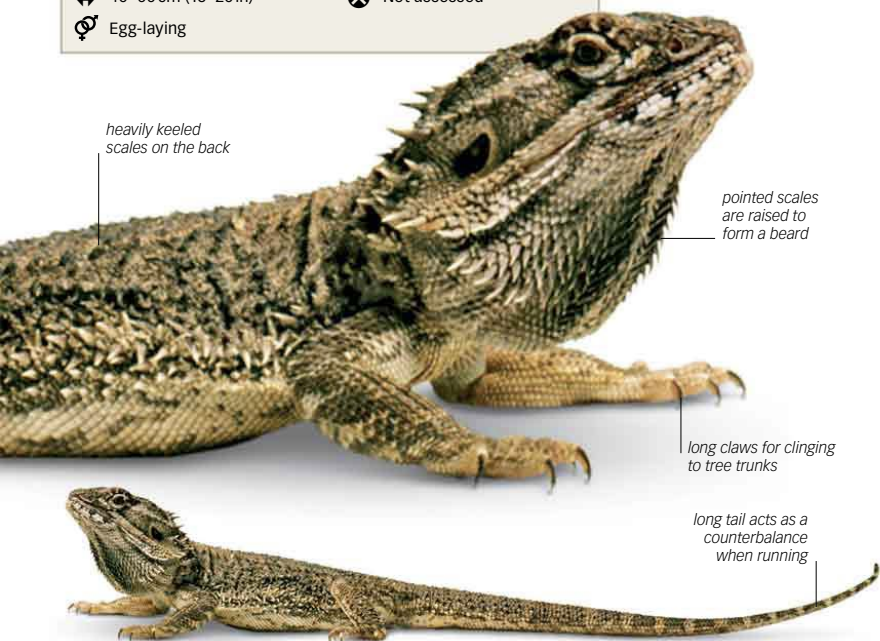


## PROFILE

-  Australia
-  Desert and dry woodland
-  40–50 cm (16–20 in)
-  Egg-laying
-  11–24
-  Diurnal
-  Not assessed

## Tamable lizard

A large and impressive lizard, the central bearded dragon can be tamed and adapts well to captivity. Its coloration is variable, ranging from brown to tan.



FULL VIEW

## SIMILAR SPECIES



**Rankin's dragon (*Pogona henrylawsoni*)** Smaller, lacks the "beard", and is often yellowish brown

*Pogona vitticeps*

## CENTRAL BEARDED DRAGON

**Bearded dragons owe their name** to a patch of spiny scales on their throat, which they erect to look like a beard when threatened. This "beard" is often black in mature males. They puff out their throat and flatten and tilt their body to appear larger than they are when responding to rivals. These animals live in dry, open spaces and typically perch on tree stumps or prominent rocks to survey the surrounding area for potential food or rivals. They eat small vertebrates, invertebrates, and plant material, including fruit and leaves.

One of the most familiar "pet" lizards, bearded dragons are bred in large numbers and are readily available through the pet trade. All these animals originate from a small number exported illegally from Australia in the 1970s. Captive specimens have a variety of patterns, as breeders strive to produce even more colourful varieties.

## PROFILE

-  N. Africa
-  Desert
-  34 cm (13½ in)
-  Egg-laying
-  8–20
-  Diurnal
-  Not assessed globally;  
Near Threatened on  
the IUCN Mediterranean  
Red List

## A useful weapon

Dab lizards have large spiny tails that act as fat stores as well as weapons – a blow from a large adult can draw blood in a human.



## SIMILAR SPECIES



**North African spiny-tailed lizard (*Uromastix acanthinura*)** Large species with a heavily armoured tail



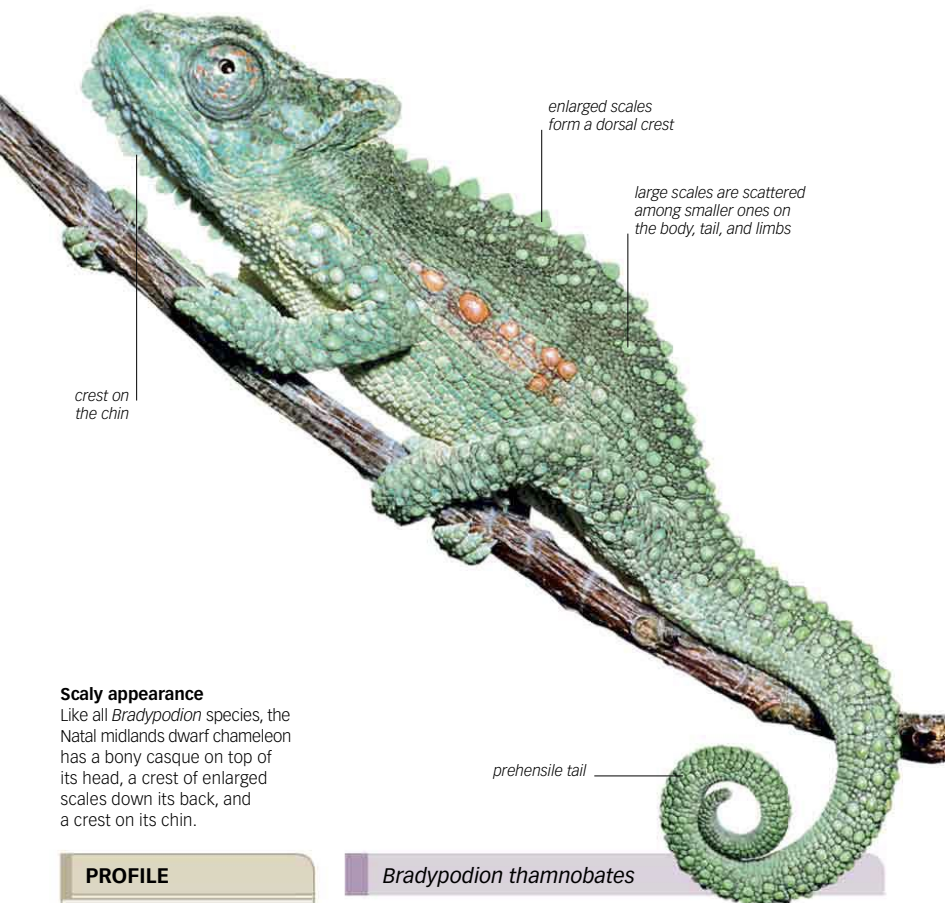
**Ocellated spiny-tailed lizard (*Uromastix ocellata*)** Also known as the eyed dab lizard due to the row of eye spots, or ocelli, along its flanks

*Uromastix geyri*

## GEYR'S SPINY-TAILED LIZARD

**Spiny-tailed lizards are also called** mastigures or dab lizards. They are more slender than some species, but have the typical broad head, blunt snout, and spiny tail common to all dab lizards. They live in a large network of burrows on rocky slopes and hillsides. If chased into a burrow, the lizard inflates its body and uses the tail to block the access.

The spiny-tailed lizard's period of activity depends on the temperature, and therefore the time of year. In the summer, it is active for most of the day, but in spring and autumn it may only be active for an hour or two in the afternoon. It does not emerge at all in winter, relying instead on the fat stored in its tail. It forages over long distances to find food, which often consists of dry bark and twigs. Only after rain does it have the opportunity to feed on green leaves and flowers, and obtains all the water it needs from its food source and from absorbing moisture from the damp soil or sand.



### Scaly appearance

Like all *Bradypodion* species, the Natal midlands dwarf chameleon has a bony casque on top of its head, a crest of enlarged scales down its back, and a crest on its chin.

### PROFILE

-  S. Africa
-  Forest, shrubs, and grassland
-  Up to 17 cm (6½ in)
-  Live-bearing
-  2–26
-  Diurnal
-  Near Threatened

*Bradypodion thamnobates*


## NATAL MIDLANDS DWARF CHAMELEON


**This species belongs to** a group of 17 small, live-bearing chameleons from southern Africa, all of which can change colour rapidly according to their mood. This makes identification difficult unless the locality is known, although the Natal midlands dwarf chameleon has a higher casque than most other species.


The dwarf chameleon normally lives in the forest canopy but can also be found in bushes alongside roads and in gardens. If approached, it tries to hide by moving around to the far side of the twig or branch on which it may be resting. However, if cornered, it flattens its body and presents the largest surface to its enemy, intensifying its colours at the same time. The female gives birth to litters of very small young at the end of winter and in early spring, when there are plenty of insects available. The species is restricted to small areas of protected forest and its future is uncertain. It has been kept and bred in captivity.

## PROFILE

 N. Madagascar


 Rainforest

 2.5–3.5 cm (1–1½ in)

 Egg-laying

 1–3

 Diurnal

 Vulnerable

## Perfect miniature

This minute chameleon has a distinctive flat head with a short, slightly upturned snout. With its dull brown coloration, it is perfectly camouflaged in the rainforests of Madagascar.

body is without crests  
or colour pattern

dark and light lines  
radiate from the eyes



## SIMILAR SPECIES

*Brookesia minima*

## MINUTE LEAF CHAMELEON

The minute leaf chameleon is often considered to be the world's smallest chameleon and one of the smallest reptiles. There are, however, several contenders, including a new species of *Brookesia* that was only discovered in 2012 and may be marginally smaller; *Brookesia micra* may be less than 3 cm (1¼ in) long. Nevertheless, the minute leaf chameleon is an extremely tiny reptile that will sit comfortably on a matchstick.

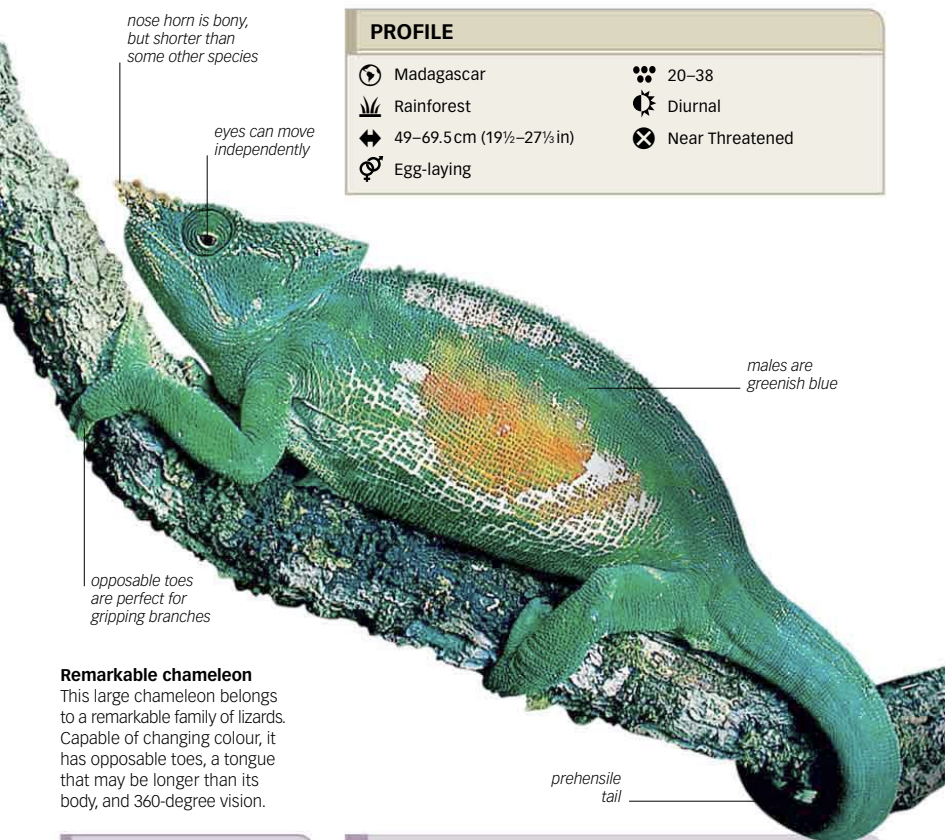
Although it lacks the ability to change colour, this species is superbly camouflaged, blending in with the leaf litter where it forages for small insects. It rarely climbs, and if discovered, plays dead by freezing and falling over on to its side. During the breeding season, males ride on the back of females, which are slightly larger, until they are ready to mate. Females lay small clutches of eggs in damp places. Each egg is about the size of a grain of rice, and the hatchlings measure about 1.5 cm (½ in) in length.



**Brown leaf chameleon**  
(*Brookesia supraciliaris*)

One of the larger *Brookesia* species, distinguished by small pointed projections over its eyes that look like horns





## PROFILE

📍 Madagascar	👥 20–38
🌿 Rainforest	☀️ Diurnal
📏 49–69.5 cm (19½–27½ in)	⚠️ Near Threatened
🥚 Egg-laying	

## Remarkable chameleon

This large chameleon belongs to a remarkable family of lizards. Capable of changing colour, it has opposable toes, a tongue that may be longer than its body, and 360-degree vision.

## SIMILAR SPECIES



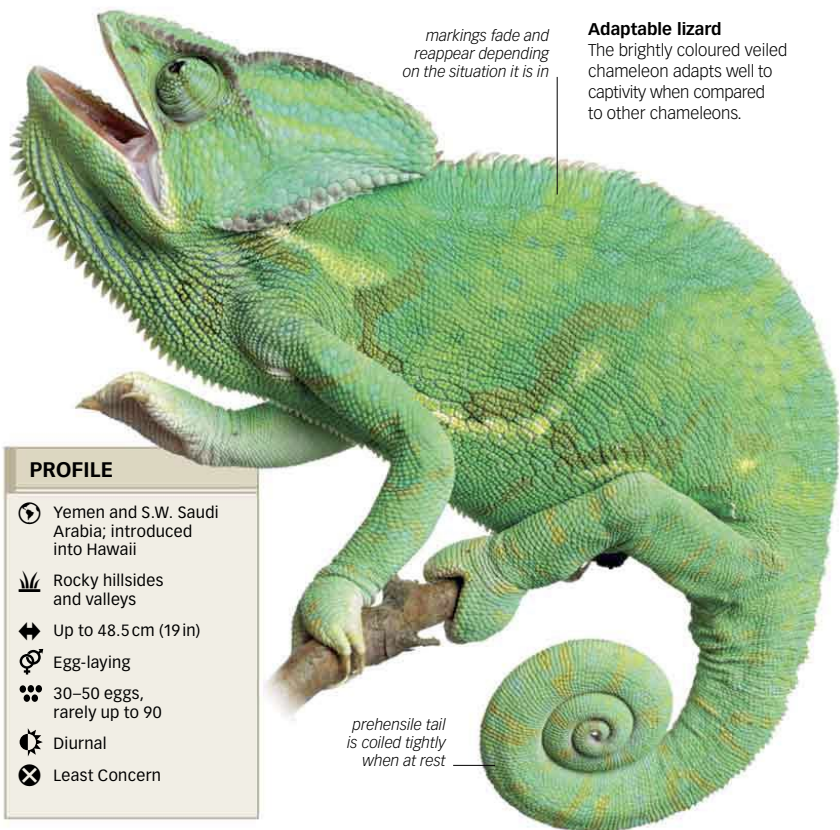
**Warty chameleon (*Furcifer verrucosus*)** Slightly smaller, with a dorsal crest and randomly scattered larger scales over its flanks

*Calumma parsonii*







## PARSON'S CHAMELEON

**A distinctive lizard**, Parson's chameleon is usually regarded as the world's largest chameleon (Oustalet's chameleon may be slightly longer, but it is more slender). Males have a pair of knobby, bony projections on their snout. There is some variation in the colour; males are normally a shade of greenish blue, although some forms are light yellow. Females are usually green with yellow around their eyes, and juveniles are brown. This is a rainforest species, but it occurs in low densities and is rarely seen. It is also found in marginal habitats, such as gardens and along tracks on the edge of rainforests, where it is more conspicuous. Males are territorial and the same individual can be found in or near the same place every day, usually clinging to a medium-sized branch or vine 2–4 m (6–13 ft) from the ground.

Females lay their eggs in holes about 30 cm (12 in) deep and the eggs take more than a year to hatch. This species lives for at least six years – an unusually long time for a chameleon.



### PROFILE

-  Yemen and S.W. Saudi Arabia; introduced into Hawaii
-  Rocky hillsides and valleys
-  Up to 48.5 cm (19 in)
-  Egg-laying
-  30–50 eggs, rarely up to 90
-  Diurnal
-  Least Concern

### SIMILAR SPECIES



**Mediterranean chameleon**

**(*Chamaeleo chamaeleon*)**

The only native European species; favours dry, scrubby areas and lives mostly in bushes in orchards, plantations, and olive groves

*Chamaeleo calyptratus*

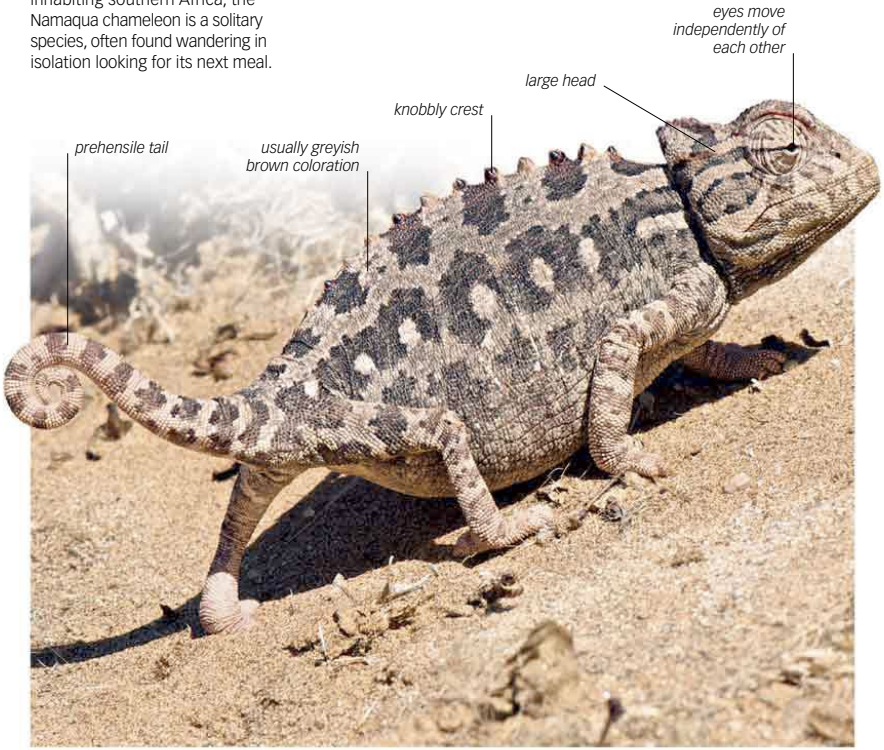
## VEILED CHAMELEON

**This species is easily recognized** by the high helmet-like structure on top of its head, known as a casque. This is much higher in males than in females. The veiled chameleon's body is extremely flattened from side to side and its markings usually consist of alternating broad bands of tan and bluish green. It is found in the extreme southwestern tip of the Arabian Peninsula, which is seasonally humid owing to onshore winds from the Indian Ocean. The veiled chameleon lives among acacia scrub, wooded watercourses, olive groves, and farms. It preys on insects and small vertebrates, and is probably the only chameleon that eats vegetable material too, especially flowers.

Females have a shorter lifespan than males as they quickly exhaust themselves through repeated egg-laying. They can lay up to three clutches in a single year, burying them in moist sand or soil. The eggs hatch after about six months and the hatchlings are pale green in colour.

**Solitary wanderer**

One of the largest chameleons inhabiting southern Africa, the Namaqua chameleon is a solitary species, often found wandering in isolation looking for its next meal.

**PROFILE**

-  S. Africa
-  Desert and semi-arid areas
-  Up to 28 cm (11 in)
-  Egg-laying
-  6–22
-  Diurnal
-  Least Concern

*Chamaeleo namaquensis*


## NAMAQUA CHAMELEON




**Although this large chameleon** has all the typical adaptations for an arboreal way of life, such as a prehensile tail, fused pincer-like digits, and a leaf-shaped body, it rarely has the opportunity to climb. It lives in the gravelly plains that form between the wind-blown dunes in the Namib Desert and in the South African Karoo. It has to cope with extremes of temperatures, which can exceed 60°C (140°F) in the day and drop below freezing at night, and it does this by changing colour from light to dark and orienting its body towards the sun when it wants to warm up.

A voracious hunter of tenebrionid beetles, the Namaqua chameleon also eats small lizards, snakes, and occasionally plants. It probably never drinks water, obtaining all the moisture it needs from its food and from the dew that condenses on its body and is channelled towards its mouth. Although common in places, its numbers are reducing due to recreational off-road vehicles.



## PROFILE

-  E. Africa (Kenya and Tanzania)
-  Lowland forest
-  8–9 cm (3¼–3½ in)
-  Egg-laying

-  6–10
-  Diurnal
-  Not assessed

## Mimicking nature

Although the female (shown here) has a less obvious tuft on her chin and a slightly smaller tail, both sexes have the same camouflage coloration.

"beard" is barely visible in females

pincer-like feet for climbing

short tail



## SIMILAR SPECIES

*Rieppeleon brevicaudatus*



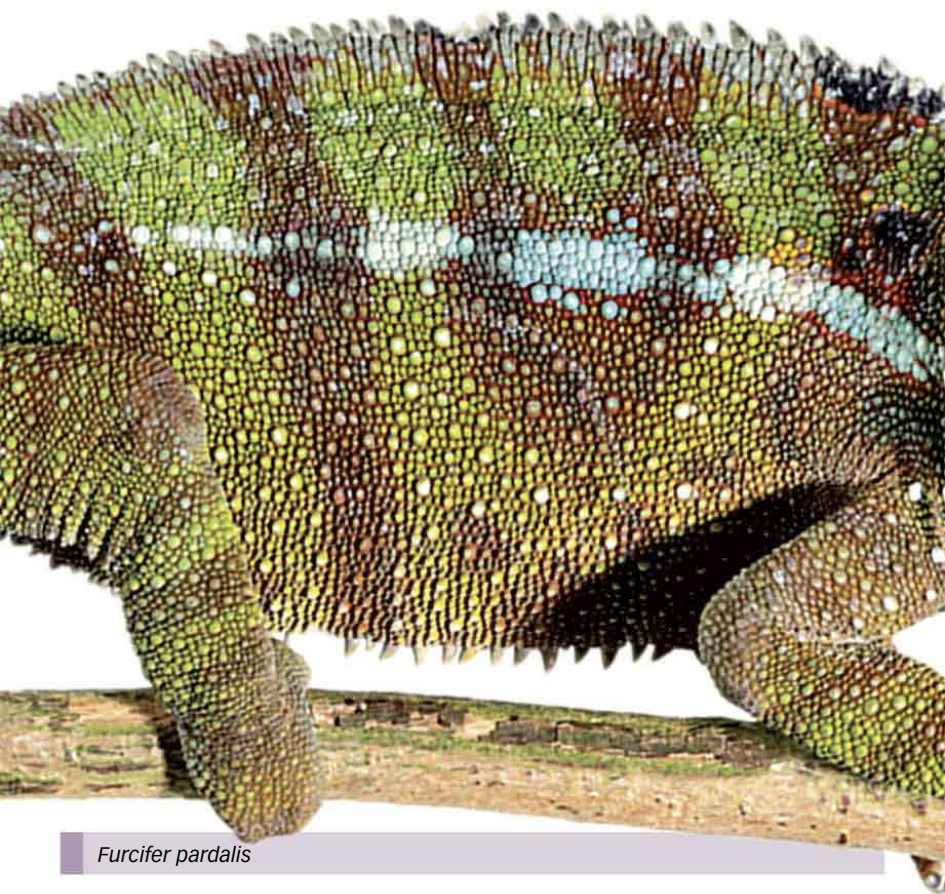
**Cameroon stump-tail chameleon (*Rhampoleon spectrum*)** Spends much of its time on the forest floor, among leaf litter; climbs up into low branches to sleep at night and to avoid predation

## BEARDED PYGMY CHAMELEON

**These short, stout-bodied chameleons** get their common name from a small tuft of elongated scales on their chin. Their bodies are laterally compressed and they have a faint stripe down their sides. Their ability to change colour is limited, although their markings may become bolder in response to a predator or a rival male. They will also turn sideways to present the largest possible area to their rival. If they are grasped, they may vibrate their body while emitting a low buzzing sound.

Bearded pygmy chameleons perch in low bushes and shrubs, often less than 50 cm (20 in) from the ground, and during the dry season aestivate under rocks or dead vegetation. They feed on small invertebrates, and are in turn preyed upon by snakes and large frogs. During the breeding season, females bury their eggs in shallow pits in the soil, but further information about their breeding habits is lacking.



*Furcifer pardalis*

## PANTHER CHAMELEON

**This large and colourful** chameleon is found in a variety of habitats throughout northern Madagascar. It is associated with disturbed forests and can be found in bushes, hedges, plantations, and gardens, as well as primary rainforests.

Males are larger than females and have a big bony appendage on their snouts. It is, however, impossible to describe their coloration, as they range from blue to green, or orange. To some extent, the coloration varies with locality, but there is some variation even within colonies; individuals can also change colour in minutes. Males are more colourful than females, especially when interacting with each other. Females change colour when they are carrying eggs, turning orange or brick-red with dark markings. The males

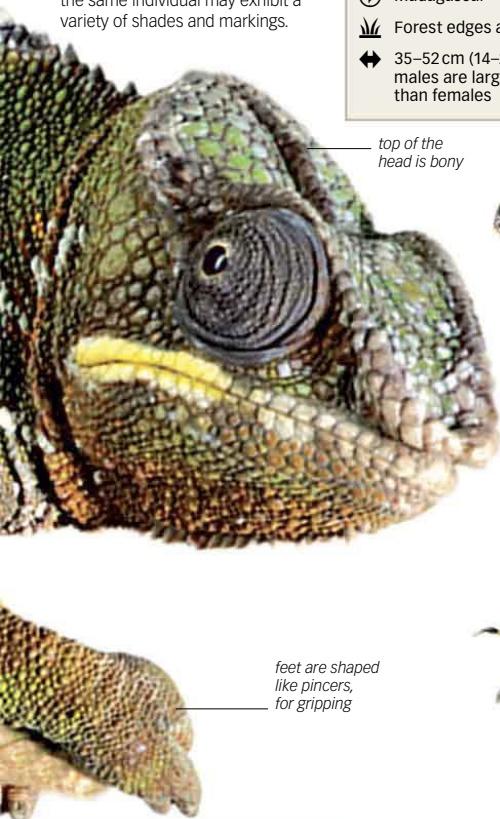
are extremely territorial and fights often break out if their territorial displays do not have the desired effect, sometimes resulting in injuries.

Courtship among panther chameleons is aggressive, with the male biting the female and pinning her down so that he can mate. The female lays her eggs about five weeks after mating, burying them in a shallow nest in moist soil. The eggs can take more than a year to hatch, but the young grow quickly and reach sexual maturity in less than a year.

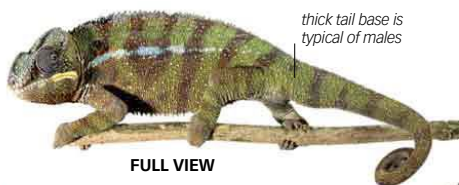
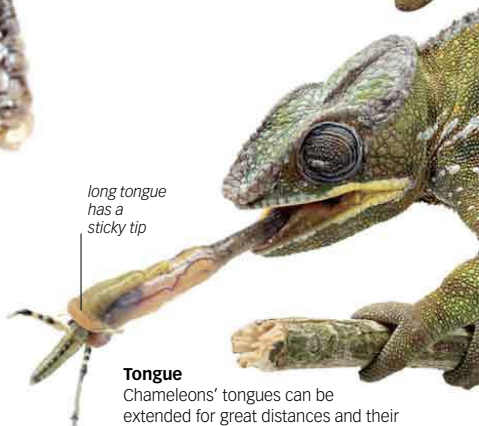
Panther chameleons are popular pets, and those from certain localities, such as Nosy Be, an island off the northwest coast Madagascar, where they tend to be most colourful, are eagerly sought.

**Variable shades**

Panther chameleons may be shades of green, blue, or orange; the same individual may exhibit a variety of shades and markings.

**PROFILE**

- |  |                 |
|--|-----------------|
| 📍 Madagascar   | 🥚 Egg-laying    |
| 🌳 Forest edges and parks                               | 👥 12–46         |
| ↔️ 35–52 cm (14–20½ in), males are larger than females | 🌞 Diurnal       |
|  | ⊗ Least Concern |

**FULL VIEW****Tongue**

Chameleons' tongues can be extended for great distances and their sticky, muscular tips help trap insects.

**BEHAVIOUR**

Panther chameleons are active during the day and sometimes can be seen walking across open ground. Most of their time, however, is spent among the branches of bushes and low trees, on the look out for insect food. At night, they cling to thin branches with the tail coiled like a watch-spring, and sleep.

**Threatening display**

This chameleon has been disturbed and has puffed out its throat in a threatening posture.

**Eye**

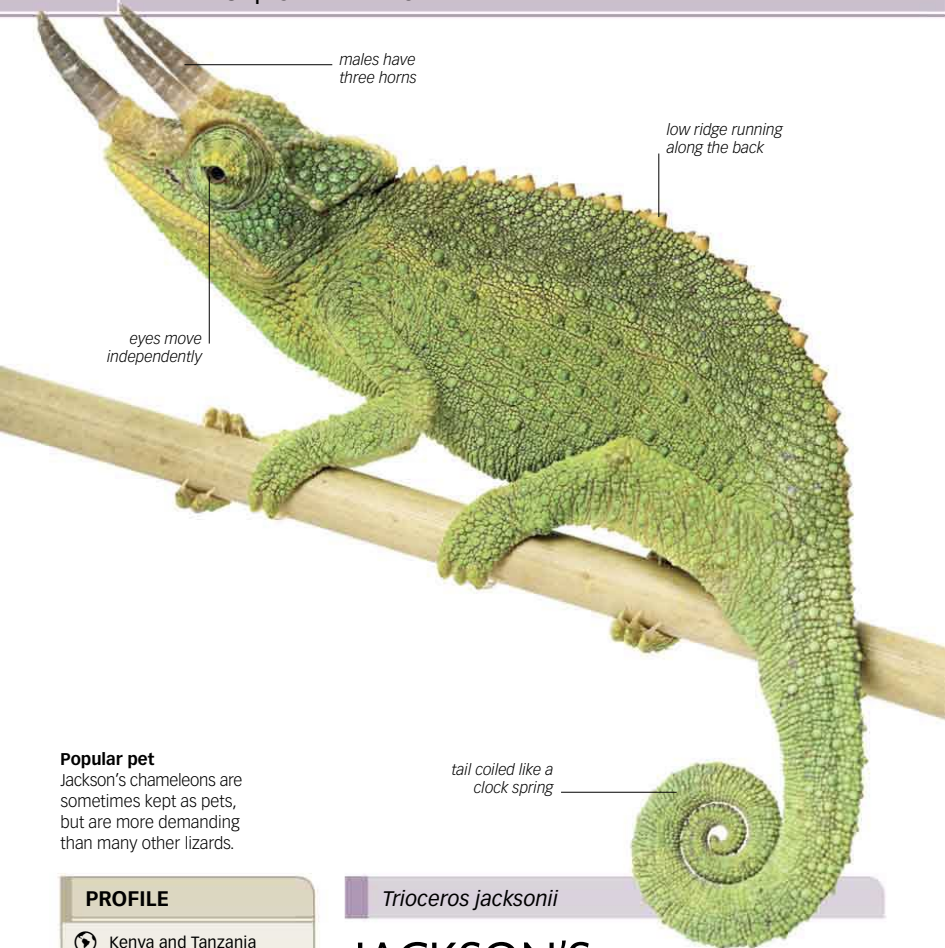
All chameleons can move each eye independently of the other.

**Prehensile tail**

The chameleon's tail, adapted to be able to grasp or hold objects, acts as a fifth limb when climbing.





**Clawed feet**

Chameleons' toes are equipped with short claws to improve their grip.

**Popular pet**

Jackson's chameleons are sometimes kept as pets, but are more demanding than many other lizards.

**PROFILE**

-  Kenya and Tanzania
-  Highland forests
-  20–30 cm (8–12 in)
-  Live-bearing
-  8–52
-  Diurnal
-  Not assessed

*Trioceros jacksonii*

## JACKSON'S CHAMELEON

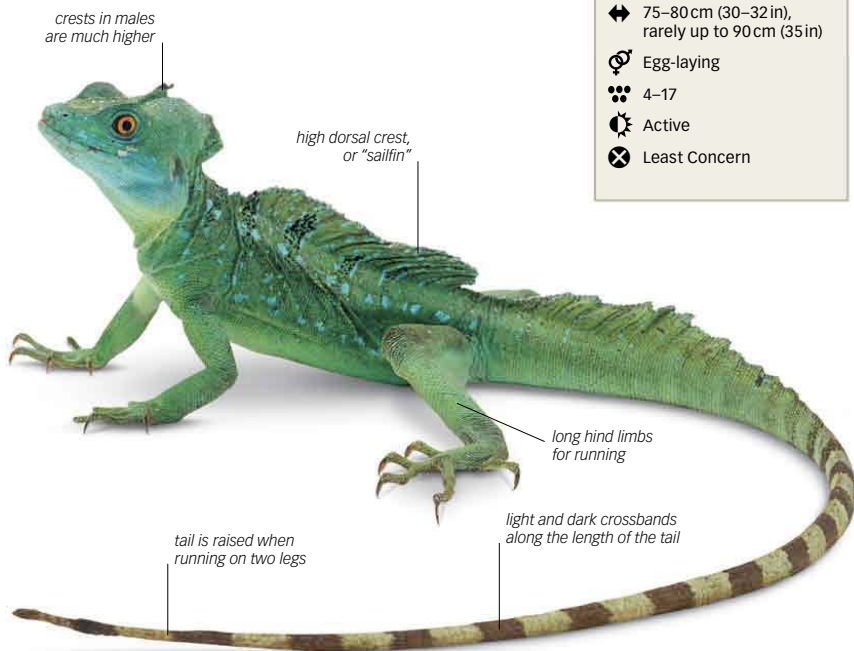
**Jackson's chameleons** are easily identified by the three horns on their head, although these are only present in the male; females have enlarged pointed scales on their head, in place of the horns. Males are highly territorial and return to the same perch to sleep every night. They use their horns to dislodge their rival from its perch during a territorial combat. There is variation in colour between populations and three subspecies are recognized – all found on isolated mountain ranges separated by savanna. They adapt well to human encroachment and are even found in hedges in Nairobi, Kenya, as well as on farms and plantations.

Females usually time the birth of their litter to coincide with wet or humid weather when there is plenty of small prey available. The young are born without horns and grow quickly, reaching sexual maturity in nine months.



**Blue spots**

Abundant in the tropical rainforests of Central America, mature male green basilisks (shown here) have distinctive bluish spots against a brilliant green background.

**PROFILE**

- Central America
- Rainforests bordering rivers and streams
- 75–80 cm (30–32 in), rarely up to 90 cm (35 in)
- Egg-laying
- 4–17
- Active
- Least Concern

**SIMILAR SPECIES**

**Brown basilisk (*Basiliscus vittatus*)** Similar lifestyle to the green basilisk; has a stripe along the side of its body

*Basiliscus plumifrons***GREEN BASILISK**

**This species is bright green** with orange eyes. Males have high crests on their head, back, and tail, separated from each other by small gaps. Females and juveniles share the same coloration, but have lower crests.








Green basilisks are usually seen basking on stems and branches overhanging water. If they are disturbed, they dive into the water and may escape by running rapidly across the surface, using only their long hind limbs. The large feet and fringes on their toes make this possible, but juveniles, being lighter, are more adept than adults. Basilisks of all species are sometimes known as Jesus Christ lizards, owing to their ability to run on water. They are also good swimmers and may dive to the bottom to escape predators. Juveniles eat insects, but as they grow they switch to a more herbivorous diet, eating seeds, fruit, and leaves. Breeding takes place in the rainy season, and females bury their eggs in a patch of open ground near water. They take 7–10 weeks to hatch.

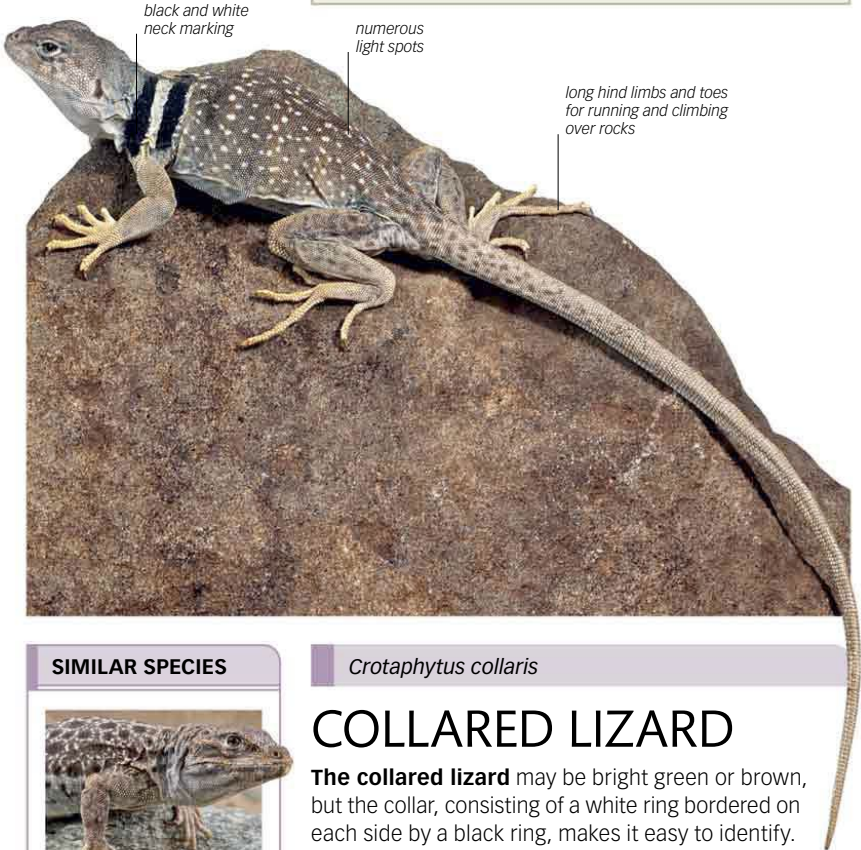


**Sexual dimorphism**

There is a strong colour variation between the sexes; females of this large and active species are usually brown, whereas males are often bright green.

**PROFILE**

- |   |   |
|---|---|
|  North America |  1–13          |
|  Rocky desert  |  Diurnal       |
|  30 cm (12 in) |  Least Concern |
|  Egg-laying    |   |



black and white  
neck marking

numerous  
light spots

long hind limbs and toes  
for running and climbing  
over rocks

**SIMILAR SPECIES**

**Long-nosed leopard lizard**  
(*Gambelia wislizenii*)

Occurs in the same region, but prefers flat, sandy, or gravelly habitats with sparse bushes and fewer rocks


*Crotaphytus collaris*


**COLLARED LIZARD**


**The collared lizard** may be bright green or brown, but the collar, consisting of a white ring bordered on each side by a black ring, makes it easy to identify. Females also develop bright red or orange spots and bars on the sides of their body and neck when carrying their eggs. Collared lizards are armed with powerful jaws for crushing their prey of large invertebrates and small lizards. They also eat berries and leaves.


Males take up positions on prominent rocks to spot prey and to display to rival males or potential mates. They make themselves conspicuous by standing stiff-legged while bobbing up and down rapidly. They even display to approaching humans before taking off at great speed, leaping from rock to rock and switching to bipedal locomotion as they pick up speed. They rarely take cover, relying instead on their speed and agility to escape.

## PROFILE

 S.E. North America


 Open woodland, parks, and gardens

 15–20 cm (6–8 in)

 Egg-laying

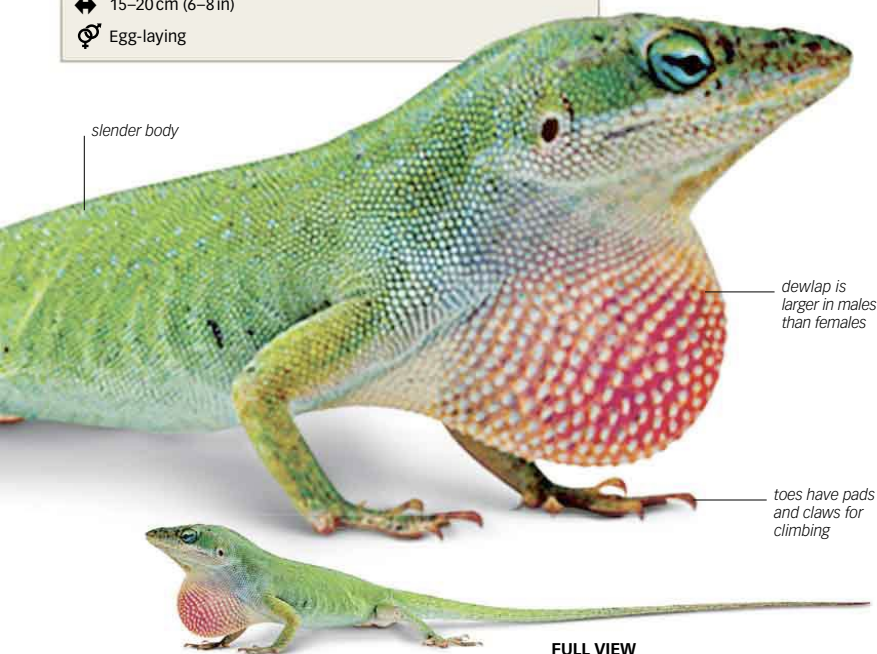
 1–2

 Diurnal

 Least Concern

## Colour change

Green anoles can change colour from bright green to brown, depending on factors such as temperature and their mood.



## SIMILAR SPECIES

**Brown anole (*Anolis sagrei*)**

Brown, with paler markings; native to Cuba and the Bahamas, but widely introduced elsewhere

*Anolis carolinensis*

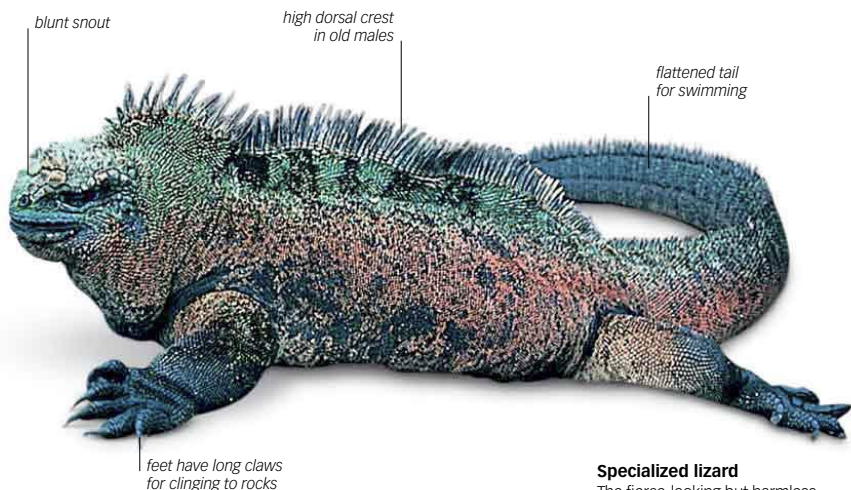
## GREEN ANOLE

**These lizards can also be pale brown** and have the ability to change colour. As a result, they are sometimes known as American “chameleons”. Green anoles have narrow heads, long limbs, and long tails. Males have large pink dewlaps, which they flick out as a signal to females or rival males. Anoles have expanded toe pads that help them cling to smooth surfaces – a characteristic similar to, but not as effective as, some geckos.

Green anoles are common around human dwellings – in garden shrubs and on the sides of buildings and fences. However, in parts of Florida, USA, where the introduced brown anole (*A. sagrei*) has become established, the number of green anoles has fallen, probably due to their inability to compete with the more adaptable species. Green anoles have an extended breeding season, with females laying one egg (sometimes two) at weekly intervals throughout summer.

## PROFILE

- |   |  |
|---|--|
|  Galapagos Islands    |  2–3        |
|  Coastal rocks        |  Diurnal    |
|  0.8–1.7 m (2½–5½ ft) |  Vulnerable |
|  Egg-laying           |  |

**Specialized lizard**

The fierce-looking but harmless marine iguanas are highly specialized lizards, adapted to life on barren tropical islands.

## SIMILAR SPECIES

**Black spiny-tailed iguana**  
**(*Ctenosaura similis*)**

Thought to be similar to the ancestors of the marine iguana; found in Central America

**Galapagos land iguana**  
**(*Conolophus subcristatus*)**

Feeds on plants, especially the fruit and pads of the prickly pear

*Amblyrhynchus cristatus*

## MARINE IGUANA

**This is the only marine lizard** in the world. It only eats sea lettuce, swimming out from the shore to graze underwater and returning to bask on volcanic rocks to regain heat lost to the cold water. As with the Galapagos tortoises (p.218) there is some variation, and each island has its own subspecies. For example, the iguanas on Genovesa are small and black, whereas those on Española are large and have red blotches.

Marine iguanas have very blunt snouts that enable them to crop the algae close to rocks. Their nostrils have glands for excreting excess salt in the form of concentrated salt water, which they snort out repeatedly while basking. In the breeding season, males guard harems of females and fight off other males by head-butting and biting. Females lay their eggs in burrows in volcanic sand and these hatch after about 95 days. Vulnerable to predation, the hatchlings hide in rock crevices, and take many years to reach breeding size.

**Agile herbivore**

Among the largest lizards found in South and Central America, the green iguana is a robust, agile herbivore.

plate-like scales at the base of the lower jaw in both sexes

spines extend from the head to the tip of the tail

**PROFILE**

-  South and Central America
-  Rainforests near rivers
-  1.5–2 m (5–6½ ft)
-  Egg-laying
-  20–40, rarely up to 70
-  Diurnal
-  Not assessed

**SIMILAR SPECIES**

**Fiji banded iguana**  
(*Brachylophus fasciatus*)

From the same family; lives on remote Pacific islands

*Iguana iguana***GREEN IGUANA**

**Depending on their distribution**, green iguanas may also be blue-green or orange in colour. Old males have large dewlaps and high dorsal crests of long needle-shaped scales. Females also have crests but they are not as well developed. These iguanas live in large rainforest trees bordering rivers. Dominant males occupy the uppermost branches and ward off rival males by bobbing their heads in short bursts, showing their brightly coloured dewlap. If in danger, they often jump into the water and swim away using their tail to propel themselves.


Females lay eggs in pits in clearings near river banks, with several females nesting in the same pit sometimes. The eggs take 2–4 months to hatch, and the hatchlings often stay together for the first few weeks of their lives.


**Orange form**


During the breeding season, male iguanas from some regions change their colour to bright orange.




## PROFILE

 S.W. North America


 Rocky desert

 50 cm (20 in)

 Egg-laying

 5–16

 Diurnal

 Least Concern

## Flat-bodied lizard

Well adapted to its harsh environment, the common chuckwalla is a large flat-bodied lizard with a blunt-tipped tail that is much wider at the base.

banded pattern on the tail and body is typical of juveniles and young females

wide, flat body



## SIMILAR SPECIES



**Piebald chuckwalla**  
(*Sauromalus varius*)

Restricted to two small islands in the Gulf of California; considered to be endangered because of its small range

*Sauromalus ater*

## COMMON CHUCKWALLA

**The common chuckwalla** is covered with small smooth scales, and has folds on its chin, throat, and flanks. Juveniles are more brightly marked than adults and have bold crossbands. A crevice-dweller, the lizard basks near its shelter. If disturbed, it will quietly slip away and wedge itself into the crevice, often inflating its body with air to entrench itself.

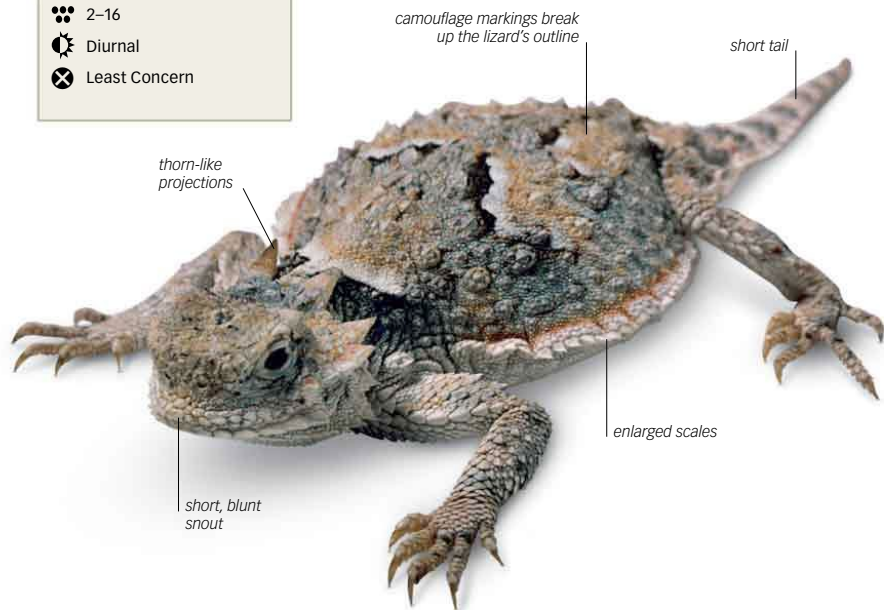
These lizards live in colonies with a dominant male, a number of smaller subordinate males, and several females. The dominant male maintains order by bobbing his head and gaping his mouth. Common chuckwallas eat desert plants, including their flowers and fruit, and supplement their diet with dry grass. They store fat in their thick tail to survive periods of drought or cold weather when they cannot forage for food. In suitable habitats, almost every pile of rock or outcrop has a resident colony of common chuckwallas, but they are shy and difficult to approach.

## PROFILE

-  S.W. North America
-  Sandy desert
-  6.5–9.5 cm (2½–3¾ in)
-  Egg-laying
-  2–16
-  Diurnal
-  Least Concern

## Blending in

Desert horned lizards vary in colour – from mottled greys to browns and yellows – enabling them to blend in with their habitat.



## SIMILAR SPECIES

longer spines  
behind the head



**Texas horned lizard**  
(*Phrynosoma cornutum*)

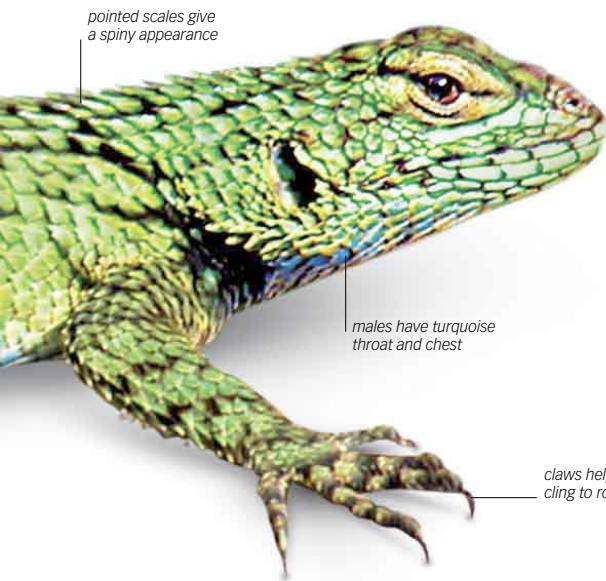
Slightly larger species; has stripes radiating from each eye

*Phrynosoma platyrhinos*

## DESERT HORNED LIZARD

**Often referred to as “horny toads”** because of their squat shape, these lizards are specialized desert dwellers with a distinctive outline. Their bodies are almost circular and their heads have a crest of thorn-like spines pointing back over the neck. There is another row of enlarged scales around the rim of their body. They feed on small invertebrates, primarily ants, and wait beside ant trails, snapping up hundreds as they pass by. They parallel the Australian thorny devil (p.132) in habitat, diet, appearance, and behaviour – a case of convergent evolution.

These lizards rely heavily on camouflage as a means of defence. When threatened, they crouch on the ground and their flattened body casts almost no shadow. They may also shuffle down into sand or fine gravel with only their head visible. If discovery looks likely, they dart forward suddenly, run a short distance, and then crouch again. As a last resort, they may squirt blood from their eyes.

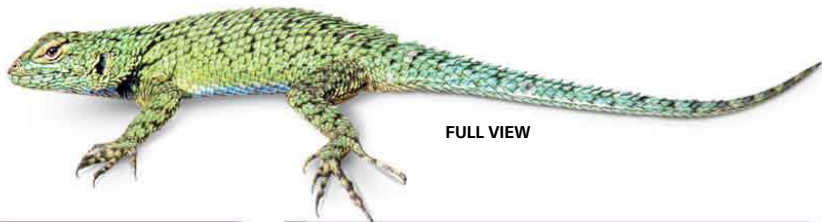


## PROFILE

- Central America
- Open fields, rocky outcrops, and gardens
- 13–19 cm (5–7½ in)
- Live-bearing
- 6–12
- Diurnal
- Least Concern

**Emerald lizard**

Distinctly emerald green in colour, spiny lizards often bask on rocks or other sunlit areas, but quickly run away if approached by predators.



## SIMILAR SPECIES

males have a patch of bright blue on their throats


**Western fence lizard**  
*(Sceloporus occidentalis)*

Not as brightly coloured as the green spiny lizard; occurs in western North America

hind toes have fringed scales


**Colorado desert fringe-toed lizard**  
*(Uma notata)*

Runs across loose sand at high speed, thanks to the specialized scales on its feet

*Sceloporus malachiticus*

# GREEN SPINY LIZARD

**Sometimes known as malachite swifts**, green spiny lizards have pointed, overlapping scales with raised tips that give them a spiny appearance. Males are exceptionally colourful, with a bright green back and turquoise chest. Females and juveniles, however, are less colourful. Males frequently bob their heads during territorial displays.

Green spiny lizards are very common in suitable habitats, where they can be seen basking on prominent objects such as rocks, tree stumps, and fence posts. They often rest head-down on vertical surfaces, and quickly run down to the ground to catch small insects, especially flies. These lizards are viviparous, unlike most members of the genus *Sceloporus*, which lay eggs. This may be a result of their distribution at higher altitudes, where the climate is cooler; the female retains the eggs inside her body and seeks out warmer places to bask, which helps speed up the development of the eggs.

## PROFILE

🌐 Countries bordering the Mediterranean; introduced elsewhere

🪨 Rocks, dry-stone walls, and buildings

↔ 10 cm (4 in)

🥚 Egg-laying

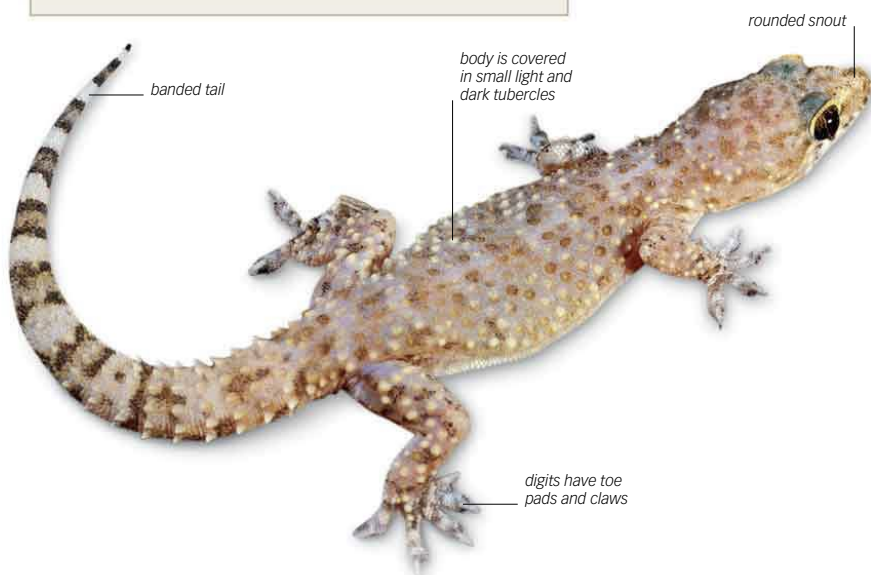
••• 2

🌙 Nocturnal

⊗ Least Concern

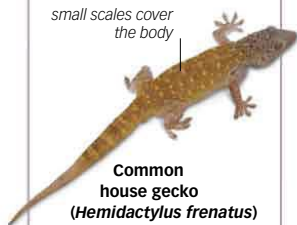
## Bumpy skin

The Turkish gecko's transparent-looking, sandy-pink skin is covered in small tubercles. In contrast to its body, its tail is patterned with crossbands.



## SIMILAR SPECIES

small scales cover the body



**Common house gecko**

**(*Hemidactylus frenatus*)**

Tropical counterpart, native to Southeast Asia, but has spread around the world

carrot-shaped tail



**Carrot-tail viper gecko**

**(*Hemidactylus imbricatus*)**  
Has a unique flattened tail covered with large overlapping scales; found in dry areas of Pakistan

*Hemidactylus turcicus*

## TURKISH GECKO

**This small, agile gecko** is most often seen around human dwellings or on dry-stone walls in the evening or at night. It hides under rocks during the day, usually clinging upside down to the underside; if the rock is turned, the lizard immediately runs to the other side so that it is always hidden underneath. The gecko often sits near lights, sometimes in groups of five or more, waiting for moths and other insects that are attracted there. It is most common in coastal areas and on small Mediterranean islands, and has been transported all over the world as a stowaway among produce.

Males are very territorial and communicate with a series of clicks and squeaks. Females lay several clutches of two hard-shelled eggs during the summer, usually hiding them in cracks or under rocks. The eggs hatch after 6–12 weeks, and the small hatchlings are translucent pink with banded tails.



**Warning display**

If cornered, the tokay gecko may open its mouth wide and exhibit its red tongue and black throat to warn a predator.

**PROFILE**

S.E. Asia



Rainforest and urban situations



20–35 cm (8–14 in)



Egg-laying

2

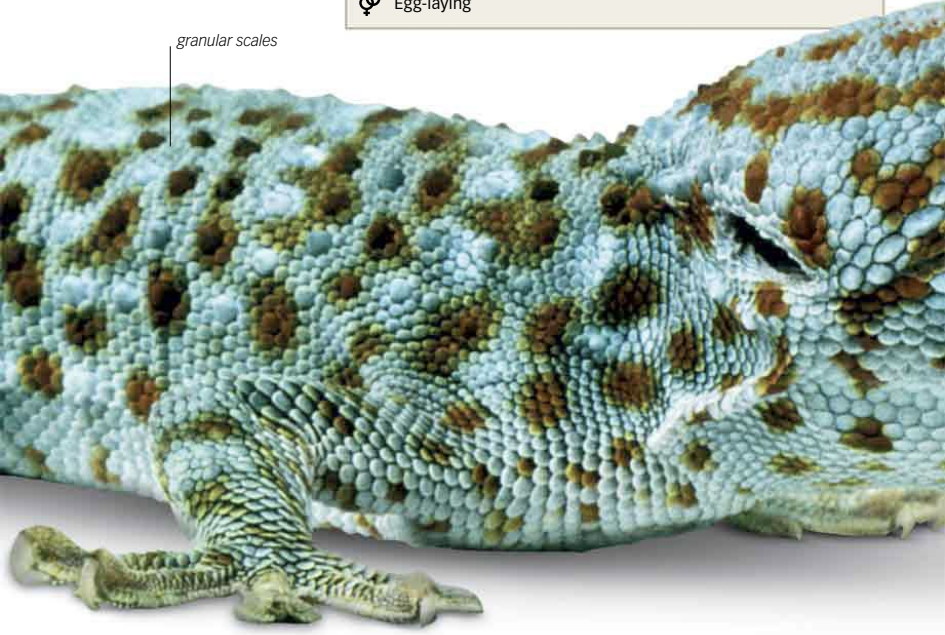


Nocturnal



Not assessed

granular scales

*Gekko gecko*

# TOKAY GECKO

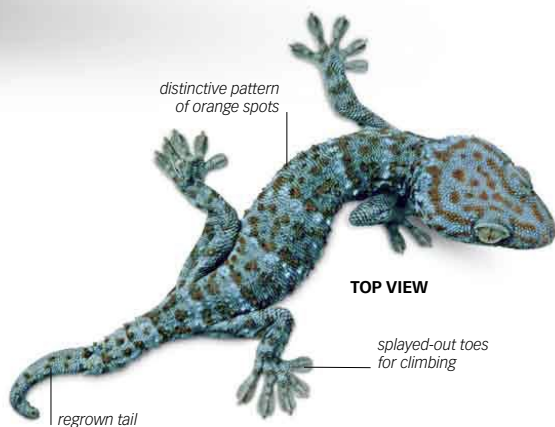
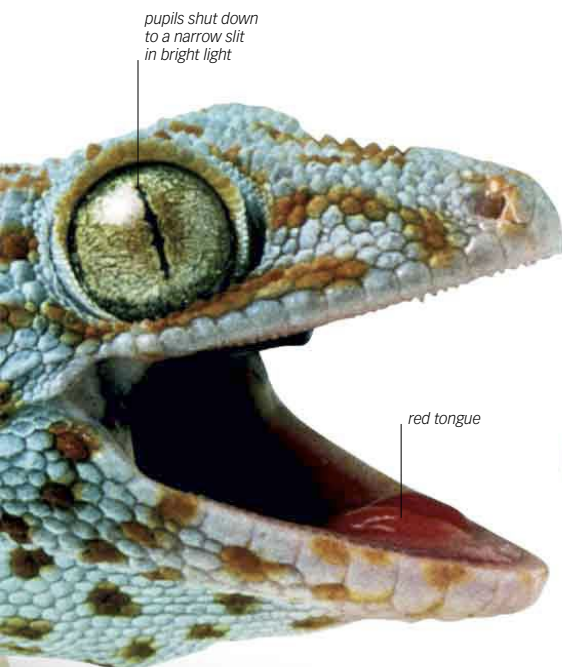
**One of the largest** Asian geckos, the tokay gecko is named for the loud and distinctive *to-kay* call with which it communicates with other members of its species. Its blue-grey body is heavily marked with striking orange and light blue spots. It has large eyes with vertical pupils; a characteristic common to nocturnal reptiles. Like most geckos, the tokay gecko lacks eyelids. Instead, it has a single transparent scale, or spectacle, covering each eye and this is shed along with the rest of its skin. Geckos keep their spectacles clean by using their tongues to wipe off drops of water or dust.

Like most climbing geckos, the tokay gecko has adhesive toe pads, which enable it to climb rock faces, tree trunks, and the walls of buildings. Each toe

pad is covered with thousands of fine bristles known as setae, with each seta further divided into hundreds of minute spoon-shaped structures called spatulae. The combined force produced by these sticky microscopic structures helps support the gecko's weight.

If threatened, the tokay gecko can be extremely aggressive and delivers a very hard and painful bite. It also discards its tail if grasped by a predator.

In recent years, the belief that the tokay gecko's body parts have healing properties have led to the gecko being in great demand. This has caused a drastic decline in its numbers, and the gecko is now protected in some places.



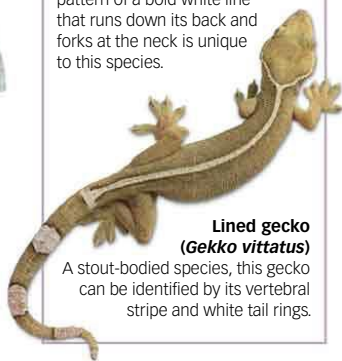
### Underside

The scales on the underside are smaller and arranged in a more regular pattern. They allow flexibility so that the body can expand when the gecko has fed heavily or if it is carrying eggs.



### SIMILAR SPECIES

Also known as the palm gecko, the lined gecko is closely related to the tokay gecko and lives in Indonesia, New Guinea, and neighbouring islands. The pattern of a bold white line that runs down its back and forks at the neck is unique to this species.

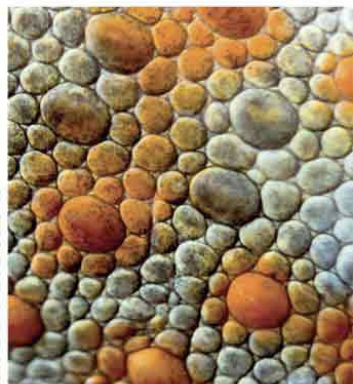


### Lined gecko (*Gekko vittatus*)

A stout-bodied species, this gecko can be identified by its vertebral stripe and white tail rings.

### Toe pads

As is the case with the majority of geckos, the tokay gecko has adhesive toe pads that enable it to cling to smooth surfaces.



### Skin

The scales on the dorsal surface are large and thick, and contain pigment cells that give the gecko its bright coloration.



### Small and slender

The back of this small, slender gecko is buff, with irregular markings; the flanks are darker brown. Hatchlings have more contrasting markings than adults.

*smooth skin  
lacks tubercles*

*dark line  
along the snout*

### PROFILE

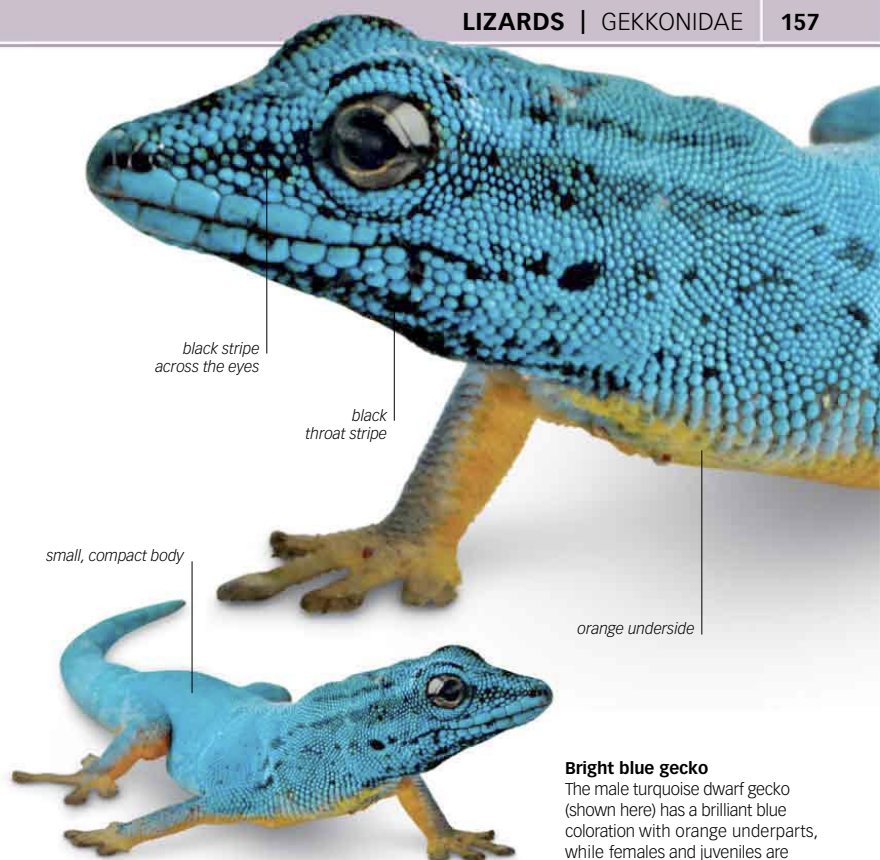
-  S.E. Asia; introduced elsewhere
-  Forest clearings, villages, and towns
-  10 cm (4 in), usually smaller
-  Egg-laying (parthenogenic)
-  1–2
-  Nocturnal
-  Not assessed

*Lepidodactylus lugubris*

## MOURNING GECKO

**The mourning gecko** is a parthenogenic, or female-only, species. No male geckos have been found and females begin to lay eggs as soon as they reach sexual maturity without needing to mate. In some colonies, females engage in false mating activity to stimulate each other to start developing eggs, but this is not essential and even females living in solitary confinement lay eggs regularly. They stick the eggs to rough surfaces – under bark and inside bamboo stems – and they hatch after about six weeks. All hatchlings are females and clones of their mother.

Parthenogenic species like the mourning gecko are easily introduced to new localities, as only a single female, or a single egg, is needed to establish a new colony. As a result, these geckos have spread to many other tropical parts of the world, including Australia, South America, and even the Galapagos Islands. Introduced colonies tend to be centred around ports and other coastal localities, whereas the species is found inland within its native range.



FULL VIEW

**Bright blue gecko**

The male turquoise dwarf gecko (shown here) has a brilliant blue coloration with orange underparts, while females and juveniles are mostly brown with a tinge of blue.

**PROFILE**

-  Tanzania
-  Forest
-  5.6 cm (2¼ in)
-  Egg-laying
-  1–2
-  Diurnal
-  Critically Endangered

*Lygodactylus williamsi*




## TURQUOISE DWARF GECKO

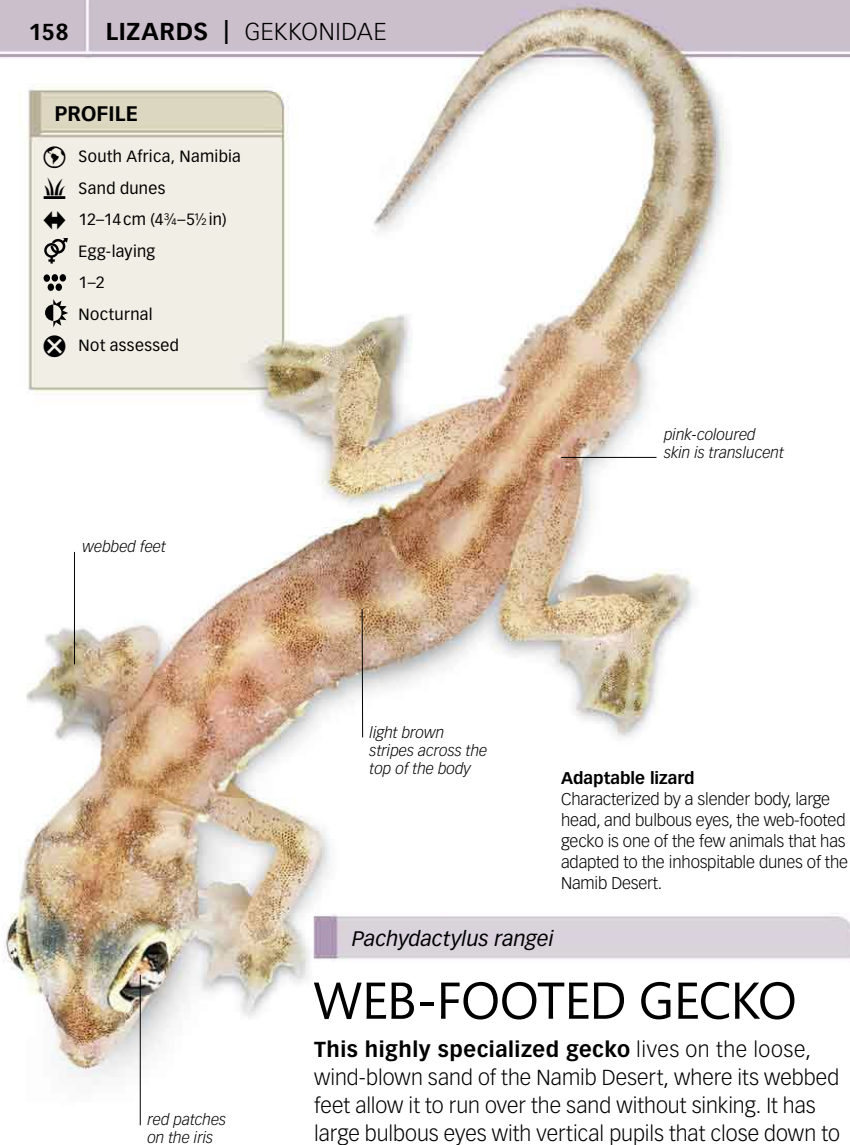
**Known as electric blue day geckos** in the pet trade, these small lizards are extremely colourful. They are most active in the morning and late afternoon, hunting among the long leaves of *Pandanus* trees (or screw pines) using their adhesive toe pads to cling to smooth, vertical surfaces. They feed on flies, spiders, and other small invertebrates. Females, who are less territorial than males, lay their eggs in crevices. The incubation period is about two months.

The turquoise dwarf gecko is restricted to the Kimboza Forest in Tanzania, and is at risk of extinction as the forests are cleared. Its habitat is further threatened by commercial reptile collectors cutting down trees to reach the crowns of the *Pandanus* trees where the geckos live. The species has been successfully bred in captivity and wild populations are now protected.



## PROFILE

-  South Africa, Namibia
-  Sand dunes
-  12–14 cm (4¾–5½ in)
-  Egg-laying
-  1–2
-  Nocturnal
-  Not assessed

**Adaptable lizard**

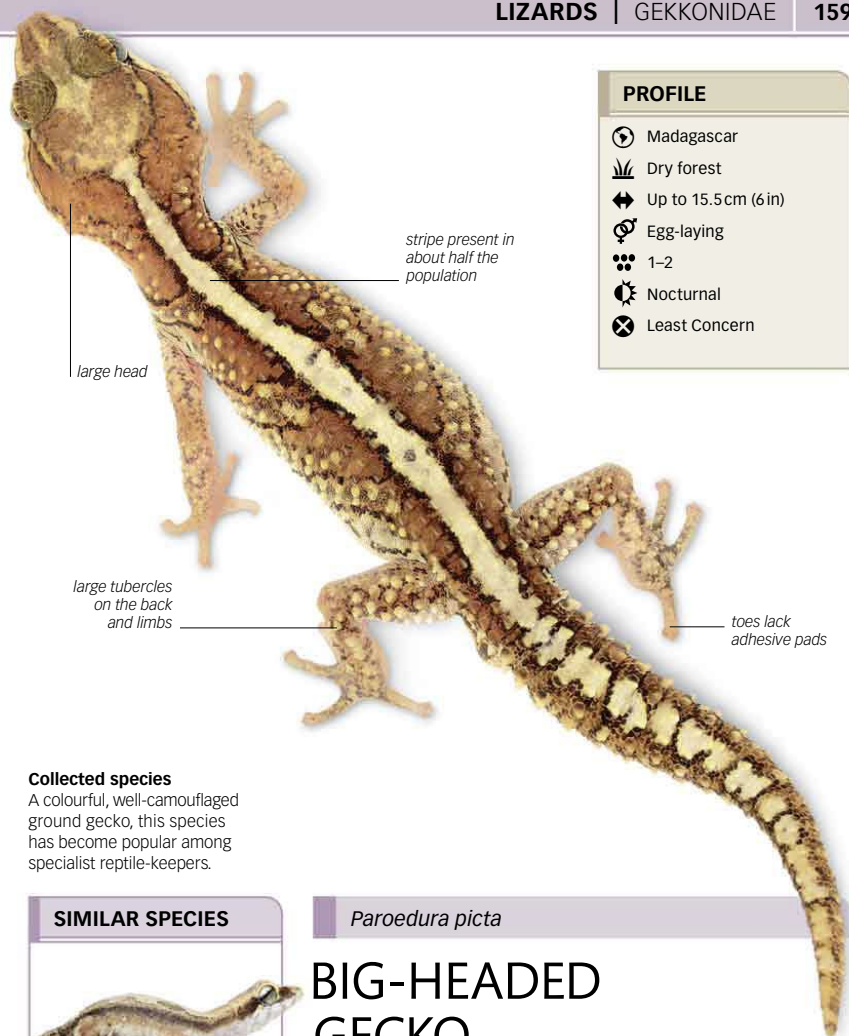
Characterized by a slender body, large head, and bulbous eyes, the web-footed gecko is one of the few animals that has adapted to the inhospitable dunes of the Namib Desert.

*Pachydactylus rangei*

## WEB-FOOTED GECKO

**This highly specialized gecko** lives on the loose, wind-blown sand of the Namib Desert, where its webbed feet allow it to run over the sand without sinking. It has large bulbous eyes with vertical pupils that close down to pinholes in bright light. Strictly nocturnal, it moves across the sand in search of small insects and spiders, and digs a long burrow in the side of a dune every morning in which to shelter from the heat; this is the only way the seemingly delicate gecko can survive in such a harsh environment. It obtains all the water it needs from its food and the desert fog that condenses on its scales.

Females lay two thin-shelled eggs in a burrow in the sand. These take about three months to hatch. Their main predators are owls and snakes, especially the sidewinding viper, *Bitis peringueyi*. When threatened, the gecko raises itself on stiffened legs to appear larger than it is.



## PROFILE

-  Madagascar
-  Dry forest
-  Up to 15.5 cm (6 in)
-  Egg-laying
-  1–2
-  Nocturnal
-  Least Concern

## Collected species

A colourful, well-camouflaged ground gecko, this species has become popular among specialist reptile-keepers.

## SIMILAR SPECIES



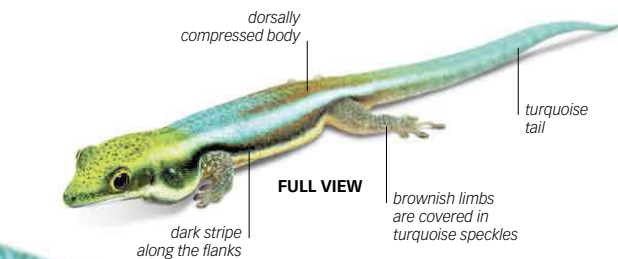
**Grandidier's gecko**  
(*Geckolepis typica*) Much smaller; lives on the forest floor and among coastal rocks

*Paroedura picta*

## BIG-HEADED GECKO

**The big-headed gecko** lives among fallen leaves and other debris in deciduous and spiny forests as well as thorn scrub. A nocturnal ground gecko, it does not climb and consequently does not have the enlarged toe pads common to most other geckos. This gecko is more common near the coast, and has been found living among rocks along the shoreline. It usually has four broad, rich brown bands crossing its body, and some individuals have a light stripe running down the centre of their back. Big-headed geckos eat invertebrates, tackling relatively large prey; their massive head and powerful jaws are well equipped to deal with even hard-bodied insects, such as beetles.

This is a very prolific species, and females lay a pair of eggs every eight to 10 days for several weeks after a single mating. The big-headed gecko is often bred in captivity and adapts well, although it sometimes bites.

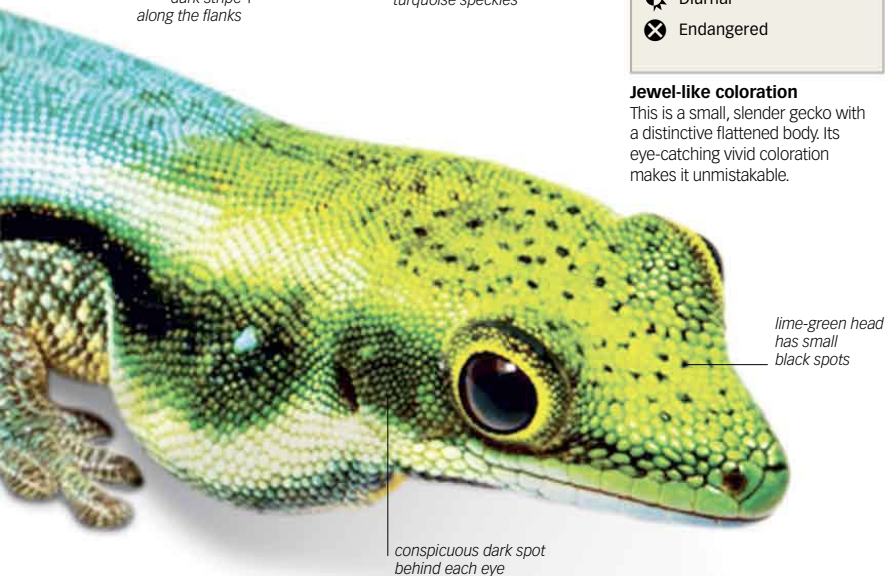


## PROFILE

- 📍 N. Madagascar
- 🌿 Rainforest
- 📏 9 cm (3½ in)
- 🥚 Egg-laying
- 👶 1–2
- 🌞 Diurnal
- ⚠️ Endangered

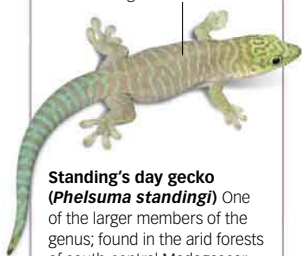
## Jewel-like coloration

This is a small, slender gecko with a distinctive flattened body. Its eye-catching vivid coloration makes it unmistakable.



## SIMILAR SPECIES

crossbars become more diffuse in older geckos



**Standing's day gecko**  
(*Phelsuma standingi*)

One of the larger members of the genus; found in the arid forests of south-central Madagascar

*Phelsuma klemmeri*

## KLEMMER'S DAY GECKO

**Whereas most day geckos are green**, this species is strikingly marked in turquoise and yellow, and is, therefore, also known as the neon day gecko. It has an extremely flattened body compared to most other geckos. Discovered in the 1990s, Klemmer's day gecko is only found in a small bamboo forest in northern Madagascar. It lives mostly on bamboo stems, and the striped pattern of the gecko serves to camouflage it when it is resting in its typical vertical position.

Males display to females with an unusual head-wagging movement. The females usually lay two eggs and, unlike many other *Phelsuma* species, they are not sticky. As she lays the eggs, she catches them between her hind feet, curling her tail around to provide additional protection. She holds the eggs in this position until they are dry and the shells become hard, before allowing them to fall into a crevice or a hollow section of a bamboo stem.

## PROFILE

-  Madagascar
-  Rainforests, plantations, and buildings
-  22–28 cm (9–11 in)
-  Egg-laying
-  1–2
-  Mostly diurnal
-  Least Concern

## Changing colours

The colour of the Madagascar day gecko may become even brighter after it has been basking in the sun.

reddish brown line from the eye to the snout

expanded toe pads for climbing

tail may be discarded

variable red markings on the back

FULL VIEW

## SIMILAR SPECIES

eyespot on the flank



## Peacock day gecko

(*Phelsuma quadriocellata*)

Smaller; has a pair of distinctive blue-bordered eyespots behind its front limbs

yellow speckles



## Gold-dust day gecko

(*Phelsuma laticauda*)

So-called because of the yellow speckles on its nape

*Phelsuma madagascariensis*

## MADAGASCAR DAY GECKO

**This is the largest day gecko** in Madagascar, and is found in various forms throughout the island except parts of the southwest region. Its bright green coloration makes it very conspicuous when it is basking on tree trunks and walls, gripping with the help of its toe pads. It often visits buildings in the evening to catch insects that are attracted to lights. It also feeds on sweet substances such as nectar and honey when in captivity.

Males are aggressively territorial, even against females on occasion. Unlike some other day geckos, this species does not glue its eggs to a solid surface; it lays them in crevices and hollow stems, where they hatch after about 60–70 days. The sex of the young depends on the incubation temperature of the eggs. The young feed mainly on insects and become sexually mature within 1–2 years. Four subspecies are recognized, of which *P.m. grandis* is the largest, occasionally growing to 30 cm (12 in).



## PROFILE

-  Southeast Asia
-  Rainforest
-  20cm (8in)
-  Egg-laying
-  1–2
-  Nocturnal
-  Not assessed

flaps of skin on the side of the body

webbed feet

scalloped tail

**Perfect camouflage**

This flying gecko's cryptic bark-like pattern makes it almost impossible to detect when it is resting on a tree trunk.

*Ptychozoon kuhli*

## KUHL'S FLYING GECKO

**Kuhl's flying gecko** uses the flaps of skin along its flanks, combined with the scalloped edges of its flattened tail and its heavily webbed feet, to create air resistance. This allows it to leap from tall trees and glide down gracefully. Before landing, it tilts its body so that it lands on a vertical surface with its head pointing up. It is not clear whether this species glides in order to move about the forest or if it is mainly an escape mechanism, but Kuhl's flying geckos are occasionally caught in mist nets put out to catch bats.

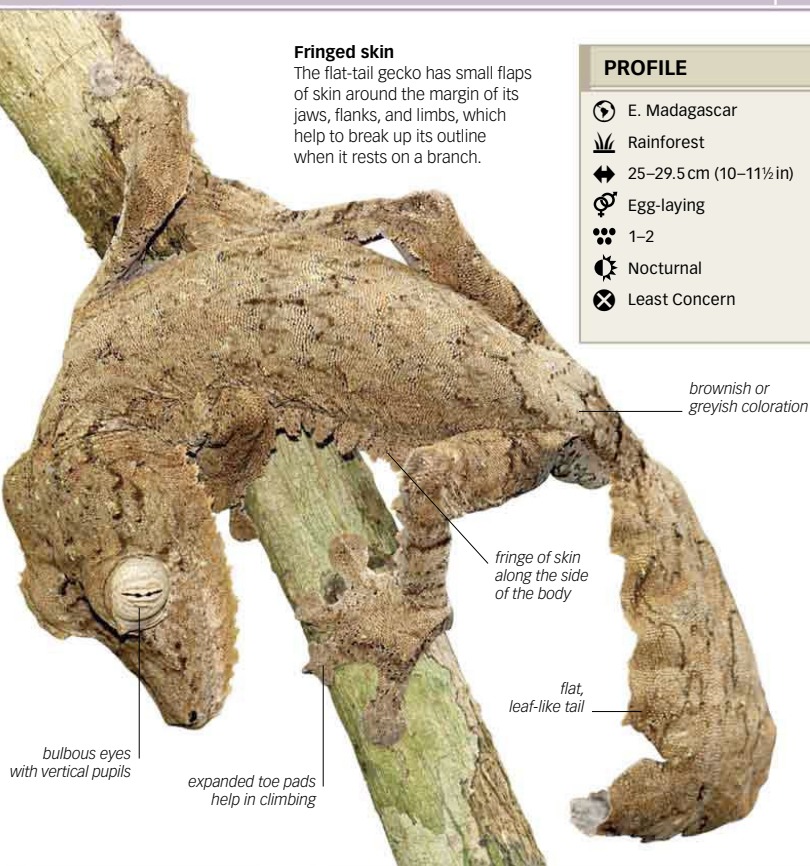
This gecko's markings and cryptic outline help it to blend in with its background when resting on a tree trunk. It is also extremely agile, running upwards if it is disturbed low down on a tree or building, and is very vocal, communicating with a vocabulary of chirps and growls. Like most geckos, it usually lays two hard-shelled, spherical eggs, and sticks them to a hidden surface, often under flaking bark.

**Fringed skin**

The flat-tail gecko has small flaps of skin around the margin of its jaws, flanks, and limbs, which help to break up its outline when it rests on a branch.

**PROFILE**

-  E. Madagascar
-  Rainforest
-  25–29.5 cm (10–11½ in)
-  Egg-laying
-  1–2
-  Nocturnal
-  Least Concern

**SIMILAR SPECIES**

**Satanic leaf-tailed gecko**  
(*Uroplatus phantasticus*)

Much smaller and shaped like a dead leaf; coils up in the branches of low shrubs and bushes during the day

*Uroplatus fimbriatus*

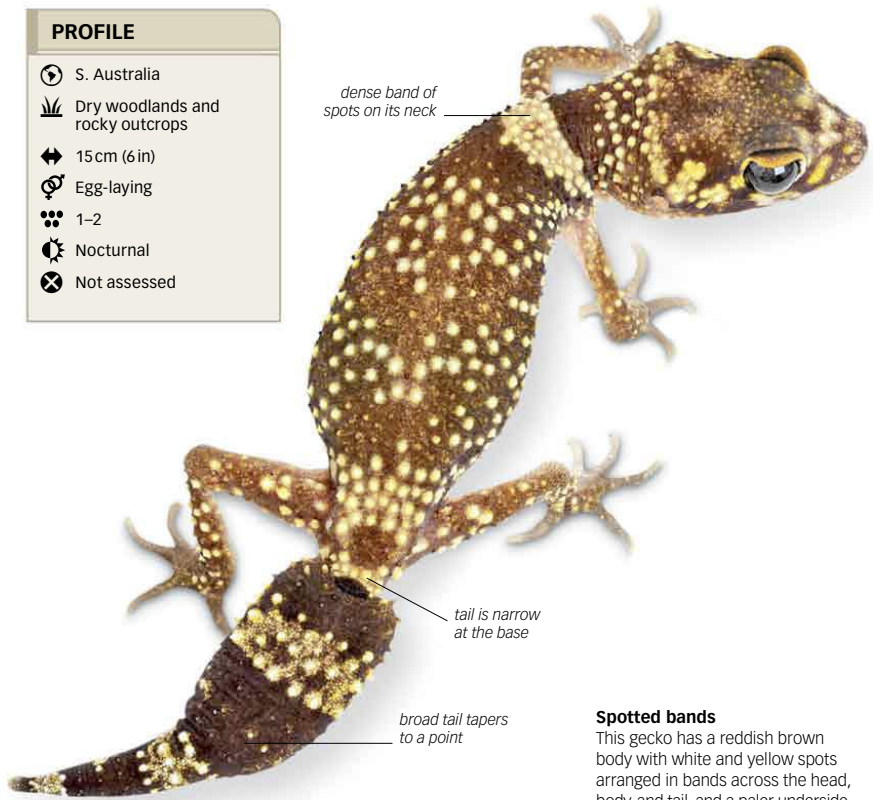
## COMMON FLAT-TAIL GECKO

**This large, unusual-looking gecko** lives in primary rainforest and spends the day pressed up against the trunk of a tree, where its markings and flattened shape make it very hard to find. The pattern on its back, limbs, and tail consist of random spots and blotches in different colours, often imitating the patches of lichen or moss that grow on the trunks of rainforest trees; no two geckos are the same. This species has huge eyes that are intricately marked with crenelated reddish brown lines, and the pupils close down to narrow vertical slits during the daytime.

The flat-tail gecko almost always rests head-down, clinging to a tree, but if touched it raises its flat, leaf-like tail and opens its mouth wide, showing the bright red interior. Individuals return to the same spot every morning after they have spent the night foraging through the rainforest. During the breeding season, the female lays two eggs, which she buries in the leaf litter on the forest floor.

## PROFILE

-  S. Australia
-  Dry woodlands and rocky outcrops
-  15 cm (6 in)
-  Egg-laying
-  1–2
-  Nocturnal
-  Not assessed

**Spotted bands**

This gecko has a reddish brown body with white and yellow spots arranged in bands across the head, body, and tail, and a paler underside.

*Underwoodisaurus mili*

## AUSTRALIAN BARKING GECKO

**Juvenile**

The markings on hatchlings are brighter than those of adults, and their heads are proportionately larger. They normally take over a year to mature.

**This species is also called** the thick-tailed gecko on account of its heart-shaped tail, which it uses to store fat. If it loses the tail, a new but thinner one grows back. The black and white bands on its tail are also found on other geckos, and may deflect an attack away from the gecko's head by diverting the predator's attention.

The Australian barking gecko lives on the ground or in burrows that it digs itself or takes over from other animals. It may also hide under rocks or logs. It feeds at night, mainly on insects and their larvae. If threatened, it stands stiff-legged and may lunge forward with its mouth wide open, making a loud wheezing sound; this defensive "bark" gives the gecko its common name. Females bury their soft-shelled eggs in the soil and these hatch after about 60 days. This species becomes very tame in captivity.





spiky, hair-like  
scales above  
the eyes

## PROFILE

-  New Caledonia  
(S.W. Pacific)
-  Rainforest
-  16–20 cm (6½–8 in)
-  Egg-laying
-  2
-  Nocturnal
-  Vulnerable

tail can be shed if  
grasped, but does  
not grow back

### Variable coloration

Popular in the pet trade, the crested gecko is a gentle species that occurs naturally in different colour forms.

### SIMILAR SPECIES



**Mossy gecko (*Mniarogekko chahoua*)** Found in New Caledonia; covered in an intricate pattern that allows it to blend in with its surroundings



**New Caledonian gargoyle gecko (*Rhacodactylus auriculatus*)** Gets its common name from the irregular shape of its head

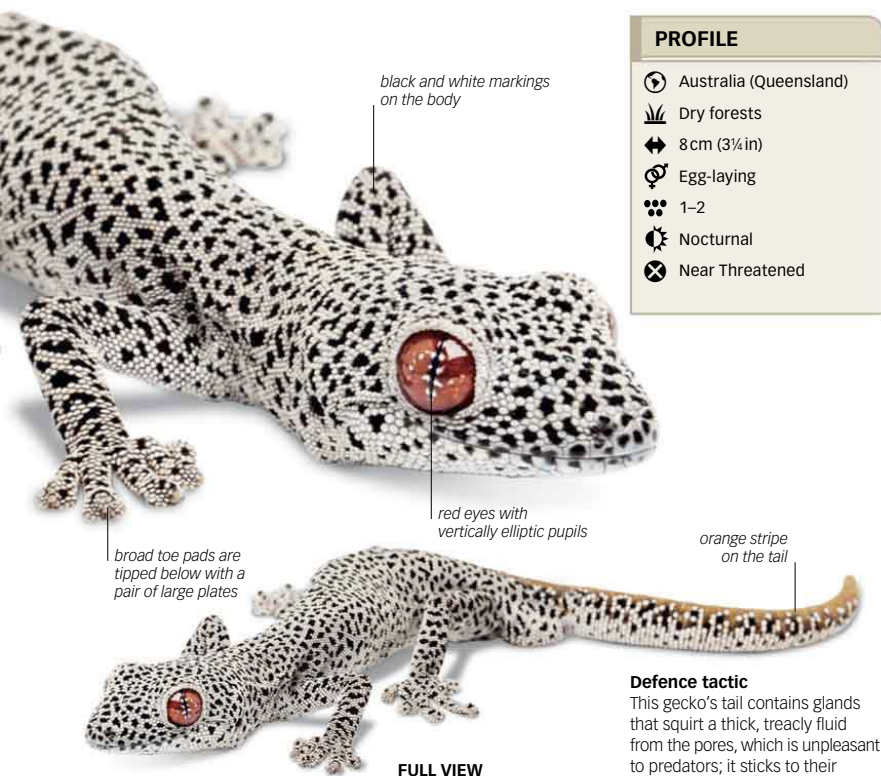
*Correlophus ciliatus*

# CRESTED GECKO

**The crested gecko's most striking feature** is the cluster of pointed scales above each eye and the crest of similar scales that runs from each eye to the nape of the neck. It is a good climber, with adhesive toe pads and an additional pad on the tip of its prehensile tail. This species has variable coloration, and may be tan, orange, or brown, with or without darker markings.

Rarely seen in the wild, the crested gecko was thought to have been extinct, until it was rediscovered in the 1990s, living in the forest canopy at night and sheltering in crevices during the day. Unlike most geckos, it eats vegetable material, including fruit and nectar, as well as insects. It adapts well to captivity and breeds readily, so there is a constant supply of young animals even though the species is protected. Its main predators may be the larger geckos with which it shares its habitat.



**PROFILE**

- Australia (Queensland)
- Dry forests
- 8 cm (3¼ in)
- Egg-laying
- 1–2
- Nocturnal
- Near Threatened

**Defence tactic**

This gecko's tail contains glands that squirt a thick, treacly fluid from the pores, which is unpleasant to predators; it sticks to their mouths and eyes, causing them to drop the lizard and avoid it in future.

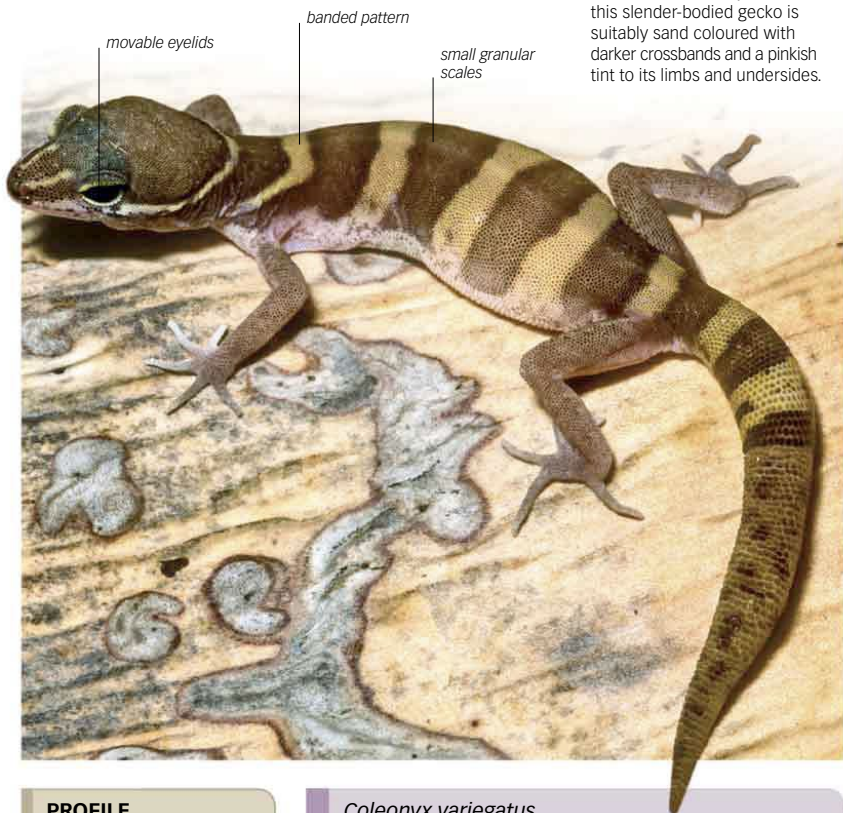
**SIMILAR SPECIES****Soft spiny-tailed gecko (*Strophurus spinigerus*)**

Cryptically coloured in shades of grey; has bright yellow eyes and two rows of spines on its tail

*Strophurus taenicauda***GOLDEN-TAILED GECKO**

The **reticulated black and white markings**, orange stripe on the tail, and bright red eyes immediately set the golden-tailed gecko apart from all other geckos. An arboreal species, it hunts insects during the night, often darting down to the ground for prey and then returning to the branches of a shrub to eat it. During the day, it often presses tightly against a small twig or stem, where it is difficult to see, or hides under bark.

In this species, the orange stripe on the tail advertises its poisonous properties, whereas other *Strophurus* species have rows of spines along their tails and are called spiny-tailed geckos. Female golden-tailed geckos lay a pair of soft shelled eggs in a damp place. These take about eight weeks to hatch, and at first, the hatchlings are darker than the adults. This species is threatened by clearing and destruction of its habitat.

**Desert ground-dweller**

An inhabitant of rocky deserts, this slender-bodied gecko is suitably sand coloured with darker crossbands and a pinkish tint to its limbs and undersides.

**PROFILE**

-  S.W. USA and N.W. Mexico
-  Rocky desert
-  10–15 cm (4–6 in)
-  Egg-laying
-  1–2
-  Nocturnal
-  Least Concern

*Coleonyx variegatus*

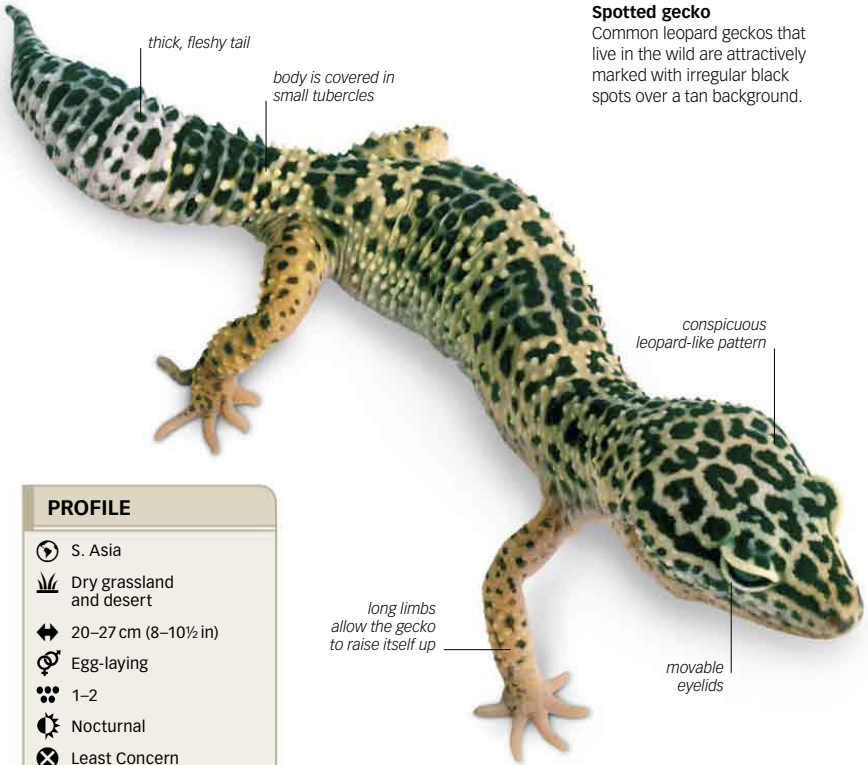
## WESTERN BANDED GECKO

**The western banded gecko** and its relatives are known as eyelid geckos and placed in a separate family because, unlike other geckos, they have movable eyelids. This species has a semi-transparent, velvety skin covered in very small granular scales, giving it a delicate appearance. Despite its fragile exterior, the gecko lives in a harsh environment, among cacti, creosote bushes, and rocks. There are six other species in the genus that are similar in appearance.

Western banded geckos shelter during the day to avoid drying out, and hunt at night when it is cooler, feeding on small insects and spiders. If disturbed, the gecko raises its tail and curls it over its back, and deflects attack away from its head and body; it squeaks if picked up. Females lay one or two soft-shelled eggs that hatch after about six weeks. The hatchlings are more vividly marked than the adults.

**Spotted gecko**

Common leopard geckos that live in the wild are attractively marked with irregular black spots over a tan background.

**PROFILE**

-  S. Asia
-  Dry grassland and desert
-  20–27 cm (8–10½ in)
-  Egg-laying
-  1–2
-  Nocturnal
-  Least Concern

*Eublepharis macularius*

## COMMON LEOPARD GECKO

**Albino form**

The albino form is one of a number of different colour morphs of common leopard geckos that are selectively bred in captivity.

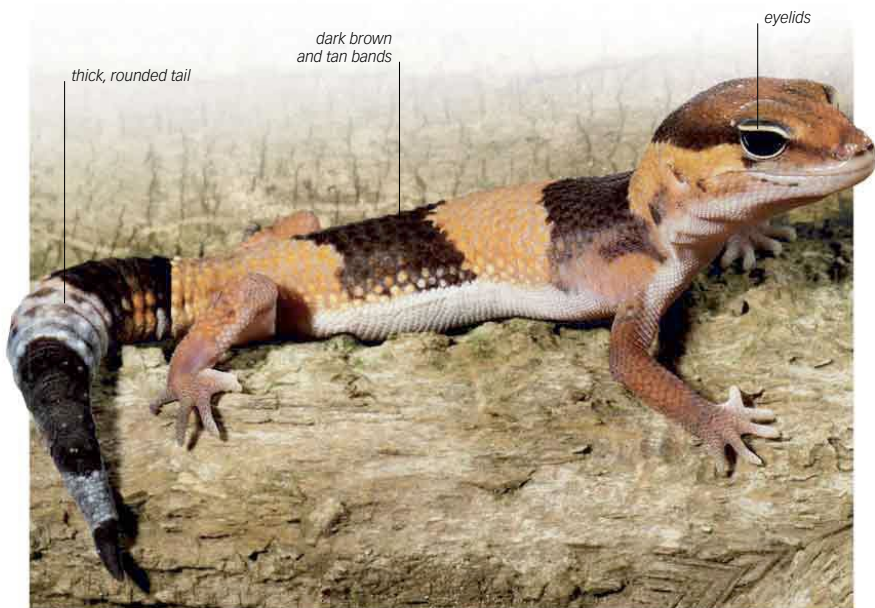


**This large gecko** has a thick, carrot-shaped tail that swells up with stored fat when it has been feeding heavily; this helps sustain it during periods of winter inactivity. The tail can also be discarded as a defence mechanism, although the common leopard gecko is more reluctant to do this than many other gecko species.

These geckos occur naturally in deserts, where they experience extremes of temperature. They also adapt well to captivity, with thousands being bred annually; it is one of the most popular pet species. In addition to the regular, wild-type spotted pattern, many different colour forms have arisen and have been selectively bred, some of which fetch high prices. This species was among the first to be used in the study of temperature-dependent sex determination in the 1970s, which showed that very high or low temperatures produce female hatchlings, whereas intermediate temperatures produce males.

### Camouflage pattern

The fat-tailed gecko is patterned with several broad bands of dark brown and tan, and has a whitish underside. Its earthy coloration provides an effective form of camouflage in the arid regions of West Africa.



### PROFILE

-  W. Africa
-  Semi-arid places
-  20–30 cm (8–12 in)
-  Egg-laying
-  1–2
-  Nocturnal
-  Least Concern

*Hemitheconyx caudicinctus*

## FAT-TAILED GECKO

**There are two naturally occurring** patterns among fat-tailed geckos: one with alternating bands of brown and tan, and the other with a pale stripe running down its back. In addition, several other colour forms have been selectively bred in captivity. A strictly terrestrial species, this gecko has no adhesive pads on its digits to help it climb. The presence of eyelids identifies it as a member of the family Eublepharidae, or eyelid geckos. Although it lives in an arid region, it spends the day inside deep burrows, where the humidity is relatively high, and only emerges at night when it is cooler.

Like the closely related leopard gecko (p.168), this species has a thick tail that acts as a food reserve, and which may be discarded as a defence mechanism. Regrown tails are shorter and more rounded than the original.



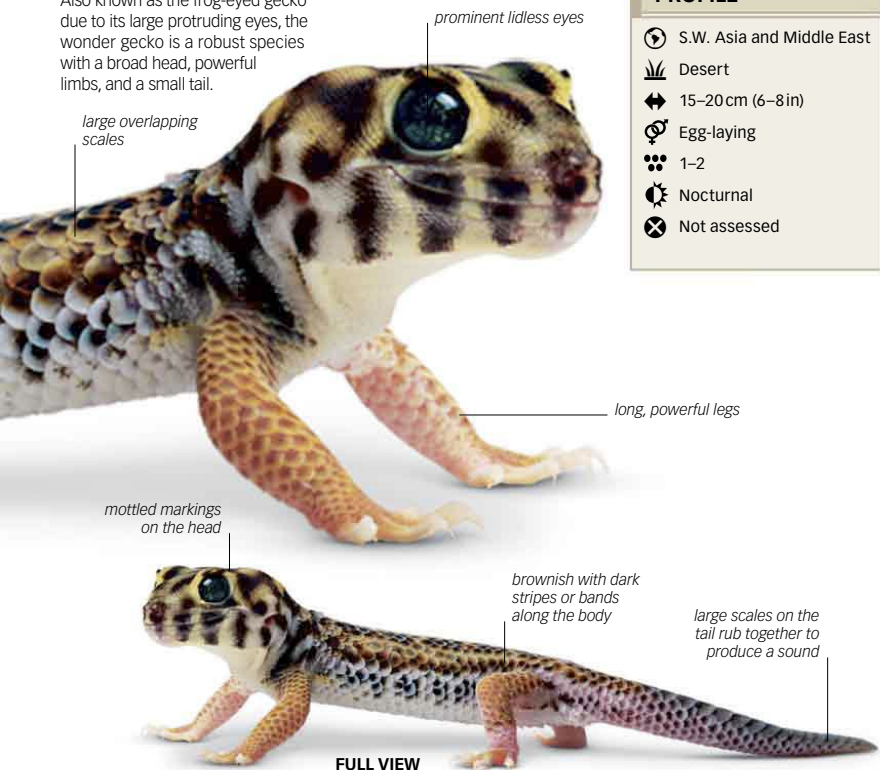
### Albino form

This individual is an example of an albino in which the markings include a white dorsal stripe.



**Frog-eyed**

Also known as the frog-eyed gecko due to its large protruding eyes, the wonder gecko is a robust species with a broad head, powerful limbs, and a small tail.

**PROFILE**

- S.W. Asia and Middle East
- Desert
- 15–20 cm (6–8 in)
- Egg-laying
- 1–2
- Nocturnal
- Not assessed

**FULL VIEW****SIMILAR SPECIES**

**Variegated gecko**  
(*Gonatodes ceciliae*)

Much smaller South American member of the same family

*Teratoscincus scincus*

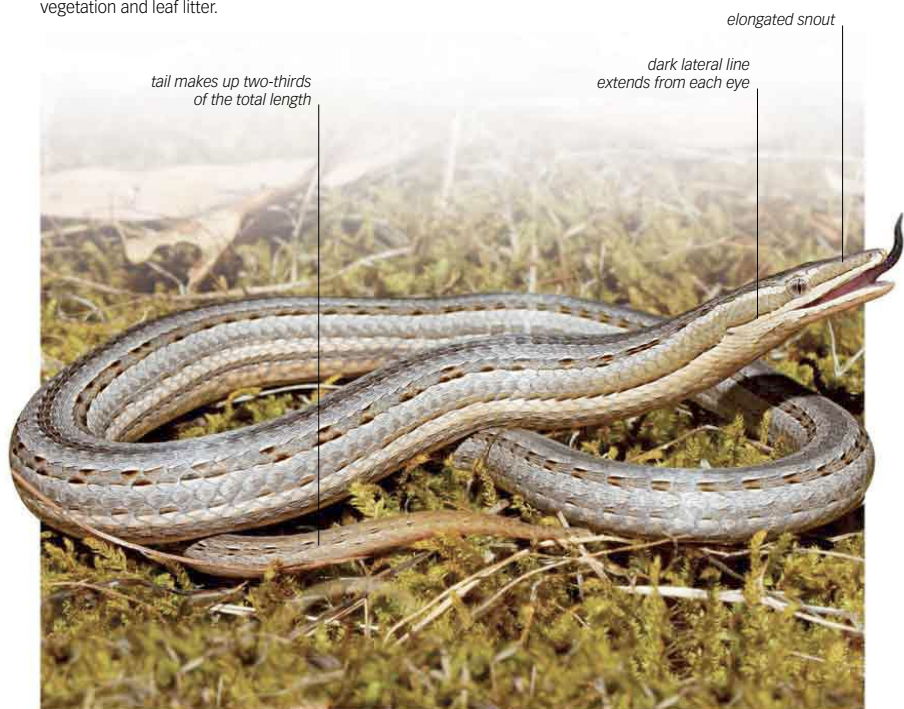
# WONDER GECKO

**This species** lives in the gravelly plains between sand dunes, and on clay pans. It is strictly nocturnal, hunting for insects and spiders during the night and resting during the day in burrows where the sand or soil retains some moisture. The female lays one or, more commonly, two thin-shelled eggs in a burrow, which hatch after 2–3 months. The hatchlings are more vividly marked than the adults.

Wonder geckos respond to predators by standing up high on the tips of their toes and opening their mouth widely. If provoked further, they lunge forward while making a squeak. They can also produce a sound by waving their tail from side to side, causing their large, plate-like scales to rasp against each other. Known as stridulation, this process is common in insects such as grasshoppers, but is rarely encountered among reptiles.

**Elongated lizard**

The elongated body and lack of limbs enable this species to move easily through dense vegetation and leaf litter.

**PROFILE**

Australia and  
S. New Guinea



Dry and humid woodland,  
grassland, and desert



50–60 cm (20–23½ in)



Egg-laying



2



Diurnal and nocturnal



Not assessed

*Lialis burtonis*

## BURTON'S SNAKE LIZARD

**This lizard is Australia's** most widespread reptile and can be found in many different habitats. It displays great variation in colour, and can be any shade of plain cream to reddish brown. It usually has black and white stripes along the sides of the head, which may continue down its body.

The Burton's snake lizard feeds almost exclusively on other lizards, especially skinks, but may also eat geckos and small snakes. It ambushes and catches prey with a rapid sideswipe of its elongated jaws, holding them around the chest until they suffocate. The upper jaw is articulated in such a way that the tips can meet even when holding its victim, preventing it from escaping. Once the prey is dead, the lizard manoeuvres it within its mouth, using several small, pointed teeth to maintain its grip, until it can be swallowed head-first.

## PROFILE



Namaqualand  
(S.W. Africa)



Rocky outcrops



16–21 cm (6½–8½ in)



Live-bearing



1–2



Diurnal



Vulnerable

## Spiny lizard

Covered in spines, the armadillo girdled lizard is the only member of its family that forms a hoop by grasping its tail in its mouth.

armoured head  
and body

yellowish  
brown  
coloration

tail is ringed with  
large spines



## SIMILAR SPECIES



**Cape girdled lizard**  
(*Cordylus cordylus*)

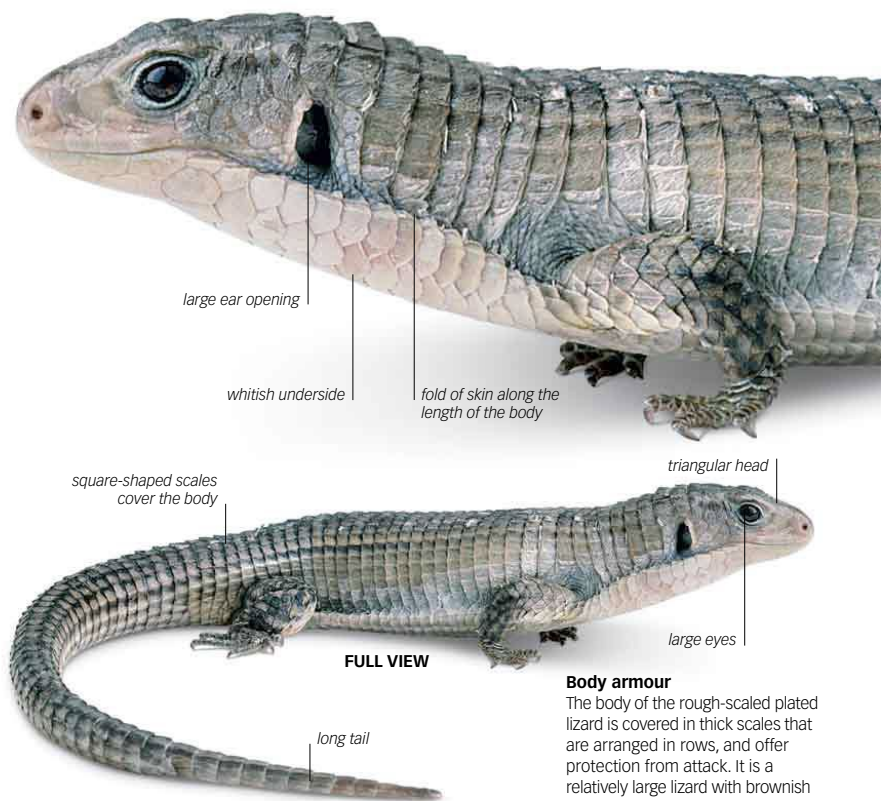
Roughly the same size; lives  
in colonies further south in  
the Cape region

*Ouroborus cataphractus*

## ARMADILLO GIRDLED LIZARD

**A heavily armoured reptile**, the armadillo girdled lizard lives on rocky outcrops where it can bask in the sun, but retreats into a crevice, wedging itself in, if threatened. The lizard gets its name from its appearance when in a defensive position – if it is caught out in the open it rolls into a ball, like an armadillo, and grips its tail in its mouth so that its hard, spiny scales protect its more vulnerable underside.

The armadillo girdled lizard feeds on a wide variety of invertebrates, which it catches with a dash before returning to its basking site. Like all the members of its genus, it gives birth to one or two large offspring each year. The young remain with the mother, and family groups tend to inhabit the same crevice in a rock; there is evidence of a high degree of parental care. The young feed on insects that are attracted to the multitude of flowers that grow in Namaqualand, southwest Africa.

**Body armour**

The body of the rough-scaled plated lizard is covered in thick scales that are arranged in rows, and offer protection from attack. It is a relatively large lizard with brownish coloration and whitish underside.

**PROFILE**

-  C. and E. Africa
-  Dry grasslands (savanna)
-  30–45 cm (12–18 in), rarely up to 55 cm (22 in)
-  Egg-laying
-  2–6
-  Diurnal
-  Not assessed

*Gerrhosaurus major*

## ROUGH-SCALED PLATED LIZARD

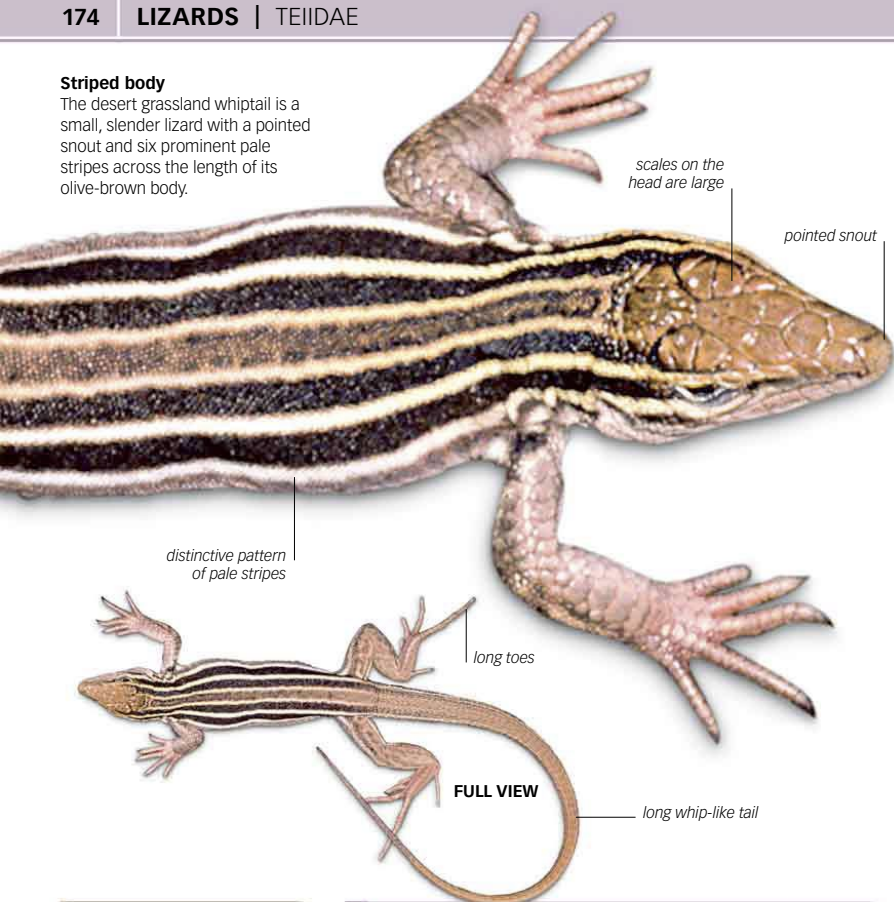
**The rough-scaled plated lizard** is the largest and the most widespread of eight species, ranging from Nigeria to Ethiopia and South Africa, wherever there are dry grasslands. There are several subspecies, which vary slightly in coloration. The large, square-shaped scales and a lateral fold along each flank are characteristic of the plated lizards.

This species favours rock piles, but may also live among building rubble near roads and villages, and coral debris on the coast. It sometimes uses an old termite mound as its retreat. The plated lizard basks during the day, but is never far from cover, and is quick to retreat to a rock crevice if disturbed. It is a solitary species, and males are very territorial. It eats a wide range of insects, other lizards, fruit, and flowers. During the breeding season, females lay small clutches of eggs, which they bury under a rock or log, or in a rock crevice. Incubation takes 70–80 days.



**Striped body**

The desert grassland whiptail is a small, slender lizard with a pointed snout and six prominent pale stripes across the length of its olive-brown body.

**PROFILE**

-  S. USA and N. Mexico
-  Desert and arid scrub
-  10–15 cm (4–6 in)
-  Egg-laying
-  1–4
-  Diurnal
-  Least Concern

*Aspidoscelis uniparens*

## DESERT GRASSLAND WHIPTAIL

**Whiptail lizards are fast-moving,** alert, and agile reptiles that are difficult to catch. There are many species, often with similar colours and markings, but the desert grassland whiptail belongs to a group whose members are parthenogenic; females lay unfertilized eggs that develop and hatch only into females. Its scientific name, *uniparens*, means “single parent”. Parthenogenic species arise through hybridization between two similar species. The resulting offsprings are identical to the female and have the ability to produce female offspring of their own. Since there is no variability, parthenogenic species do not adapt well to changing environmental conditions.

This species lives among rocky desert scrub and in the sparse oak forests that grow in the low foothills of isolated mountain ranges of Arizona, New Mexico, and Chihuahua. It feeds on insects and spiders, and in turn is preyed upon by birds and snakes.

## PROFILE

📍 South America

🌳 Open forest and grassland

↔️ 80–140 cm (32–55 in)

🥚 Egg-laying

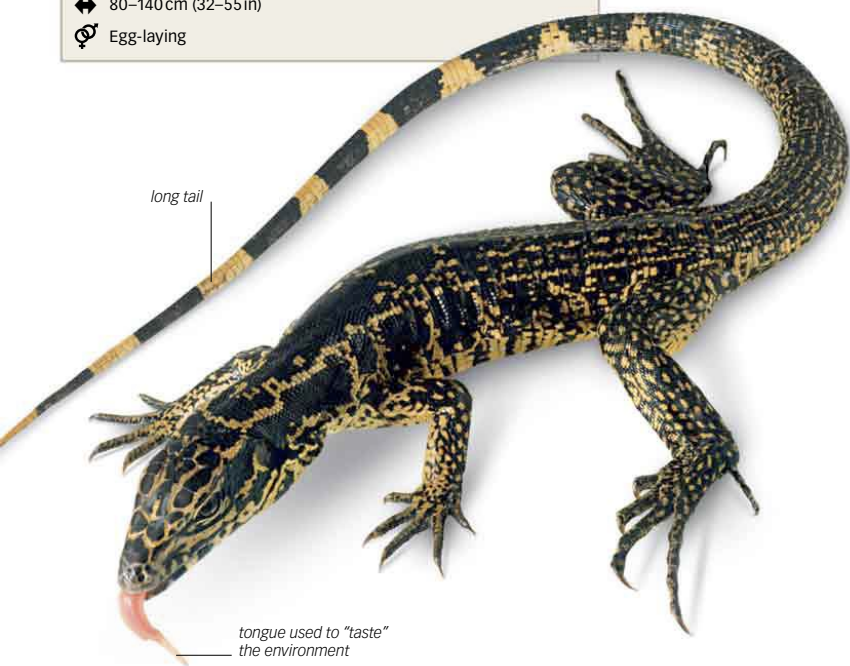
👤 4–32

🕒 Diurnal

⊗ Least Concern

## Giant lizard

This is the largest species of tegu and one of the largest lizards in South America. It has a distinctive pattern of white or yellowish dots and stripes on its body and crossbands on its tail.



## SIMILAR SPECIES



## FULL VIEW

**Red tegu (*Tupinambis rufescens*)** Occurs in arid regions in South America; is an active predator and scavenger

*Salvator merianae*

## ARGENTINE BLACK AND WHITE TEGU

**A large, opportunistic lizard**, the Argentine black and white tegu is at home in a variety of habitats, including villages and the outskirts of cities. It is mainly terrestrial, but swims well and can run on its hind limbs (bipedal locomotion). It has a varied diet, feeding on plant material and meat, including carrion; it even raids poultry houses for eggs and hens.

Males are larger than females and develop jowls as they get older, but both sexes are powerful and have strong jaws. Females lay their eggs in a burrow, which they protect from predators. Tegus are the ecological counterparts of the Old World monitor lizards, although they are not closely related. Once considered to be a part of the genus *Tupinambis*, the species has recently been reclassified and now belongs to the genus *Salvator*.

**Vigilant male**

Males often bask on prominent rocks from where they can keep an eye on rivals and spot approaching danger. They are slightly more colourful than the females, with bright blue eye spots on a greenish yellow body.

**PROFILE**

📍 S.W. Europe

🌳 Open woodland, scrub, and overgrown vineyards

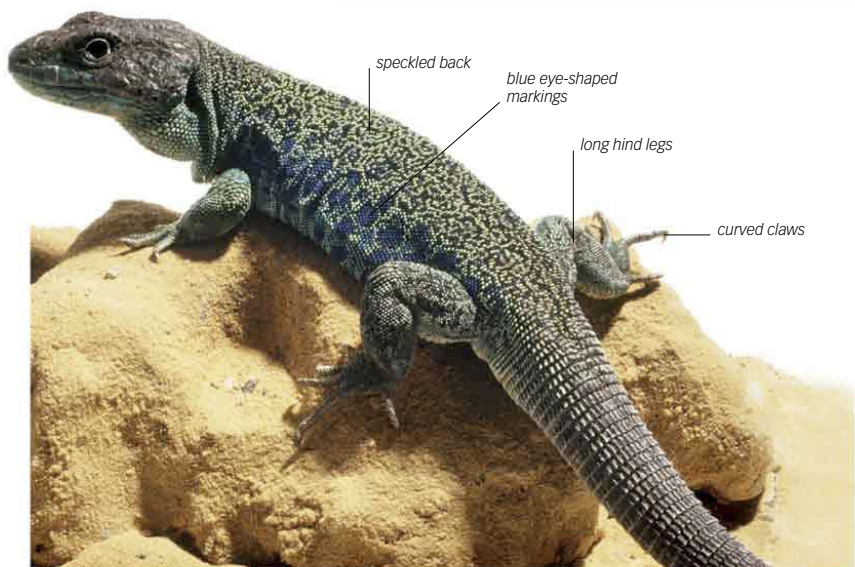
📏 50–60 cm (20–23½ in), rarely up to 80 cm (32 in)

🥚 Egg-laying

👤 5–22

🕒 Diurnal

⚠️ Near Threatened

**SIMILAR SPECIES**

**Schreiber's green lizard**  
(*Lacerta schreiberi*)

Smaller, lacks the blue spots; occurs only in northwest and central Spain

small yellow and black spots on the back of males



**Green lizard (*Lacerta viridis*)** More uniform green colour and lacks the blue spots; females often have pale yellow stripes


*Timon lepidus*

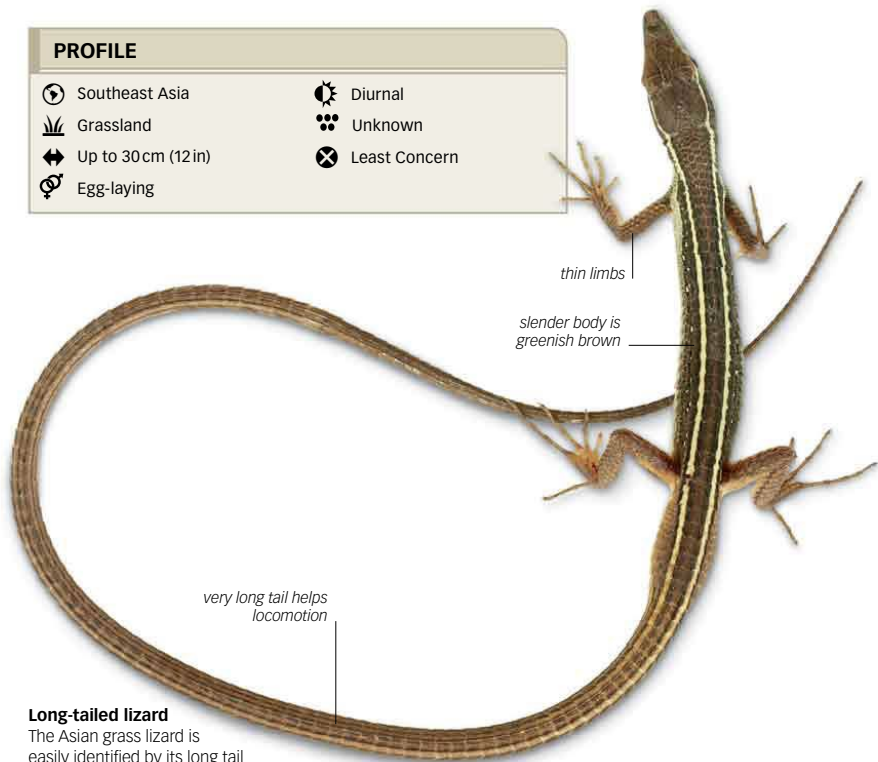
**EYED LIZARD**

**One of the largest** members of its family, the male eyed lizard has a distinctive row of blue eye spots down each flank and a broad head, while the female is smaller and less colourful. It basks on rocks, edges of roads, and parapets, but will make off noisily if approached, taking refuge in rock piles, dry-stone walls, and burrows. If cornered, the lizard defends itself by opening its mouth and hissing; it bites very hard and is often difficult to dislodge. The eyed lizard feeds on a wide variety of food, including large insects, frogs, fruit, and even other lizards.

Males are territorial and fight among themselves; they seem to need a large area and the territories are well spaced out. Females lay their eggs under rocks or logs, or in burrows in damp soil. The eggs take about 2–3 months to hatch; the juveniles are brown or olive, with large white, black-edged spots scattered over their body.

## PROFILE

- |  |   |
|--|---|
|  Southeast Asia      |  Diurnal       |
|  Grassland           |  Unknown       |
|  Up to 30 cm (12 in) |  Least Concern |
|  Egg-laying          |   |

**Long-tailed lizard**

The Asian grass lizard is easily identified by its long tail and light stripes on its body. Like all members of the Lacertidae family, it may discard its tail if threatened and grow a new one.

## SIMILAR SPECIES

**Large Psammodromus**  
**(Psammodromus**

**algerius)** Found in Europe; similar coloration, although it lacks the very long tail

*Takydromus sexlineatus*

## ASIAN GRASS LIZARD

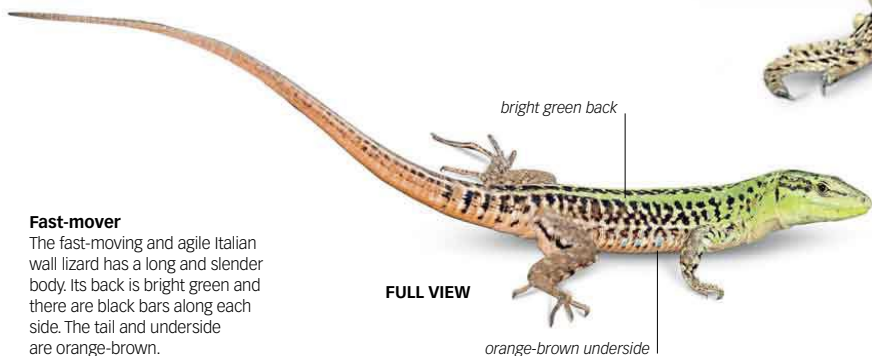
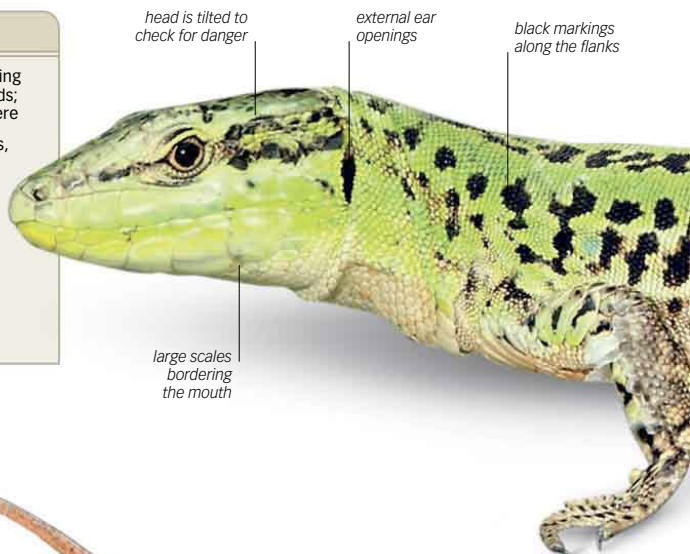
**This member of the wall lizard family** is a grassland specialist. Its very long tail, accounting for nearly three-quarters of its total length, helps it to wriggle rapidly through dense grasses and other low vegetation; when moving quickly, its limbs are often held against its side and its rough scales help it to push against the soil. Active by day, Asian grass lizards are quick and agile, preying on a variety of small insects. They wave their front limbs slowly, as if paddling, as a means of communication with each other.

The Asian grass lizard is one of the few species that has benefited from forest and woodland clearance as it can move into newly created open areas that have been cleared for grazing. It is collected in small numbers for the pet trade, but its large range and relative abundance should prevent its numbers from falling in the future.



## PROFILE

-  Italy and neighbouring countries and islands; introduced elsewhere
-  Fields, walls, verges, and ruins
-  15–18 cm (6–7 in)
-  Egg-laying
-  2–12 (typically 5–6)
-  Diurnal
-  Least Concern

**Fast-mover**

The fast-moving and agile Italian wall lizard has a long and slender body. Its back is bright green and there are black bars along each side. The tail and underside are orange-brown.

## SIMILAR SPECIES



**Sharp-snouted rock lizard (*Dalmatolacerta oxycephala*)** Occurs along the Dalmatian coast; usually seen on rocks and walls of buildings


*Podarcis siculus*

# ITALIAN WALL LIZARD

**A colourful wall lizard**, this adaptable species is very common throughout Italy and nearby countries, living mostly on the ground along roadsides, in vineyards, villages, and ruins. The lizard is often seen in large numbers, crawling and basking on rocks and paths, always on the lookout for a meal. If threatened, it moves away from its basking spot but moves back as soon as the danger has passed.

The Italian wall lizard has been accidentally carried to offshore islands of Corsica and Sardinia, as well as the Croatian coast, where it has become established. In some of these areas, it has ousted more specialized local species, some of which may have become extinct as a result. Breeding males are territorial, and often fight with each other and with males of related species. Females lay several clutches of eggs throughout the summer, placing them under stones or logs.

## PROFILE

-  N. and C. Europe
-  Many habitats, but usually densely vegetated and humid places
-  15–18 cm (6–7 in)
-  Live-bearing (egg-laying in places)
-  1–13
-  Diurnal
-  Least Concern

males have a spotted pattern

limbs are spread out when basking

tail is up to twice the length of its head and body

thick neck

## Coloration and markings

Typically, the viviparous lizard has brownish upperparts with lines of darker markings along the back, which are often bordered with yellow or white.

FULL VIEW

## SIMILAR SPECIES

Sand lizard (*Lacerta agilis*)

Slightly larger and more heavily marked; breeding males are suffused with green

*Zootoca vivipara*

## VIVIPAROUS LIZARD

**This widespread and adaptable lizard** occurs in high densities in fields, hedgerows, commons, woodland clearings, and many other types of habitat. It typically basks on south-facing slopes, flattening itself to the ground with its limbs spread-eagled. It occurs further north than any other reptile, well into the Arctic Circle in Norway and up to 2,500 m (8,200 ft) above sea level in mountain ranges.


Viviparous lizards are variable in colour and markings, and some individuals are plain brown; males usually have dark spots and females have stripes, while breeding males may be orange or yellow below. Pregnant females bask at every opportunity to speed up the development of their embryos, and give birth to small, almost black live young at the end of summer. However, in parts of southern France and northern Spain, they lay eggs that hatch after a short incubation period.

### Slender and smooth

This slender skink has large scales on its head and smooth, tightly fitting scales on its body, which enables it to move easily through sandy soil. It is typically cream with a series of thin, dark-coloured stripes.



#### PROFILE

-  S.W. Africa
-  Arid areas with sandy soil
-  15–18 cm (6–7 in)
-  Live-bearing
-  1
-  Nocturnal
-  Least Concern








#### *Acontias lineatus*

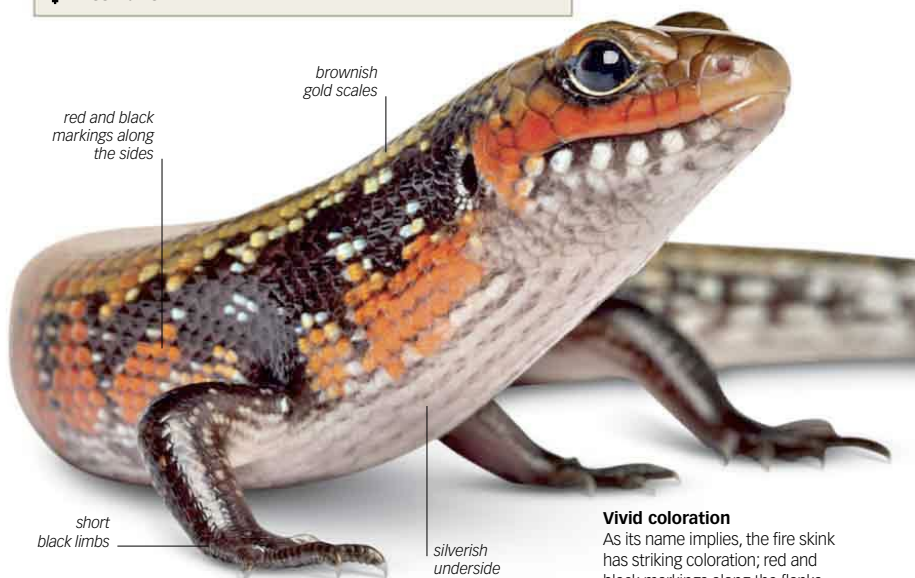
## STRIPED LEGLESS SKINK

**The striped legless skink** belongs to a group of highly specialized burrowing species from southern Africa. It has a cylindrical body with a tail that is flattened below. It lacks any traces of legs; a trait that is seen in some other skinks and which is an adaption to burrowing in loose, sandy soil, through which it can “swim”. The lance-shaped head further helps it push through the sand. This species is probably quite common in suitable habitat, but is rarely seen, being small and active on the surface mostly at night.

The striped legless skink hunts for termites, beetle grubs, and other burrowing invertebrates in loose sand at the base of shrubs. The courtship and breeding behaviour of this species is unknown, but it is thought to give birth to a single, relatively large offspring; other species in the genus may have larger litters.

## PROFILE

- |   |  |
|---|--|
|  W. Africa            |  5–9          |
|  Forest               |  Diurnal      |
|  Up to 37 cm (14½ in) |  Not assessed |
|  Egg-laying           |  |

**Vivid coloration**

As its name implies, the fire skink has striking coloration; red and black markings along the flanks with a silverish underside and gold scales on top of its body.

## SIMILAR SPECIES

*Lepidothyris fernandi*

## FIRE SKINK

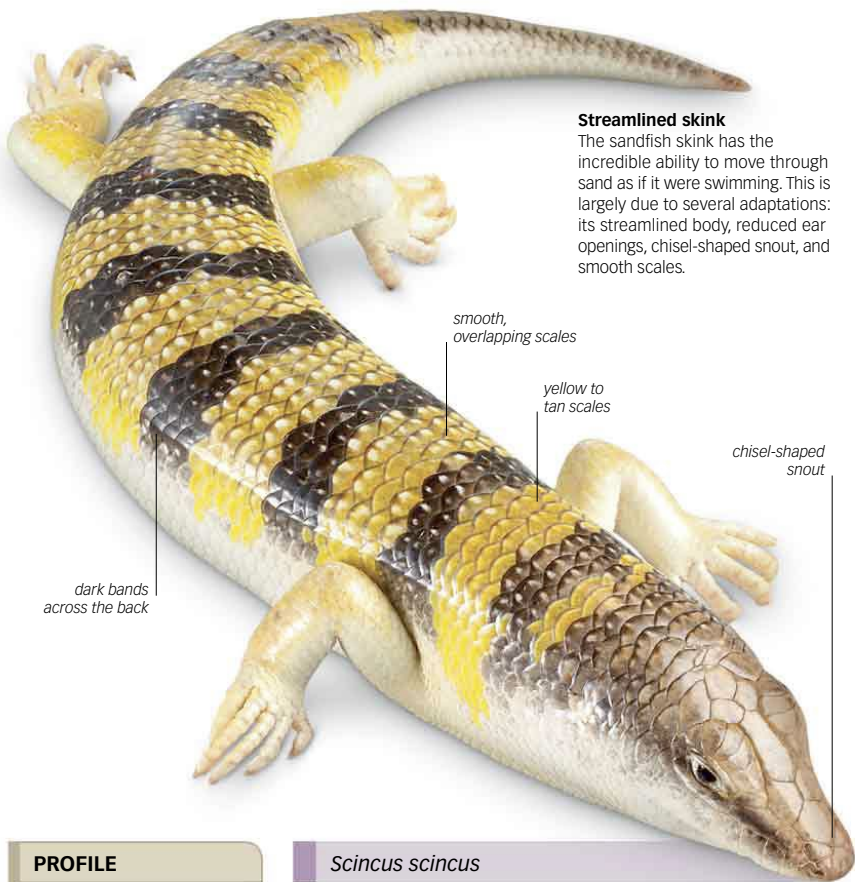
**The fire skink** is a large, stocky, beautifully coloured lizard from the tropical forests of West Africa, where it lives among deep leaf litter and in burrows in the soil. Males are especially colourful, with bright red flanks and a red neck set off by dense black markings. Fire skinks have short, stocky tails that may be discarded if they are grasped by a predator. Like many skinks, they have short limbs, which are not used when they are moving quickly; they use their powerful body to push against firm objects – much like a snake.

Fire skinks are generalist hunters, and forage among the forest litter for invertebrates. They may also feed on a small amount of plant material. Females bury their eggs in moist soil, and they take 6–8 weeks to hatch. The hatchlings are darker than the parents, being mostly black with red bars on their bodies and blue bars on their tails.

**Emerald tree skink**  
**(*Lamprolepis smaragdina*)**

Arboreal species that lives on tree trunks in Asian forests; this individual has lost part of its tail





### Streamlined skink

The sandfish skink has the incredible ability to move through sand as if it were swimming. This is largely due to several adaptations: its streamlined body, reduced ear openings, chisel-shaped snout, and smooth scales.

### PROFILE

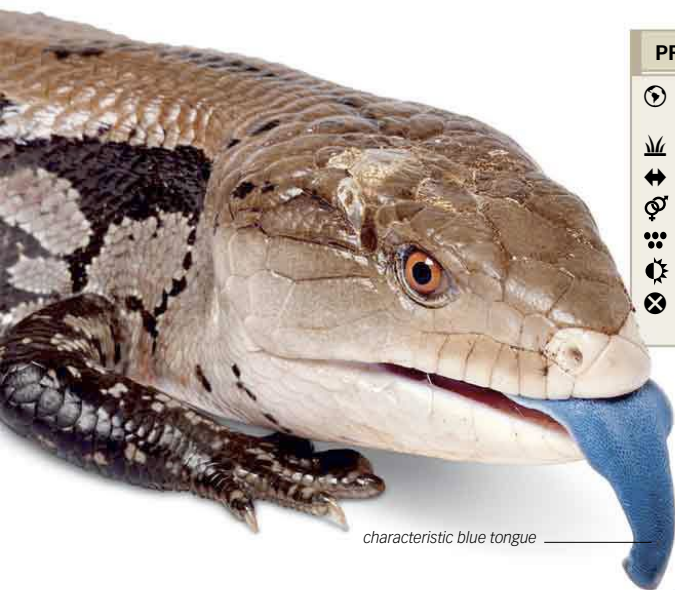
-  N. Africa and Middle East
-  Sand dunes
-  15–20 cm (6–8 in)
-  Egg-laying
-  4–6
-  Diurnal
-  Not assessed

*Scincus scincus*







## SANDFISH SKINK

**The sandfish skink is highly specialized** for living among the sand dunes of its desert habitat. It can move with considerable speed below the surface of loose, wind-blown sand. When moving quickly, the sandfish skink folds its short limbs along its side, and they play no part in locomotion. It uses them, however, when pushing itself slowly across the surface.

The sandfish skink lives on the leeward side of dunes, usually at the base of bushes, and hunts insects and smaller lizards from below the sand, detecting movement from vibrations and attacking suddenly. If disturbed, it immediately dives beneath the surface and swims down obliquely for a short distance, leaving a shallow, undulating furrow on the surface as the sand collapses behind it. It moves up and down in the sand to avoid the extremes of temperature and often basks with just the top of its head showing.



## PROFILE

-  New Guinea and neighbouring islands
-  Tropical forest
-  45–60 cm (18–23½ in)
-  Live-bearing
-  5–15
-  Diurnal
-  Not assessed

characteristic blue tongue

short, thick tail

pale brown body  
with dark crossbands

FULL VIEW

## Dark bands and legs

The coloration of this species may vary depending on the area, but it is usually some shade of brown with dark crossbands. The hind legs, however, are invariably black.

## SIMILAR SPECIES

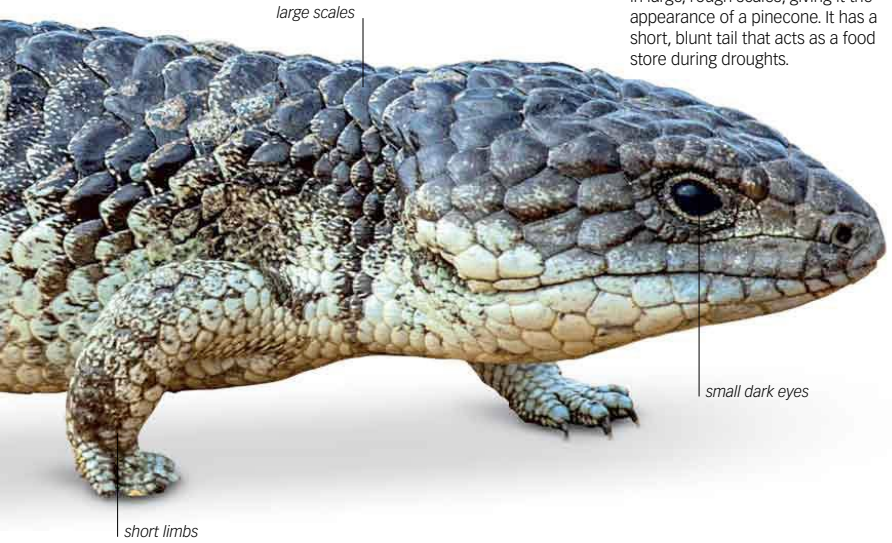
oblique tan bars  
on the flank

**Eastern blue-tongued skink**  
(*Tiliqua scincoides*) Often more colourful, with broader crossbars on the body; found in Australia

*Tiliqua gigas*NEW GUINEA  
BLUE-TONGUED SKINK

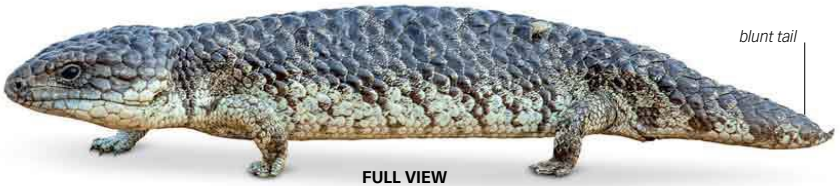
**This skink is one of the largest species**, although it still conforms to the typical skink shape. A smooth-scaled lizard, it is stocky in appearance with a broad, triangular head, a thick tail, and relatively short limbs; the body is almost square in cross-section. The young are relatively large when they are born.

The bright blue tongue is used to ward off predators; when threatened, the skink opens its mouth and sticks out its tongue for several seconds, startling its enemies. It may also gape widely and hiss at the same time. This threatening display led to a popular belief in its native country that it was venomous. It has powerful crushing jaws, and feeds on a variety of invertebrates, as well as vegetable material, including flowers, fruit, and berries. A relatively cumbersome and slow-moving lizard, it is unable to catch very active prey.



### Pinecone look-alike

The stumpy tail lizard is covered in large, rough scales, giving it the appearance of a pinecone. It has a short, blunt tail that acts as a food store during droughts.



### PROFILE

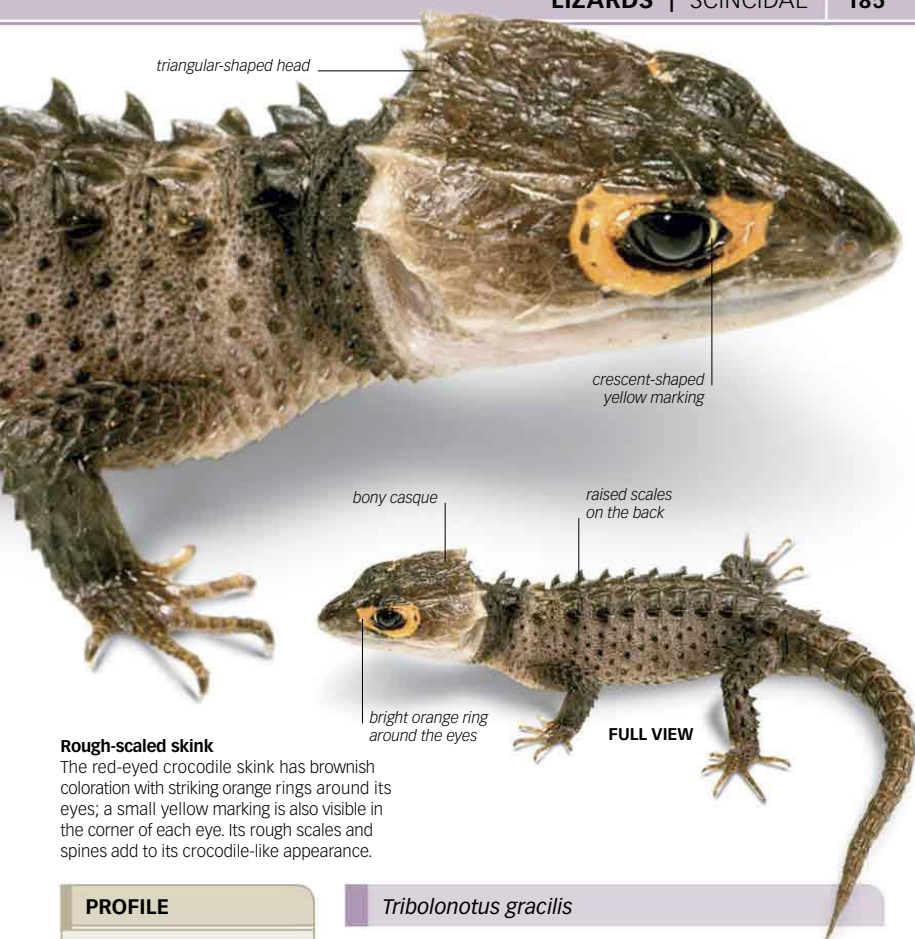
-  Australia
-  Dry woodland and desert scrub
-  30–35 cm (12–14 in)
-  Live-bearing
-  1–4
-  Diurnal
-  Not assessed

*Tiliqua rugosa*

## STUMPY TAIL LIZARD

**A large, stocky skink**, the stumpy tail lizard has many alternative common names, including pinecone lizard, sleepy lizard, and shingleback. A unique and distinctive species, it has very large keeled scales, a large head, and a short, blunt tail. There is a lot of colour variation throughout its range, and a number of subspecies are recognized. One of these, *T.r. konowi*, is restricted to Rottnest Island, western Australia, and is nearly extinct.

The stumpy tail lizard feeds on slow-moving invertebrates such as snails and insects, and will also eat carrion and vegetable material. Remarkably for a lizard, it appears to mate for life, remaining together throughout the breeding season and even after the young are born; both parents also play a part in guarding the young. These slow-moving lizards are often killed by traffic where their habitat borders a road.



### Rough-scaled skink

The red-eyed crocodile skink has brownish coloration with striking orange rings around its eyes; a small yellow marking is also visible in the corner of each eye. Its rough scales and spines add to its crocodile-like appearance.

### PROFILE

-  New Guinea
-  Forest and plantations
-  15–20 cm (6–8 in)
-  Egg-laying
-  1
-  Crepuscular
-  Not assessed

*Tribolonotus gracilis*

## RED-EYED CROCODILE SKINK

This skink is one of several members of the genus *Tribolonotus* found in the New Guinea region. The most arresting feature of this species is the bright orange ring around its eyes and its bony, triangular head with a row of blunt spines protruding back over its neck. The red-eyed crocodile skink derives its common name from the three rows of large, heavily keeled scales that run down its back; this distinguishes it from most other skinks, which have smooth, shiny scales.

The crocodile skink has a secretive lifestyle, sheltering under rotting logs or plantation debris, sometimes partially submerged in water, and emerging in the evening and early morning to hunt. It mainly preys on insects and other invertebrates. If grasped or picked up, this skink screeches loudly. Little is known of its natural history, but the female lays a single large egg.



**Yellow spots**

Found in the rainforests of Central America, this dark brown slender night lizard has distinctive yellow spots on its flanks and chin.

raised tubercles

dark bars on  
the lip scales

conspicuous  
yellow spots

snake-like  
head

FULL VIEW

**PROFILE**

-  Central America
-  Rainforest
-  15–22 cm (6–9 in)
-  Live-bearing
-  5–6
-  Nocturnal
-  Least Concern

*Lepidophyma flavimaculatum*

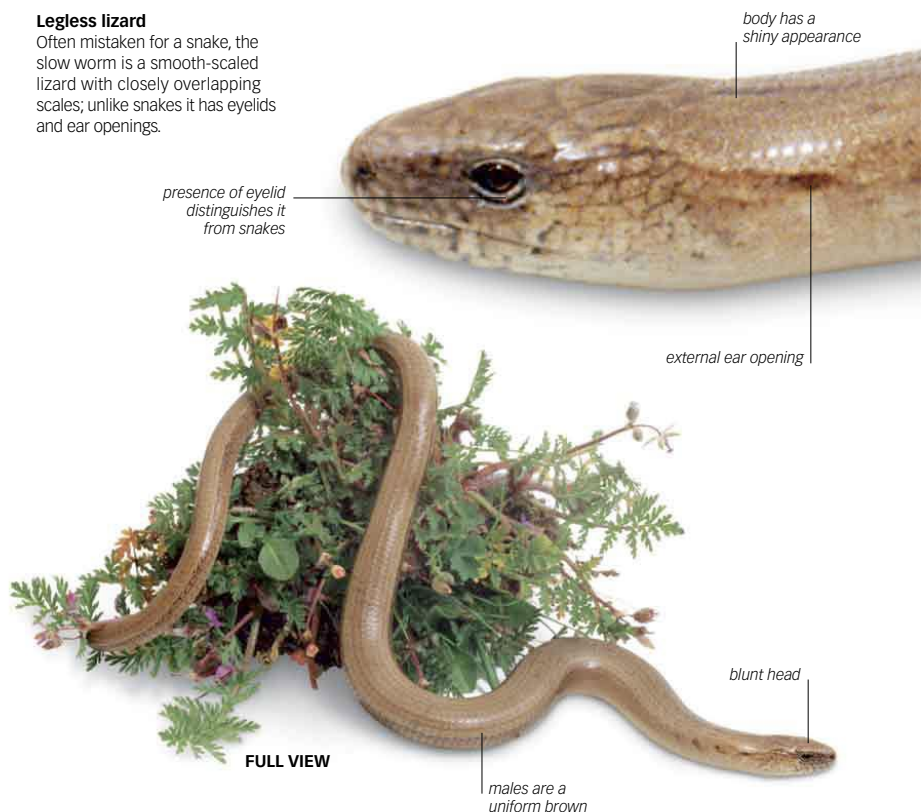
## YELLOW-SPOTTED NIGHT LIZARD

**Like all night lizards**, yellow-spotted lizards are small with granular scales above and rectangular scales on the underside. Their back is covered with small pointed tubercles scattered among the scales. Like geckos, they lack eyelids; instead, they have a large scale covering their eyes, which is shed with the rest of the skin.

The yellow-spotted night lizard is a tropical species that lives on the forest floor under rotting logs and other forest debris, and it is occasionally found in caves or in crevices between the building blocks of ancient ruins. They prey on small insects and spiders. Like the other members of their family, females give birth to live young, but this species differs in having parthenogenic (all-female) populations in the south of its range. Other populations, however, have normal bisexual reproduction.

**Legless lizard**

Often mistaken for a snake, the slow worm is a smooth-scaled lizard with closely overlapping scales; unlike snakes it has eyelids and ear openings.

**PROFILE**

-  Europe and parts of the Middle East
-  Moist, grassy banks; less common in other habitats
-  Up to 50 cm (20 in)
-  Live-bearing
-  3–12, occasionally more
-  Diurnal
-  Not assessed

*Anguis fragilis*

## SLOW WORM

**The slow worm is a legless lizard** that is very common in places, especially where grass and dense vegetation grow. Although these lizards are sometimes seen in the open, they normally bask under flat rocks or other debris, usually on south-facing slopes. Slow worms may occur within city boundaries by spreading along railway embankments. Males are plain brown, while females and juveniles have dark sides and a thin dark line running down their back. Females bask to speed up the development of their young, giving birth at the end of summer.

Slow worms feed mostly on slugs and earthworms, but may also eat insects and small lizards, grasping them firmly in their mouth and manoeuvring them into a convenient position to be swallowed. They themselves escape predators by discarding their tail readily, although the replacement tail that grows is much shorter than the original.

## PROFILE

-  S.E. Europe and parts of W. Asia
-  Dry fields and open woodland
-  Up to 1.4 m (4½ ft)
-  Egg-laying
-  6–10
-  Diurnal
-  Not assessed

## Long lizard

Also known as the scheltopusik, the European glass lizard has a distinctive fold of skin along each side of its incredibly long body as well as movable eyelids. It is often active after rain, feeding on the snails that emerge.



FULL VIEW

paler head  
and underside

fold along each  
side of the body

visible eyelids



## SIMILAR SPECIES



**Slender glass lizard**  
(*Ophisaurus attenuatus*)

Smaller American counterpart; much more likely to break its tail if it is restrained

*Pseudopus apodus*

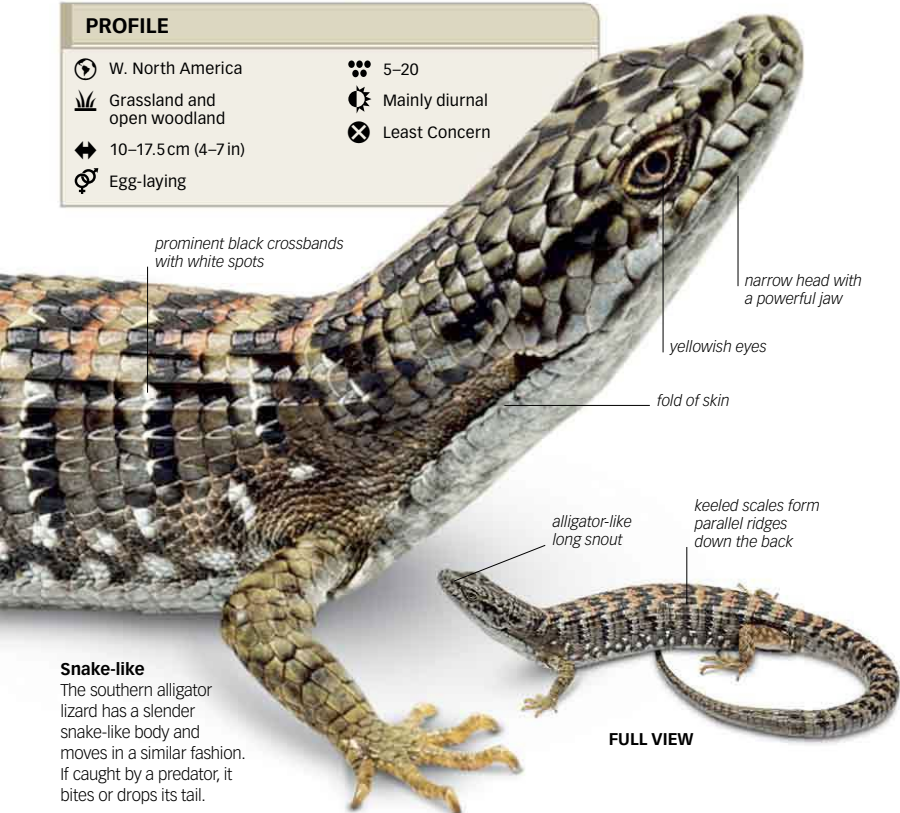
## EUROPEAN GLASS LIZARD

**The European glass lizard** is a large, legless lizard with a brown or brown and buff body, large head, and a prominent fold along each flank. Some individuals have vestigial legs on each side of the cloaca, but these are often too small to be easily visible. Unlike snakes, this species has eyelids and its body is stiff, not supple like that of a snake. Juveniles are grey with dark brown crossbars, and could be mistaken for a different species.

A common and conspicuous lizard in suitable habitat, it occurs near roads, villages, and cultivated fields, and feeds on snails, large insects, and the occasional young mouse or bird. In captivity, these lizards even eat strips of liver or meat. If caught, it spins wildly and attempts to smear its captor with faeces. As a last resort, it may even discard its tail, leading to the myth that the lizard can shatter like glass and later reassemble itself.

## PROFILE

-  W. North America
-  Grassland and open woodland
-  10–17.5 cm (4–7 in)
-  Egg-laying
-  5–20
-  Mainly diurnal
-  Least Concern



## Snake-like

The southern alligator lizard has a slender snake-like body and moves in a similar fashion. If caught by a predator, it bites or drops its tail.

FULL VIEW

## SIMILAR SPECIES



**Northern alligator lizard (*Elgaria coerulea*)** Similar but darker in colour; occurs further north and gives birth to live young

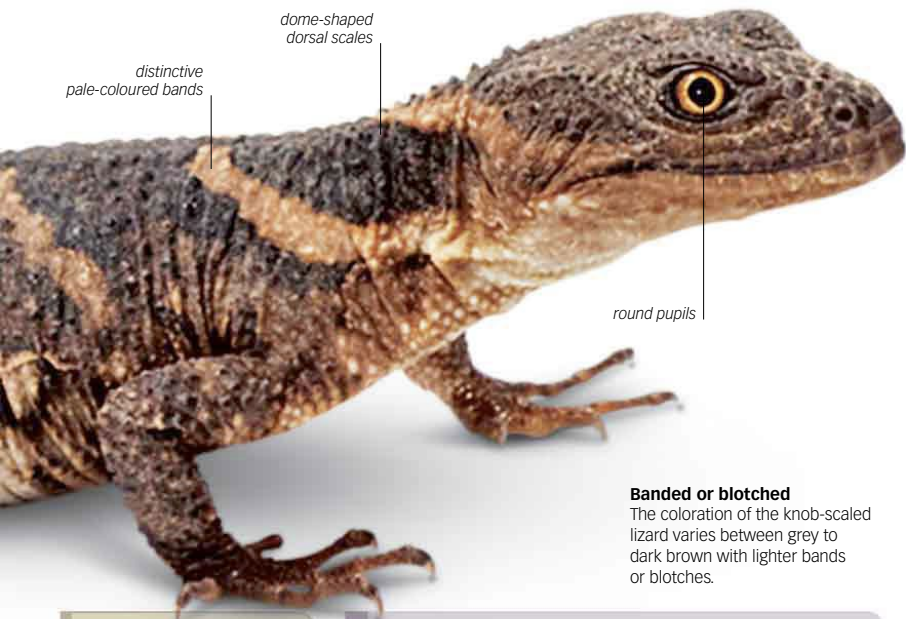
*Elgaria multicarinata*

## SOUTHERN ALLIGATOR LIZARD

**The southern alligator lizard** has a long, slender body with relatively short legs. It has a distinctive fold of skin along each side and squarish scales on its back. Its overall colour can vary, but the crossbands of black with white spots are characteristic. This lizard shuns hot, dry places and retreats beneath logs and piles of rubbish in mid-summer. It may even move to small valleys and gullies, where streams maintain a locally high humidity even in the driest months, and may enter the water to escape predators.

This lizard feeds on slugs, insects, spiders, including venomous black widows, centipedes, scorpions, and molluscs, which it crushes with its powerful jaws. It may even climb into bushes in search of prey. The female southern alligator lizard lays eggs and each female may produce two or three clutches in a year. Some related species give birth to live young.





#### Banded or blotched

The coloration of the knob-scaled lizard varies between grey to dark brown with lighter bands or blotches.

#### PROFILE

-  Central America
-  Tropical forest
-  12–24 cm (4¾–9½ in)
-  Live-bearing
-  2–7
-  Diurnal
-  Vulnerable









*Xenosaurus grandis*

## KNOB-SCALED LIZARD

**This solitary lizard** belongs to a small family that contains only 10 species, all members of the same genus. They are characterized by the rounded, domed scales that cover their dorsal surface, while the scales on their underside are small and granular. They live in forests, but rock crevices are essential to their lifestyle; each lizard lives in a separate crevice and will defend it from others. Their flattened body shape allows them to squeeze into narrow spaces from which they ambush their prey, darting out quickly to catch insects and small vertebrates, including other lizards.

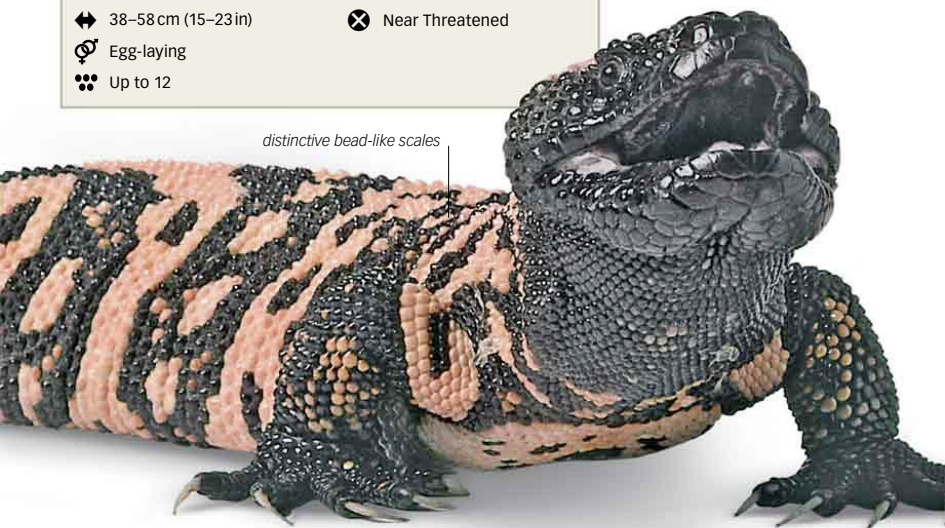
Female knob-scaled lizards give birth to small litters of relatively large young after a long gestation period of about nine months. Numbers are thought to be declining due to habitat destruction, mainly through land clearance for development and industry, but populations may linger on in disturbed habitats for a while.

## PROFILE

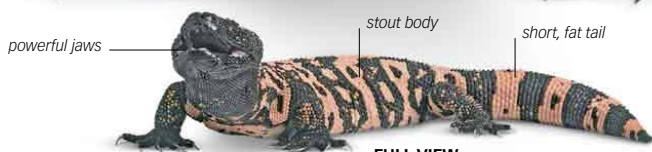
- |  |  |
|--|--|
|  S.W. USA and N.W. Mexico |  Mainly nocturnal     |
|  Desert                   |  Dangerously venomous |
|  38–58 cm (15–23 in)      |  Near Threatened      |
|  Egg-laying               |  |
|  Up to 12                 |  |

**Beaded body**

The Gila monster's black and pink markings, together with its bead-like scales, make it an unmistakable lizard.



distinctive bead-like scales



powerful jaws

stout body

short, fat tail

FULL VIEW

## SIMILAR SPECIES


**Beaded lizard**  
*(Heloderma horridum)*

Larger with cream and brown markings, except in the humid regions of southern Mexico where it may be uniform black

*Heloderma suspectum*

## GILA MONSTER

**The Gila monster** is one of only two venomous lizards in the world. Unlike venomous snakes, its venom glands, and the long fangs that puncture the skin and allow the venom to penetrate, are situated in the lower jaw. Gila monsters bite to defend themselves, striking rapidly and biting down hard. The venom has an immediate and very painful effect, and can be fatal to people in rare cases.

The Gila monster feeds on a wide range of terrestrial animals, including invertebrates, rodents, and nestling birds. It also eats bird and reptile eggs. The Gila monster is rarely seen on the surface, remaining underground in burrows most of the time to avoid freezing temperatures during winter and scorching heat in summer. When underground, it relies on the fat stored in its large bulbous tail. Mating occurs above ground, and the female buries her eggs, which hatch the following spring. The offspring have the same coloration and markings as their parents.

## PROFILE

-  Australia
-  Desert, grassland, and open woodland
-  1.2–1.6 m (4–5½ ft)
-  Egg-laying
-  6–17
-  Diurnal
-  Not assessed

## Spots and flecks

Gould's goanna is a large, alert lizard. Its coloration ranges from brown to greenish grey with numerous yellowish spots and dark flecks.

black stripe through each eye

long, powerful limbs

long whip-like tail

prominent yellow spots

narrow snake-like head

FULL VIEW

## SIMILAR SPECIES



**Ridgetail monitor**  
(*Varanus acanthurus*)

Smaller; lives in rocky areas, sheltering in crevices and old termite mounds

*Varanus gouldii*

## GOULD'S GOANNA

**This lizard is also known** as the sand goanna – “goanna” being the local name for all monitors in Australia. It is Australia’s most common monitor, found almost everywhere in mainland Australia. Gould’s goanna has an excellent sense of smell, which helps it locate prey; it often walks with its head held down so that its nose is close to the surface, and uses its long, forked tongue to “taste” the air in the same way as a snake. It excavates and feeds on lizards and small mammals hiding in burrows, as well as buried lizard eggs. It also eats carrion, including dead animals crushed by traffic.


Gould’s goannas breed in the summer season, after which the pair separate and forage independently. The females lay their eggs in termite nests, which provide a stable environment for the eggs to develop.



**Desert form (*V.g. flavirufus*)**

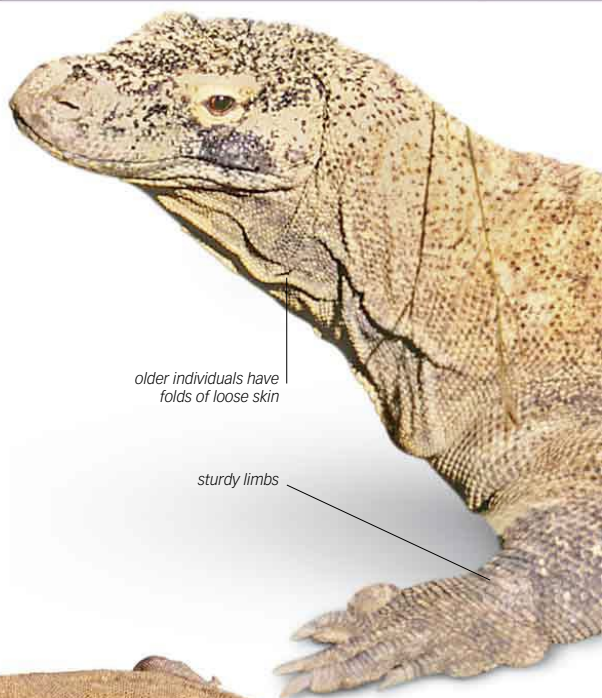
Found in deserts, this subspecies is more reddish in colour and lays fewer eggs than the typical form.

## PROFILE

-  Indonesia
-  Grassland and open woods
-  2.5–3.1m (8¼–10ft)
-  Egg-laying
-  8–27
-  Diurnal
-  Vulnerable

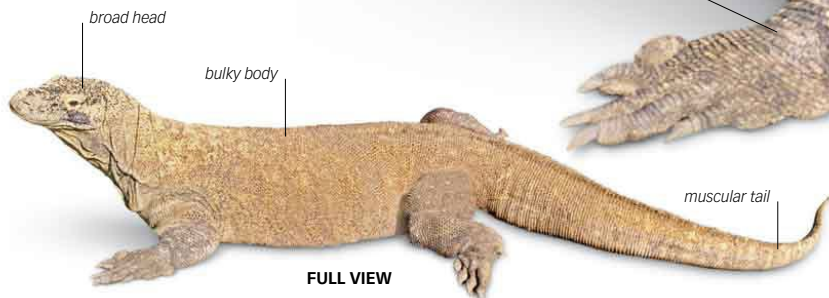
## Giant lizard

The Komodo dragon is typically greyish brown, but juveniles are more brightly patterned. It has a broad head and powerful tail that it uses as a weapon. Despite its immense size, it can run 18 kph (11 mph) in short bursts.



older individuals have folds of loose skin

sturdy limbs



FULL VIEW

## SIMILAR SPECIES



**Asian water monitor**  
(*Varanus salvator*) Another large species; found along waterways in Southeast Asia

*Varanus komodoensis*

## KOMODO DRAGON

**This is the largest and heaviest lizard** in the world. It lives on the island of Komodo and a few small neighbouring islands, feeding mainly on large mammals, including goats and cattle that were introduced to the islands by human colonizers. A big kill is often attended by a large number of Komodo dragons, all keen to have a share of the spoils; the Komodo dragon can eat up to 80 per cent of its own body weight in a single meal. Humans have also been ambushed and eaten.

Males fight over females, which lay their eggs in burrows. The eggs take about nine months to hatch. The young are more brightly coloured than the adults, and have an arboreal lifestyle.










## Forked tongue

Komodo dragons locate their food using their forked tongue to “taste” the air. Their saliva is rich in toxic bacteria that infects and eventually kills the prey even if it escapes.

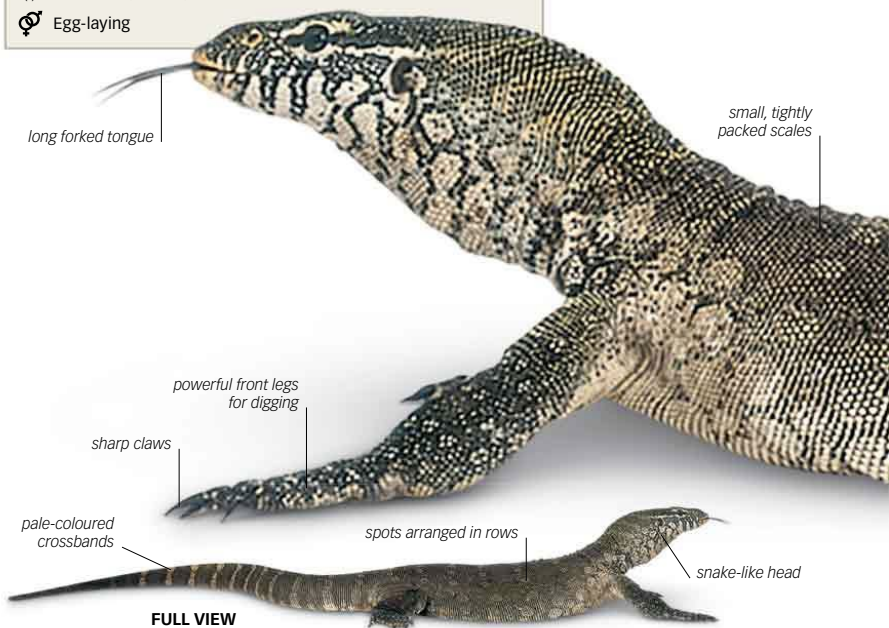


## PROFILE

-  Africa (south of the Sahara)
-  Marshes, lakes, and rivers
-  1.8–2.2 m (6–7½ ft)
-  Egg-laying
-  20–60
-  Diurnal
-  Not assessed

## Spots and crossbands

The greyish brown Nile monitor has a striking pattern of pale-coloured spots arranged in rows on its body and crossbands on its tail.



FULL VIEW

## SIMILAR SPECIES



**White-throated monitor**  
(*Varanus albigularis*)

Shorter, but stockier in build; occurs in the same region but prefers drier habitats

*Varanus niloticus*

## NILE MONITOR

The **semi-aquatic monitor lizard** has a slender body, pointed head, and a long, flat tail that it uses to help propel itself through the water. It is most often seen when foraging among reeds and other marginal vegetation along the edges of slow-moving rivers and lakes, and may emerge to bask on an exposed section of a bank or on rocks. The Nile monitor hibernates in communal dens in the cooler parts of its range, and feeds on most types of prey, including crabs, frogs, fish, and birds, and, in some places, sea turtles and crocodile eggs.

The female lays her eggs in termite mounds during the wet season, digging a hole when the clay is damp. The termites then repair the hole and the monitor eggs develop under the stable conditions inside the mound, hatching after 6–12 months. The hatchlings remain in the nest until fresh rains have softened the soil again, when they dig their way out.

### Arboreal lifestyle


The emerald tree monitor is well equipped for its arboreal way of life. It has a slender body that enables it to rest on narrow branches, and sharp claws and a long prehensile tail for gripping.

black scales  
arranged in bands

external eardrum

long toes with  
claws for climbing

### PROFILE

-  New Guinea
-  Rainforest and mangrove forest
-  0.8–1 m (2½–3¼ ft)
-  Egg-laying
-  2–5
-  Diurnal
-  Not assessed

*Varanus prasinus*

## EMERALD TREE MONITOR

**Also known as the green tree monitor**, this is an arboreal species with a slender body, long toes and claws for climbing, and a long prehensile tail that acts as a fifth limb. Its green coloration camouflages it among the leaves, but if threatened, the emerald tree monitor uses its whip-like tail to lash out at predators. It feeds mainly on invertebrates such as bush crickets, molluscs, and stick insects that share its habitat, and also eats rodents, frogs, and other lizards if the opportunity arises.

The female lays a small clutch of eggs in arboreal termite nests, where they are protected from predators and maintained at an even temperature. The eggs take about 160–190 days to hatch, and the young monitors feed on adult and larval termites at first. They are thought to take 2–3 years to reach sexual maturity, but many aspects of their natural history are poorly known.

extremely  
long tail



#### Crocodile-like

The Chinese crocodile lizard is so-called because of the enlarged bony scales along its back and tail like those found on a crocodile.

#### PROFILE

-  S. China
-  Alongside mountain streams and rivers
-  35–45 cm (14–18 in)
-  Live-bearing
-  2–7
-  Diurnal
-  Not assessed

*Shinisaurus crocodilurus*

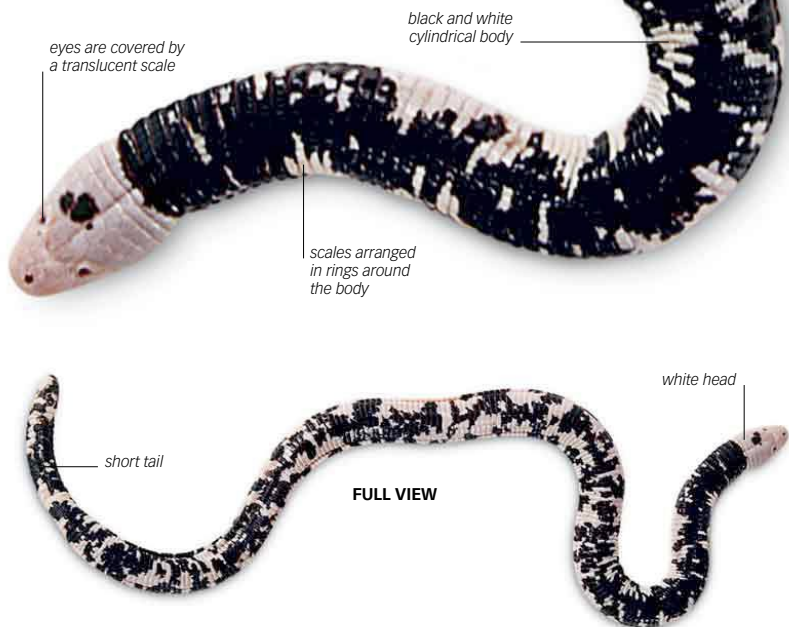
## CHINESE CROCODILE LIZARD

**This species is the only member of its family.** It lives in the undergrowth at the edges of cold mountain streams and rivers, sometimes basking on overhanging branches, but quickly dropping into the water to escape predators. A sluggish lizard, it may remain in the same place for many days, often half-submerged in the shallow backwater of a stream. It swims well and can remain underwater for 30 minutes or more.




Males are sometimes more colourful than females, perhaps only in the breeding season. They have bright orange markings on their throats and bellies, whereas females are grey. The lizard feeds on snails, crustaceans, fish, and insects, and has powerful jaws for crushing its prey, although, in keeping with its low metabolism, it eats very little. This lizard hibernates for 3–4 months. Mating takes place in mid-summer and the females give birth the following spring. The juveniles are relatively large.

### Striking pattern

This South American species has a conspicuous black and white mottled coloration. With its long and slender body and robust head, it is well adapted for a burrowing lifestyle.



### PROFILE

-  South America
-  Subterranean in rainforests
-  30–50 cm (12–20 in)
-  Egg-laying
-  Unknown
-  Unknown
-  Least Concern

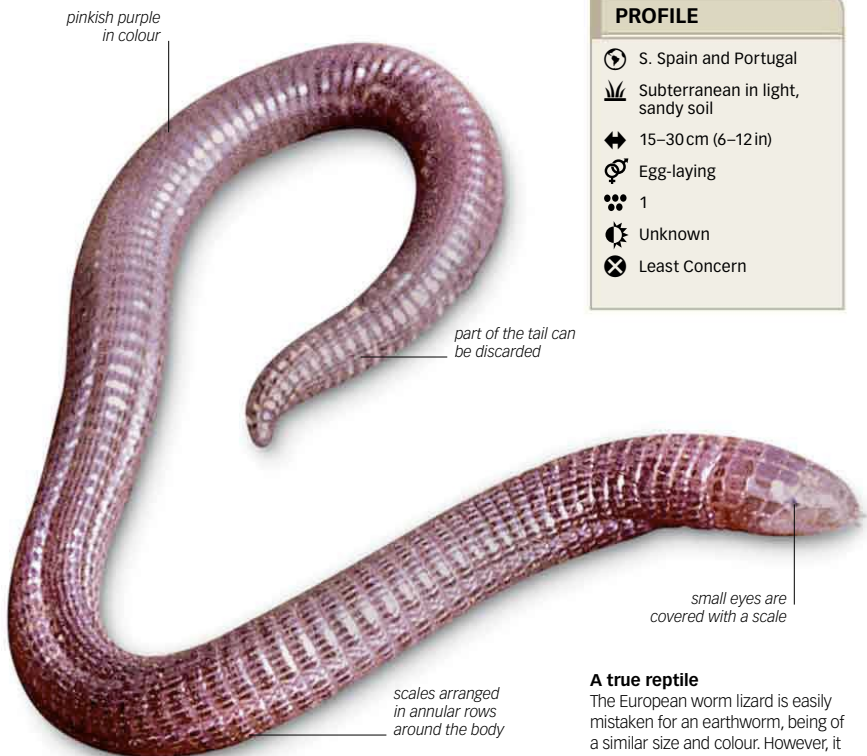
*Amphisbaena fuliginosa*

## SPECKLED WORM LIZARD

**One of the largest amphisbaenians**, this species is characterized by a black and white pattern that sets it apart from all other species. A burrowing reptile, the speckled worm lizard spends most of its time in tunnels that it makes itself, using its reinforced skull as a ram to push through the soil. It is preyed upon by coral snakes, which are ideally suited to hunting in burrows and tunnels.

Armed with powerful jaws, this species tackles a variety of prey. It can also be found in ant nests, especially those of leafcutter ants, where it is thought to feed on the ants and their larvae, as well as other small vertebrates that cohabit the nests. The stable temperatures inside the nests may also provide ideal conditions in which to lay its eggs, but very little is known about its reproductive biology. Although it is primarily a rainforest species, the speckled worm lizard adapts well to altered habitats, and occurs in plantations and piles of rotting sawdust from rural sawmills.





## PROFILE

- S. Spain and Portugal
- Subterranean in light, sandy soil
- 15–30 cm (6–12 in)
- Egg-laying
- 1
- Unknown
- Least Concern

**A true reptile**

The European worm lizard is easily mistaken for an earthworm, being of a similar size and colour. However, it belongs to a poorly known group of reptiles called amphisbaenians.

## SIMILAR SPECIES

thicker body than the European species


**Zarudny's worm lizard**  
**(*Diplometopon zarudnyi*)**

A spade-headed worm lizard from the Arabian Peninsula; lives in loose, sandy soil

*Blanus cinereus*

## EUROPEAN WORM LIZARD

**Despite their name**, worm lizards are neither worms nor lizards. They have narrow pointed heads and small eyes embedded under the skin, while their bodies consist of a series of rings, each made of a number of rectangular scales. This species occurs in a variety of habitats, but only if the soil is friable and sandy or with ample humus, so that it can tunnel easily. Pine forests are favoured, but it is also found in open fields and meadows. The worm lizard rarely emerges on to the surface and then too only during heavy rain, usually at night, or if its burrow becomes inundated. However, it is very common and can be found by turning rocks or logs. When exposed in this way, it quickly disappears down a ready-made tunnel.

Little is known about its natural history, but it is thought to eat soft-bodied invertebrates. Females lay a single elongated egg, but the details of incubation are unknown.

**Distinctively different**

One of only three worm lizards with limbs, the five-toed worm lizard is well adapted for a burrowing lifestyle; it has powerful forelimbs equipped with sharp claws for digging and a rounded, robust head.

**PROFILE**

-  Mexico (Baja California)
-  Desert
-  17–24 cm (6½–9½ in)
-  Egg-laying
-  1–4
-  Nocturnal
-  Least Concern

*Bipes biporus*

## FIVE-TOED WORM LIZARD

**Also called the Mexican mole lizard** or ajolote, this unusual reptile has a pale pink body and a pair of short, powerful legs located just behind the head, but no hind legs. It burrows in loose, sandy soil in dry lowlands and builds extensive tunnels radiating from a central point, such as a shrub or the base of a rotting fence post or stump, where termites are present in large numbers.

The five-toed worm lizard comes close to the surface at night and early in the morning, moving deeper during the day to avoid high temperatures. It rarely emerges on to the surface, but may appear following heavy rain or if the ground is artificially irrigated. It is ungainly on the surface and moves by using a combination of a caterpillar-like crawl supplemented by alternate walking with its limbs. Little is known of its reproductive behaviour, but females lay 1–4 eggs in June and July. Although harmless, the species is greatly feared by local people.

# TURTLES AND TORTOISES

Turtles and tortoises are instantly recognizable by their distinctive shells. They live on land as well as in freshwater and marine habitats, although all species lay their eggs on land. Terrestrial species are known as tortoises, freshwater species as turtles or terrapins, and those that live in the sea as marine turtles.

## SHELLED VERTEBRATES

Tortoises tend to have a high domed shell, are heavily armoured, and can often pull their limbs, head, and tail into their shell. Aquatic species, on the other hand, are often less well protected with thinner and flatter shells, having traded armour-plating for better speed and agility. The shells of many species are intricately patterned.

These reptiles range in size from 10–250 cm (4–98 in), with marine turtles and the giant land tortoises from islands in the Pacific and Indian oceans being the largest. Most, however, measure 15–45 cm (6–18 in) along their shells.

Although found worldwide, turtles and tortoises are more numerous in warmer regions. They may be herbivorous or carnivorous, with some switching diets as they grow.

ORDER	TESTUDINES
FAMILIES	14
SPECIES	328

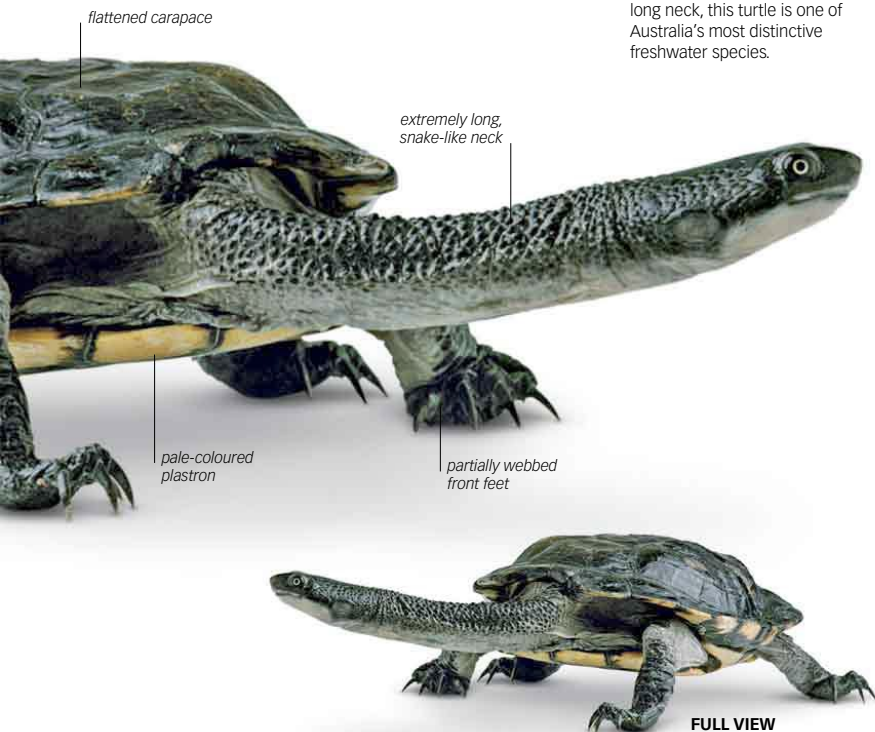
## HIDDEN- AND SIDE-NECKED SPECIES

Taxonomically, turtles and tortoises are placed into two major suborders, based on the way they withdraw their head into their shell. The hidden-necked species (Cryptodira) retract their heads by bending their necks into a vertical S-shaped curve, and the side-necked species (Pleurodira) protect their heads by bending their necks horizontally to one side. The Cryptodira are further divided into 11 families and the Pleurodira into three.

### Streamlined swimmers

Aquatic turtles, such as the yellow-bellied sliders shown here, are more streamlined than terrestrial species.



**Elongated neck**

With its small head and extremely long neck, this turtle is one of Australia's most distinctive freshwater species.

**PROFILE**

-  E. Australia
-  Slow-moving rivers and lakes
-  Shell up to 25 cm (10 in)
-  Egg-laying
-  6–23
-  Diurnal
-  Least Concern

*Chelodina longicollis*








## COMMON SNAKE-NECKED TURTLE

**Snake-necked turtles** and their close relatives protect their head by swinging their neck to one side rather than withdrawing it straight into their shell, and are collectively known as side-necked turtles. In the case of the common snake-necked turtle, the neck can be as long as the carapace, and is used to strike at prey, including fish, tadpoles, and invertebrates. The low carapace is an adaptation to an aquatic way of life.

Migrations are sometimes brought on by droughts, as the turtles' pools and swamps dry out and they seek more favourable habitats. Failing this, they aestivate by digging down into leaf litter or soil. Female snake-necked turtles can lay up to three clutches of eggs each year, choosing a suitable site that may be some distance from the water's edge. In some places, the nests are dug up by introduced red foxes.



## PROFILE

-  N. South America
-  Aquatic, in slow-moving bodies of water
-  Shell 30–45 cm (12–18 in)
-  Egg-laying
-  12–28
-  Diurnal and nocturnal
-  Least Concern

**Coloured for camouflage**

The colour and outline of this unusual-looking turtle make it very difficult to spot. It has a rough, knobby shell and skin flaps that may enable it to detect moving prey.

**Hatchling**

The hatchlings are brightly coloured with pink undersides. As they mature, the colour fades to yellows and browns.

*Chelus fimbriatus*

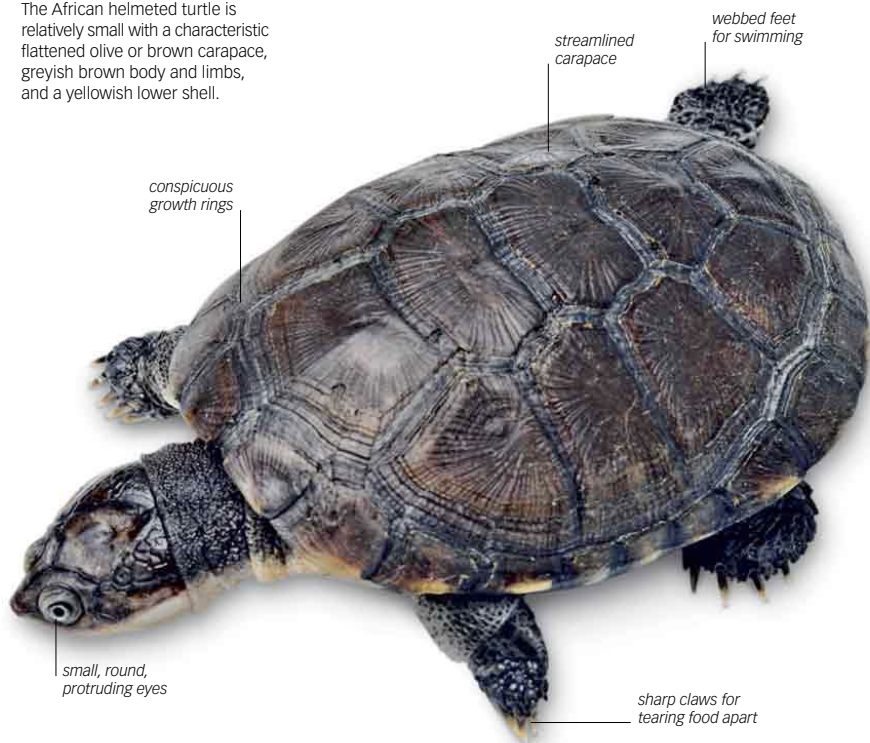
## MATAMATA

**An extremely unusual member** of the side-necked turtle family, the matamata has a wide, brown, bark-like carapace covered with rough scutes and three distinct keels. Its plastron is reduced in size, and it cannot withdraw its head or limbs completely. The head is flattened and triangular, with flaps of skin jutting out on each side; there are additional flaps and frills on its neck. The snout is drawn out into a long proboscis, with the nostrils at its tip. Its shape and colour provide excellent camouflage as it lurks on the bottom of a quiet lake or backwater, waiting for fish to swim within range. It catches them by suddenly lunging forward with open gape, causing water and fish to rush into its mouth.

This species is completely aquatic, resting in shallow water where it can breathe by extending its neck and breaking the surface with the tip of its snout. Females, however, need to come out of the water to lay their eggs on mud banks.

**Brownish coloration**

The African helmeted turtle is relatively small with a characteristic flattened olive or brown carapace, greyish brown body and limbs, and a yellowish lower shell.

**PROFILE**

-  Mainland Africa and Madagascar
-  Ponds, lakes, and rivers
-  Shell 20–30 cm (8–12 in)
-  Egg-laying
-  10–30, occasionally more
-  Diurnal
-  Least Concern

*Pelomedusa subrufa*

## AFRICAN HELMETED TURTLE

**A versatile species**, the helmeted turtle occurs in almost any body of water, from small pools and puddles to water holes and extensive swamps and lakes. Although it walks long distances in search of new pools, it tends to be very aquatic once settled in a place, basking by floating on the surface or hauling out on to mud banks a few centimetres from the water. In the dry season, it digs down into the mud and aestivates until the following rainy season. Mating takes place in the water, and the female lays her eggs in a hole that she digs in the mud near water. The shells of the hatchlings are about 3 cm (1¼ in) long and are more circular than those of adults.

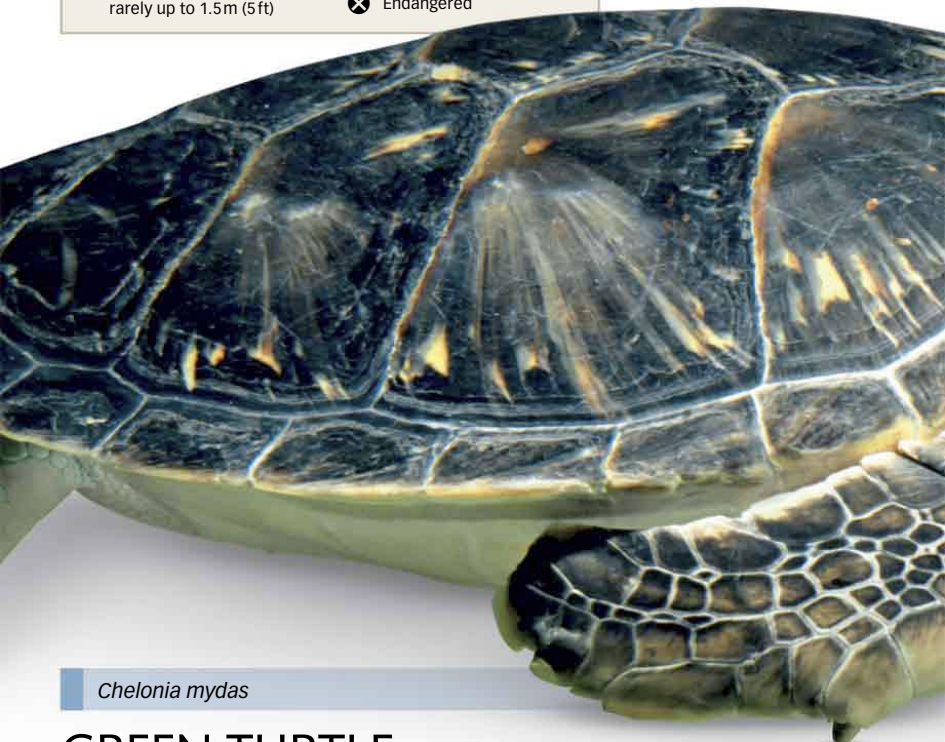
When threatened, the helmeted turtle dives to the bottom and buries itself in mud. If captured, it bites, scratches, and gives off a foul-smelling fluid from specialized musk glands. This species has a large appetite and eats a variety of prey as well as carrion.

## PROFILE

- |   |                        |
|---|------------------------|
| 📍 Tropical and subtropical oceans                 | 🥚 Eggs laid on beaches |
| 🌊 Marine  | 🐣 100–200              |
| 🕒 0.8–1.1 m (2½–3½ ft), rarely up to 1.5 m (5 ft) | 🌞 Mostly diurnal       |
|   | ⊗ Endangered           |

## Teardrop carapace

Seen from above, the green turtle's carapace is streamlined and shaped like a teardrop. The scales on its head have conspicuous white edges.



*Chelonia mydas*

## GREEN TURTLE

**This turtle is so-called** because of the layer of green fat between its shell and organs. The coloration of the turtle's shell is dark brown to black with lighter markings; hatchlings have mostly black shells. A very familiar sea turtle, two distinct populations occur in the Pacific and Atlantic oceans. Its nesting sites are scattered throughout the world, many on small islands, because they are often free from predators; some of the nesting sites have become a magnet for tourists.

Adult green turtles live in shallow water, often just offshore. They migrate to breeding sites en masse and hundreds congregate beyond the beaches; the males to find mates, and the females to wait for an opportunity to come ashore to lay their eggs. Most of the eggs and

hatchlings are eaten by a host of predators, but the surviving hatchlings enter the sea and effectively disappear for many years, living a pelagic life and feeding on small aquatic animals. As they approach maturity, their diet changes and they gravitate towards land, often to the same places where they hatched 15–20 years before.

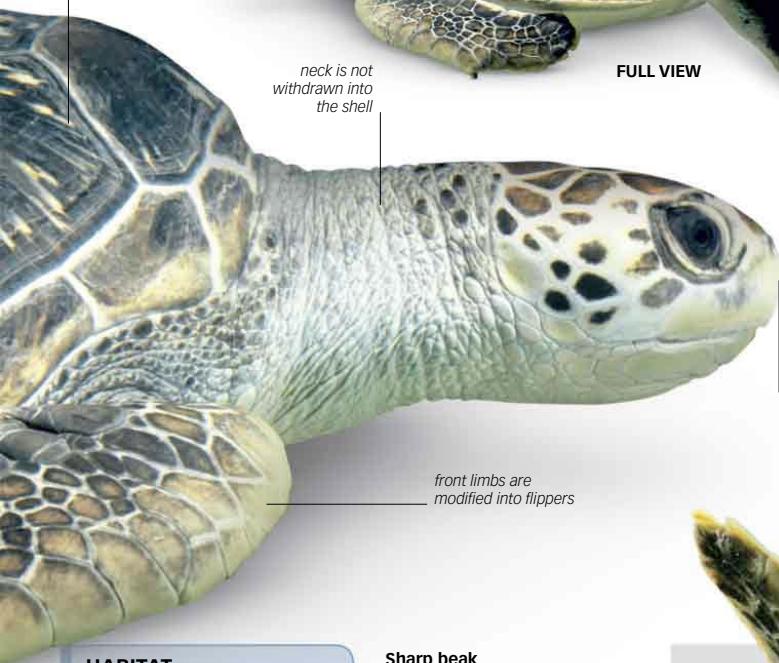
Green turtles and their eggs are legally protected. Many schemes have been established to harvest and hatch their eggs artificially so that juveniles can be given a head start. They are released only when they are past their most vulnerable stage. By the time they are subadults, their only enemies are sharks and people.

*pale lines radiate from the centre of each scute*



**FULL VIEW**

*neck is not withdrawn into the shell*



*blunt snout*

*front limbs are modified into flippers*

## HABITAT

Powerful swimmers, adult green turtles live in shallow coastal waters and coral reefs, where their preferred food, eel grass, can be found in abundance. Until they reach this stage in their life, young green turtles drift in open water, feeding on small animals, and are hardly ever seen.



### Superb swimmer

The green turtle's swimming prowess helps it to explore reefs in search of food.

### Sharp beak

The turtle's mouth is shaped like a beak, and its edges are sharp enough to crop eel grass and other plants.



### Paddle-like flipper

The front flippers are large and especially powerful, giving the turtle a surprising burst of speed while swimming.



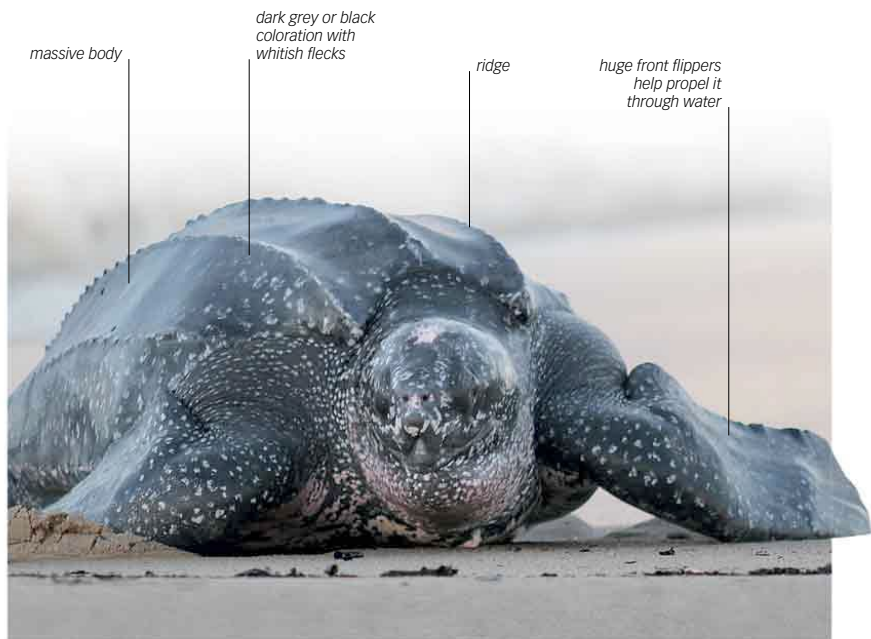
### Plastron


The underside of a green turtle is smooth, pale-coloured, and unmarked.



**Leathery shell**

Unlike other sea turtles, which have a bony shell, the leatherback's carapace has a leathery covering embedded with numerous bony plates, called osteoderms.

**PROFILE**








-  Global
-  Open oceans
-  1–1.75 m (3¼–5½ ft), rarely up to 3 m (9¾ ft)
-  Eggs laid on beaches
-  50–160, average 110
-  Diurnal and nocturnal
-  Vulnerable

*Dermochelys coriacea***LEATHERBACK TURTLE**

**This is the largest turtle** and the fourth-largest reptile, after three species of crocodilians. Leatherbacks have been found well outside the tropics, even reaching the Arctic Circle on occasions. They are able to tolerate the cold by generating heat from their muscle activity, raising their body temperature significantly above that of their surroundings. In addition, a thick layer of adipose fat insulates them, and their great bulk also helps them to retain core temperature. Most remarkably, they subsist almost entirely on jellyfish; shoals are tracked on monumental journeys, some of which take them up to 9,700 km (6,000 miles). These turtles also end up swallowing discarded plastic bags that have found their way into the sea, mistaking them for jellyfish, sometimes with fatal consequences.

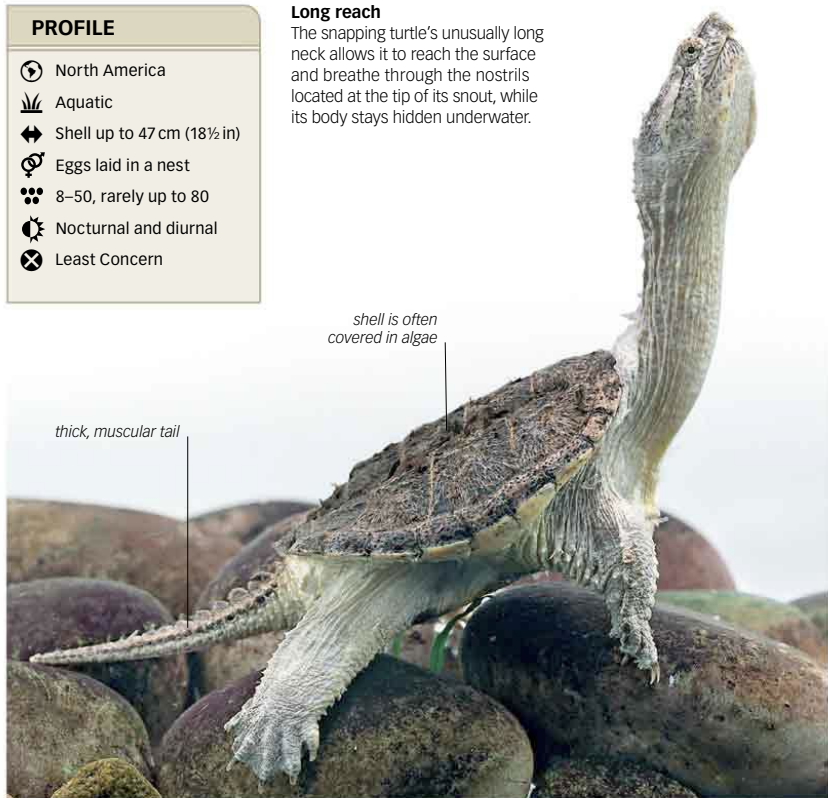
Leatherback turtles use breeding sites throughout the world but predation by humans and feral dogs, as well as pollution and habitat changes have reduced their numbers by 50–75 per cent in the last 30 years.

## PROFILE

-  North America
-  Aquatic
-  Shell up to 47 cm (18½ in)
-  Eggs laid in a nest
-  8–50, rarely up to 80
-  Nocturnal and diurnal
-  Least Concern

## Long reach

The snapping turtle's unusually long neck allows it to reach the surface and breathe through the nostrils located at the tip of its snout, while its body stays hidden underwater.



## SIMILAR SPECIES

*Chelydra serpentina*

## COMMON SNAPPING TURTLE

**The snapping turtle**, or “snapper”, is widespread in North America, living in different types of water, including streams, ponds, and lakes. It sometimes travels long distances overland, however, and can be seen crossing busy roads; it is usually more aggressive when encountered on land than in the water.

This turtle is a bottom-dweller, preferring muddy waters, and often rests with its body hidden and neck outstretched. Over time, the carapaces of older individuals get covered with algae, enhancing their camouflage. The turtle has a smaller shell than would be expected in a turtle of this size and is unable to completely withdraw its head and limbs, hence, its main defence is intimidation. When threatened, it opens its mouth wide, showing its sharp, hooked bill, and strikes rapidly if necessary. This is also how it hunts, lying in wait for a meal to pass by. An omnivorous species, it eats some vegetation as well as fish, crustaceans, and carrion.

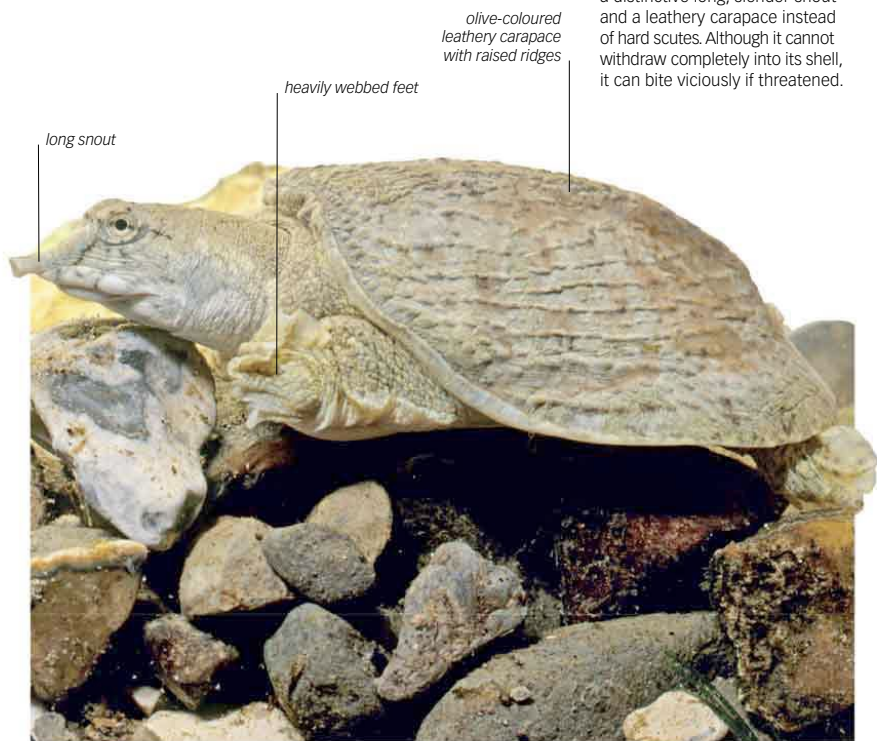



**Alligator snapping turtle (*Macrochelys temminckii*)**


One of the largest freshwater turtles in the world; has a more limited range in North America


**Powerful bite**


The Chinese soft-shelled turtle has a distinctive long, slender snout and a leathery carapace instead of hard scutes. Although it cannot withdraw completely into its shell, it can bite viciously if threatened.

**PROFILE**


 S. China and neighbouring countries; introduced elsewhere


 Aquatic; in quiet rivers and lakes, including brackish water

 Shell up to 30 cm (12 in)

 Egg-laying

 8–30

 Mostly nocturnal

 Vulnerable (in its natural range)

*Pelodiscus sinensis*

## CHINESE SOFT-SHELLED TURTLE

**Soft-shell turtles are distinct** from all others on account of their leathery “shell”, although this is a superficial covering overlying the bony shell beneath. The edges of the shell, however, form a soft, fleshy margin. All species are highly aquatic. The Chinese soft-shelled turtle has a long neck and a sharp beak. It has an extended snout, which it uses as a snorkel. The snout allows it to rest at the bottom, hidden under a thin layer of sand or mud, with its neck extended upwards and its nostrils breaking the surface. Mostly carnivorous, it feeds on fish, crustaceans, and aquatic invertebrates. It lies in wait for its prey and strikes swiftly. It also eats carrion.

A delicacy in China, these turtles are bred in large numbers on turtle farms. At least one million are produced every year for the food trade. As a result of their popularity as food, migrating people have taken soft-shelled turtles to other parts of the world.

## PROFILE

-  E. North America
-  Ponds, lakes, and rivers
-  Shell 10–14 cm (4–5½ in)
-  Egg-laying
-  1–9
-  Mostly nocturnal
-  Least Concern

sensory barbels  
on the chin

rounded, olive-brown  
to black carapace

beak is sharp enough  
to tear prey apart

FULL VIEW

**Worn-down shell**

As common musk turtles grow, the surface of their carapace wears down until, by the time they are adults, it is smooth and plain grey.

## SIMILAR SPECIES

*Sternotherus odoratus*

## COMMON MUSK TURTLE

**This species is also known as the stinkpot** on account of the unpleasant odour it releases when disturbed; this is produced by four musk glands situated along its flanks. Captive specimens, however, rarely discharge musk and become quite tame. A bottom-walker, the common musk turtle rarely swims in mid-water. Its diet consists of molluscs and carrion, further supplemented by small numbers of invertebrates, fish, and plants.

Mating takes place in water and can occur at almost any time of the year; if necessary, the female can store the sperm over winter and lay fertile eggs the following spring. Females lay small clutches of about 1–5 eggs (occasionally more), usually on soil underlying leaf litter or under logs or stumps. The hatchlings are very small, measuring just over 2 cm (¾ in) along their carapace. They are darker in colour and the stripes on their head are more sharply defined.

**Eastern mud turtle****(*Kinosternon subrubrum*)**

Olive-brown to black carapace;  
black spots on head and neck

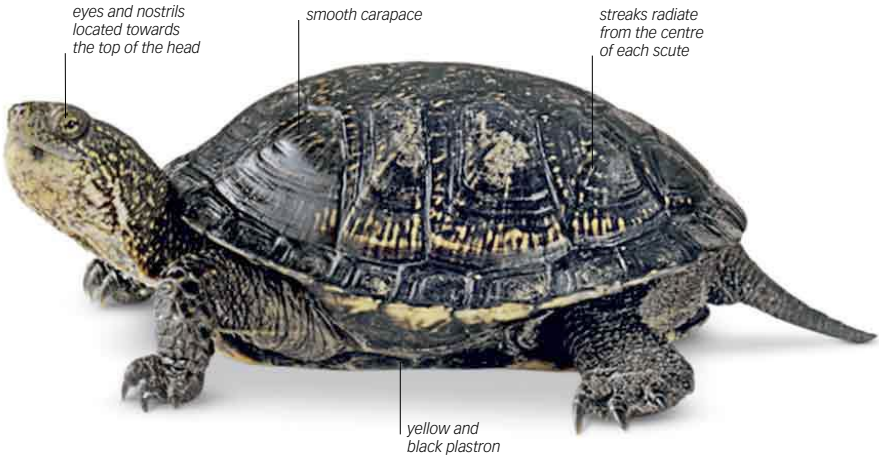


### PROFILE

- 📍 Most of Europe, W. Asia, and N. Africa
- 🌿 Large and small bodies of water with abundant vegetation
- ↔️ 20 cm (8 in) or more
- ♀️ Egg-laying
- ⬢ 3–12, rarely up to 18
- ☀️ Diurnal
- ⊗ Near Threatened

### Oval carapace

Adult European pond turtles have smooth, oval carapaces. The juveniles have more rounded shells and brighter markings.



### SIMILAR SPECIES



**Blanding's turtle**  
(*Emydoidea blandingii*)

An aquatic species from North America that occasionally moves about on land

### *Emys orbicularis*

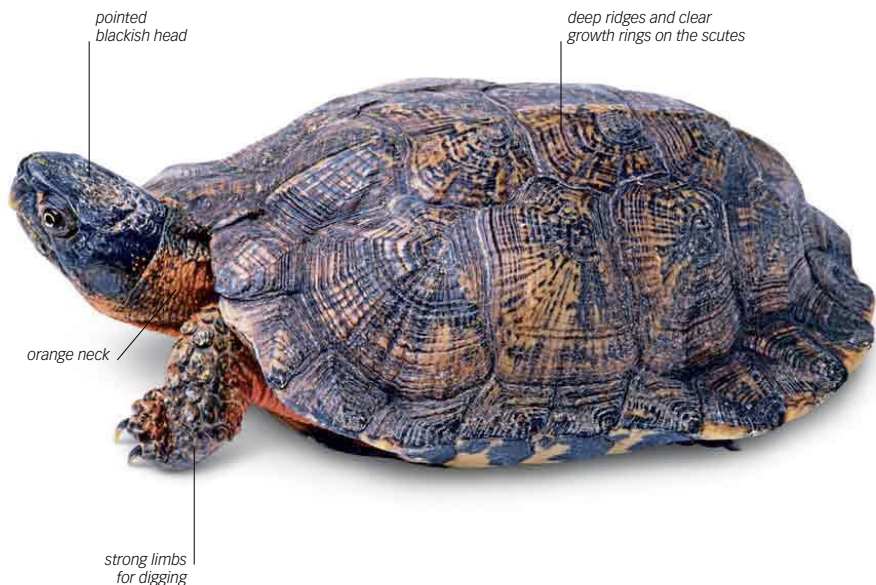
## EUROPEAN POND TURTLE

**The European pond turtle** has a dark brown or black carapace that is flattened and oval in shape, although hatchlings' shells are almost perfectly circular. The carapace is patterned with yellow spots and streaks, which are brighter in hatchlings and juveniles. The underside is pale yellow with dark markings. Many subspecies are recognized, and vary in colour, size, and shape.

This species basks on emergent rocks and logs with its neck and legs outstretched, but quickly dives into the water if disturbed. It eats a range of aquatic invertebrates; adults also eat some plant material. The eggs are buried in soil or mud, sometimes well away from water, and in a sunny position. However, many eggs fail to hatch if the weather is too cold, especially in the north of its range.

**Pyramid pattern**

Each scute of the wood turtle's sculptured carapace consists of a low, off-centre pyramid of concentric ridges. The carapace is usually brown with some yellowish streaking.

**PROFILE**

-  N.E. North America
-  Woodland, fields, streams, and ponds
-  Shell 14–20 cm (5½–8 in)
-  Egg-laying
-  4–18
-  Diurnal
-  Endangered

*Glyptemys insculpta*

## WOOD TURTLE

**The wood turtle** tends to be terrestrial for most of the year, wandering over long distances in search of food, but never far from water. It feeds on a variety of plant and animal material, with berries and earthworms being favoured. The turtle also hibernates underwater in mud at the bottom of a pond or stream, and may aestivate in mud during droughts.

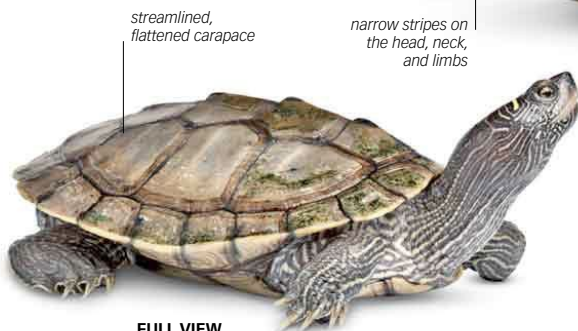
In the breeding season, the wood turtle moves to streams and ponds, and mating takes place in the water. The eggs are laid between May and July, and hatch between August and October. The hatchlings are darker than the adults and their shells are more circular. Regarded as a very intelligent species, the wood turtle used to be a popular pet. It is now protected due to a decline in numbers; habitat loss, predation, as well as collection for the pet trade have all had a drastic effect on the population.

## PROFILE

-  E. North America
-  Slow-flowing rivers and lakes
-  Shell 15–28 cm (6–11 in), females are larger than males
-  Egg-laying
-  6–16
-  Diurnal
-  Least Concern



narrow stripes on the head, neck, and limbs



FULL VIEW

streamlined, flattened carapace

**Prominent pattern**

The northern map turtle's common and scientific names are derived from the lines on its carapace and skin, which resemble the contour lines on a map.

*Graptemys geographica*

## NORTHERN MAP TURTLE

**The northern map turtle** has an olive-green carapace marked by an intricate pattern of pale yellow lines. These, however, are not always clear in adults, especially as they often acquire a covering of algae. The carapace of juveniles has a central keel, which is lost as they grow.

Northern map turtles live in wide, slow-moving rivers or lakes, although they are sometimes found in smaller, rocky rivers in the south of their range. They love to bask, and several individuals may pile up on a favourable log or emergent rock, but quickly dive into the water at the slightest disturbance. Although they eat a range of animal food, molluscs and crustaceans feature heavily in their diet. For this reason, they have evolved jaws that are significantly wider than in related species. Female northern map turtles often wander far from the water in search of suitable nesting sites, and the hatchlings have to make an equally long journey back.

**Mississippi map turtle**

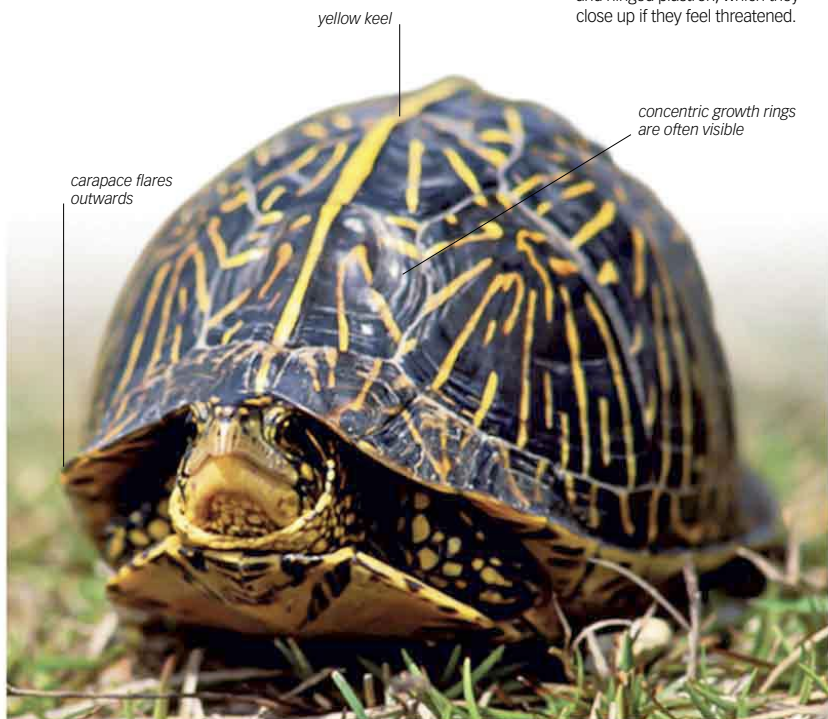
**(*Graptemys pseudogeographica kohnii*)**

Hatchlings have a row of small knobs on their carapace and an orange crescent-shaped marking behind each eye.



**Protective shell**

Box-turtles are easily recognized due to their high-domed carapace and hinged plastron, which they close up if they feel threatened.

**PROFILE**

-  S.E. USA and parts of Mexico
-  Woods and fields
-  Shell 12–26 cm (4¾–10 in)
-  Egg-laying
-  1–11
-  Diurnal
-  Vulnerable

*Terrapene carolina*

## COMMON BOX TURTLE

**Common box turtles** are named for their lower shell, or plastron, which is hinged from side to side and can be clamped shut to completely protect the head and limbs. These turtles sometimes remain in this position for several hours, or even days, although most start to emerge cautiously after a few minutes. There are a number of subspecies, which vary in terms of shell size and the amount of patterning on the shell.

Box turtles are mostly terrestrial, although they can swim and may enter the water voluntarily.

Adults feed on vegetable material and are especially fond of berries, fruit, and fungi. They also eat animal matter, including carrion. The young are more likely to eat invertebrates, including earthworms, grubs, and caterpillars, and switch to a more herbivorous diet as they grow.








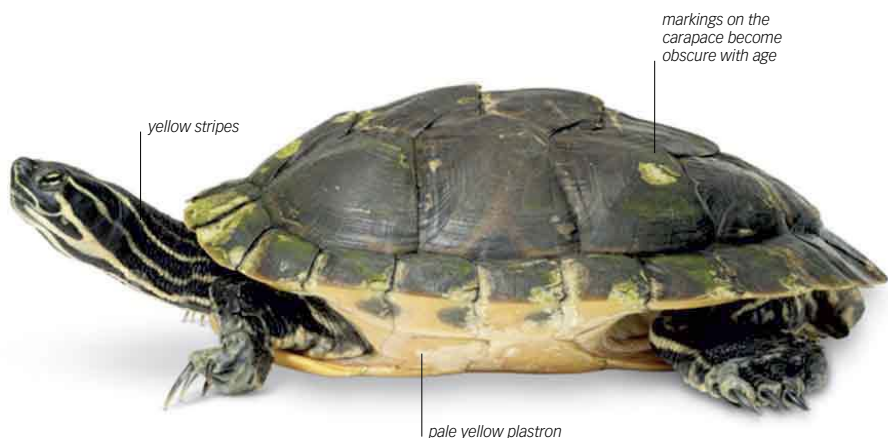
**Florida box turtle**  
(*T.c. bauri*)

This turtle is arguably the most colourful subspecies.



## PROFILE

-  E. North America, and C. and N. South America; widely introduced elsewhere
-  Egg-laying
-  5–22
-  Diurnal
-  Ponds, drainage ditches, streams, and lakes
-  Least Concern
-  Shell 12–30 cm (4¾–12 in)

**Yellow markings**

As the name suggests, these turtles have yellowish plastrons with some black spots along the edges. They also have prominent yellow stripes along the neck and legs.

## SIMILAR SPECIES

very smooth carapace



**Painted turtle (*Chrysemys picta*)** Usually has red markings somewhere on its shell, which are brighter in juveniles

*Trachemys scripta*

## YELLOW-BELLIED SLIDER

**This widespread turtle** occurs in many different guises, some of which are recognized as subspecies. Apart from being smaller, male yellow-bellied sliders are also darker in colour than the females and the claws on their front feet are much longer. They use these claws during courtship to tickle the female's chin and the sides of her head while swimming backwards in front of her. Often seen basking, these turtles are so-called because of their habit of sliding into the water at the slightest disturbance.

Breeding usually takes place in spring and summer. The time of nesting, however, depends on the climate at any given locality – the eggs of the northern populations may overwinter in the nest, whereas they hatch the same year further south.










**Red-eared turtle**  
(*T.s. elegans*)

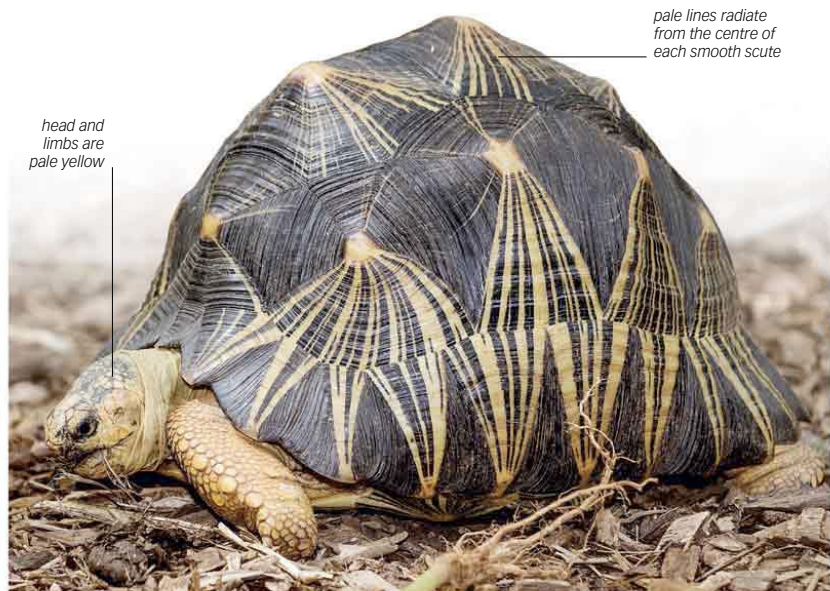
This distinctive subspecies is identified by a prominent red stripe behind its eyes.

**Tough shell**

Instantly recognizable with its beautiful star-like pattern, the radiated tortoise's carapace is extremely tough, making it difficult for predators to break into.

**PROFILE**

- |   |   |
|---|---|
|  S. Madagascar             |  3–12                  |
|  Dry forest                |  Diurnal               |
|  Shell up to 40 cm (16 in) |  Critically Endangered |
|  Egg-laying                |   |



pale lines radiate from the centre of each smooth scute

head and limbs are pale yellow

**SIMILAR SPECIES**

**Indian starred tortoise**  
(*Geochelone elegans*)

Slightly smaller and has bolder markings








*Astrochelys radiata*

## RADIATED TORTOISE

**The radiated tortoise** is one of the most attractive species in the world. The heavily constructed high-domed shell is marked with striking pale lines that radiate from the centre of each dark scute. At the end of the wet season, females lay their eggs in holes, and the eggs can take up to eight months to hatch. The hatchlings are very small, with more rounded shells than those of adults.

This species feeds on succulent vegetation, including the pads of the introduced prickly pear, *Opuntia*, and can live for well over 100 years. It has, however, been hunted by people for food, and its present range is only a small portion of what it used to be. More recently, it has also been collected for the pet trade, despite being protected. Breeding programmes in Madagascar and in other countries are helping to increase numbers, but releasing them into the wild will not be effective until adequate protection is in place.

## PROFILE

-  Aldabra Atoll
-  Scrub and grassland
-  Shell 0.9–1.2 m (3–4 ft)
-  Egg-laying
-  9–25
-  Diurnal
-  Vulnerable

scutes on the upper shell show growth rings

**Built to last**

The tortoise's massive shell provides it with protection but also slows it down; it has traded speed and agility for defence.

skin folds around the neck

*Aldabrachelys gigantea*

## ALDABRA GIANT TORTOISE

**The Aldabra giant tortoise** is one of two surviving species of giant land tortoises, the other being the Galapagos tortoise (p.218). Males can weigh as much as 250 kg (550 lb). This tortoise has a domed shell, which is thick and heavy, and is brown or black in colour. Each scute is shaped like a flattened pyramid, and growth rings are clearly visible on the carapace of young adults, although they often wear away in old individuals.

Females bury their eggs in nest chambers that they dig themselves, and the eggs hatch after 14–28 weeks. The tortoise mostly feeds on vegetation, including grasses and low plants, but also eats carrion. It seeks shelter during the hottest part of the day, with several tortoises often crowding together under the sparse shade of thorn bushes.

Aldabra giant tortoises can live for 200 years or more, although many die as a result of falling into crevices or by accidentally tipping over on to their backs, where they are unable to right themselves. This species has suffered in the past from exploitation for food by visiting sailors, habitat destruction, and the introduction of predators such as rats and cats, which eat the eggs and hatchlings. Related giant tortoise species and subspecies from neighbouring islands, including the Seychelles, have become extinct in recent times. The Aldabra giant tortoise is now protected in the wild and there is a captive breeding programme on the nearby island of Mauritius.



## BEHAVIOUR

Male Aldabra giant tortoises fight each other for the opportunity to mate, and are significantly larger than the females as a result of selective pressure that favours the more powerful individuals. They have a concave plastron so that when they mount the female they do not slide off; females have flat or convex plastrons. In the wild, the breeding season lasts from February to May.



### Mating

For male tortoises, mating is not easy and requires the female to stand still while he mounts her.



FULL VIEW

### Eyes

The relatively large eyes are positioned at the side of its head, giving it good all-round vision.



### Horny beak

Tortoises have no teeth but their horny beaks are ideally suited for cropping leaves and grasses.



### Tail

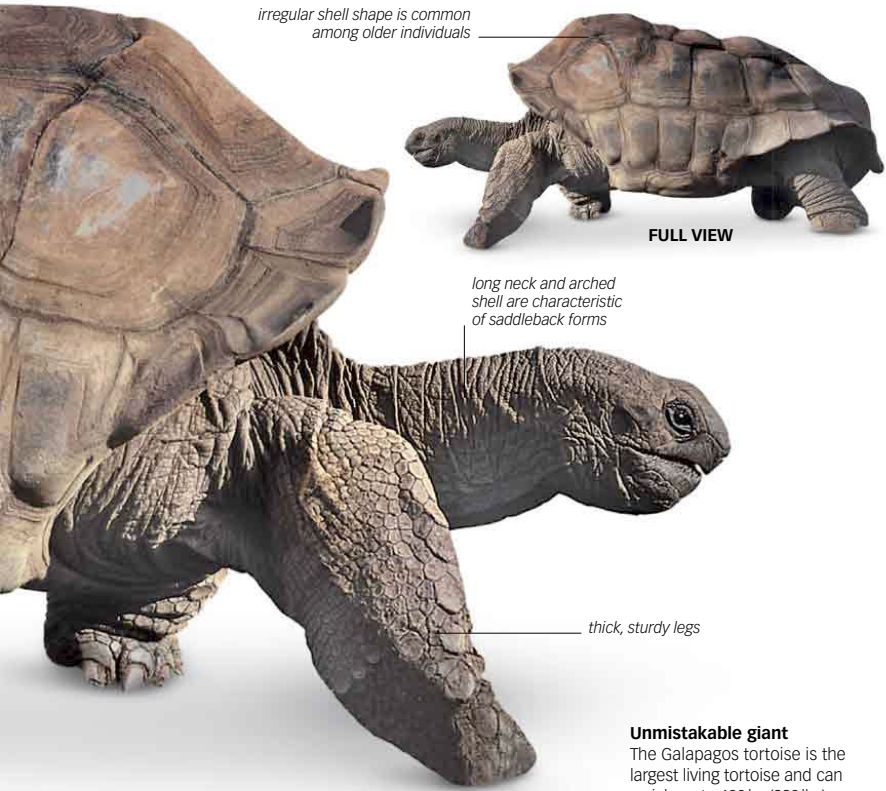
The female's tail is shorter than the male's.



### Hind limbs

The giant tortoise has sturdy limbs with five claws on each foot; females have larger claws than males, which helps them to excavate a nesting site.





FULL VIEW

**Unmistakable giant**

The Galapagos tortoise is the largest living tortoise and can weigh up to 400 kg (880 lbs).

**PROFILE**

- 📍 Galapagos Islands
- 🌋 Volcanic islands
- 📏 Shell 80–110 cm (32–43 in)
- 🥚 Egg-laying
- 👨‍👩‍👧‍👦 2–12
- 🕒 Diurnal
- ⊗ Not assessed

*Chelonoidis nigra*

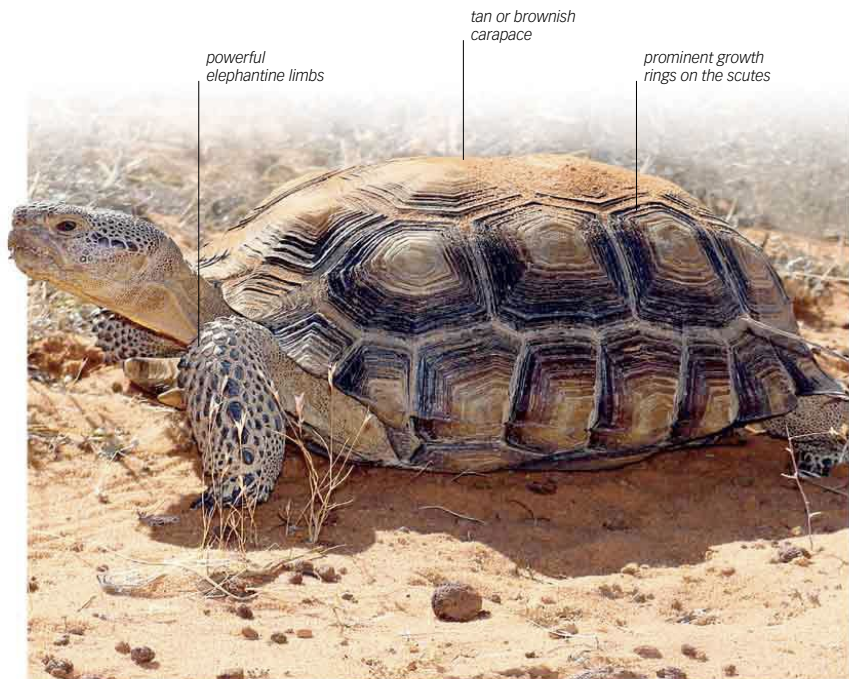
# GIANT GALAPAGOS TORTOISE






**The Galapagos tortoise** was studied by Charles Darwin and was instrumental in the formulation of his theory of evolution. Originally, about 14 or 15 distinct subspecies were found on various islands, but exploitation by whalers between the 16th and 19th centuries drastically reduced the number. At least one subspecies from Floreana Island was wiped out during this time. A second, from Pinta Island, became extinct with the death of the sole survivor, nicknamed Lonesome George, in 2012. While several subspecies have less than 1,000 individuals, captive breeding and subsequent reintroduction of the offspring have successfully boosted the numbers of several forms.

This species can be divided into two types by the shape of its shell, which may be domed or saddleback. Domed tortoises live on relatively wet islands and graze on grass and herbs, whereas the saddleback tortoises live on drier islands and browse on bushes.

**Expert burrower**

This species has thick, shovel-shaped forefeet that are specially adapted for digging through the desert sand.

**PROFILE**

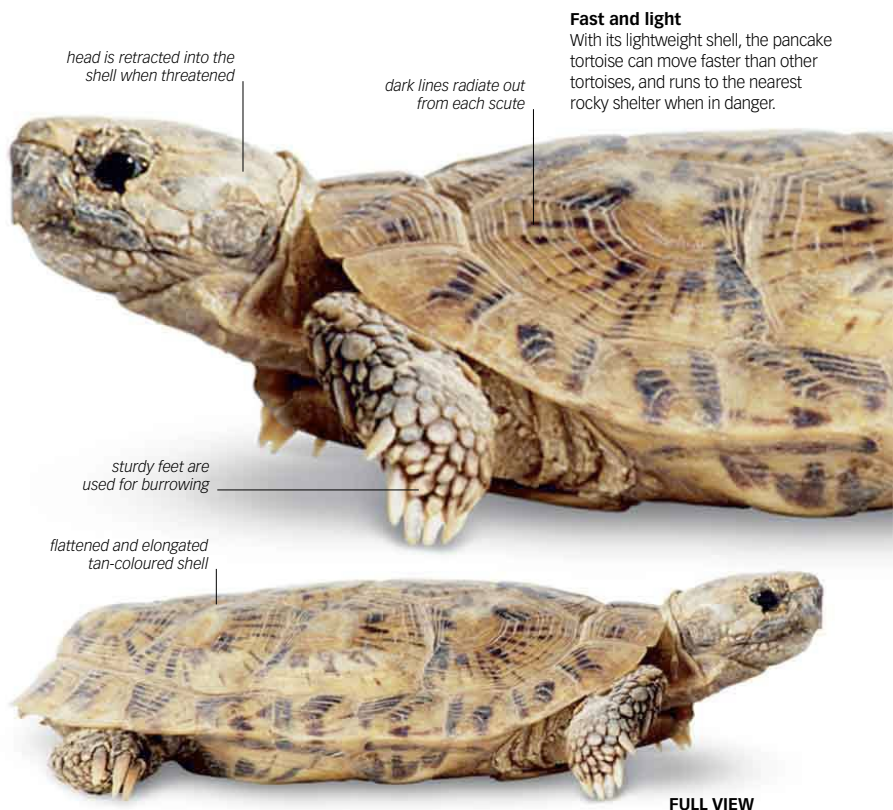
-  S.W. USA and N.W. Mexico
-  Desert
-  Shell 20–35 cm (8–14 in)
-  Egg-laying
-  1–15
-  Diurnal or nocturnal
-  Vulnerable

*Gopherus agassizii*

## DESERT TORTOISE

**These tortoises modify** their behaviour to survive the extremes of desert temperature. In winter, they migrate to areas with deep burrows – several individuals congregate in one burrow. In spring, they emerge from their hibernation sites and disperse across the surrounding desert. They use shallower burrows or rocky crevices, retreating into them at night and emerging in the middle of the day. However, as temperatures rise later in the year, they begin to shelter in the middle of the day and become active in the morning and evening. By mid-summer, they are active only at night and early morning. They dig burrows that have a characteristic half-moon shape, and are often shared by a number of other desert animals, including rattlesnakes.

Desert tortoises grow slowly and take 15–20 years to reach maturity. They may live for up to 50 years, but are vulnerable to habitat change.



FULL VIEW

## PROFILE

-  E. Africa
-  Rocky outcrops in grassland
-  Shell up to 17.8 cm (7 in)
-  Egg-laying
-  1
-  Diurnal
-  Vulnerable








*Malacochersus tornieri*

## PANCAKE TORTOISE

**This is a very unusual tortoise** because its shell is not domed and rigid like other species, but flattened and flexible. This allows the tortoise to jam itself into narrow crevices to avoid predation. The bones of its shell are porous and very light, and allow it to move quickly. The pancake tortoise lives in the expansive grasslands of East Africa, but is confined to rocky outcrops, known as kopjes. It lives in large colonies with several individuals occupying the same crevice. The tortoise forages close to the rocks, feeding on grasses and herbs.

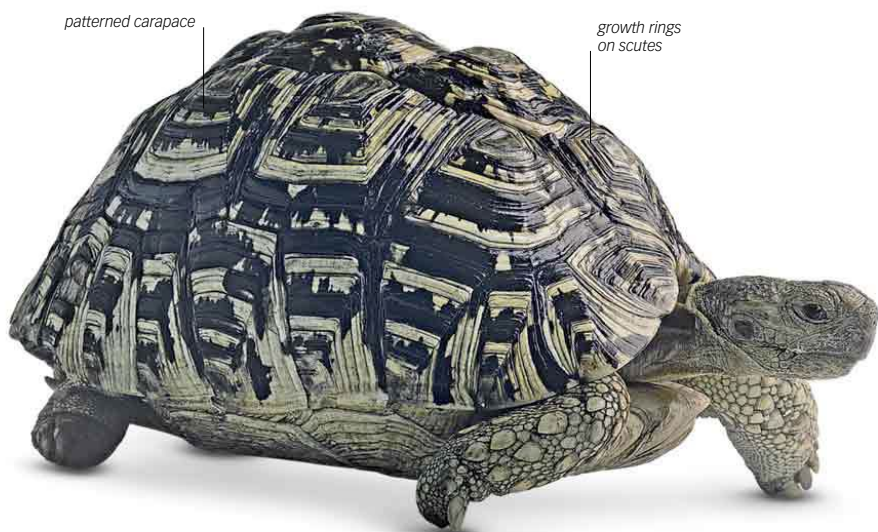
Males establish a dominance hierarchy by fighting, and the largest male usually gains access to most females. Due to their body shape, females are unable to hold large clutches of eggs inside their body, so they lay one egg every 4–6 weeks. The young are not as flat as the adults and have brighter markings. The rarity and uniqueness of the pancake tortoise makes it desirable to reptile collectors, but its main threat comes from land clearance for agriculture.

## PROFILE

-  Africa, south of the Sahara
-  Open grassland and thorn scrub
-  Shell up to 46 cm (18 in), rarely up to 70 cm (28 in)
-  Egg-laying
-  5–18
-  Diurnal
-  Not assessed

## Common species

The leopard tortoise is a large and attractive species found over a wide area in southern Africa. Its highly domed carapace and leopard-like markings make it an unmistakable species.



## SIMILAR SPECIES

unmarked  
carapace



**African spurred tortoise**  
(*Geochelone sulcata*)

Largest mainland species;  
has pale brown or  
bone-coloured scutes

*Stigmochelys pardalis*








## LEOPARD TORTOISE

**This species is the fourth largest tortoise** and the second largest mainland species in the world. It is boldly marked with black on a yellow or cream shell, although there is some variation in the markings; juveniles have especially bright markings. The leopard tortoise is predominantly herbivorous, but occasionally eats carnivore faeces and bones as sources of calcium. It lives mainly in grassland and sparse woodland, and when inactive at night or during cool weather, it pushes itself into thorn bushes or wedges itself under rocks, presumably to keep out of the way of predators.

Mating is a boisterous affair, with males violently butting both rivals and potential mates. Females lay several clutches of hard-shelled eggs during a single season, in a burrow that is carefully filled in and concealed afterwards. If the young hatch during dry weather, they may remain in the nest for several days or weeks until the rain softens the ground, enabling them to dig themselves out later.



## PROFILE

-  Europe, mainly the Balkan Peninsula
-  Light woodlands, hillsides, and olive groves
-  Shell up to 20 cm (8 in)
-  Egg-laying
-  3–8, occasionally up to 12
-  Diurnal
-  Near Threatened

## Horn-coloured shell

Hermann's tortoise has a striking domed carapace with markings that become darker as the tortoise ages.

scutes become smooth and shiny on older individuals

marginal scutes slightly flared above the hind legs

stubby limbs covered in scales

sharp beak for cutting through leaves

## SIMILAR SPECIES

*Testudo hermanni*

## HERMANN'S TORTOISE

**This tortoise has a yellowish** or horn-coloured domed shell with darker markings, often vaguely triangular in shape. It has a large scale at the tip of its tail, and the scutes immediately above the tail are paired. Hermann's tortoises feed on a wide variety of plants, favouring legumes such as clover and vetch, but also eat the leaves of other plant species, grasses, and fallen fruit.

The female lays her eggs in a chamber that she digs in loose soil. The eggs, which are about the size and shape of a ping-pong ball, take about 2–3 months to hatch. The young have a more rounded shell and take more than 10 years to reach breeding size. Hermann's tortoises live for about 50 years or more. Once a familiar garden pet in parts of Europe, over-collection has led to it being classed as Near Threatened.



**Horsfield's tortoise**  
(*Testudo horsfieldii*) More rounded with dome-shaped individual scutes; found in Central Asia



**Spur-thighed tortoise**  
(*Testudo graeca*) Similar, with a single scute immediately above the tail

# CROCODILIANS

**Crocodilians are all highly aquatic, and superficially similar, with a pointed snout, streamlined body, large armoured scales on their backs, and a long, flattened tail for swimming. They include the largest living reptiles and are all predatory.**

Crocodilians are mainly restricted to the tropics and subtropics, although some alligators extend into temperate regions. Crocodilians have been widely hunted by people and many species are endangered, although others have recovered rapidly once protection has been put in place. The largest species is the saltwater crocodile, with a maximum size approaching 7 m (25 ft), while at the other end of the scale, the Cuvier's dwarf caiman and the West African dwarf crocodile both have maximum sizes of about 1.5 m (5 ft) and mainly eat insects. The

ORDER	CROCODYLIA
-------	------------

FAMILIES	3
----------	---

SPECIES	25
---------	----

three crocodilian families are alligators (Alligatoridae) with eight species, crocodiles (Crocodylidae) with 16 species, and the gharial (Gavialidae) with a single species. The gharial is in a family of its own, and has long, narrow jaws. The alligator family also includes the caimans, which have short, rounded jaws. The members of the crocodile family have narrow, pointed jaws.



## Cuban crocodile

Almost extinct by 1959 due to predation by an introduced species of caiman, the Cuban crocodile is now the subject of a breeding programme in Cuba.

# TUATARAS

**Tuatara are the only survivors of an ancient group of reptiles known as Rhynchocephalia that used to be fairly widespread. This group inhabited the Earth at about the same time as dinosaurs.**

There is some debate among zoologists on the number of surviving species of tuataras. The one surviving species, *Sphenodon punctatus* (p.231), is restricted to several small rocky islands off the coast of New Zealand; some authorities recognize a second species,

ORDER	RHYNCHOCEPHALIA
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FAMILIES	1
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SPECIES	1
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*Sphenodon guntheri*, from North Brother Island, in the Cook Strait.

**Bulbous snout**

The male gharial has a prominent fleshy proboscis on its snout, which resembles an Indian pot known as a ghara. This acts as a sound resonator when he calls to attract females or advertise his territory.

**PROFILE**

-  S. Asia
-  Wide, slow-moving rivers
-  Up to 6 m (20 ft)
-  Eggs laid in a nest
-  20–90
-  Nocturnal and diurnal
-  Critically Endangered

*Gavialis gangeticus*

# GHARIAL

**Also known as the gavial**, this unique crocodilian is the only member of its family and can be instantly recognized by its long, narrow jaws, which contain up to 100 teeth. This is an adaptation to its fish diet, which it catches with a sideways slash, clamping its jaws shut when it makes contact with the prey. The gharial is the most aquatic of all crocodilians, frequenting wide, shallow rivers and rarely venturing far from the river bank.

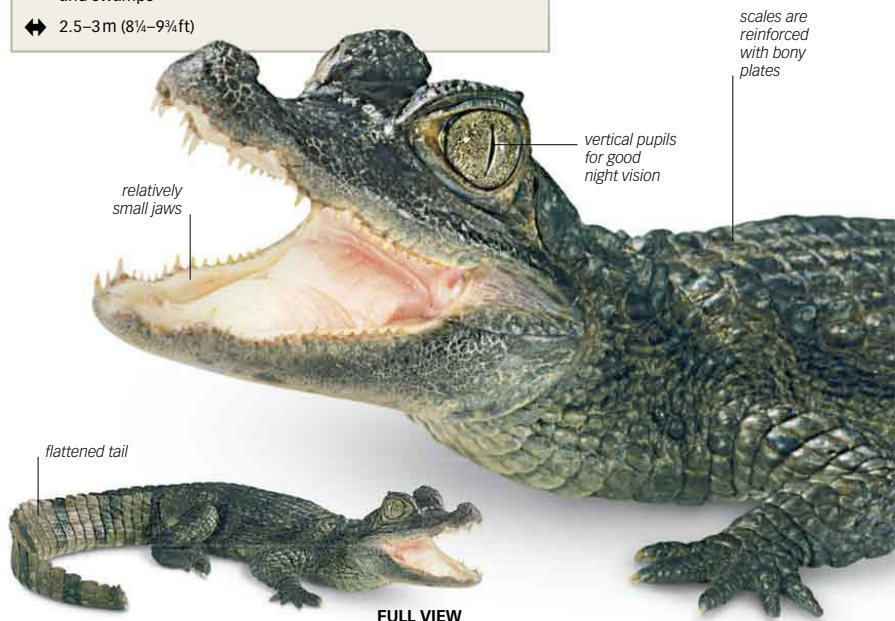
Female gharials bury their eggs in burrows on sand banks, and dig out the hatchlings after hearing their chirping calls. They do not carry them to the water, probably because of the unsuitable shape of their jaws. This species was on the brink of extinction in the early 1970s, and its current range is only a small fraction of what it was. There have been attempts to boost numbers by harvesting eggs and reintroducing young into river systems. These, however, have had limited success because fish stocks in many rivers have been depleted by humans.

## PROFILE

-  N. South America and Central America; introduced to Florida and Cuba
-  Egg-laying
-  Up to 40
-  Nocturnal and diurnal
-  Lakes, rivers, and swamps
-  Least Concern
-  2.5–3 m (8¼–9¾ ft)

## Spectacled crocodilian

This crocodile is named for the bony ridge between its eyes that appears to join them like a pair of spectacles.



## SIMILAR SPECIES

brown coloration with darker crossbands



**Cuvier's dwarf caiman**  
(*Paleosuchus palpebrosus*)

The world's smallest crocodilian, reaching a maximum length of 1.5 m (5 ft); comes from the same part of the world

## Caiman crocodilus

## SPECTACLED CAIMAN

**Probably the most common** of all crocodilians, the spectacled caiman occurs over a wide area and in a number of different habitats. It can survive in salt water as well as fresh, and uses its flattened tail for swimming. The spectacled caiman has successfully colonized areas outside its natural range following irresponsible introduction. In Cuba, it may be responsible for the decline of the native Cuban crocodile, *Crocodylus rhombifer* (p.228). The poor quality of the spectacled caiman's skin is due to the presence of underlying bony plates known as osteoderms, and so it is not hunted commercially.

Mating takes place in the dry season. The eggs are laid in mounds of dead vegetation built by the female. She guards the nests until the eggs hatch during the wet season. The mother stays with her young and protects them for several months.



## PROFILE

- |  |                         |
|--|-------------------------|
| 📍 S.E. USA                             | 🥚 Eggs laid in a nest   |
| 🌿 Freshwater swamps, lakes, and rivers | 🥚 20–50                 |
| 👤 3–5 m (9¾–16 ft)                     | 🌙 Diurnal and nocturnal |
|  | ⊗ Least Concern         |

## Adaptations

The eyes and nostrils of the alligator are positioned high on its head, so that it can breathe and see while most of its body is submerged and hidden in water.

scales on the back are raised into ridges



*Alligator mississippiensis*

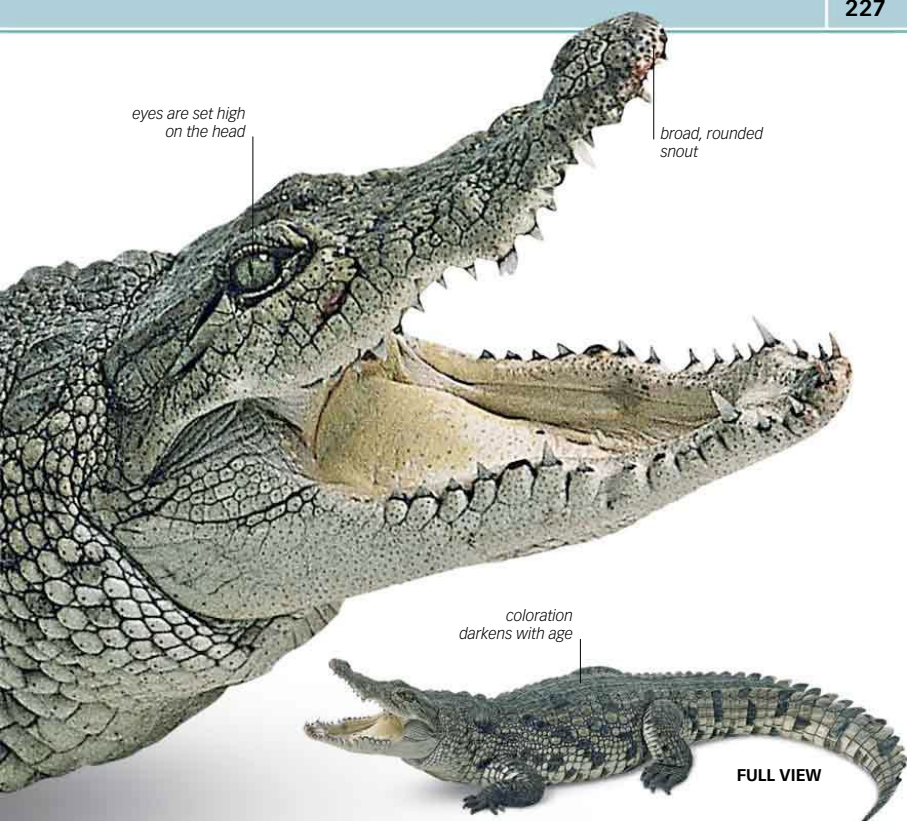
## AMERICAN ALLIGATOR

**A powerful reptile**, adult American alligators have rounded snouts and are dark olive or black in colour. Juveniles, however, have yellow bands across their backs. American alligators are very common in places, and are typically found floating, partially submerged, with just their eyes, nostrils, and back exposed. At times, they haul themselves out on to the shore to bask.

Males are larger than females and very territorial, creating alligator holes in heavily vegetated areas like the Florida Everglades. During the breeding season, they bellow to attract a mate; the bellows cause vibrations that make the water on the male's back "dance". At the same time, they lift their head and tail out of the water by bending their body into a concave arc. Mating takes place in water, and the female lays eggs in

the middle of a large mound-like nest that she builds out of dead vegetation. She guards the eggs until they hatch, which takes about 65 days. The female helps the hatchlings into shallow water, often digging them out of the nest and carrying them in her mouth. She remains with her brood for at least the first year of their lives.

Until the 1960s, American alligators were widely hunted and their population declined, but conservation efforts have resulted in their numbers recovering dramatically, to the extent that they are now commonly seen in canals and drainage waterways throughout their range. Some have become a nuisance by encroaching into private grounds and eating pets, but only a handful of human casualties have been reported.



## ALLIGATOR FARM

Although wild alligators are protected, alligator farms in the southeastern states of the USA produce animals for the skin and meat trade. The hides of the alligators are harvested when they are about 2 m (6½ ft) long. Alligator farms are also major tourist attractions in parts of Florida.



### Congregation

Juvenile and subadult alligators can be housed in high densities as long as they are well fed.

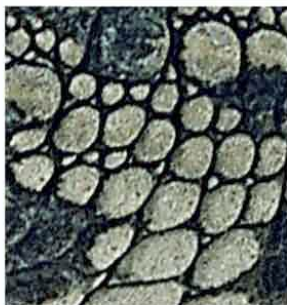
### Hind feet

Unlike the front feet, the American alligator's hind feet are partially webbed.



### Teeth

Alligators have 74–80 teeth of varying size, which are replaced as they are worn down.



### Scales

Alligator skin is heavily armoured with thick scales that do not overlap.



### Tail

The muscular tail is flattened from side to side, and helps to propel the alligator through water.

PROFILE



S. Florida, Central America, and N. South America



Coastal waters



3–4.5 m (9¼–15 ft), rarely up to 6 m (20 ft), males being larger than females



Egg-laying



30–70



Diurnal and nocturnal



Vulnerable

Basking crocodile

The wide-bodied American crocodile has greyish coloration with rows of raised plates; juveniles are greenish grey with darker spots or bands. On sunny days, the American crocodile can be seen basking in the sun.



SIMILAR SPECIES



spotted flanks and throat



FULL VIEW

Cuban crocodile  
(*Crocodylus rhombifer*)

Smaller, but very aggressive; found only on the Zapata Peninsula in southern Cuba

*Crocodylus acutus*




AMERICAN CROCODILE

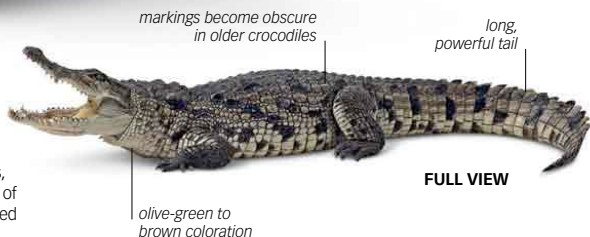
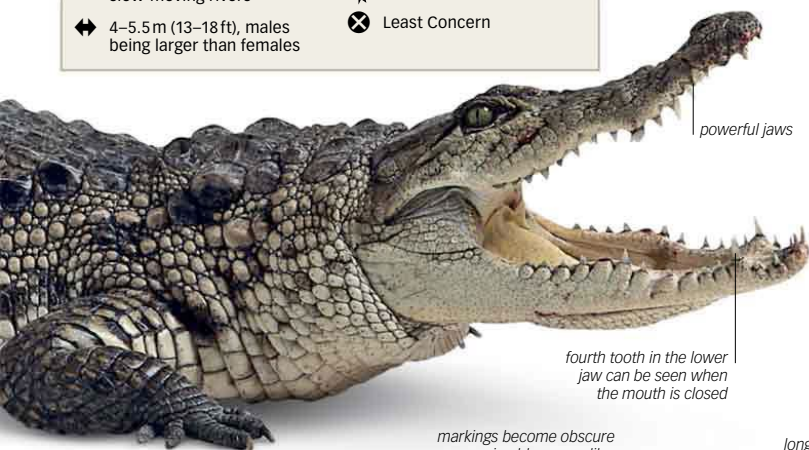
**Unlike the American alligator**, this species is intolerant of cold weather; this restricts the crocodile’s range in the USA to the south of Florida, where it occurs in small numbers on the coastal fringes of the Everglades National Park. It rarely enters fresh water, preferring coastal lagoons, mangrove swamps, and estuaries. Although the crocodile preys on fish, it will eat wading birds, small mammals, and carrion; it has also been known to attack people.

The female lays eggs in a purpose-built pile of mud, sand, and vegetation, and stays nearby throughout their incubation. Despite this, the eggs are frequently taken by raccoons and other small mammals. Maternal care is limited, and the young stay together for only a short spell after hatching. During the 1950s and 60s, the American crocodile was hunted for its skin, which drastically affected the population. It is now protected in most of the countries it inhabits.



## PROFILE

-  Madagascar and mainland Africa
-  Eggs laid in nests
-  25–100
-  Lakes and slow-moving rivers
-  Nocturnal and diurnal
-  4–5.5 m (13–18 ft), males being larger than females
-  Least Concern

**Formidable predator**

This large, incredibly strong crocodile attacks almost anything that crosses its path. Its eyes, ears, and nostrils are all situated on top of its head, allowing it to lie submerged in water, waiting for prey.

## SIMILAR SPECIES

**Cuban crocodile**  
**(*Crocodylus rhombifer*)**

Was almost extinct, but is now recovering due to a conservation programme

**Dwarf crocodile**  
**(*Osteolaemus tetraspis*)**

Smallest crocodilian in Africa, reaches a maximum length of 1.9 m (6¼ ft)

*Crocodilus niloticus*







## NILE CROCODILE

**The Nile crocodile** is the most common crocodilian in Africa with relic populations even in the Sahara Desert where permanent oases remain. Although mainly aquatic, large groups often bask along a muddy or sandy river bank. It eats most vertebrate prey, including fish, birds, and mammals. In East Africa, however, it is a notorious predator of migrating wildebeest and zebra, typically ambushing them at waterholes or river crossings. A single large food item is often shared by a number of individuals, tearing pieces off in a strict hierarchical order, with the oldest males having priority. The Nile crocodile is also responsible for many human deaths each year.

The female lays her eggs in sand or sandy soil, excavating a hole a few metres from the water's edge. She guards them throughout the incubation period and the male may also play a part in this role. Upon hatching, the female digs the young crocodiles out of their nest and carries them to the water in her mouth.

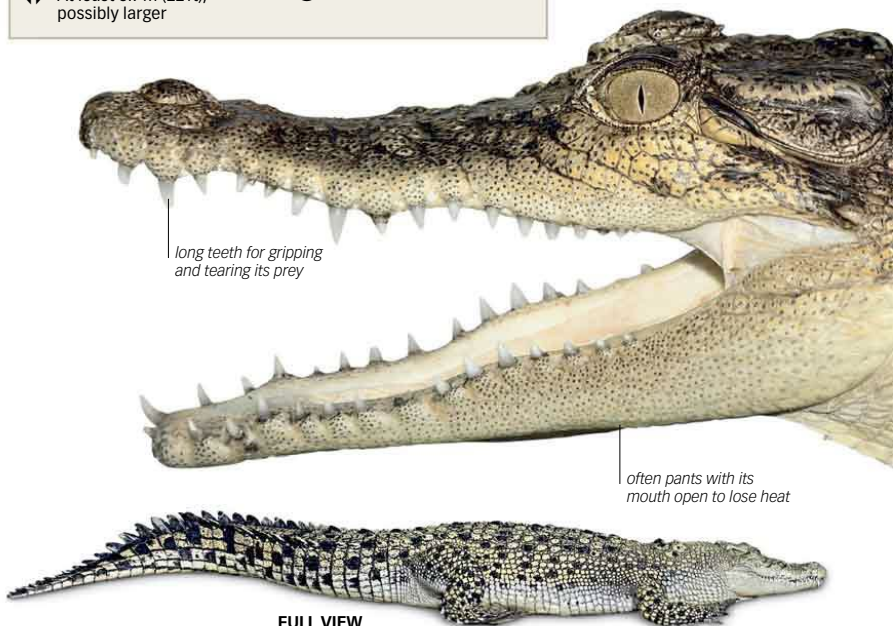


## PROFILE

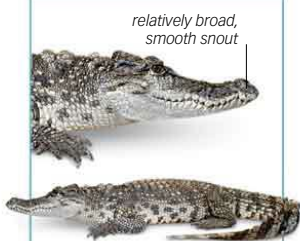
-  S. and S.E. Asia, Australia, and S.W. Pacific islands
-  Large rivers, estuaries, and inshore waters
-  At least 6.7 m (22 ft), possibly larger
-  Eggs laid in nests
-  20–90
-  Nocturnal and diurnal
-  Least Concern

## Immensely big

Compared to other crocodiles, the saltwater crocodile has a larger head and broader body with fewer scales on its neck. Although there are several colour variations, it is usually greenish.



## SIMILAR SPECIES



## FULL VIEW

**Siamese crocodile**  
*(Crocodylus siamensis)*

Critically endangered freshwater species; has been exterminated over most of its former range

*Crocodylus porosus*

## SALTWATER CROCODILE

**This is the largest reptile in the world**, and the largest terrestrial predator. Saltwater crocodiles, called “salties” in Australia, are formidable creatures that can tackle any prey – from fish, birds, and reptiles to mammals, including humans. Although they normally occur in estuaries, deltas, and mangrove swamps, they sometimes venture out to sea and have been found swimming a considerable distance from the shore. As a result, they have colonized numerous small islands in the South Pacific, and occasionally have reached as far as Japan. As with other crocodilians, the mother guards the eggs and the newly hatched young; the temperature at which the eggs are incubated determines the sex of the young.

Saltwater crocodiles have been widely hunted for their skin, resulting in the extermination of many populations. However, they are now protected in many countries, and numbers are recovering.



FULL VIEW

stout limbs  
for burrowingolive-brown  
colorationhead covered  
in small scales**Unique lizard**

The tuatara looks like a large lizard and belongs to an ancient order of reptiles, of which it is the sole survivor.

**PROFILE**

-  New Zealand (offshore islands)
-  Scrub and open woodland
-  50–65 cm (20–26 in)
-  Egg-laying
-  12–17
-  Nocturnal
-  Least Concern

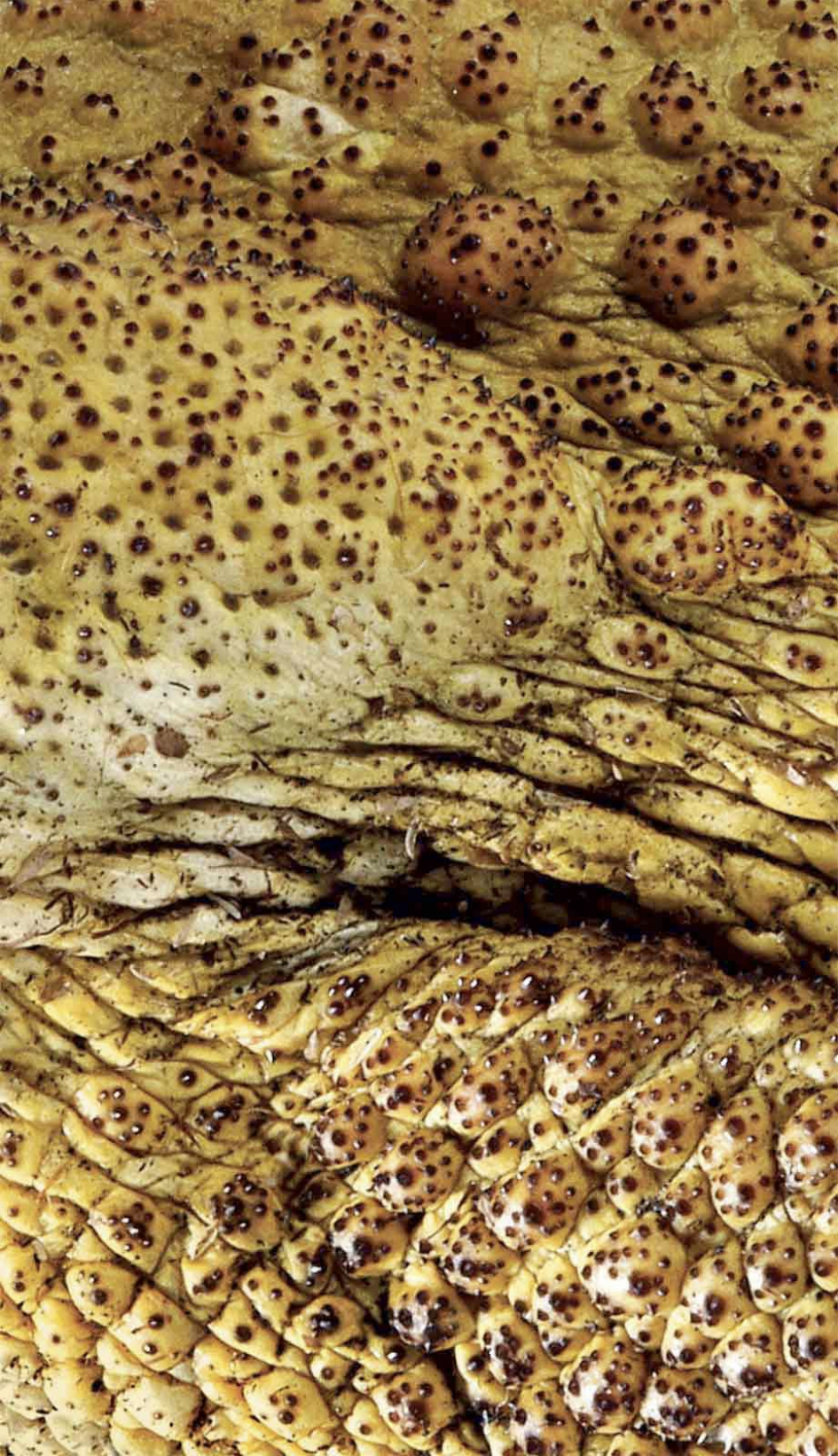
*Sphenodon punctatus*

# TUATARA

**The tuatara is distinct from lizards** and all other reptiles due to the shape of its skull and the arrangement of its teeth. It belongs to an ancient order that was more widespread in prehistoric times. Tuataras live in burrows, which they may construct themselves or take over burrows dug by petrels. They occasionally eat petrel chicks, but their main diet appears to be large insects. They are also known to eat their own young. Adults are mainly nocturnal, whereas juveniles tend to be more active by day, perhaps to avoid being eaten.

Tuataras have a very slow metabolism. They become sexually mature when they are 10–20 years old, and may live to be 100. Their eggs are buried and overwinter, taking 12–15 months to hatch. Due to their declining numbers in mainland New Zealand, the species is protected and a reserve has been created there in an attempt to re-establish them. The population from North Brother Island is sometimes recognized as a distinct species, *Sphenodon guntheri*.









AMPHIBIANS



# SALAMANDERS

**Salamanders are tailed amphibians, usually with four legs and often with an aquatic and a terrestrial stage to their lives. They are sometimes confused with lizards, but they have soft, moist skin through which some gaseous exchange takes place. A few completely aquatic species are eel-like.**

The mole salamanders, Ambystomatidae, constitute an important family of large salamanders in North America and include well-known species such as the tiger salamander (p.238) and the axolotl (p.237). The Plethodontidae, mostly from the Americas, but with a few species in Europe and one in Asia, are lungless salamanders; they breathe through their skin and

ORDER	CAUDATA
FAMILIES	9
SPECIES	671

the lining of their mouth, and many of them are small, secretive species. In Europe, the Salamandridae predominates, with terrestrial species such as the fire salamander (pp.244–45), and semi-aquatic species such as the crested newt (p.242). The term newt is usually reserved for species that spend a large amount of time in the water.



**Poisonous salamander**

Many species of salamanders have poison-secreting glands within their skin and some of them, such as the fire salamander shown here, are brightly coloured to advertise this fact.

# CAECILIANS

**Caecilians are among the least-known vertebrates and much of their natural history is still a complete mystery.**

Terrestrial caecilians look more like earthworms than amphibians, and aquatic caecilians look like eels. The most numerous families are the Ichthyophiidae from India and Southeast Asia, and the Caeciliidae from Central and South America. The aquatic species all belong to the Typhlonectidae, which also comes from South America, and are sometimes known as rubber eels in the pet trade.

ORDER	GYMNOPHIONA
FAMILIES	10
SPECIES	192



**Worm-like amphibian**

The Varagua caecilian or the purple caecilian (*Gymnopsis multiplicata*) occurs in lowland forests throughout most of Central America.

**Inconspicuous salamander**








An aquatic salamander, the hellbender is rarely seen as it lives in river beds, hidden under large flat rocks.

fold along the sides of the body increases surface area

paddle-shaped tail

flattened head

**PROFILE**

-  E. North America
-  Aquatic (rocky, fast-flowing streams and rivers)
-  30–74 cm (12–29 in)
-  External fertilization; eggs laid in depression built by male at the bottom of a stream
-  150–300
-  Mainly nocturnal
-  Near Threatened (declining populations)

*Cryptobranchus alleganiensis*

## HELLBENDER

**A large aquatic species**, the hellbender has a flattened head and a fleshy fold of skin along each side of its body. It may be grey, olive, brown, or yellowish brown in colour with black spots on its body. Hellbenders live under rocks on the bottom of well-oxygenated, fast-flowing rivers and streams, emerging at night to hunt shellfish, crayfish, and small fish.

Unlike other salamanders, hellbenders reproduce through external fertilization. The male scrapes out a hollow under a large rock and waits for a female to enter the hollow. The female lays her eggs over a two- or three-day period and the male fertilizes them as they are laid, after which the female leaves the nest. The male remains to guard the eggs during the incubation period, which lasts 68–75 days. The rarely seen larvae probably live in the spaces between larger pieces of gravel. These spaces are becoming unavailable due to siltation of rivers, which is contributing to the decline of the species.

## PROFILE

-  E. North America
-  Woodland, especially in floodplains
-  15–25 cm (6–10 in)
-  Eggs laid in temporary pools
-  150–350
-  Nocturnal
-  Least Concern

evenly distributed round yellow spots

small bulbous eyes on top of the head

rounded snout

## Covert species

The stout-bodied spotted salamander is a secretive species, hiding among leaf litter or under rocks by day and foraging at night.

## SIMILAR SPECIES

silvery markings

**Marbled salamander**  
(*Ambystoma opacum*)

Occurs over much the same region as the spotted salamander but has white or greyish crossbands

*Ambystoma maculatum*

## SPOTTED SALAMANDER

**More slender than the tiger salamander** (p.238), the spotted salamander has a grey or black body with two rows of round yellow spots along its back. In some populations, the spots on the head are orange. Its bright coloration signals to predators that it produces distasteful skin secretions. When approached by a potential predator, it lowers its snout to the ground and raises the back of its head in a head-butting posture, which helps to display its bright yellow spots.

The spotted salamander migrates to breeding ponds as early as December in the south of its range. It usually breeds in temporary bodies of water or permanent lakes that are free from fish. Breeding may last for three or four days, when all the adults from surrounding areas arrive at the pools, mate, lay eggs, and depart. Once the larvae have metamorphosed and dispersed over the surrounding countryside, they are hardly ever seen, and take three or four years to reach breeding size.



**Feeding habits**

Axolotls are stout-bodied salamanders with thin limbs. Largely nocturnal, they feed on invertebrates such as worms, molluscs, and crustaceans.

flattened tail for swimming

external gills are retained throughout its life

**PROFILE**

-  Lake Xochimilco (C. Mexico)
-  Aquatic, in large lakes
-  15–45 cm (6–18 in), rarely more than 30 cm (12 in)
-  Eggs laid in autumn and winter (in the wild)
-  100–1,000
-  Nocturnal and diurnal
-  Critically Endangered

*Ambystoma mexicanum*

# AXOLOTL

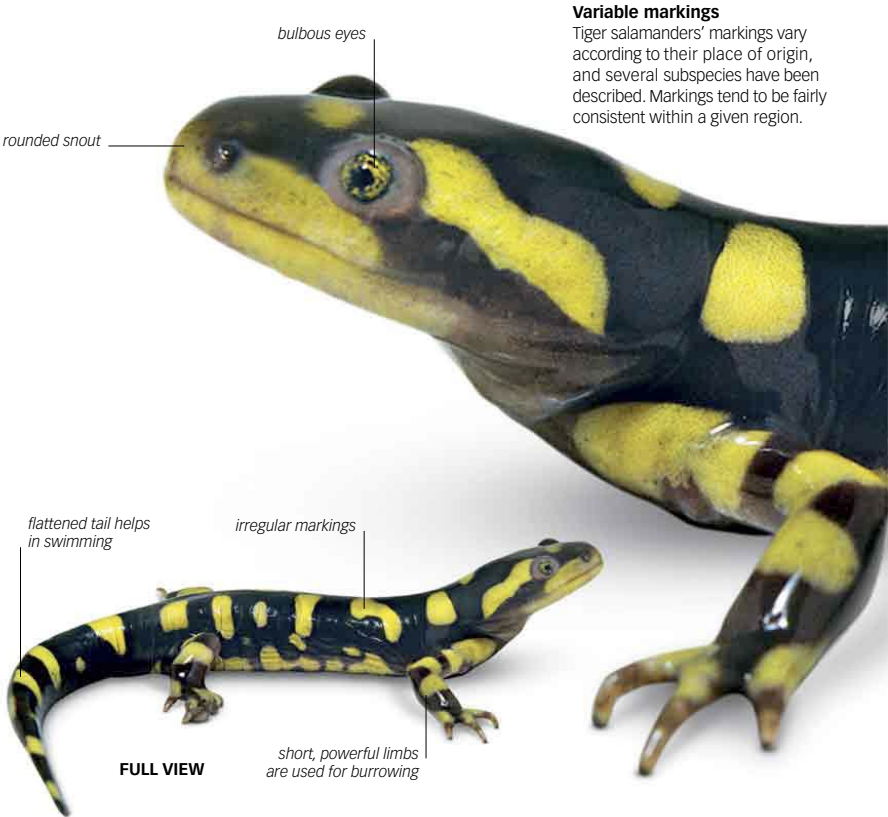
**The axolotl is a species of salamander.** They become sexually mature while still displaying larval characteristics, a condition known as neoteny. They can be encouraged to metamorphose under laboratory conditions by using natural hormones.

Axolotls have high dorsal crests and a pair of large, feathery external gills. Several colour forms are known to occur; wild specimens are dark grey with small black spots, and golden, piebald, and albino forms have been bred in captivity. Wild populations are nearly extinct as the complex of lakes and canals they inhabit have become increasingly polluted, and introduced fish eat their young and compete with them for food. Axolotls are easy to breed in captivity, however, and are very prolific, so they will not become extinct, even though there is little hope for the wild population.

**Albino form**

The albino form of the axolotl has a white body and feathery red gills. It is widely bred in captivity.





**Variable markings**  
Tiger salamanders' markings vary according to their place of origin, and several subspecies have been described. Markings tend to be fairly consistent within a given region.

**PROFILE**

North America, from S. Canada to Mexico

Forests, fields, and even deserts

25–35 cm (10–14 in)

Eggs laid in temporary or permanent bodies of water in autumn or early spring

400–6,000

Nocturnal

Least Concern

*Ambystoma tigrinum*

# TIGER SALAMANDER

**A heavy-bodied species**, tiger salamanders are typically dark grey or brown, with light grey, buff, or yellow markings in the form of spots, bars, or irregular blotches. They spend the greater part of their life underground, emerging only at night during damp weather to feed.

Tiger salamanders migrate to breeding ponds in spring or autumn for courtship and egg-laying. Females attach small clusters of eggs to underwater plants and debris. The larvae feed on aquatic invertebrates as well as other amphibian eggs and larvae; a proportion are cannibalistic, and these tend to have larger heads and an extra row of teeth. Some larvae do not metamorphose, but retain larval characteristics, a phenomenon known as neoteny, and remain in water throughout their lives.



**Barred tiger salamander**  
One of several distinctive subspecies, the barred tiger salamander is more strikingly marked than most.

**Colourful newt**

One of the most colourful European newts, this species has a small grey or black body with bluish flanks, and a deep yellow, orange, or red underside.

bright orange  
underside

notable leopard-like spots

flattened tail with  
blue markings

**PROFILE**

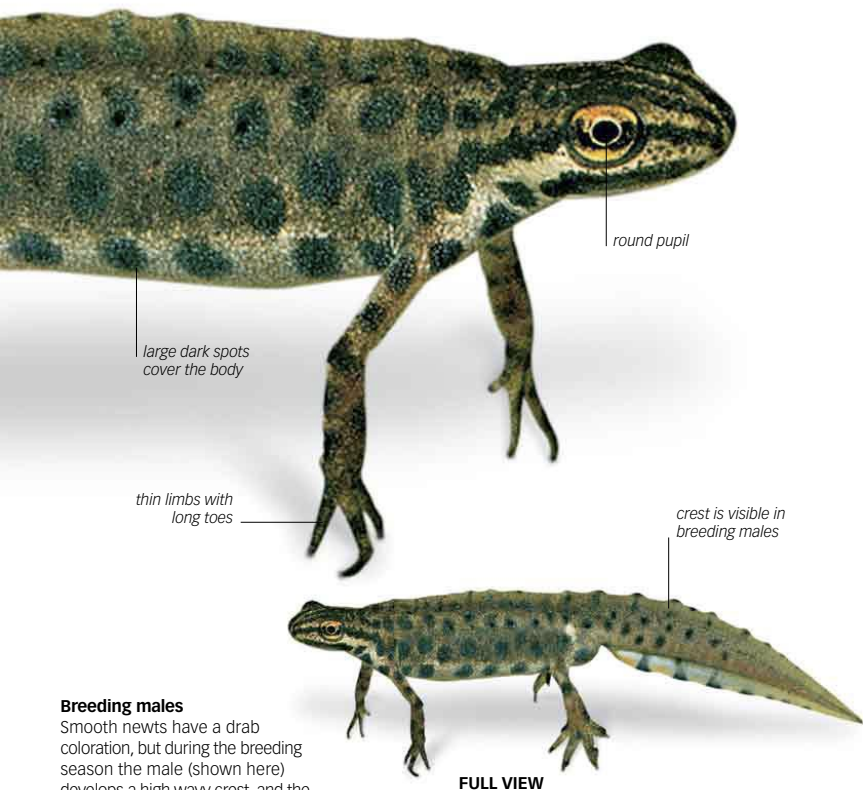
-  Widespread in Europe
-  Aquatic
-  12 cm (4¾ in)
-  Egg-laying
-  250–530
-  Diurnal and nocturnal
-  Not assessed

*Ichthyosaura alpestris*

## ALPINE NEWT

**A highly aquatic species**, the Alpine newt is nearly always found in water or under stones at the edge of a pond, lake, or slow-moving stream. It lives high in the mountains, up to 2,500 m (8,200 ft) in the Alps, for example, where it occurs in cold ponds and lakes above the treeline. Lowland habitats in northern Europe are more varied and include temporary ponds, wells, and flooded tyre tracks. Several subspecies of the Alpine newt have been described over its wide range, some more distinctive than others.

Male alpine newts are especially bright in the breeding season; their colour intensifies and they develop a low yellow crest with black bars. Newly metamorphosed young often have an orange stripe down their back. In parts of eastern Europe, a high proportion of the larvae fail to metamorphose and are neotenic, retaining their gills and other larval characteristics throughout their lives.



### Breeding males

Smooth newts have a drab coloration, but during the breeding season the male (shown here) develops a high wavy crest, and the spots become more pronounced.

FULL VIEW

### PROFILE

-  Most of Europe and parts of W. Asia
-  Damp woodland, fields, and gardens; breeds in shallow ponds and ditches
-  Up to 11 cm (4¼ in)
-  Eggs attached to aquatic vegetation
-  200–300
-  Nocturnal on land; may be diurnal when aquatic
-  Least Concern








*Lissotriton vulgaris*

## SMOOTH NEWT

**The most common newt** over much of its range, the smooth newt is found in a range of habitats, often in garden ponds, shallow lakes, and pools where there is plenty of submerged vegetation. Males and females of this species are brown or olive in colour with an orange or red underside. There are dark spots below, which vary in size.

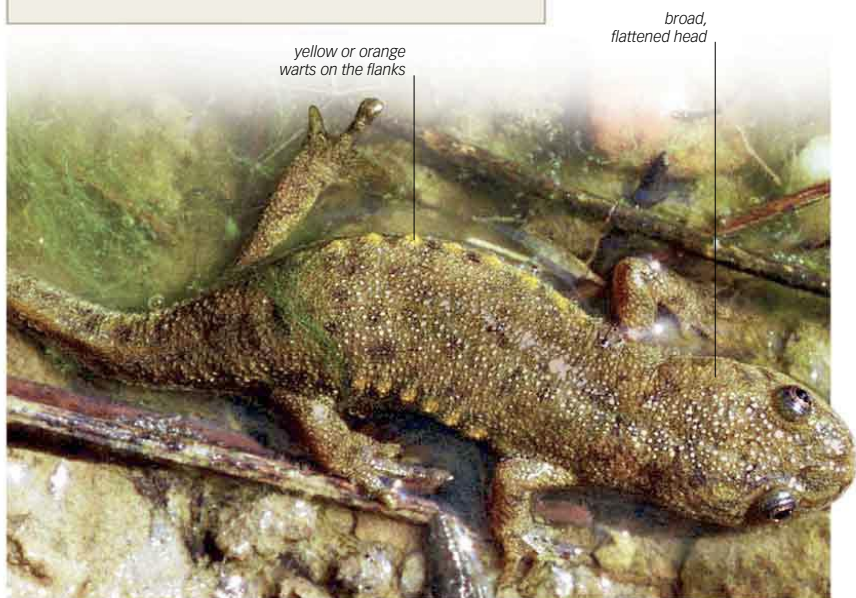
Males court females underwater with a complex display during which they waft pheromones towards the female, using their tail to produce a current. The eggs are attached individually to the leaves of aquatic plants, which are then folded over the eggs. The larvae feed on small aquatic invertebrates. They usually metamorphose by the end of summer and take about 2–3 years to reach maturity. On land, where they spend most of their time, smooth newts can be difficult to distinguish from other species of newts, as the male's crest shrinks after the breeding season and the female's coloration is similar to that of other species.

## PROFILE

-  Iberian Peninsula
-  Highly aquatic, occurring in overgrown ponds, ditches, and irrigation channels
-  15–30 cm (6–12 in)
-  Eggs laid on plants, stones, and twigs
-  15–1,300
-  Mainly nocturnal
-  Least Concern

## Physical appearance

The large size, warty skin, and flattened head help to identify this species.



## SIMILAR SPECIES



**Pyrenean brook salamander**  
(*Calotriton asper*) Smaller;  
found in mountain streams  
in the Pyrenees

*Pleurodeles waltl*

## SHARP-RIBBED NEWT

**A heavily built species** with a broad head, small eyes, and powerful jaws, the sharp-ribbed newt is the largest newt in Europe. It has warty skin, and is olive or brown in colour with numerous black spots. There is also a row of raised, dull yellow or orange spots along each flank that mark the pointed ends of the ribs. When threatened, the ribs, found just under the surface, may pierce its skin, releasing poison produced in nearby glands. It may also arch its back or bite if attacked.

This species lives in weed-choked bodies of water. It feeds mainly on aquatic invertebrates and other prey that fall into its pond, sometimes even tackling prey longer than itself. The newt is highly aquatic, and some individuals never leave the water unless their pond dries up. In such cases, they may travel overland to find another pond. Other individuals may burrow or hide under a stone until their pond or ditch becomes flooded again.

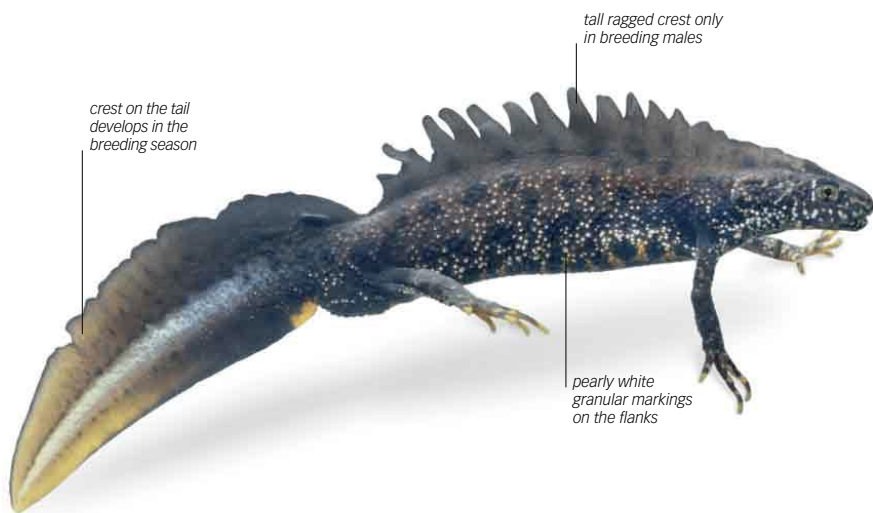


## PROFILE

-  N. and C. Europe and C. Asia
-  Moist woodland, fields, and hedgerows; aquatic in breeding season
-  Up to 15 cm (6 in)
-  Eggs attached to aquatic vegetation
-  200–400
-  Nocturnal
-  Least Concern, but declining in places

**Warty newt**

Found in Europe and parts of Asia, the northern crested newt is also known as the warty newt because of its distinctive warty skin.



## SIMILAR SPECIES



**Southern marbled newt (*Triturus pygmaeus*)** Bright green with black markings; females have an orange stripe on their back

*Triturus cristatus*

## NORTHERN CRESTED NEWT

**A large, dark-coloured newt**, the northern crested newt has many small pearly spots on its flanks and its underside is bright orange with large dark blotches. In the breeding season, the male develops a tall ragged crest on its back and another crest on top of its tail. The sides of the tail also develop a bluish sheen. This newt's skin produces toxic substances, giving it some degree of protection against predators, but not grass snakes, which are immune to the toxins.

The northern crested newt is highly aquatic in the summer and may remain in ponds throughout the year. This species, along with the closely related marbled newt, exhibits a chromosome abnormality that prevents half of the eggs from developing. The species has declined in the British Isles in the last 50 years due to habitat destruction and draining of its breeding ponds, and is now protected.

## PROFILE

📍 China, N. India, Vietnam, and Thailand

🌿 Humid montane forest

↔ 12–18 cm (4¾–7 in)

♀ Eggs laid in water

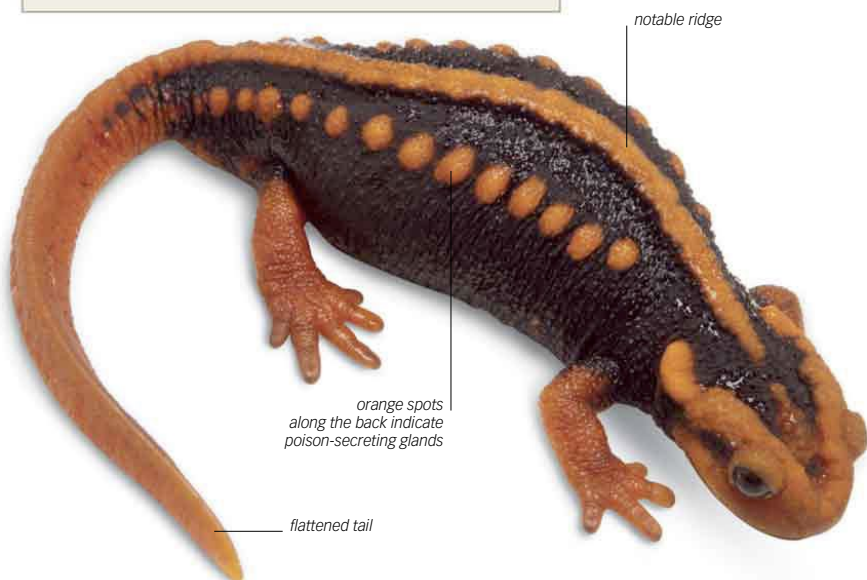
••• 25–60

🌙 Nocturnal

⊗ Least Concern

## Colourful markings

This robust newt is easily identified by the brightly coloured markings on its head and flanks, and the prominent ridge on its spine. Both males and females display the same markings.



## SIMILAR SPECIES



**Kweichow crocodile newt (*Tylotriton kweichowensis*)** Similar, but often with less orange on the head and limbs



**Taliang knobby newt (*Liangshantriton taliangensis*)** Totally black, apart from small areas of orange on its head, toes, and underside








*Tylotriton verrucosus*

## CROCODILE NEWT

**Sometimes known as** the mandarin salamander or mandarin newt, the crocodile newt has a large head and thickset body with rough black skin. Its coloration advertises the toxic nature of its skin secretions, and the orange or yellow spots down either side of its back – in this and related species – mark the position of toxin-producing glands. The crocodile newt lives in forests, gardens, parks, and plantations. Habitat destruction, together with pollution and deliberate forest fires are threatening many populations; although classed as Least Concern by the IUCN, other organizations have given it Near Threatened status.

Active at night, crocodile newts feed on invertebrates. They aestivate during the dry summer season, and migrate to ponds, lakes, and irrigation ditches to breed, usually at the beginning of the monsoon season. The eggs are attached to aquatic vegetation.

## PROFILE

-  Europe
-  Cool forests, meadows, rocky outcrops, and other shady places; some subspecies are aquatic
-  15–20 cm (6–8 in)
-  Live-bearing, giving birth to well-developed larvae or fully formed young
-  8–70
-  Nocturnal, but may be active early morning after rain
-  Least Concern (but some populations are declining)

**Unmistakable salamander**

Although the shape of the body markings may vary, the bright yellow and black fire salamander cannot be confused with any other amphibian.



*Salamandra salamandra*

## FIRE SALAMANDER

**This species** is highly variable both in appearance and habits; several subspecies are recognized, and there are often intermediate forms where their ranges meet. Most fire salamanders are glossy black with bright yellow markings, which may be arranged in stripes, spots, or large blotches. The markings may occasionally be orange or dull red. The bright coloration warns predators that it produces powerful toxins in glands in its skin, which can kill animals as large as a dog.

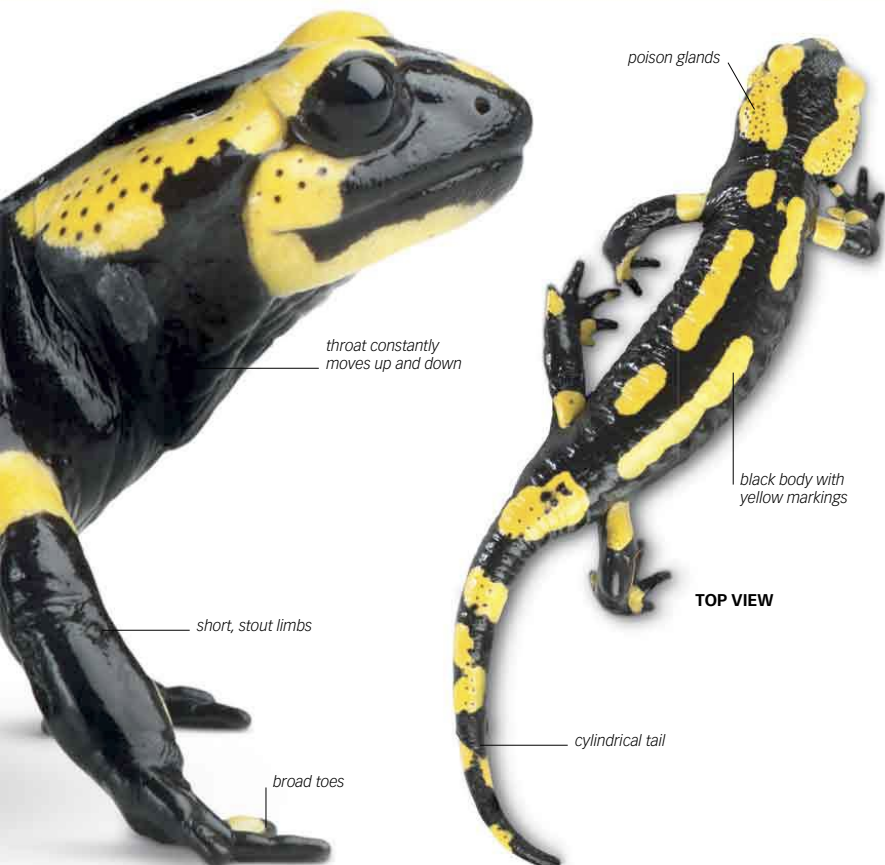
Fire salamanders are secretive amphibians that live under logs, moss, and forest debris. They emerge mainly at night during damp weather, when they may be abundant on the surface, searching for the soft-bodied

invertebrates on which they feed. Mating occurs on land, and females typically give birth to up to 80 aquatic larvae, which they deposit in ponds or streams by lowering the posterior part of their bodies into the water. In some forms, the larvae are retained inside the female's body until they have metamorphosed and are born on land as fully developed salamanders. A few populations living at high altitudes are completely aquatic and their larvae are born smaller than terrestrial forms and take longer to develop.



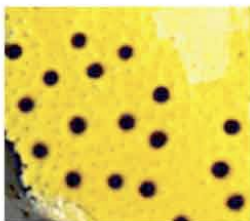
**Portuguese fire salamander**  
(*S.s. gallaica*)

This subspecies has many small spots on its body, some of which may be dull red.



### Feet

Adult salamanders do not need to enter the water and consequently their feet are not webbed; only their larvae develop in water.



### Large parotid gland

There is a concentration of poison (parotid) glands behind the eyes, typically marked by a large yellow area, and conspicuous pores that secrete the poison.



### Prominent eyes

Although seemingly ungainly, fire salamanders have good vision and are adept at locating prey, including worms and insects.

### HABITAT

The fire salamander inhabits the cool, damp broadleaved forests of Europe. In the warmer and drier southern regions where it occurs, its habitat is restricted mainly to mountain ranges. The larvae develop in streams and ponds, hence the fire salamander is rarely found far from water.



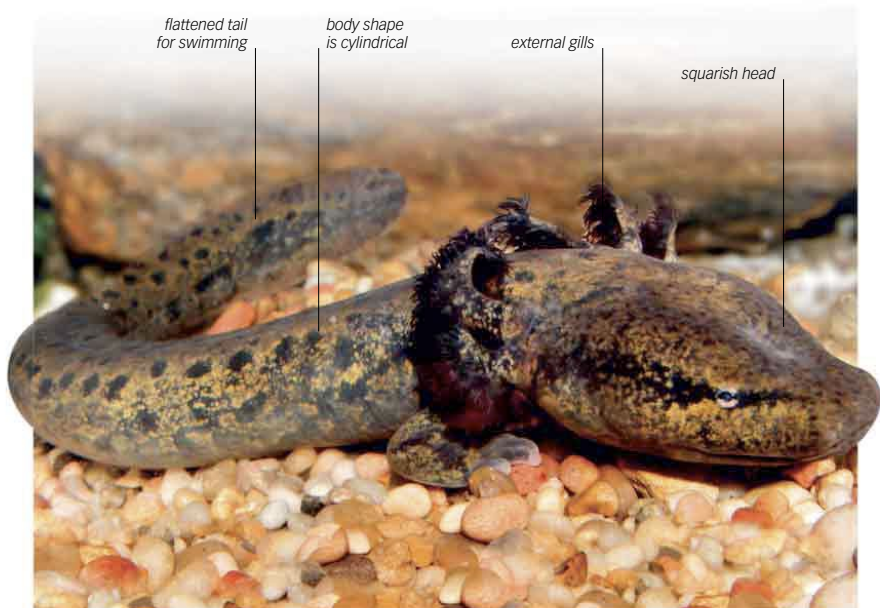
### Shady habitat

Rotting branches and deep leaf litter provide this species with places to hide and hunt.



**Perfect coloration**

An inhabitant of freshwater habitats, the mudpuppy is a permanent larva, retaining gills throughout its life. Its mottled coloration enables it to blend with the muddy, weed-choked waters in which it lives.

**PROFILE**

-  E.C. North America
-  Streams and rivers
-  20–45 cm (8–18 in)
-  Eggs laid underwater attached to rocks
-  75–150
-  Nocturnal
-  Least Concern

*Necturus maculosus*

## MUDPUPPY

**The mudpuppy, or waterdog,** is an elongated aquatic salamander with bushy external gills that it retains throughout its life. A night-time hunter, its brown or grey colour helps to camouflage it in its underwater habitat. It hides on the river bed beneath flat rocks, logs, or planks, where its flattened head and body allow it to wedge itself into narrow crevices.

The female lays her eggs beneath a rock, having first formed a shallow scrape by removing gravel. The eggs are suspended from the underside of the rock by a short stalk. She remains with the eggs until they hatch, protecting them from predators such as large fish and wading birds. The young take about five years to reach breeding size, but there is no metamorphosis. Mudpuppies are sometimes caught by fishermen and, in former times, many hundreds were caught in dragnets or on long lines. Although numbers have declined, they are not thought to be endangered.

**Slight build**

The slender salamander has a narrow head and body with small limbs and a tail that may be nearly twice the length of its head and body.

some slender salamanders have a distinct herringbone pattern

long tail

small limbs

dorsal stripe may be reddish brown, yellow, or buff

**PROFILE**

📍 North America (S. Oregon and N. California)

🌿 Forest, grassland, gardens, and parks

↔ 8–14 cm (3¼–5½ in); the tail accounts for more than half the size

🥚 Eggs are linked together like a string of beads

••• 7–12

🌙 Nocturnal

ⓧ Least Concern

*Batrachoseps attenuatus*

## CALIFORNIAN SLENDER SALAMANDER

**Small, elongated, and worm-like**, the slender salamander is dark brown or black in colour with a wide reddish brown dorsal stripe. Slender salamanders lead a subterranean life, emerging only after rain, mostly in autumn. They avoid dry conditions during the summer by retreating under logs, stones, or debris. Females lay clutches of about 10 eggs in underground cavities in the autumn. Several females may lay their eggs in the same cavity, and the incubation period lasts for about 60 days. The hatchlings take 2–3 years to reach maturity.

Adults and juveniles eat small invertebrates and appear to remain in one place, waiting for potential prey to come within range. They have many predators and are able to discard their tails in order to escape. However, individuals that have lost their tails seem to be less likely to survive, as the tail acts as a fat storage organ to tide them over periods when food is in short supply.

**Ground-dwelling**

Long and slender-bodied, the slimy salamander is a ground-dwelling species that does not need water in which to breed. It lays its eggs in a damp burrow.

**PROFILE**

- |  |   |
|--|---|
|  E. North America                             |  10–20         |
|  Moist deciduous forests and swamp forests    |  Nocturnal     |
|  11–20 cm (4¼–8 in)                           |  Least Concern |
|  Eggs laid in cavities under logs or in caves |   |

**SIMILAR SPECIES**

**Italian cave salamander**  
(*Hydromantes italicus*)

One of the few European members of the lungless salamander family

*Plethodon glutinosus*

## SLIMY SALAMANDER

**The northern slimy salamander** is part of a complex of species and races that are often difficult to distinguish apart, and which were considered to be a single species. They are so-called because of the large amounts of a sticky substance they secrete from their tail if handled roughly. This dries to form a coating that is difficult to remove and is intended to deter predators.

The northern slimy salamander mates in autumn but the eggs are not laid until the following spring or early summer. Females only breed every second year as they need an intermediate year to build up fat reserves from which to produce eggs. Courtship takes place on land and involves an elaborate “dance”; during which the male maintains contact with the female’s body through his chin, which contains chemical sense organs. Females lay clutches of eggs, remaining with them throughout the incubation period. The eggs hatch after 2–3 months and the hatchlings are fully formed, having skipped the free-living larval stage altogether.

**Hidden from view**

Despite its bright coloration, this stout-bodied salamander is rarely seen as it lives in moss and under logs and rocks.



bright red coloration  
is typical of young  
specimens

black spots may vary  
in size and number

**PROFILE**

-  E. North America
-  Springs and seeps that flow through fields and woods
-  11–15 cm (4¼–6 in)
-  Eggs laid in wet places
-  30–130
-  Nocturnal
-  Least Concern

*Pseudotriton ruber*

## RED SALAMANDER

**This stocky salamander** is bright red or dull purplish red; older individuals tend to be darker than young ones. The red coloration is thought to mimic that of another species, the red eft. The skin of both these species contains toxins, making them unpalatable, so they gain protection from predators by imitating each other (Müllerian mimicry). When attacked, the salamander curls up its body and raises its tail in the air, waving it slowly from side to side to deflect attention away from its head.

This species lives in damp or wet ground near springs and clear streams, hiding under moss, stones, or logs during the day. It preys on smaller salamanders and invertebrates. Females attach their eggs to the underside of rocks or logs in boggy places, sometimes submerged in shallow water, and stay near the eggs throughout their incubation, which takes about 2–3 months. When the eggs hatch, the larvae move into streams and pools and feed on aquatic invertebrates. They can take up to three-and-a-half years to lose their larval characteristics.





**Burrowing specialist**

Ringed caecilians have distinct glossy blue coloration with a series of grooved rings edged in white. They are rarely seen as they do not venture on to the surface unless driven from their burrows by floods.

**PROFILE**

- South America
- Rainforest and plantations
- 28–45 cm (11–18 in)
- Eggs laid on land
- 5–16
- Subterranean
- Least Concern

*Siphonops annulatus*

# RINGED CAECILIAN

**One of the more distinctive** caecilians, most of which have dull colours, this species is blue with white rings around its body. It lives in humus-rich forest soil, and is common in cacao plantations. Ringed caecilians feed on burrowing invertebrates, especially earthworms. In turn, they are preyed upon by burrowing mammals and by at least two specialized snakes, the mussurana, *Clelia clelia*, and the South American pipe snake, *Anilius scytale*, which follow them down their burrows.

Females lay eggs below the ground, and remain coiled around them until they hatch. Young caecilians have thin bodies and broad heads. They stay in the nest with their mother after hatching. The mother’s skin becomes swollen and oily at this time. The young feed on this skin, tearing pieces of it from her body, using specialized teeth that they lose later. They feed in short sessions lasting about 10 minutes, and may wait for up to three days between feeds. This behaviour was only recently discovered and has been recorded for one other African species.

**Eel-like amphibian**

The Rio Cauca caecilian resembles an eel, and is sometimes imported along with tropical fish for the pet trade, under the misleading name of rubber eel.

smooth,  
slimy body

**PROFILE**

-  N. South America
-  Aquatic
-  45–55 cm (18–22 in)
-  Live-bearing
-  3–7
-  Probably nocturnal
-  Least Concern

*Typhlonectes natans*

## RIO CAUCA CAECILIAN

**This caecilian is completely aquatic**, and is almost helpless out of water. It prefers heavily vegetated muddy rivers, swamps, and streams, and is tolerant of polluted water. Its small eyes are covered in skin, and are probably not important to it in the murky waters in which it lives. This species is uniformly black above with no markings, and grey below. There are about 80 grooves in the form of rings around its body, and its tail is flattened to help with swimming. Its skin is covered with a toxic slime that protects it from predators, especially fish.

Little is known of the caecilian's behaviour, but it gives birth to small litters of fully formed young after a gestation period of about 220 days. The embryo feeds on secretions from the mother's uterus, developing a pair of large gills that surround it, and deriving nourishment and oxygen from the uterine wall. These highly specialized gills are shed within minutes of birth. The young grow quickly and reach half their adult size within the first year.

# FROGS AND TOADS

By far the largest group of amphibians, frogs and toads are found on every continent, except Antarctica. They are especially widespread in tropical regions, but are also found in temperate localities, even extending into the Arctic Circle.

## FROG OR TOAD?

There are no taxonomic differences between frogs and toads; the terms owe more to common usage rather than any scientific basis. However, the term toad is usually reserved for species with relatively dry skin and which crawl or make short hops rather than leap. Toads also tend to rely more heavily on their lungs for respiration. Species from the Bufonidae, Bombinatoridae, and Pelobatidae families are normally referred to as toads.

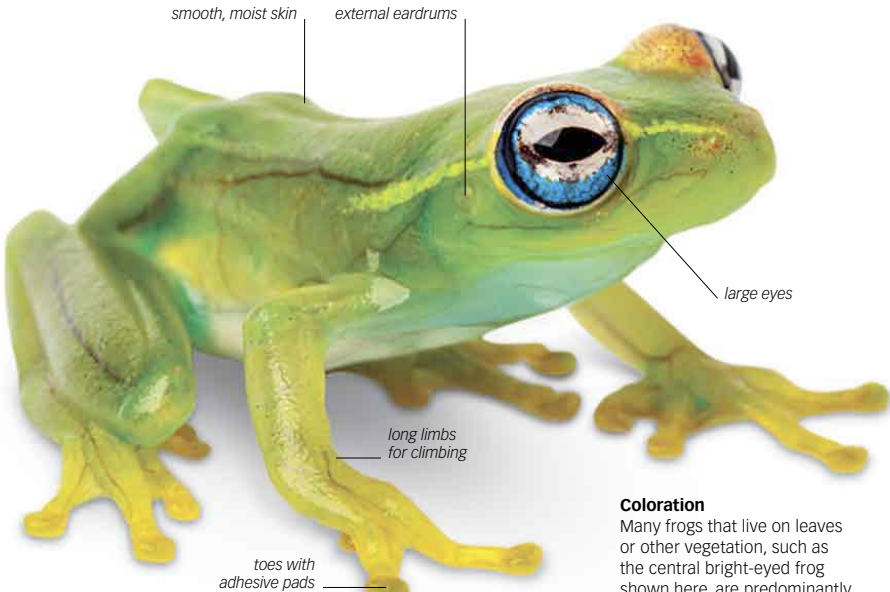
## ANATOMY

All frogs and toads have a tailless body and four limbs. They are relatively small, with the largest species reaching 35 cm (14 in) and the smallest, 1 cm (1/3 in). Most are 2–10 cm (3/4–4 in) in length. A considerable number of

ORDER	ANURA
FAMILIES	54
SPECIES	6,200

species are cleverly camouflaged whereas a few are brightly coloured to advertise their unpalatability. The pigments that give them their colours are embedded in the skin, and some colour cells, or chromatophores, can expand or contract to control the frog's overall hue.

The most important sense organs are the eyes, which are large in nocturnal frogs, with vertical or horizontal pupils; other frogs have round pupils. The external eardrum, or tympanum, is situated behind each eye and is important in species that call; in some cases, the eardrums of males are larger than those of females.



## Coloration

Many frogs that live on leaves or other vegetation, such as the central bright-eyed frog shown here, are predominantly green in colour.

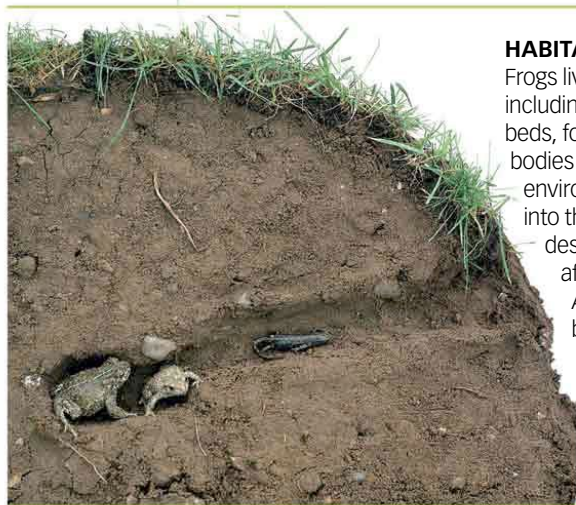
## ADAPTATIONS

The hind limbs of many frogs and toads are invariably longer than the front limbs and often have webbed digits for swimming. Proportions vary from long-legged, streamlined species that are built for speed and agility to stout, short-limbed species that live a more sedentary lifestyle. These shapes reflect

their hunting strategies and influence their defensive behaviour. Their feet may also be webbed for gliding, while burrowing species often have a hardened tubercle on their hind feet for digging.

### Powerful leaps

Frogs with long hind limbs are adept at leaping and often dive into water to escape from predators.



## HABITAT

Frogs live in diverse habitats, including forest canopies, reed beds, forest floors, or permanent bodies of water. Species from dry environments burrow down into the sand or soil to avoid desiccation, coming out only after rain to breed and feed. A few tolerate slightly brackish conditions, but none live in salt water.

### Cohabitants

On rare occasions, more than one species share a burrow.

## FAMILIES AND THEIR DISTRIBUTION

Of the 54 families that frogs and toads are divided into, the largest is the Hylidae, comprising mostly of tree frogs, with an almost global distribution. The Bufonidae contains nearly 600 species of toads and also has a wide distribution, but none are native to Australia. The Dendrobatidae includes the brightly coloured poison dart frogs from South and Central America, and the Ranidae contains water frogs, which are a common sight in ponds, swamps, and lakes across the world. The Microhylidae is also a large and widespread family but its members are small and easily overlooked.



### True toad

Living among leaf litter, the Truando toad (*Rhaebo haematiticus*) belongs to the Bufonidae family and is found in the forests of Central and South America.



**Tail-like appendage**








Male tailed frogs are unique in having a short “tail”. This is an extension of the cloaca and is used for internal fertilization.

flattened body  
with rough skin

extended cloaca  
resembles a tail



**PROFILE**

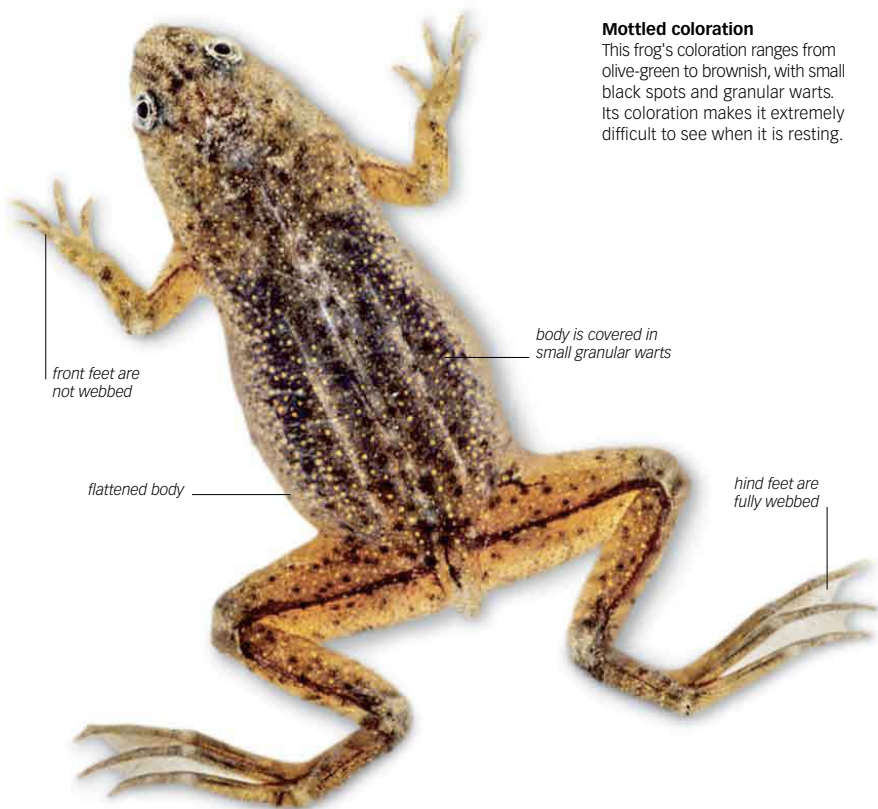
-  N.W. North America
-  Clear, fast-flowing rocky streams in forests
-  3–5 cm (1¼–2 in)
-  Internal fertilization; eggs laid in strings under stones in streams
-  28–96
-  Mostly nocturnal
-  Least Concern

*Ascaphus truei*

# TAILED FROG

**Tailed frogs live along** cool mountain streams in the forests of the Pacific Northwest, where their brown, olive, or greyish coloration provides good camouflage among the rocks. They are rarely found far from water, except during damp weather when they may wander over forest floors in search of food.

In most cases, mating takes place in the autumn and the eggs are laid the following spring, which hatch at the end of summer. The tadpoles have a large sucker-like structure around their mouth so that they can attach themselves to rocks and avoid being swept away. During the day, they hide in rock crevices, and emerge at night to scrape algae and micro-organisms from the surface of rocks, sometimes working their way above the water level to graze on damp rocks. They may take up to three years to develop. The young are also slow-growing due to the cool environment, often taking 7–8 years before they reach breeding size. This species is thought to have a lifespan of 15–20 years.

**Mottled coloration**

This frog's coloration ranges from olive-green to brownish, with small black spots and granular warts. Its coloration makes it extremely difficult to see when it is resting.







front feet are  
not webbed

body is covered in  
small granular warts

flattened body

hind feet are  
fully webbed

**PROFILE**

-  W. and C. Africa
-  Still waters, including ponds and backwaters, and flooded forests
-  3.5 cm (1½ in)
-  Egg-laying; eggs float on the surface
-  Up to 750
-  Mainly diurnal
-  Least Concern

*Hymenochirus boettgeri*

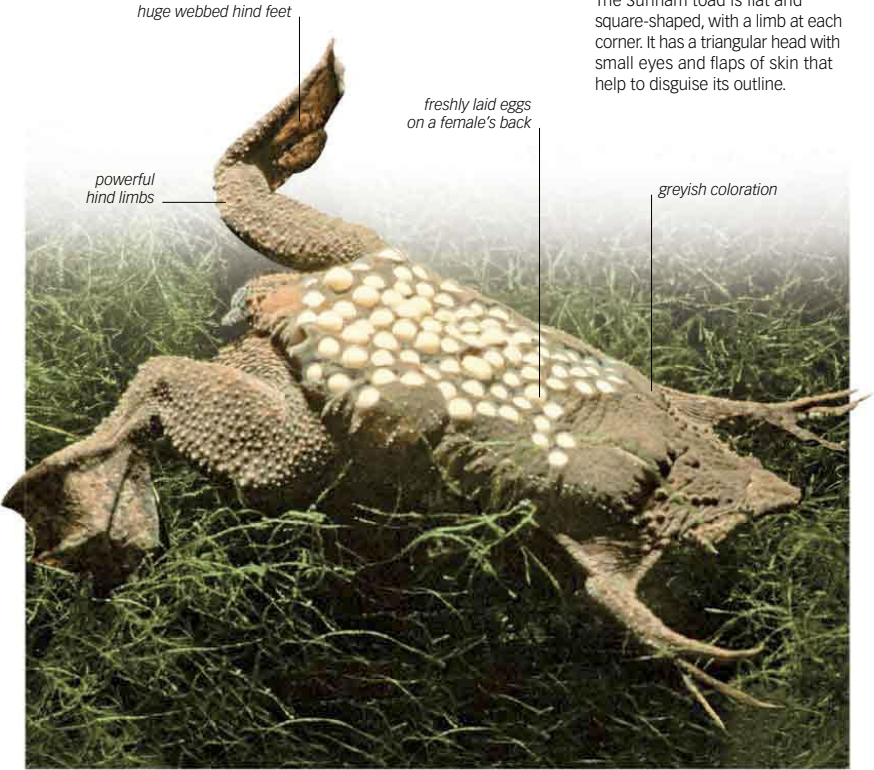
## CONGO DWARF CLAWED FROG

**Although it has been widely studied** in captivity, this frog is rarely seen in the wild. A small, secretive species, it prefers shady, weedy bodies of water where it lives mainly at the bottom, foraging for small aquatic invertebrates and occasionally swimming to the surface to breathe.








During the breeding season, males call with a quiet trill, which lasts several seconds. Receptive females are grasped around the waist (inguinal amplexus), and after a while the pair swim up to the surface and turn over as the female releases the eggs. They repeat this process many times until all the eggs are laid, forming a small raft. The newly hatched tadpoles are very small, and begin by feeding on protozoans and other microscopic water life before graduating to larger prey. They feed by suddenly opening their mouth, causing water and prey to rush in. Congo dwarf clawed frogs are popular pets and live in harmony with fish, but will eat very small fry.

**Unusual shape**

The Surinam toad is flat and square-shaped, with a limb at each corner. It has a triangular head with small eyes and flaps of skin that help to disguise its outline.



**PROFILE**

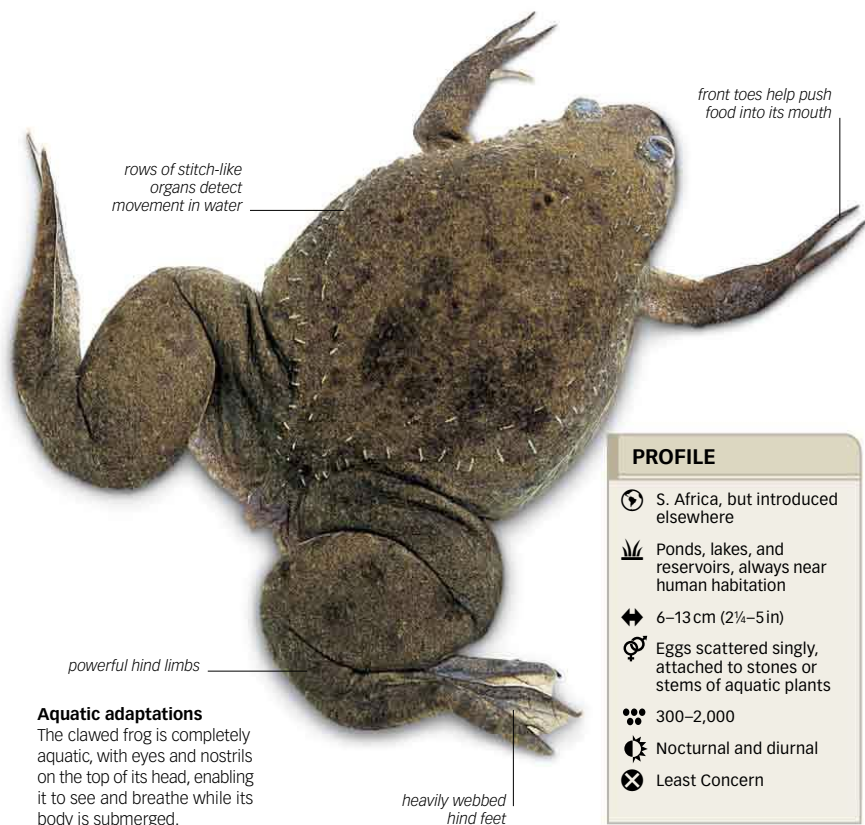
-  N. South America
-  Swamps and slow-moving rivers
-  10–15 cm (4–6 in)
-  Egg-laying
-  Up to 100
-  Nocturnal
-  Least Concern

*Pipa pipa*








# SURINAM TOAD

**A completely aquatic species**, the Surinam toad lives at the bottom of muddy pools, slow-moving rivers, and flooded forests, hiding among the dead leaves that it resembles so closely. It feeds on small fish and aquatic invertebrates, finding them with its fingers, which have sensitive star-shaped organs at their tips. Once the prey is located, the toad suddenly opens its wide mouth, sucking in water and its prey.

The breeding habits of the Surinam toad are very unusual. The amplexant pair swim to the surface of the water and turn upside down. The female lays a few eggs, which fall on to the belly of the male. He gathers the eggs with his huge webbed feet and scoops them on to her back. After several such manoeuvres, a complete clutch is laid and the pair separate. Over the next few days, the mother's back swells and becomes spongy, enveloping each egg individually. The eggs develop inside their own cell, and the fully formed toadlets break out and swim away after about 3–4 months.



### PROFILE

-  S. Africa, but introduced elsewhere
-  Ponds, lakes, and reservoirs, always near human habitation
-  6–13 cm (2¼–5 in)
-  Eggs scattered singly, attached to stones or stems of aquatic plants
-  300–2,000
-  Nocturnal and diurnal
-  Least Concern

### Aquatic adaptations

The clawed frog is completely aquatic, with eyes and nostrils on the top of its head, enabling it to see and breathe while its body is submerged.

### SIMILAR SPECIES



**Fraser's clawed frog**  
(*Xenopus fraseri*) Similar, with minor differences; found in Angola, southern Africa

### *Xenopus laevis*

## AFRICAN CLAWED FROG

**With a smooth, streamlined body**, heavily webbed hind feet, and eyes situated on top of its head, the African clawed frog is well adapted to an aquatic lifestyle. Its grey colour makes it difficult to see against a muddy bottom, and a line of pressure-sensitive, stitch-like organs along each flank help it to sense movement at night or in murky water. It leaves its pond if it begins to dry out, moving across the land during wet weather to colonize newly created water bodies.

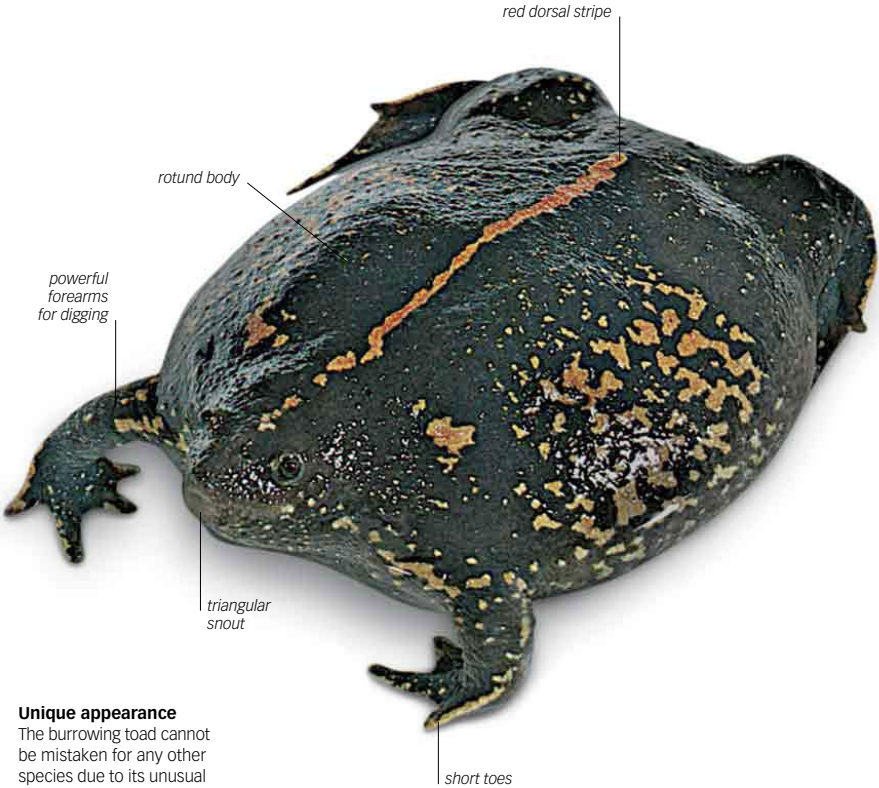
This species is so adaptable that it has become established in countries outside its natural range. It may be responsible for declining populations of native species, either through predation or the spreading of diseases.



### Albino form

An albino strain is commonly bred in captivity, and is often sold as a pet.





Unique appearance

The burrowing toad cannot be mistaken for any other species due to its unusual shape and colouring.

**PROFILE**

S.USA through Costa Rica

Fields and plains with sandy soil

5–7 cm (2–2¾ in)

Eggs laid in small clumps

Not known

Nocturnal

Least Concern

*Rhinophrynus dorsalis*

BURROWING TOAD

**A species with a distinctive** globular body, the burrowing toad puffs itself up even more when threatened. The body shape and red dorsal stripe distinguishes the toad from any other species. It feeds on ants and termites, using a specialized tongue that it can project outwards and reshape into a rod-like form.

This toad lives underground for much of the year. It uses the hardened tubercles on its hind limbs to burrow down into the soil to avoid dry conditions, a process known as aestivation. It can survive over a year without feeding while aestivating. Adults emerge from the soil to breed during heavy rains. Males call while floating on the surface of the water, or from soil near water, and have a loud, low-pitched call. The eggs, laid in clumps, are small and float to the surface. Tadpoles feed on microscopic plants in the water and may form large moving aggregations with many individuals.

## PROFILE



Most of the Iberian Peninsula and into C. Europe



South-facing hillsides, quarries, gardens, and mountains; usually near water



Up to 5.5 cm (2¼ in)



Egg-laying; the male carries a string of eggs wrapped around its hind limbs



10–80, usually less than 40



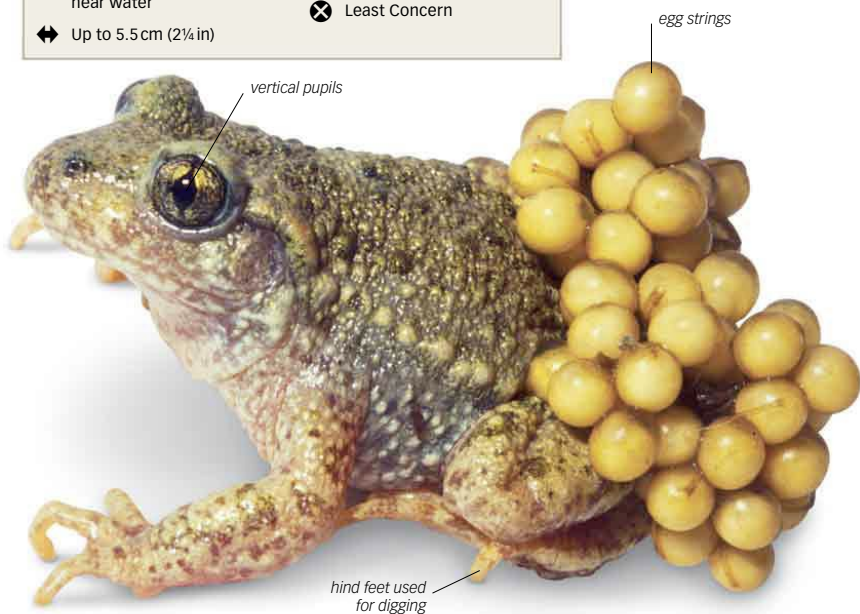
Nocturnal



Least Concern

## Paternal care

This species is very unusual in that the male toad cares for the eggs, keeping them out of harm's way on his body until they are ready to hatch.



## SIMILAR SPECIES



**Majorcan midwife toad**  
(*Alytes muletensis*) Lives in a small mountainous region on the island of Majorca, where it is restricted to a single valley








*Alytes obstetricans*

## MIDWIFE TOAD

**Also known as the bell toad** due to its call, this small, stocky species is grey or brown, and has fairly smooth skin for a toad. A line of small warts, which may be orange, pinkish, or yellow, runs down each side of its back.

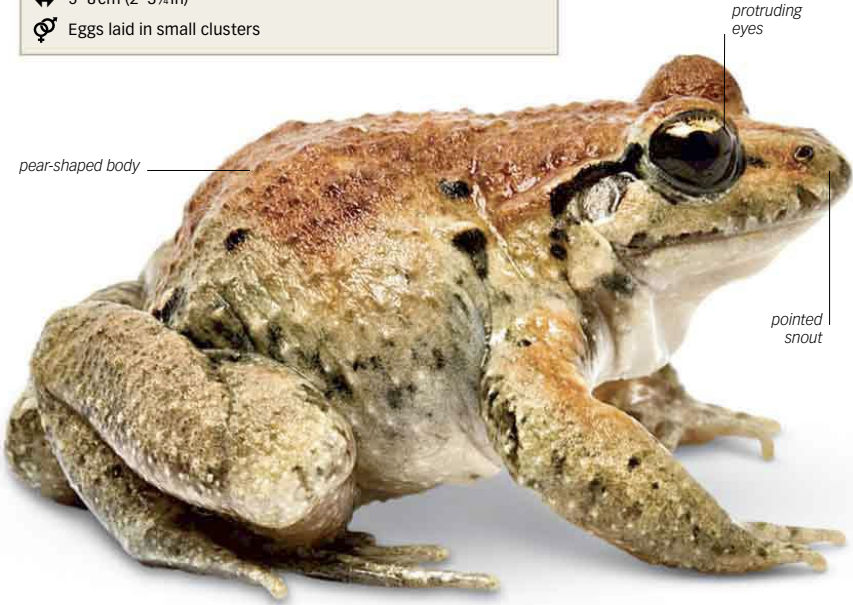
Male midwife toads make a pleasant, soft call from under a rock or a burrow to attract females. They mate on land, and after fertilizing the eggs the male wraps them around its hind legs. Some males carry more than one string if they have courted several females. They keep the eggs moist by remaining in a burrow of damp soil, and, during dry weather, they sometimes sit in a shallow puddle of water to stop them from drying out. After 3–8 weeks, they take the eggs to a small body of permanent water, where the tadpoles hatch. The tadpoles grow relatively large and often overwinter before metamorphosing the following year. This species has been successfully introduced into several parts of England, where some colonies have spread from the original site of introduction into neighbouring woods and gardens.

**PROFILE**

-  N. Africa; introduced into parts of N.E. Spain and S.W. France
-  Fields, coastal sand flats, and open forests
-  5–8 cm (2–3¼ in)
-  Eggs laid in small clusters
-  Several clutches of 20–50 eggs laid throughout winter and spring
-  Mainly nocturnal
-  Least Concern

**Colourful frog**

A stout-bodied frog with a slightly flattened head and pointed snout, the painted frog has variable coloration and markings. Its underside, however, is always whitish.



**SIMILAR SPECIES**

spots may not always be present



**West Iberian painted frog**  
*(Discoglossus galganoi)*

Very similar, with a variable colouring; differs mainly in not having visible eardrums






*Discoglossus pictus*

**PAINTED FROG**

**This adaptable species** is found in a wide variety of habitats, usually among dense vegetation and always close to water, including drinking troughs and cisterns as well as natural ponds, irrigation ditches, and slow-moving rivers and streams. As its name suggests, the painted frog has colourful markings; its relatively smooth skin may be brown, dull yellow, green, or reddish in colour, and with or without large blotches on its back and limbs. It typically rests in the water with just its head showing.

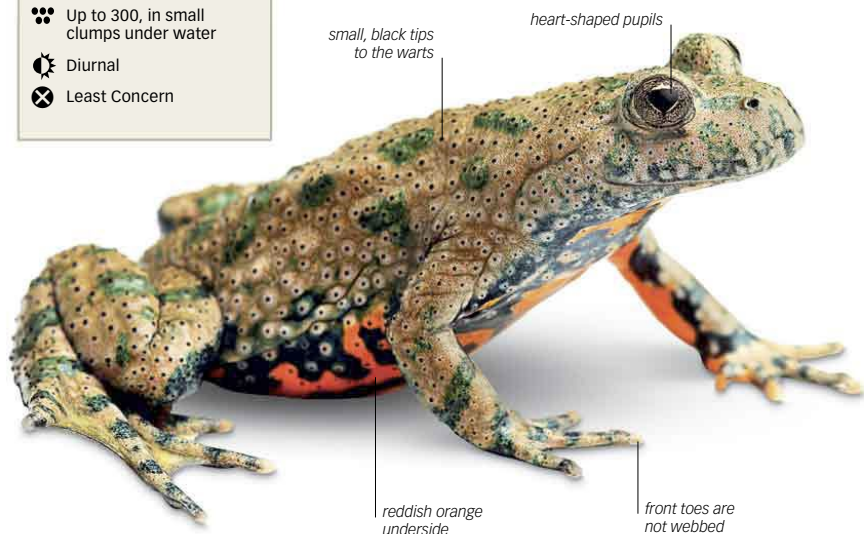
The painted frog is a prolific species with an extended breeding season. Females lay small clutches of eggs at frequent intervals whenever conditions are suitable and may produce a total of about 5,000 eggs in a year. The tadpoles grow quickly. Similar species of painted frogs occur in Israel, Spain, and the islands of Sardinia and Corsica. Their identification is difficult unless their origin is known. The Israeli species *D. nigriventer* was considered extinct. It was only rediscovered in 2011 and is now listed as Critically Endangered.

## PROFILE

-  E. and N.E. Europe and Russia
-  Shallow ponds and lake edges in open landscapes
-  Up to 5 cm (2 in)
-  Egg-laying
-  Up to 300, in small clumps under water
-  Diurnal
-  Least Concern

## Elevated eyes

The European fire-bellied toad has raised eyes that allow it to see above the water when it is floating just below the surface.



## SIMILAR SPECIES

irregular dark spots on the back



**Yellow-bellied toad**  
(*Bombina variegata*) Ventral markings are yellow; found in temporary pools, water-filled hoof prints, and wheel ruts

*Bombina bombina*

## EUROPEAN FIRE-BELLIED TOAD

**Fire-bellied toads** have bright reddish orange blotches on their blue-grey underside, which they display by arching their back when they are disturbed. They are grey or grey-brown above, and the upper surface of their skin is covered with small warts. These toads usually rest in shallow water, with their heads exposed and their bodies hanging just below the surface.

In the breeding season, the males attract females with a soft *oop-ooop-ooop* call. Amplexus (the embrace during the mating process) is inguinal (pelvic), and the eggs are attached to underwater vegetation in clumps of about 30. Several clumps of eggs are laid in a single breeding season. This species has become rare in the northern parts of its range and extinct in some countries, such as Sweden. However, populations further east are unaffected at present.

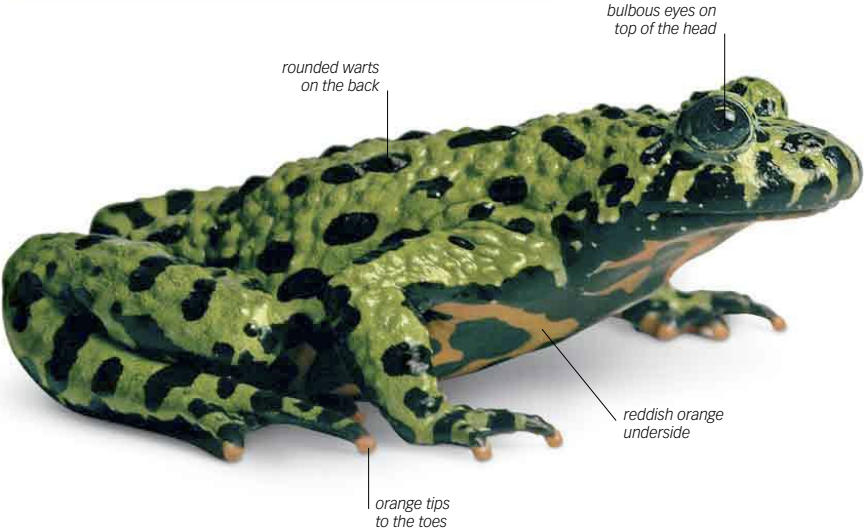


PROFILE

-  N.E. China, Korea, and E. Russia
-  50–250
-  Forest streams, meadows, and fields
-  Diurnal
-  3–5 cm (1¼–2 in)
-  Least Concern
-  Eggs laid in small clusters

Brightly coloured underside

When it feels threatened, the Oriental fire-bellied toad arches its back and raises its limbs to expose its colourful underside, warning predators that it is toxic.



SIMILAR SPECIES



**Yunnan firebelly toad**  
(*Bombina maxima*)

Largest species in the genus; distinguished by very large warts on its dorsal surface

*Bombina orientalis*




ORIENTAL  
FIRE-BELLIED TOAD

**Fire-bellied toads** are popular pets among amphibian-keepers due to their bright coloration and the ease with which they can be cared for. Variation occurs mainly in the colour of the dorsal surface, which might be bright green, grey, or olive. Captive-bred toads are often less colourful than wild ones because they lack certain colour-producing pigments in their diet.

In the breeding season, which can last throughout spring and early summer, fire-bellied toads are a common sight. Amplexus is pelvic in this species. Females lay eggs in small clusters, scattering them over a wide area and often attaching them to aquatic plants. The tadpoles eat plant material and rotting leaves, and metamorphose after about two months. The young toads are very small and lack the bright colours of adults. They eat small invertebrates and feed on land and in water. These toads can live up to 20 years in captivity.

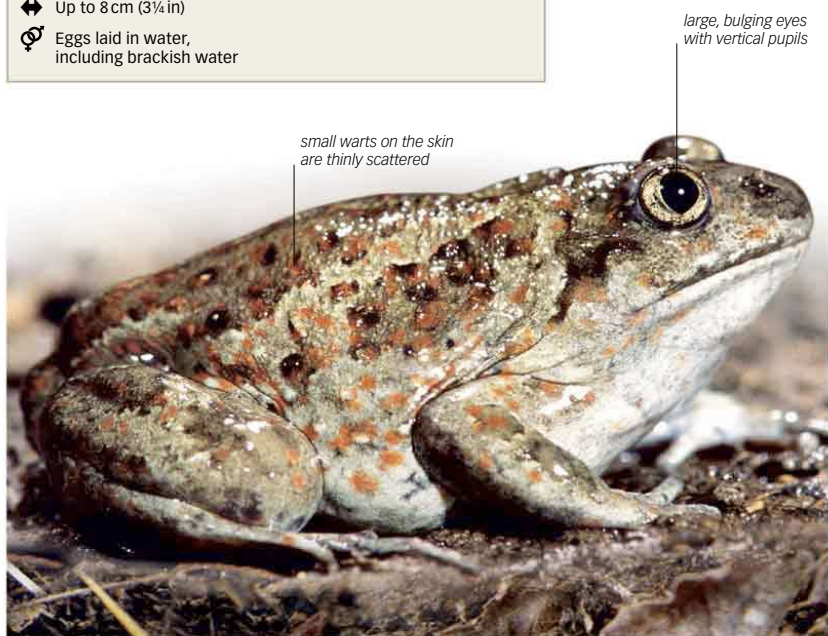
## PROFILE

-  C. and E. Europe, into W. Asia
-  Flat regions with loose, sandy soil
-  Up to 8 cm (3¼ in)
-  Eggs laid in water, including brackish water

-  1,000–3,500
-  Nocturnal
-  Least Concern

## Efficient burrower

Spadefoot toads are highly efficient burrowers, disappearing from view beneath the surface within a few minutes.



## SIMILAR SPECIES



**Western spadefoot toad**  
(*Pelobates cultripes*) Yellow and brown in colour, with silver or greenish eyes; occurs in Spain and Portugal, and isolated populations are found in France

*Pelobates fuscus*

## COMMON SPADEFOOT TOAD

**This plump toad** has smooth skin and large, prominent eyes. It is variable in colour and may be grey, brown, olive, or reddish with darker markings that can take the form of blotches or poorly defined stripes. Its eyes are golden and have vertical pupils. The toad's name is derived from the hardened, sharp-edged tubercle on its hind feet, which it uses to dig into the soil with a shuffling motion. It burrows down to about 20cm (8in) to avoid dry conditions, and emerges at night, especially after rain, to feed and breed.

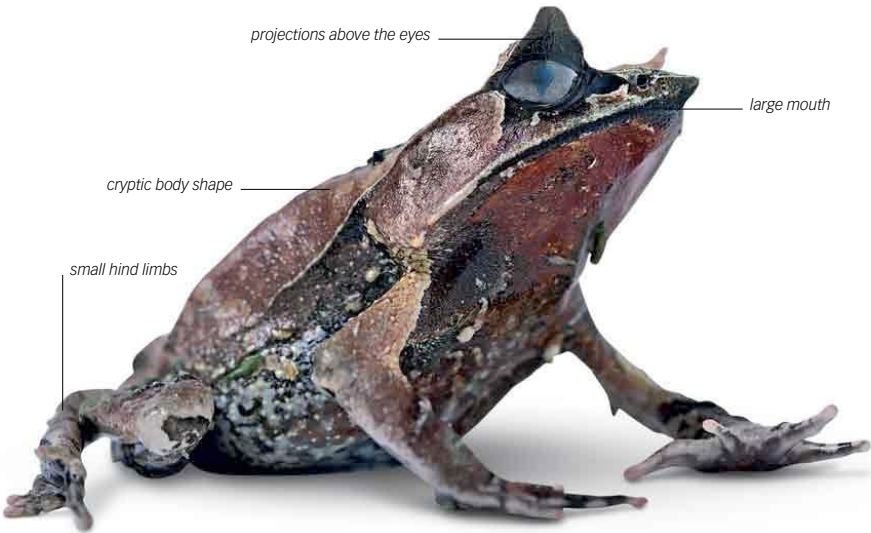
Breeding takes place in temporary pools, usually those with a reedy margin, and often lasts for only a few days. During this time, females may lay up to 3,500 eggs. The eggs hatch a week or two later, and the tadpoles take several months to develop fully; if their ponds dry up, as often happens, they die before they can metamorphose.

PROFILE

-  Southeast Asia
-  Lowland forests
-  7–12.5 cm (2¾–5 in); females are much larger than males
-  Eggs laid in water
-  50–300
-  Nocturnal
-  Least Concern

Pointed projections

This frog gets its common name from the long, triangular projections on its upper eyelids and snout, which resemble horns.



SIMILAR SPECIES



**Kobayashi's horned frog (*Megophrys kobayashi*)** The same size, but with a blunter projection on its snout; has bright yellow irises

*Megophrys nasuta*

ASIAN HORNED FROG

The Asian horned frog is an amazing example of camouflage. Not only is it coloured in such a way that it looks like the dead leaves among which it lives, but the deception is enhanced by the pointed projections from its snout and above its eyes, which give the appearance of leaf stems. This makes it exceptionally hard to find, even in areas where it occurs in large numbers.

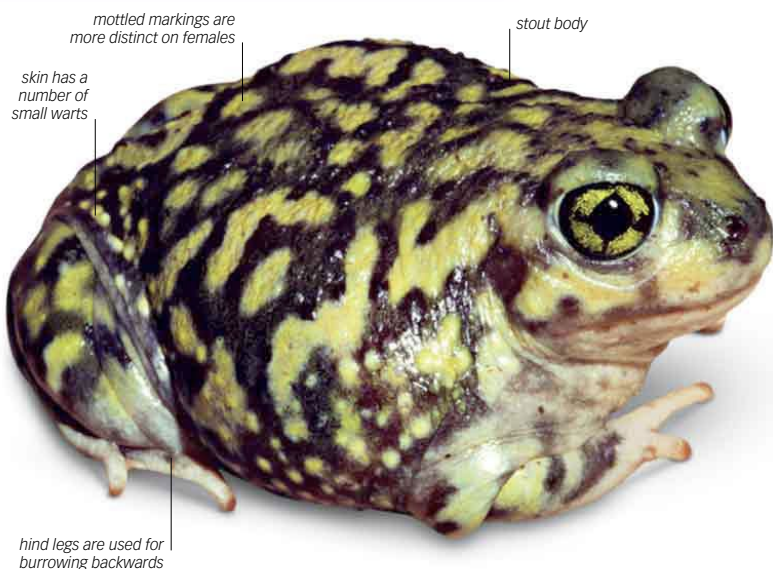
Ambushing any suitable prey that comes within range, these frogs feed on a variety of invertebrates as well as smaller frogs. During the breeding season, males call with a loud, single *honk* prior to heavy rain. The females, which are much larger than the males, move to forest streams, with the male already in amplexus, and lay their eggs in the quiet backwaters of the slow-moving streams. The tadpoles are very unusual in having upturned, funnel-shaped mouths, which they use to feed from the surface of the water at night. During the day, they hide in spaces between gravel or in dead vegetation.

## PROFILE

-  S. North America
-  Plains, grassland, and arid areas
-  5.5–7.5 cm (2¼–3 in)
-  Eggs laid in temporary pools after heavy rain
-  Up to 3,000
-  Nocturnal
-  Least Concern

## Subterranean life

Couch's spadefoot toad spends most of its life underground. It has greenish or brownish yellow coloration and a network of dark markings, which are more prominent on the female (shown here).



## SIMILAR SPECIES



**Western spadefoot toad (*Spea hammondi*)** Has a similar lifestyle, but some tadpoles are carnivorous, even feeding on each other to hasten their development

*Scaphiopus couchii*

## COUCH'S SPADEFOOT TOAD

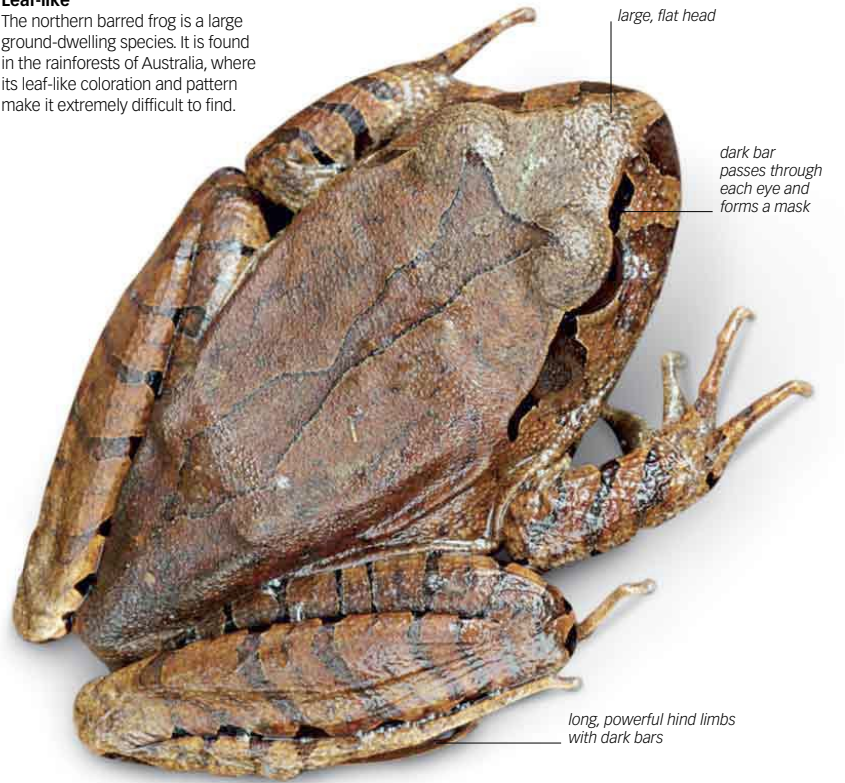
**The spadefoot toads** are named for the hardened sickle-shaped cuticles on their hind feet, which they use like small spades to burrow backwards into the soil. As they shuffle down, using their hind feet alternately, the toads turn slightly, appearing to spiral downwards until they are hidden beneath the surface. They remain underground, at a depth of up to 1 m (3¼ ft), for 9–10 months, emerging only with the onset of rain. Once heavy rain has flooded the surrounding area, the toads come up to the surface to feed and to breed.

Owing to the temporary nature of their breeding pools, development of the eggs is rapid; they hatch after a day and the tadpoles may metamorphose after only eight days, although 10–20 days is more usual. Despite this, a large number of larvae fail to metamorphose before the pools dry out. This species has benefited in some areas from the building of artificial pools and troughs for cattle.



Leaf-like

The northern barred frog is a large ground-dwelling species. It is found in the rainforests of Australia, where its leaf-like coloration and pattern make it extremely difficult to find.



PROFILE

- Queensland, Australia
- Upland rainforest
- 6–9 cm (2¼–3½ in)
- Eggs laid on the ground near streams
- Unknown
- Nocturnal
- Least Concern

*Mixophyes schevilli*

NORTHERN BARRED FROG

**This Australian frog** is variable in colour and ranges from yellow to dark brown, although most individuals are coppery-brown with darker markings. There is invariably a dark marking passing through each eye, which helps disrupt the outline of the eye and improves the frog’s camouflage.

During the breeding season, males call from leaf litter near streams to attract females; a deep resonant *wakh* sound is emitted four or five times followed by a low grunting sound. Females lay their eggs on the ground at the edge of streams. These are then washed into the water by rain or as a result of rising water levels, and the tadpoles develop in the water. In the past, the barred frog’s habitat was greatly reduced due to clearance of the forest for agricultural purposes. Their habitat is now protected within national parks.

**Heavily built frog**

The stocky-looking western banjo frog has a greyish green coloration marked with numerous irregular patches and a pale-coloured line down its back.

**PROFILE**

-  W. Australia
-  Woodland and fields
-  6–7 cm (2¼–2¾ in)
-  Eggs laid in a foam nest
-  Unknown
-  Nocturnal
-  Least Concern

*Limnodynastes dorsalis*

## WESTERN BANJO FROG

**A ground-dwelling frog** with short legs and a triangular head, the banjo frog has a large oval gland on the upper surface of its thigh and another gland, the sub-labial, at the corners of its jaw. It is known locally as pobblebonk because of its banjo-like call; a resonant *plonk* that sounds like the plucking of a banjo string.

These frogs live a solitary life in burrows. However, at the start of the winter rains, males move to breeding sites and live in the vegetation at the water's edge. Large numbers form choruses that can be heard over long distances. The eggs are laid in shallow water or the edges of slow-moving rivers, and they float on the surface in a raft of foam that the male whips up as the eggs are laid. If many pairs spawn in the same body of water, it can become covered in meringue-like masses, which gradually break down as the eggs hatch. The tadpoles have a high dorsal fin and deep body. They grow to a large size before metamorphosing.

**Rotund appearance**

The turtle frog's back is humped immediately behind its head, giving it the overall appearance of a turtle without a shell, hence its common name.



**PROFILE**

-  W. Australia
-  Woodland and scrub with sandy soils
-  3.5–5 cm (1½–2 in)
-  Eggs laid underground
-  Up to 38
-  Active after rains
-  Least Concern

*Myobatrachus gouldii*

**TURTLE FROG**

**An unusual looking species**, the turtle frog has a swollen body, small head, and tiny eyes. Its short, powerful limbs originate from the side rather than underneath the body. It spends most of its life underground, burrowing head-first into sandy soil using its muscular front limbs. The species is also found under rotting logs, attracted by a plentiful supply of termites, which are its main food. There are records of the turtle frog eating nearly 500 termites in a single sitting.

This frog breeds after heavy rains; it digs up to the surface and the male calls from a few centimetres down or with only its head showing. The pair may burrow down into the soil after they have gone into amplexus, but this has not been confirmed. The eggs are laid underground, at a depth of 1 m (3¼ ft) or more. Development takes places within the egg capsule, and there is no free-living tadpole stage.

**Patient hunter**

A distinctive frog with its yellow and black stripes, the corroboree toadlet is primarily a sit-and-wait predator, preying mostly on small and slow-moving creatures, such as ants and termites.

**PROFILE**

-  New South Wales, Australia (Snowy Mountains)
-  Alpine grasslands and bogs
-  2–3 cm (¾–1¼ in)
-  Eggs laid in burrows
-  10–38
-  Unknown
-  Critically Endangered

*Pseudophryne corroboree*

## CORROBOREE TOADLET

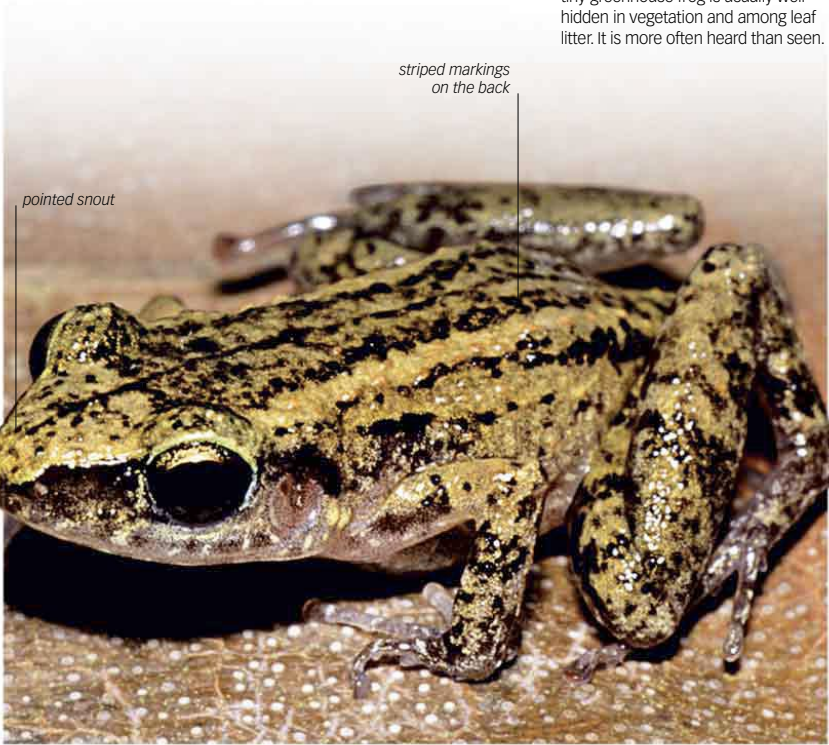
**The corroboree toadlet** is a brightly coloured species, whose markings recall the startling patterns painted on to the bodies of Australian aborigines during the Corroboree festival (an annual event celebrating their indigenous culture). Its coloration may help to warn predators that the toad's skin contains toxins. The toadlet lives in sphagnum bogs, in the higher reaches of the Snowy Mountains. There are two distinct populations – northern and southern – and opinions are divided over whether they represent different species or are forms of the same species.

In the breeding season, the male builds burrows in moss and calls to attract a female. The eggs are laid in the burrow, which later becomes inundated when water levels rise. The tadpoles live in the flooded moss and take 6–7 months to reach metamorphosis. They are believed to take another three years before they become sexually mature. This species is endangered due to its small area of habitat, and also because it is unlikely to breed successfully during years of drought.



**Well camouflaged**

With its olive-brown coloration, the tiny greenhouse frog is usually well hidden in vegetation and among leaf litter. It is more often heard than seen.



**PROFILE**



Cuba and neighbouring islands; introduced into several parts of North and Central America



Woodland and gardens (in leaf litter and sometimes in bromeliad plants)



2.5–4 cm (1–1½ in)



Eggs laid on land



3–26



Nocturnal



Least Concern

*Eleutherodactylus planirostris*

# GREENHOUSE FROG

**The greenhouse frog** is a small species that occurs in two forms: striped and mottled. Although common, this species is rarely seen owing to its diminutive size and secretive lifestyle. It has found its way into many parts of North and South America, and once it becomes established, it may extend its range.

Males make a repetitive chirping call throughout an extended breeding season – from May to September in Florida, USA. Females lay a small cluster of large eggs in damp places, often under a log. Young frogs develop inside the egg capsules and have no free-living tadpole stage. In warm, humid conditions they may hatch as fully formed frogs in as little as two weeks, each measuring about 0.5 cm (¾ in). Their reproductive method has helped them to spread, as the eggs are sometimes transported accidentally in the soil of potted plants; the first colonies in Florida were found in greenhouses and nurseries as far back as 1875, although there is evidence to suggest that the greenhouse frog arrived much earlier.

**Rare climber**

Although it is related to treefrogs and has small adhesive toe pads, the Riobamba marsupial frog rarely climbs trees; it lives on vegetation, often close to a water source.

**PROFILE**

-  Ecuador
-  Montane meadows and fields
-  5 cm (2 in)
-  Eggs carried in pouch on female's back
-  Up to 100
-  Mainly nocturnal
-  Endangered

*Gastrotheca riobambae*

## RIOBAMBA MARSUPIAL FROG

**The female marsupial frog** carries her eggs in a pouch formed from flaps of skin on her back. The male calls from the vicinity of small water bodies to attract the female. They mate on land, and once they are in amplexus, the female begins to lay her eggs. The male fertilizes each egg as it is laid and then manoeuvres it into the female's pouch using his hind feet.

The female carries the eggs while they develop and releases them when they are well-grown tadpoles, taking them to a small pool and, if necessary, using the long toes of her hind feet to scrape them out of the pouch. Other *Gastrotheca* species, notably those from lowland habitats, retain the tadpoles until they have metamorphosed and release them as small frogs. *G. riobambae* used to be one of the most common Andean frogs, but its numbers have fallen drastically in recent years due to habitat destruction, pollution, and disease.

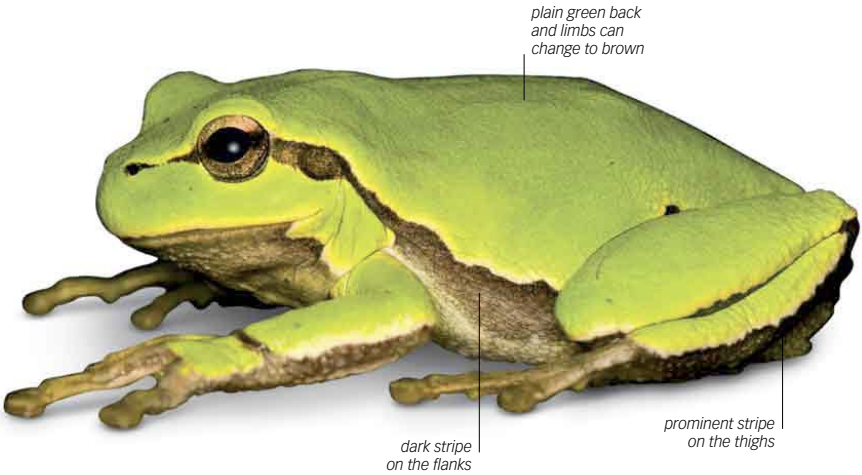
**PROFILE**

- 🌐 Europe and W. Asia
- 🌿 Reedbeds, bushes, and trees
- 📏 Up to 5 cm (2 in)
- 🥚 Lays many small clusters of eggs in warm shallow bodies of water

- 👁️ 200–1,400
- 🌙 Nocturnal and crepuscular; occasionally active during the day
- ⊗ Least Concern

**Disruptive stripe**

The brown side-stripe helps to disguise the shape of this otherwise plain green frog and makes it difficult to see, even when it is in full view.



**SIMILAR SPECIES**



**Mediterranean treefrog**  
(*Hyla meridionalis*) Similar, but lacks the stripe along the flanks








*Hyla arborea*

**EUROPEAN TREEFROG**

**This species is commonly found** in some parts of southern Europe. It is a good climber and may rest as high as 10 m (33 ft) from the ground, but is usually seen sitting on leaves and stems lower down. Its digits end in a round adhesive pad, used for clinging on to smooth surfaces. It often feeds on flying insects, which it can catch in midair.

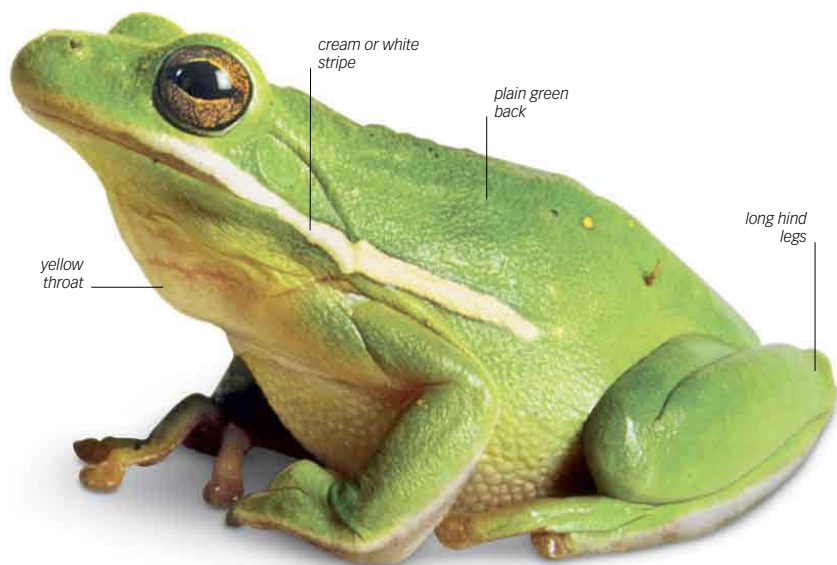
During the breeding season, European treefrogs congregate around the edges of ponds and larger bodies of still water. The males start to call in the late afternoon, with activity increasing into the evening. Their call is particularly raucous, and large choruses can be heard from a great distance. The eggs are laid in small clumps of 3–60 attached to aquatic vegetation, and each female lays several batches. Some populations that were once part of this species have been split into separate species.

## PROFILE

-  S.E. USA
-  Swamps and edges of lakes and ponds
-  3–5.5 cm (1¼–2¼ in)
-  Eggs laid in floating vegetation
-  500–1,000
-  Nocturnal
-  Least Concern

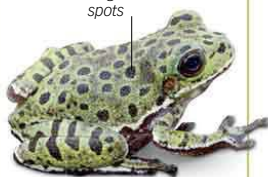
## Aquatic species

The smooth-skinned green treefrog prefers to live near water, mostly in vegetation around the margins.



## SIMILAR SPECIES

large spots

**Barking treefrog**

**(*Hyla gratiosa*)** Slightly stockier with spots on its back; has a dog-like bark

*Hyla cinerea*








## GREEN TREEFROG

**One of the most common treefrogs** of the American southeast, the green treefrog can be found around the fringes of most large and small bodies of water, living among reeds and emergent vegetation. They may vary in colour and pattern, with some individuals being yellow while others lack the distinctive cream side-stripes. It is attracted to lights at night in search of the insects that congregate there.

Males make a loud *quack* sound to attract females, but they also call in response to rain or to a variety of everyday noises. These frogs have an extended breeding season, and lay their eggs in mats of floating vegetation such as duckweed, *Salvinia* (a floating fern), and water hyacinth. The tadpoles metamorphose after 4–6 weeks. The green treefrog is widely collected for the pet trade.



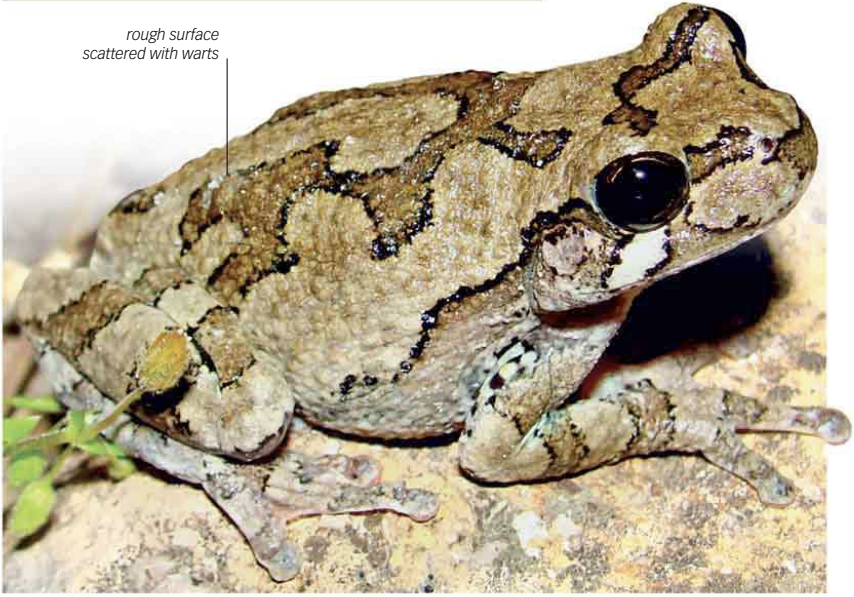
## PROFILE

-  E. North America
-  Trees and shrubs near water
-  3.2–5 cm (1¼–2 in)
-  Egg-laying
-  Up to 1,800, in clumps of 30–40
-  Nocturnal
-  Least Concern

## Effective disguise

With its mottled pattern, this tree frog is so well camouflaged when resting that it can easily be overlooked.

rough surface  
scattered with warts



## SIMILAR SPECIES



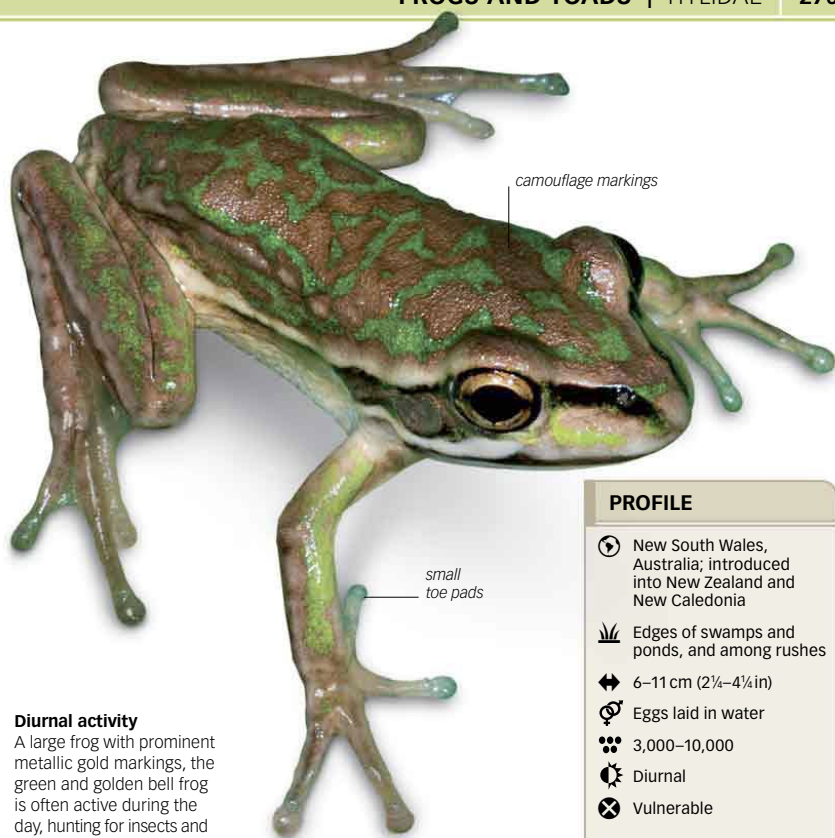
**Cope's grey tree frog**  
(*Hyla chrysoscelis*) Almost identical in appearance

*Hyla versicolor*

## NORTHERN GREY TREE FROG

**The small, slightly warty** northern grey tree frog is very well camouflaged when resting on tree trunks or lichen due to its mottled grey pattern. As the scientific name suggests, its colour is variable and it may also be brown, greenish grey, or almost white, depending on the temperature and its mood. The tadpoles may be equally variable in colour. The adult frog has a patch of yellowish orange on the concealed inner surface of its thigh. When the frog walks or jumps, this flash colour is exposed, helping to confuse predators.








This species and the southern grey tree frog, *H. chrysoscelis*, from Florida and other parts of the American southeast and east, are almost identical in appearance but their calls differ, as does their genetic make-up. When two different species look almost identical they are known as cryptic species.



#### Diurnal activity

A large frog with prominent metallic gold markings, the green and golden bell frog is often active during the day, hunting for insects and basking in the sun.

#### PROFILE

-  New South Wales, Australia; introduced into New Zealand and New Caledonia
-  Edges of swamps and ponds, and among rushes
-  6–11 cm (2¼–4¼ in)
-  Eggs laid in water
-  3,000–10,000
-  Diurnal
-  Vulnerable

#### SIMILAR SPECIES



**Motorbike frog (*Litoria moorei*)** Also called the western bell frog; its call sounds like a motorbike changing gears, hence its name



**Slender tree frog (*Litoria adelaidensis*)** Often seen clinging to reeds or thin stems; it can be recognized by the stripe along its side

#### *Litoria aurea*

## GREEN AND GOLDEN BELL FROG





**Despite belonging** to the tree frog family, the green and golden bell frog lives on the ground, among grass and aquatic vegetation. It was formerly common in New South Wales, Australia, where large numbers were collected for dissection in biology classes.




In recent years, the population has declined drastically. The causes for this are thought to be habitat destruction and the introduction of non-native fish such as the mosquito fish, *Gambusia holbrooki*. This fish was introduced to control mosquito larvae, but it also eats tadpoles, including the very small newly hatched tadpoles of the green and golden bell frog. The chytrid fungus disease that affects the frog population in many parts of the world may also be contributing towards its decline. The species was introduced into New Zealand and other Pacific islands where they are still thriving.

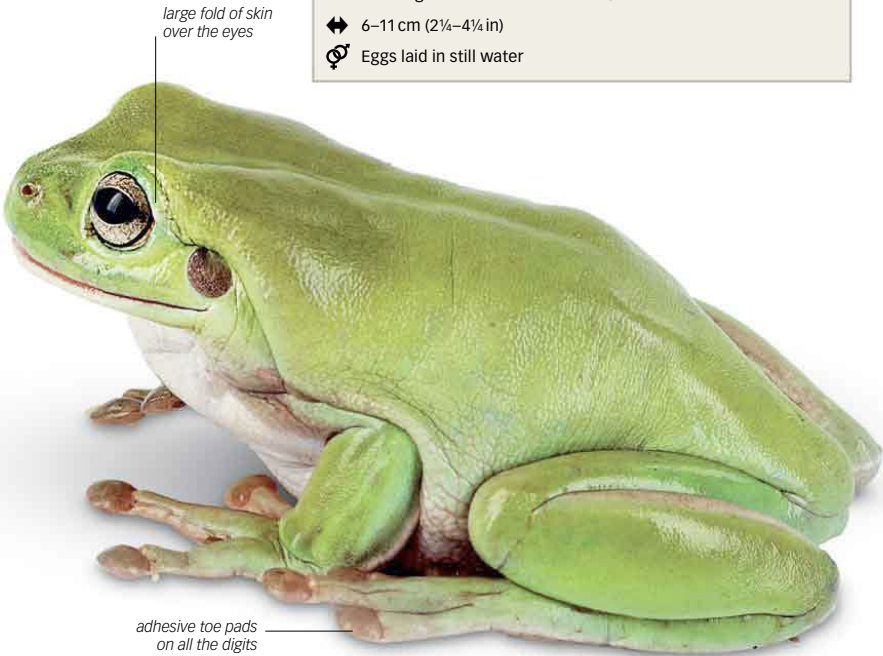
**Popular pet**

Australian green treefrogs are popular as pets because of their calm disposition and the permanent grin-like look on their face.

**PROFILE**

-  Northern half of Australia and parts of New Guinea
-  Dry woodland and human dwellings
-  6–11 cm (2¼–4¼ in)
-  Eggs laid in still water

-  200–2,000
-  Nocturnal
-  Least Concern



**SIMILAR SPECIES**

similar size and coloration to Australian green treefrog



**White-lipped treefrog (*Litoria infrafrenata*)**  
More slender and agile; lives in New Guinea and coastal Queensland, Australia

*Litoria caerulea*

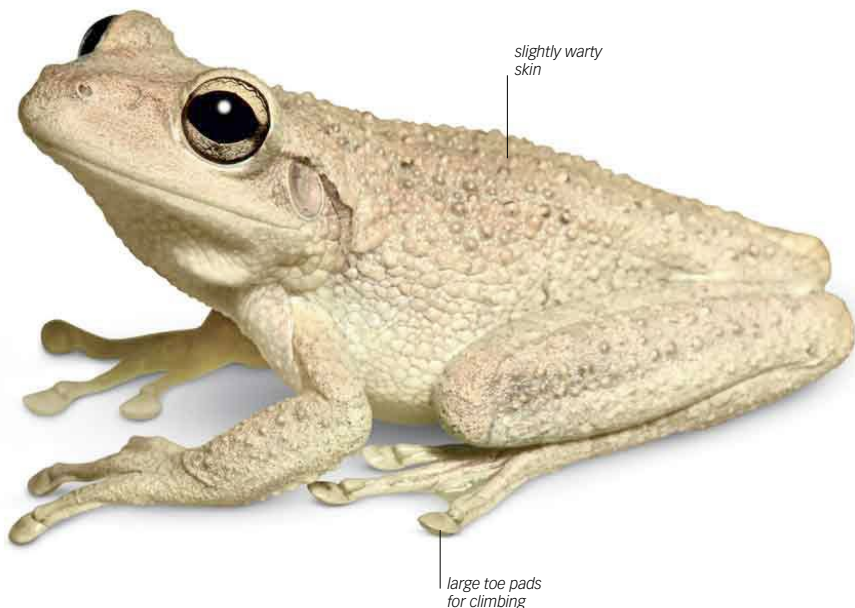
# AUSTRALIAN GREEN TREEFROG

**This species is usually bright green**, but may also be greyish green or grey, especially in captivity. Also known as White’s treefrogs, some individuals have small white spots scattered over their backs. A characteristic that separates this species from most others is the fold of skin behind the eyes, which may partially obscure the eardrums, especially in old, heavy-bodied individuals.

Australian green treefrogs often live in dry habitats, but may avoid drying out by living in hollow trees. They are common around human dwellings and are often found in sinks, toilets, and showers. Breeding takes place after rain that follows prolonged dry weather, and the eggs are laid in a large clump, which floats at first and later sinks. The tadpoles take about six weeks to develop. Australian green treefrogs are popular pets in Europe and North America, as their adaptability and calm temperament make them easy to care for.

**Adaptable and variable**

Accidentally brought into Florida, the highly adaptable Cuban treefrog varies in colour and has rough, warty skin.

**PROFILE**

-  West Indies and introduced into Florida, USA
-  Any damp place, including plant pots
-  4–8.5 cm (1½–3¼ in)
-  Eggs laid in water
-  About 130
-  Nocturnal
-  Least Concern

*Osteopilus septentrionalis*

## CUBAN TREEFROG

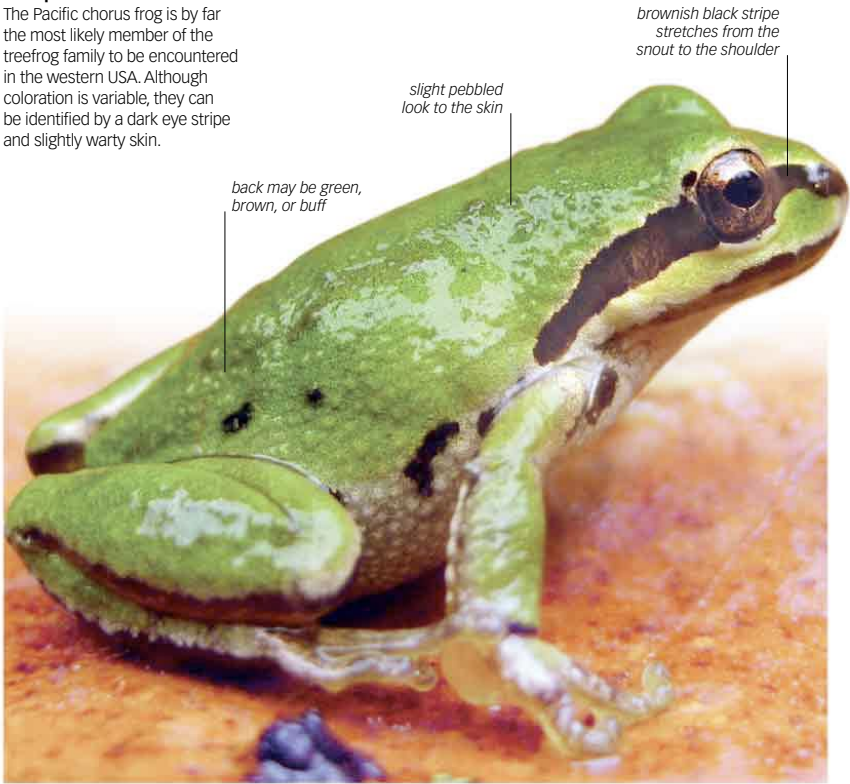
**The Cuban treefrog** has variable colours and markings – green, brown, or bronze, with or without darker markings on its back. It is large for a treefrog, with proportionately large toe pads for climbing. It is highly adaptable, requiring only a small damp area to thrive, and can even tolerate brackish water. For this reason, the Cuban treefrog has become established in many places outside its natural range, including Florida where it is especially common around buildings and in gardens, often hiding in potted plants. It also turns up in swimming pools and bathrooms.

The Cuban treefrog is a voracious predator, eating anything that will fit into its wide gape, including other frogs, and has eliminated native species in some parts of its range. It breeds after heavy rainstorms, in temporary bodies of water or permanent pools that are free of predatory fish, laying small clutches of eggs that hatch and develop quickly. The adult frogs have skin secretions that can irritate human skin.



**Conspicuous resident**

The Pacific chorus frog is by far the most likely member of the treefrog family to be encountered in the western USA. Although coloration is variable, they can be identified by a dark eye stripe and slightly warty skin.



**PROFILE**

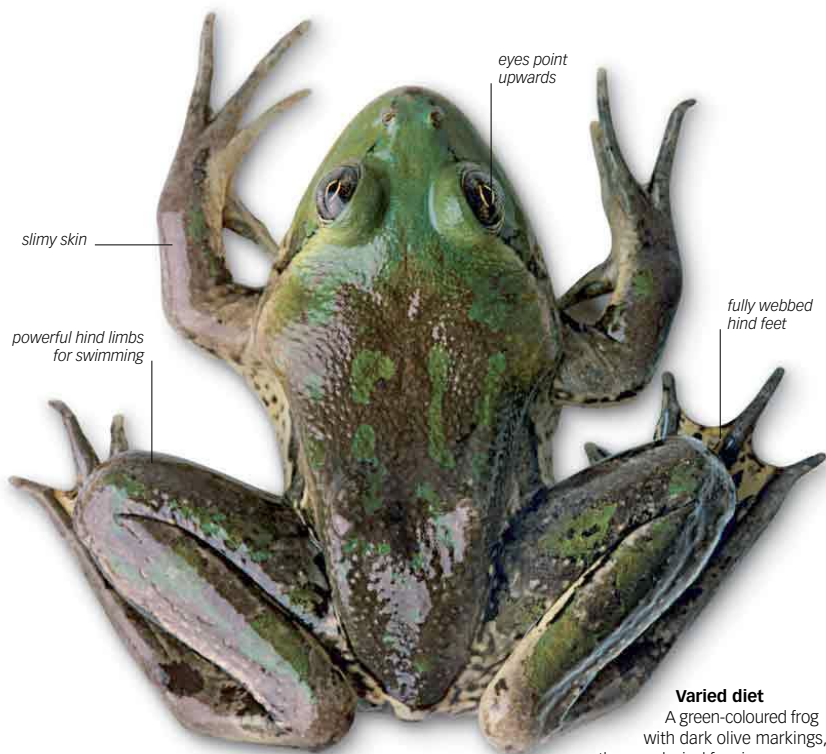
-  W. North America
-  Grassland and woodland, in damp places
-  2–5 cm (¾–2 in)
-  Eggs laid in shallow water
-  5–50
-  Nocturnal
-  Least Concern

*Pseudacris regilla*

# PACIFIC CHORUS FROG

**Although this species belongs** to the treefrog family, it spends most of its time close to the ground, among grass and other low plants near water. It can often be seen out in the open, basking in the sun. It varies greatly in colour and may be green, tan, or brown. Individuals can also change from one shade to another in a matter of minutes. There may be a pattern of spots on its back, although this is also variable. The skin, however, is invariably slightly rough and covered in small rounded warts.

Males call with a repeated *ribbit, ribbit* sound, and large choruses that can be heard from some distance help the females to home in on the breeding pools. Pacific chorus frogs breed throughout spring and early summer, laying eggs in small clusters in shallow water, including ponds, ditches, slow-moving streams, and temporarily flooded depressions. The tadpoles take 2–3 months to metamorphose.

**Varied diet**

A green-coloured frog with dark olive markings, the paradoxical frog is an inhabitant of shallow water, and feeds on a variety of smaller animals, including other frogs.

**PROFILE**

-  South America
-  Swamps and flooded forests
-  4.5–7 cm (1¾–2¾ in)
-  Eggs laid in a frothy mass
-  Unknown
-  Mainly nocturnal
-  Least Concern

*Pseudis paradoxa*

## PARADOXICAL FROG

**This frog is almost entirely aquatic**, despite being a member of the tree frog family. It has powerful hind limbs and heavily webbed feet. The eyes and nostrils are situated on top of the head so that it can see and breathe while floating just beneath the surface. The skin produces a substance known as pseudin; under laboratory conditions, synthesized versions of the compound stimulate the production of insulin in pancreatic cells and may be useful in the treatment of type 2 diabetes.

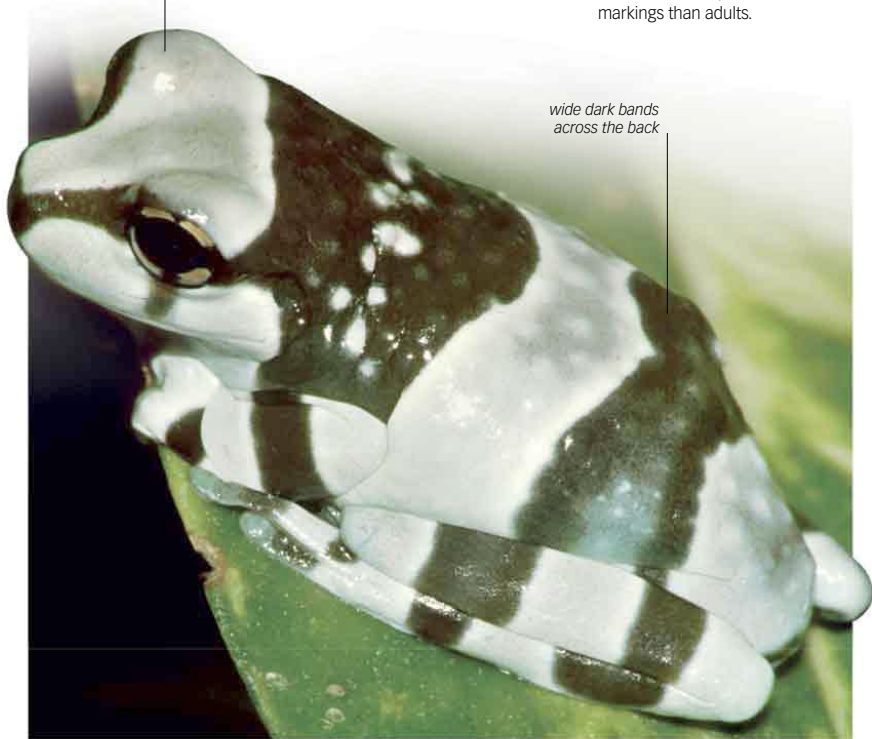
This species breeds in the rainy season in response to rising water levels. Its eggs are green and laid in large frothy masses along the edge of the water, among floating vegetation. The tadpoles grow and develop quickly if they are living in small temporary pools, but in larger bodies of water they grow slowly and can reach a considerable size – potentially four times the length of an adult. Hence, the origin of their name and the reason why they are also known as shrinking frogs. An extremely voracious species, it feeds on a wide variety of prey.

white triangular marking  
on top of the head

#### Juvenile markings

Newly metamorphosed juveniles, such as this one, have bolder markings than adults.

wide dark bands  
across the back



#### PROFILE

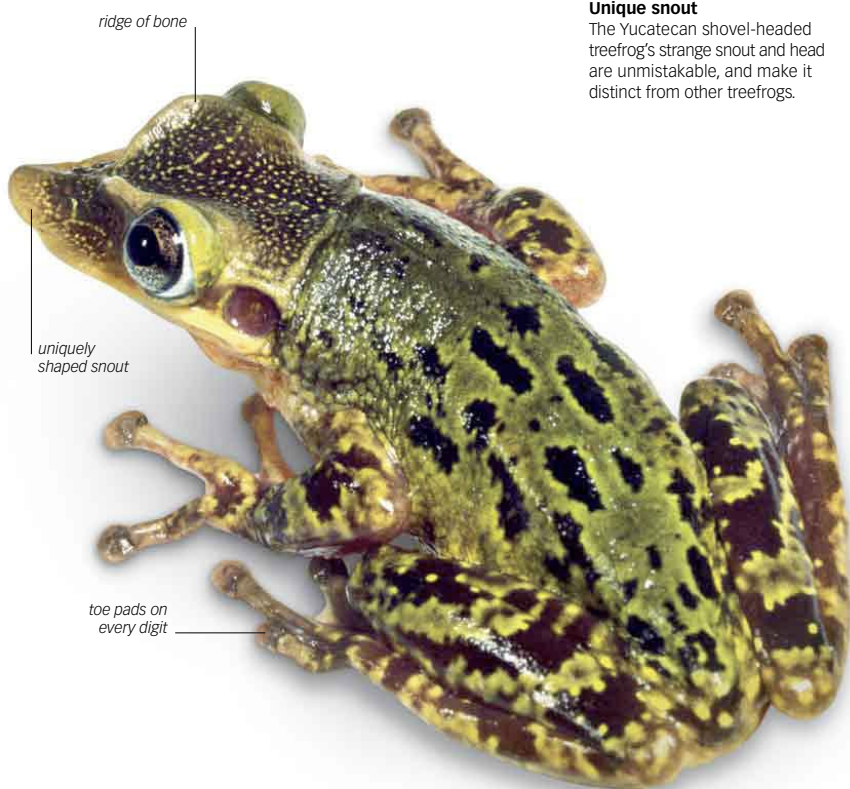
-  South America
-  Lowland rainforest
-  7.5–9 cm (3–3½ in)
-  Eggs laid in tree holes
-  Up to 2,500
-  Nocturnal
-  Least Concern

*Trachycephalus resinifictrix*

## MISSION GOLDEN-EYED TREEFROG

**This frog is also called the milk frog** because it secretes a thick, sticky white substance from glands on its skin when handled roughly. This secretion is toxic and unpleasant to predators, which usually results in the frog being dropped. The bones of this species and that of other members of its genus are green.

These treefrogs live in the canopy but come down to lower levels to breed. Males call from inside tree holes where water has collected. The eggs are laid on the surface of the water or attached to the sides of the tree hole just above the surface. The tadpoles eat dead leaves and other debris that has collected in the tree hole, as well as eggs of their own species that are laid subsequently. They leave the tree hole and disperse across the forest once they metamorphose. This species is popular among amphibian-keepers and is regularly bred in captivity.

**Unique snout**

The Yucatecan shovel-headed treefrog's strange snout and head are unmistakable, and make it distinct from other treefrogs.

**PROFILE**

-  Central America
-  Lowland forest and grassland
-  5–7.5 cm (2–3 in)
-  Eggs laid in water
-  Unknown
-  Nocturnal
-  Least Concern

*Triprion petasatus*


## YUCATECAN SHOVEL-HEADED TREEFROG

**Also called the duck-billed treefrog,** this species has a distinctive appearance. Its head is flattened and covered with a bony plate that is fused with the skin. There is a bony knob in front of each eye, and a ridge joins this knob with the snout. The tip of the snout is upturned and extends beyond the lower jaw, so that it looks like a beak.

These shovel-headed treefrogs live in the Yucatan Peninsula, Mexico, and neighbouring countries, in areas with distinct wet and dry seasons. They are thought to hide in hollow trees and rock crevices during the dry season; they may use the bony plate on their head to plug the hole and prevent water loss. Their diet includes invertebrates as well as other small frogs. Breeding takes place as soon as the rainy season begins. Males call loudly from branches around temporary water holes, puddles in limestone, and even broken bottles. The eggs are laid in clumps, and the tadpoles that emerge are deep bodied with high tail fins.

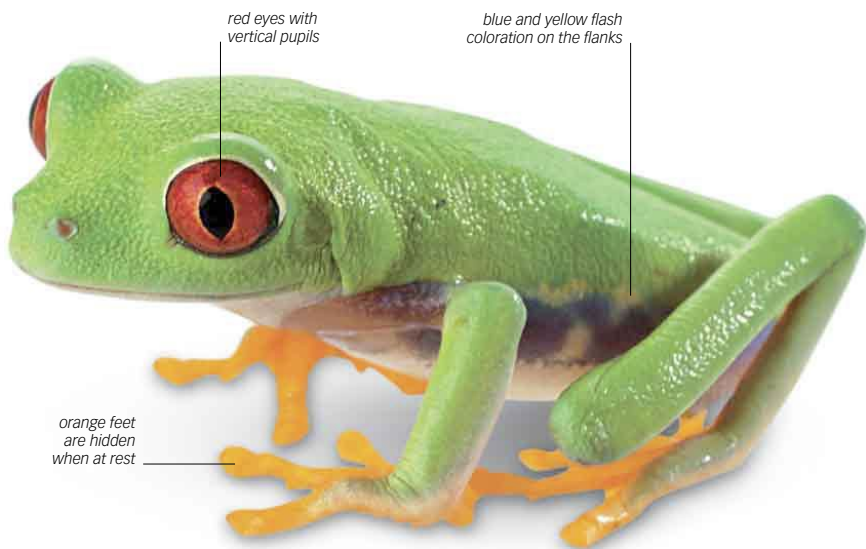


## PROFILE

-  Central America
-  Rainforest
-  6–7.5 cm (2¼–3 in)
-  Eggs laid on vegetation overhanging water
-  About 40
-  Nocturnal
-  Least Concern

## Arresting colours

With its brilliant green coloration, bulging red eyes, orange feet, and blue and yellow flanks, the red-eyed leaf frog is one of the most distinctive species of frog.



## SIMILAR SPECIES



**Misfit leaf frog**  
(*Agalychnis saltator*)

Less common; has deep ruby-red eyes

*Agalychnis callidryas*

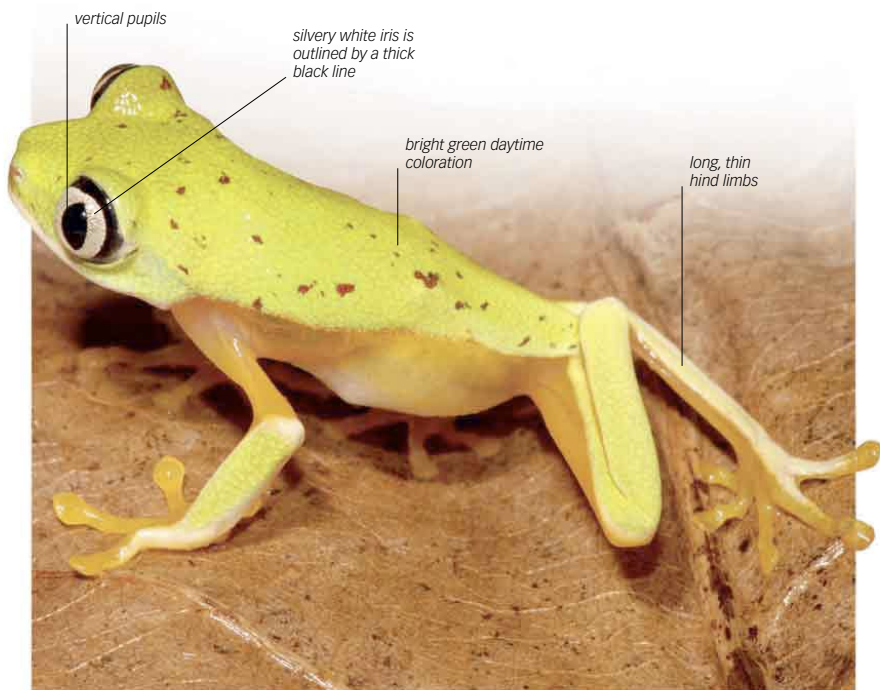
## RED-EYED LEAF FROG

**This slender, colourful frog** inhabits the rainforests of Central America, where it spends most of its time in the upper canopy, only coming down to ground level to breed. Males call throughout the wet season but females only approach them after heavy rainstorms. After they pair up, they move to a tree or shrub overhanging a small pond and attach their clutch of greenish eggs to the surface of a leaf.

The eggs hatch after 6–10 days, but if they are disturbed, by a foraging snake, for instance, they can hatch earlier. The tadpoles wriggle out of the jelly capsule and slide down the leaf, dropping into the water below – this can be a drop of up to 3m (9¾ft). They hang in mid-water with their heads directed upwards, gulping water from which they filter suspended food. Once they metamorphose, the young frogs leave the water and do not return. This is a popular frog in the pet trade, but its wild populations are now protected.

**Patient stalker**

The lemur leaf frog moves slowly along stems, rarely jumping, and catches its prey by patiently stalking it.

**PROFILE**

-  Central America
-  Rainforest
-  3–5 cm (1¼–2 in)
-  Eggs laid on leaves overhanging water
-  15–30
-  Nocturnal
-  Critically Endangered

*Agalychnis lemur*

## LEMUR LEAF FROG

**This is a slender leaf frog** with long, spindly limbs and huge bulging eyes, making it one of the most distinctive species. Perfectly camouflaged, its colour changes from bright green during the day to reddish brown or tan at night.

The breeding habits of the lemur leaf frog are similar to those of other American leaf frogs; it lays its eggs on leaves overhanging pools, and the tadpoles wriggle into the water or are washed off by rain when they hatch. A rare species in Central America, its numbers have fallen drastically in recent years due to the deadly chytrid fungus disease that has affected many other species of frogs. It is the subject of several captive-breeding programmes in Europe and North America. The object of these is to help increase numbers and reintroduce them into their native habitats at a later date if conditions for their continued survival improve.

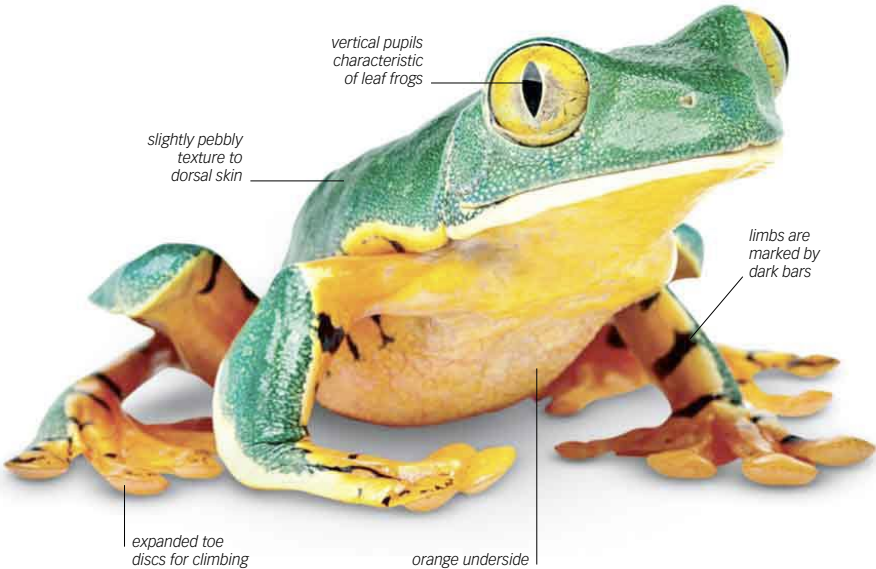
**PROFILE**

- 📍 Central America and N. South America
- 🌿 Lowland rainforest
- 📏 5–8.5 cm (2–3¼ in)
- 🥚 Eggs laid on fallen tree trunks above water

- 👥 10–54
- 🌙 Nocturnal
- ⊗ Least Concern

**Rarely seen**

The brightly coloured splendid leaf frog is not seen very often as it lives high in the canopy and does not congregate around ponds to breed.



**SIMILAR SPECIES**

row of oval cream spots on flanks



**White-lined leaf frog**  
(*Phyllomedusa vaillantii*)

An arboreal leaf frog from the rainforests of the Amazon Basin


*Cruziohyla calcarifer*

# SPLENDID LEAF FROG

**This large “flying frog”** from Central and South America is not as common as many of its close relatives, such as the red-eyed leaf frog (p.282). Despite its large size, it can glide using its flattened limbs and webbed feet as a crude but effective parachute. Its large eyes with yellow rims and vertical pupils are a conspicuous feature, as are the tiger-like stripes along its flanks, the fringes along the edges of its limbs, and the triangular flaps of skin on its heels.

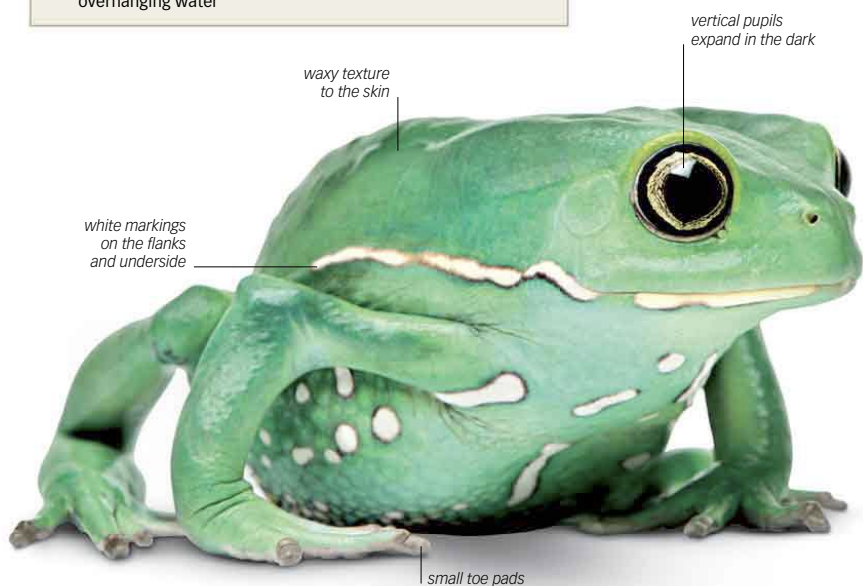
Splendid leaf frogs spend most of their life in the high canopy, but descend to ground level in order to breed. The female lays her eggs on the leaves of fallen trees or in the hollows and crevices of the tree bark. Once the eggs hatch, the tadpoles slide down into puddles or are washed off by rain into shallow pools. They take about six months to complete their development. However, they have many predators and survival rates may be as low as 2 per cent.

## PROFILE

-  South America
-  Dry plains near temporary lagoons and pools
-  7 cm (2¾ in)
-  Eggs laid on leaves overhanging water
-  Unknown
-  Nocturnal
-  Least Concern

## Unusual leaf frog

A uniform green species with scattered irregular white markings, the waxy monkey leaf frog occurs further south than other leaf frogs and is one of the few that does not inhabit rainforests.



## SIMILAR SPECIES



**Barred leaf frog**  
(*Phyllomedusa tomopterna*)

A rainforest species; has orange and black bars on its flanks

*Phyllomedusa sauvagii*

## WAXY MONKEY LEAF FROG

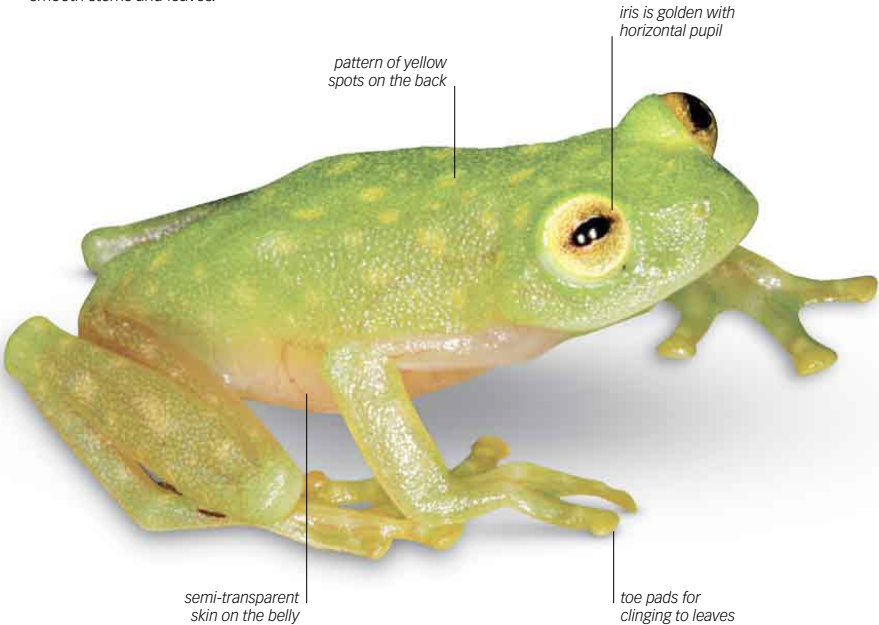
**The waxy monkey leaf frog** lives in the dry Chaco region of South America, on the borders of Argentina, Paraguay, and Brazil. It has several mechanisms to prevent itself from becoming desiccated during the hot, dry summer. Unusually for an amphibian, this species releases its waste as uric acid – a white crystalline substance that contains very little water. It also has the ability to coat its skin in a waxy substance secreted from specialized glands in its skin. The frog uses its arms and legs to wipe this substance over its entire surface, greatly reducing water loss and allowing it to sit in exposed positions even in the middle of the day.

The waxy monkey leaf frog breeds in the rainy season when the land floods, filling temporary lagoons and pools with water. The female lays large clutches of eggs on leaves overhanging water. When the eggs hatch, the tadpoles drop into the water.



Expert climber

The small, delicate-looking northern glass frog has long, slender limbs with well-developed adhesive discs on its toes, enabling it to cling to smooth stems and leaves.



PROFILE

- 📍 Central America and N. South America
- 🌿 Rainforest and near streams
- 📏 2–3.2 cm (¾–1¼ in)
- 🥚 Eggs laid on leaves overhanging streams
- 🕒 18–30
- 🌙 Nocturnal
- 🛡️ Least Concern

*Hyalinobatrachium fleischmanni*

NORTHERN GLASS FROG

**This species is green** with yellow spots, and has translucent skin on its underside revealing the skeleton and some of the internal organs. The glass frog often rests on the underside of leaves, making it difficult to see.

Males call from leaves above forest streams, and defend their territory from other males by calling more loudly or through physical combat. Females lay a small cluster of eggs on leaves that overhang water. The males stay near the eggs throughout their incubation, guarding them from predators. If a male has attracted more than one female, he may guard several clutches on the same leaf. When the eggs hatch, the tadpoles drip into the water below. There is some evidence that the spotted pattern on the frog’s back makes it look like a cluster of eggs, deflecting the attention of parasitic wasps and flies away from the real eggs.





**Powerfully built**

Adult smoky jungle frogs have powerful limbs and large mouths. They eat anything they can overpower, including birds, lizards, and other frogs, including poison dart frogs, being apparently immune to their skin toxins.

*tan to reddish brown coloration with dark markings*

*muscular hind legs*

**PROFILE**

-  South America
-  Lowland rainforest, especially in swampy areas
-  Up to 18.5 cm (7½ in)
-  Eggs laid in a foam nest
-  About 1,000
-  Mainly nocturnal
-  Least Concern

*Leptodactylus pentadactylus*

## SMOKY JUNGLE FROG








**The smoky jungle frog** is one of the largest members of its genus, and is also known as the South American bullfrog. It lives on the floor of damp forests or swamps. Adults are secretive and hide in holes during the day, but juveniles may be seen on the surface. When threatened, these frogs raise themselves by straightening their legs, sometimes followed by a series of press-ups. If grasped, they emit a screeching sound and secrete large amounts of mucus from their skin, which can cause a rash in people and may be fatal to smaller animals, including other frogs. Despite this, they are preyed on by snakes, caimans, and carnivorous mammals such as coatimundis.

The female lays her eggs near water or in a damp depression in the ground. As they are laid, the male whips up the jelly surrounding them into a large mass of foam. This protects the developing tadpoles from drying out.

**Voracious appetite**

This frog has a large mouth that is nearly as wide as its body. It can swallow animals almost half its size, sometimes attempting to feed on animals larger than itself.

**PROFILE**

- |   |   |
|---|---|
|  South America             |  1,000–2,000   |
|  Dry and semi-arid regions |  Nocturnal     |
|  8–13 cm (3¼–5 in)         |  Least Concern |
|  Eggs laid in water        |   |

fleshy, horn-like  
projection above  
each eye

distinctive green, tan,  
and brown markings  
on the back

wide mouth

**SIMILAR SPECIES**

**Colombian horned frog**  
(*Ceratophrys calcarata*)

Lives in open, semi-dry regions in Colombia and Venezuela; hybrids with the Cranwell's horned frog under artificial conditions are sometimes called fantasy horned frogs

*Ceratophrys cranwelli*

## CRANWELL'S HORNED FROG

**This frog is also known as** the Chacoan horned frog, and is commonly referred to as the Pacman frog in the pet trade due to its appetite and resemblance to the popular video game character with the same name. The frog is poorly known in the wild as it lives underground. An ambush predator, it rests with just the top of its head visible, waiting for unwary insects or small vertebrates to come within range. It then lunges and grasps them in its huge mouth. The frog defends itself aggressively by puffing up its body to look bigger; if this fails, it may bite.

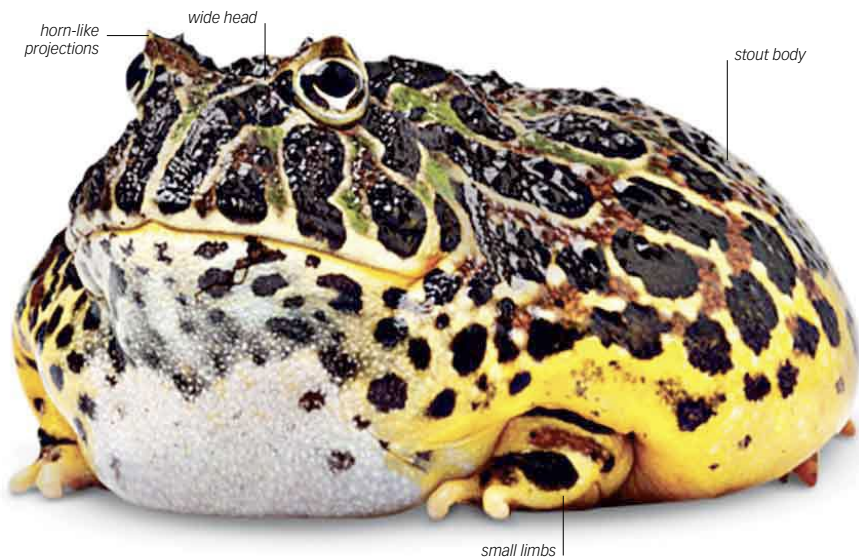
This species is widely bred for the pet trade. There are several colour forms, including albinos, and hormone injections are used to induce them to spawn. The tadpoles are relatively easy to raise, but they must be fed well or they will resort to cannibalism. Captive specimens are calmer than wild individuals and rarely bite.

## PROFILE

-  Argentina, Brazil, and Uruguay
-  Grassland (Pampas)
-  10–12 cm (4–4¾ in)
-  Eggs laid in temporary pools
-  1,000–2,000
-  Nocturnal
-  Near Threatened

## Sit-and-wait hunter

The horned frog is not agile enough to chase its prey but waits in hiding until something edible comes within range.



## SIMILAR SPECIES



**Amazonian horned frog**  
(*Ceratophrys cornuta*)

Comes from the Amazon Basin; has especially long and pointed horns over its eyes

*Ceratophrys ornata*ORNATE  
HORNED FROG

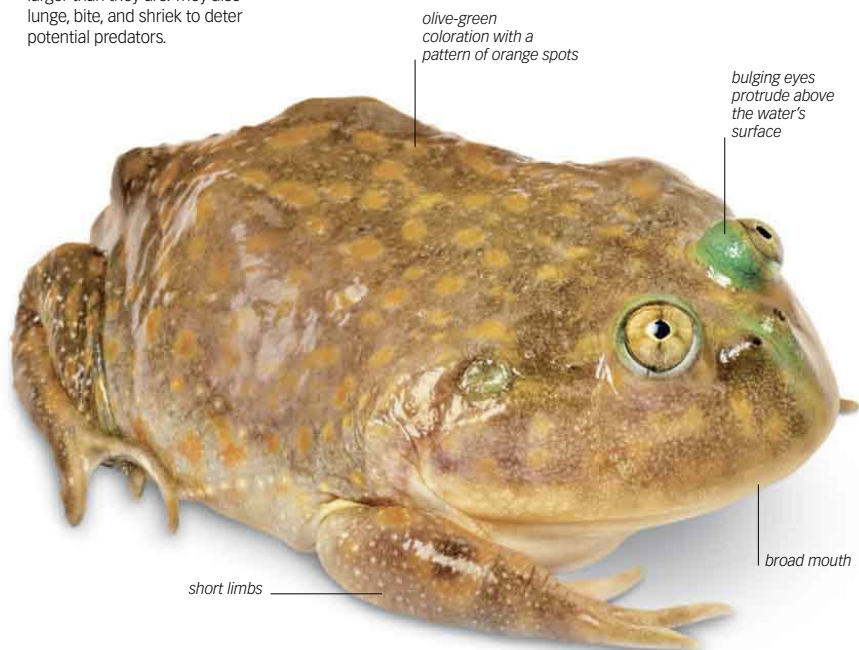
**This large horned frog**, sometimes known as the Argentine horned frog or locally as the escuerzo, is almost as wide as it is long. It feeds mainly on vertebrates, especially other frogs; insects make up a small proportion of its diet. The frog employs a sit-and-wait strategy to capture prey, ambushing them from a hidden position. It can even tackle animals that are nearly its own size.


During the dry season, this frog burrows into the ground and stays there, encapsulated in a cocoon made up of several layers of shed skin. It becomes active again only after heavy rain or floods soak the ground. If approached, this aggressive species may raise itself on stiff legs with its mouth wide open. Tadpoles are equally aggressive and mostly eat tadpoles of other frogs, but not their own species. They are unique among frog tadpoles in that they make a sound under water – between a squeak and a croak – and may communicate with each other in this way.



**Defence mechanism**

Budgett's frogs have a flattish appearance, but when disturbed they inflate themselves and stand on outstretched limbs to appear larger than they are. They also lunge, bite, and shriek to deter potential predators.

**PROFILE**

-  South America
-  Aquatic, in temporary pools
-  5–10 cm (2–4 in); females being twice as large as the males
-  Eggs laid in water
-  Up to 1,400
-  Nocturnal
-  Least Concern

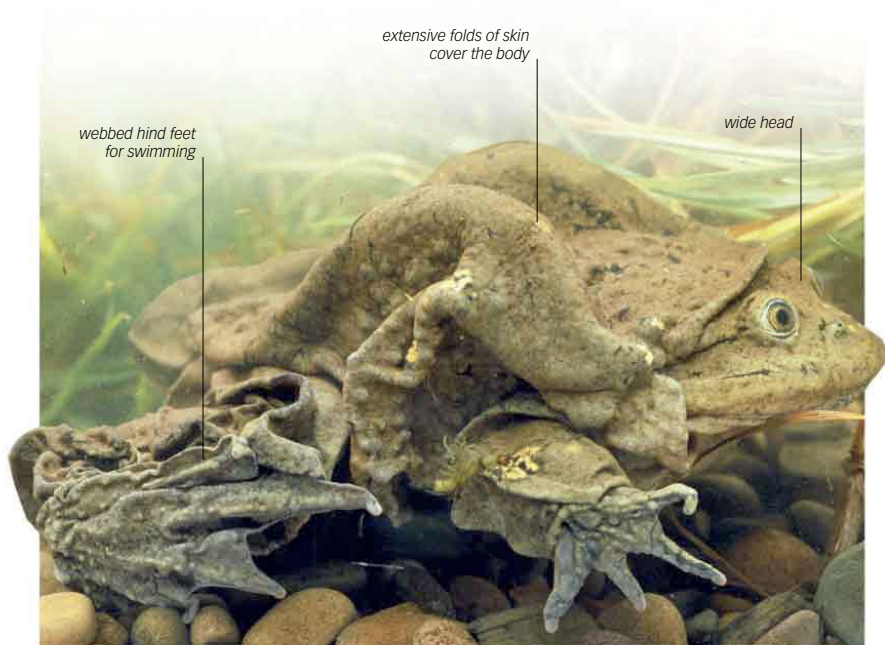
*Lepidobatrachus laevis***BUDGETT'S FROG**

**This unusual frog** lives in shallow, muddy pools in a semi-desert region known as the Chaco in South America. It rests with just its eyes above the water, waiting to pounce on unsuspecting prey. It has an extraordinarily huge mouth, enabling it to tackle prey almost as large as itself.

Budgett's frogs are highly specialized. When their pools start to dry out, they shuffle into the mud, using the hard tubercles on their hind legs to dig down. By the time the mud dries completely, they are deep underground where they form a "cocoon" consisting of several layers of shed skin to help prevent excessive water loss. They remain in this state until the rains arrive the following year, when they burrow back up to the surface to feed and breed. Their tadpoles are unlike those of most other frogs, as they have large mouths and teeth, which they use to prey on other organisms. The tadpoles develop quickly in order to metamorphose before the pools start to dry up again.

**Folded frog**

This unusual frog's body is covered in large folds of loose skin with a brown mottled pattern and darker markings.

**PROFILE**

-  Bolivia (Lake Titicaca)
-  Aquatic
-  7.5–13.5 cm (3–5¼ in)
-  Eggs laid in shallow water
-  About 500
-  Unknown
-  Critically Endangered

*Telmatobius culeus*

## LAKE TITICACA FROG

**This frog lives in the cold**, well-oxygenated waters of Lake Titicaca in the Bolivian Andes. It has the lowest metabolic rate of any frog tested so far. The species has very small lungs and rarely comes to the surface to breathe, relying on its skin instead for gaseous exchange. Extensive folds in its skin increase the body's surface area, helping the frog absorb more oxygen. It increases oxygen uptake still further by moving up and down at regular intervals in order to keep a flow of oxygenated water in contact with its skin.

The frog lays its eggs at the edge of the lake in shallow water, but little is known about the tadpoles. The species was formerly very common, but numbers have fallen drastically in the last 20 years. The causes of this decline are not fully understood, but may include water pollution, the introduction of predatory trout to the lake, and the presence of chytrid fungus, which has already wiped out three related species in Ecuador.

**Characteristic snout**

This small frog has an elongated snout with a pronounced, fleshy proboscis at the end, which gives its head a triangular shape.



**PROFILE**

Chile

Wet forests and near streams

2–3 cm (¾–1¼ in)

Eggs carried in male's throat

20–40

Mostly diurnal

Vulnerable








*Rhinoderma darwinii*

DARWIN'S FROG

**This species may be green, brown, or reddish brown** above, and black and white beneath. It lives in cool, boggy forests, along slow-moving streams, and has a unique life cycle. The male calls to attract the female, who approaches him and moves underneath his body, although there is no conventional amplexus (the male does not grasp the female). She lays up to 40 eggs on the surface of leaf litter, and the male fertilizes them, staying nearby until there are signs of development within the eggs. He then picks them up in his mouth and moves them to his vocal sac, where they remain throughout their development.

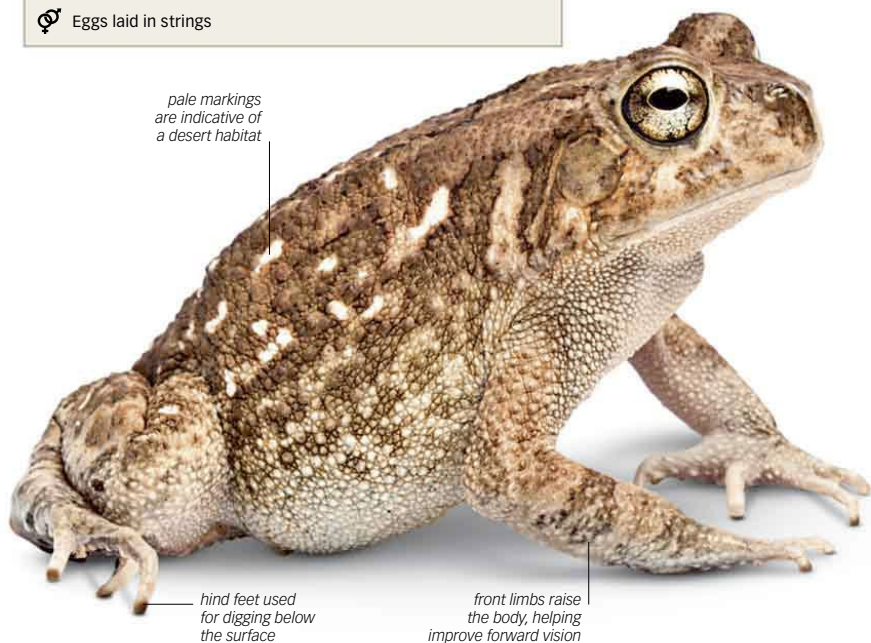
The eggs hatch about three days later, with the larvae obtaining nourishment from the yolk sac and then from a milky substance secreted from cells inside the male's mouth. They absorb this through their body at first, but later use their mouth to ingest it directly. There is no free-living tadpole stage, and the larvae metamorphose after 50–70 days, at which point they move back into the male's mouth and he releases them as small, fully formed froglets.

## PROFILE

-  Africa
-  Grassland, open forests, and human settlements
-  6.5–13 cm (2½–5 in)
-  Eggs laid in strings
-  9,000–13,000
-  Nocturnal
-  Least Concern

## Native to Africa

Found throughout most of Africa, this relatively large warty toad has olive-brown coloration with irregular dark and light markings.



## SIMILAR SPECIES

*Amietophrynus regularis*

## SQUARE-MARKED TOAD

**This toad derives its common name** from the squarish markings on its back, although these are not always present. Individuals from sandy desert regions tend to be paler and have less distinctive markings. It is most frequently seen over much of the northern half of Africa, and is replaced further south by closely related species.

The square-marked toad is highly adaptable. It lives in habitats ranging from humid forests to semi-deserts, including the southern fringes of the Sahara. It is also common around villages and farms. The species often occurs in large concentrations and, in places, it is used as a food source by people. It is an opportunistic breeder, laying its eggs in the shallow backwaters of rivers. The species has benefitted from irrigation systems in various parts of North Africa, and has expanded its range as a result.



**Raucous toad**  
(*Amietophrynus rangeri*)

Southern counterpart of the square-marked toad; a number of very similar species also have overlapping distributions



PROFILE



S.C. USA,  
into N. Mexico



Desert and  
semi-arid plains



3.5 cm (1½ in)



Eggs laid in temporary  
bodies of water



About 1,000



Nocturnal



Least Concern

Colourful and warty

This small toad has a green or yellow-green dorsal surface, with irregular black spots and numerous warts on the back, head, and limbs.



SIMILAR SPECIES



**Red-spotted toad**  
*(Anaxyrus punctatus)*

Pale grey to tan, with small red warts; lives in rocky places at higher elevations in the same region

*Anaxyrus debilis*

# CHIHUAHUA GREEN TOAD

**This is a small, brightly coloured toad** with black spots and blotches on its body. It lives under rocks and in old rodent burrows on semi-arid plains and grasslands. It is rarely seen except after rain, when it emerges in large numbers to feed and breed.

This species breeds mainly in temporary pools and streams, although it may also use irrigation ditches and artificial water holes.

Males make a buzzing call, which lasts up to 10 seconds, and form large choruses that attract females. Breeding takes place over a short period of rainy weather, often lasting only 1–3 days. A single female lays about 1,000 eggs. The development of the tadpoles may be as short as three weeks so that they can leave the water before the pools dry out; despite this, many desiccate before they emerge.

**Long-legged and smooth**

Long, thin limbs and a relatively smooth skin distinguish stubfoot toads from the rest of the toad family.

**PROFILE**

-  South America
-  Tropical rainforest
-  2.5–4 cm (1–1½ in)
-  Eggs laid in strings
-  Unknown
-  Diurnal
-  Vulnerable

*Atelopus spumarius*

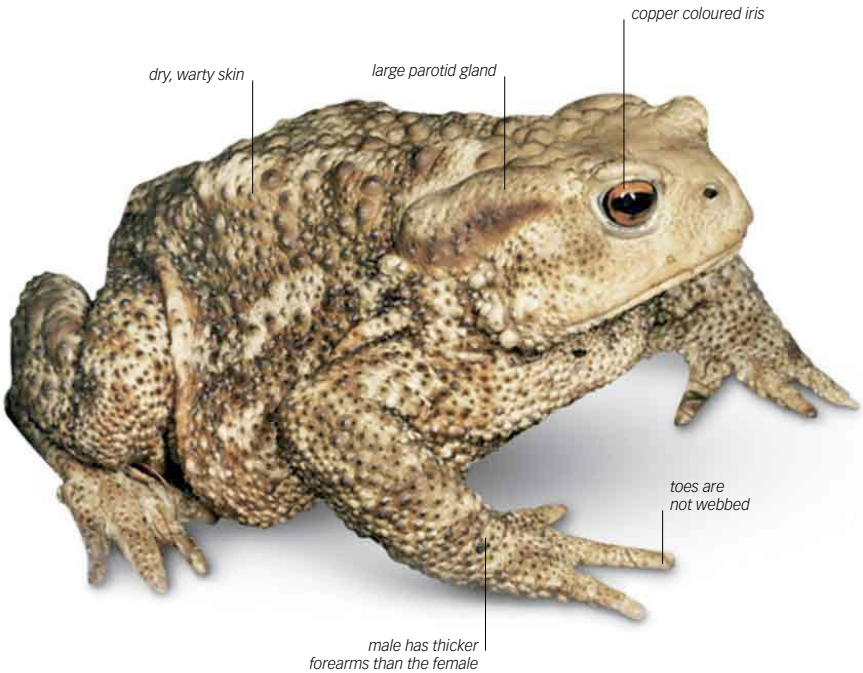
## PEBAS STUBFOOT TOAD

**The pebas stubfoot toad** has a highly variable coloration and may represent more than one species. The most common form has a green or yellow pattern on a brown background with a white underside. Other forms, however, are black with thin lines of yellow, purple, or blue, and the throat may be purple.

This toad spawns in streams or pools near streams, and lays its eggs in a long, sticky string. The tadpoles have a sucker surrounding their mouth so that they can attach themselves to stones to avoid being washed downstream. Although this toad is still thought to be abundant, 80 per cent of all *Atelopus* species, including the Panamanian golden toad, *A. zeteki*, are endangered, and at least 30 species have become extinct recently, largely due to the deadly chytrid fungus.

**Variable and warty**

A robust species, the European common toad is always covered in wart-like lumps, but its coloration is variable.



**PROFILE**

- 📍 Europe, N.W. Africa, and W. Asia
- 🌿 Varied, including woods, fields, farmland, parks, and gardens
- ↔ Up to 15 cm (6 in) in southern Europe, smaller elsewhere
- 🥚 Egg-laying
- 🐸 3,000–8,000
- 🌙 Mainly nocturnal
- ⚠️ Least Concern

*Bufo bufo*

# EUROPEAN COMMON TOAD

**A large, warty toad with dry skin**, the European common toad is usually some shade of brown, but it can also be yellowish, greenish, or brick-red. The large glands on its skin – particularly behind the eyes – produce a milky, toxic substance that is distasteful to most predators. Several subspecies of various sizes and colours have been recognized throughout its range.

Common toads are “explosive” breeders, migrating to ponds in the spring and breeding in a frenzy of activity that may last only a week. Females may drown due to overenthusiastic males forming mating “balls” with a single female in the centre. A double string of eggs is released by the female, wrapped around underwater vegetation, usually at the bottom of a pond or lake. The eggs and tadpoles are also distasteful to predators. The tadpoles metamorphose into tiny toadlets and usually emerge and disperse across the countryside during wet or humid weather.

## PROFILE

-  Southeast Asia
-  Fields, plantations, and villages
-  6–8.5 cm (2¼–3¼ in)
-  Eggs laid in still water
-  Unknown
-  Nocturnal
-  Least Concern

## Black ridges

The most common toad over much of Southeast Asia, the black-spined toad has several prominent ridges around its head and very visible eardrums.

bony ridge

eardrum

warty skin



## SIMILAR SPECIES

yellow spots  
on the female



## Malayan tree toad

(*Pedostibes hosii*) Mainly brown, some females are olive-green with yellow spots; found in primary rainforest in Southeast Asia

*Duttaphrynus melanostictus*

## BLACK-SPINED TOAD

**This toad has a variety of common names**, but is often referred to as the black-spined toad owing to its many pointed black warts, especially in the regions around its poison glands. The bony ridges on top of its head are also edged in black. Male black-spined toads are unusual among toads in that they become paler and more brightly coloured during the breeding season, often acquiring patches of pink and yellow, which contrast strongly with the black markings. Breeding takes place immediately after rains, and the toads make use of any body of water, including drains, puddles, and flooded fields.

The black-spined toad can be found in cities, and is almost never encountered away from human habitation. It congregates around street lights, where it feeds on insects that have been attracted to the lights; several toads may encircle a single lamppost.

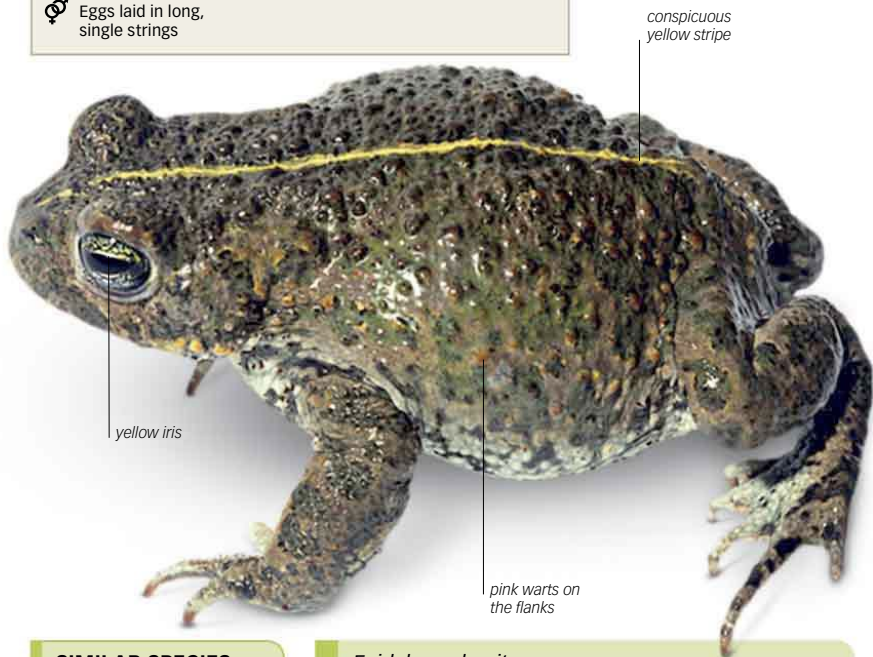


## PROFILE

-  W. and N. Europe
-  Open, sandy places, including dunes, fields, and open woodland
-  Up to 8 cm (3¼ in)
-  Eggs laid in long, single strings
-  1,500–7,500
-  Nocturnal
-  Least Concern (but protected in Britain)

## Running toad

A brown or olive toad with distinctive markings, the natterjack toad tends to run rather than hop when moving on land.



## SIMILAR SPECIES



**European green toad**  
(*Bufo viridis*) Bold greenish blotches on a paler surface; lacks the yellow dorsal stripe

*Epidalea calamita*

## NATTERJACK TOAD

**This stocky, short-limbed toad** is light brown or greenish in colour. It has a distinctive yellow stripe down the centre of its back, which is occasionally absent. The warts covering its body usually have an orange or pink tinge, especially those on the flanks. The natterjack toad moves by running, and digs burrows in sand or loose soil to hide in during the day; sometimes several toads can be found together in a single burrow.

Males call from shallow, exposed ponds and dune slacks, and their choruses can be heard over long distances. The eggs are laid in a single string, wound around the stems of reeds and other aquatic plants, and hatch quickly in warm water. The young can metamorphose in less than one month under ideal conditions, but usually take longer. The young toads are very small in size when they emerge from the water and can sometimes be found under wood and debris close to the edge of their pond.



yellow markings are scattered on the back and limbs



#### Warning colours

The redbelly toad's striking black and yellow coloration and the red markings on its underside serve as a warning to predators.

#### PROFILE

-  Argentina
-  Grassland and fields
-  2.5–3 cm (1–1¼ in)
-  Eggs laid in water
-  Unknown
-  Diurnal
-  Least Concern


*Melanophryniscus stelzneri*


## REDBELLY TOAD


**This little toad occurs in grassy valleys** among the sierras of northern Argentina. It is most commonly seen after rain near the stony streams in which it breeds. Its back is velvety black with irregular yellow blotches, and the undersides of its hands and feet have bright red markings. If it feels threatened, the toad arches its back and displays the bright red markings below, in much the same way as the European fire-bellied toad (p.261), even though they are not related.


The redbelly toad is active during the day and feeds on very small invertebrates, such as ants and aphids. A poor swimmer, the female attaches a sticky mass of eggs to submerged stems in shallow water. The small tadpoles are difficult to see in their natural environment and grow to only about 1 cm (¾ in) in length. There is variation in the colours and patterns of different populations and these were formerly regarded as subspecies. Since 2000, however, many have been separated into new species.


## PROFILE


 S. USA (Texas) and Central and South America; introduced into Australia and elsewhere


 Varied, often around human dwellings

 8.5–22 cm (3¼–9 in)

 Eggs laid in water

 8,000–17,000

 Mainly diurnal and crepuscular

 Least Concern

bony ridge

horizontal pupils

wide mouth

long front limbs allow the head to be raised

## FRONT VIEW

prominent warts

web of skin

## Nostril

The nostrils are used mainly for breathing, as the toad breathes with its mouth shut.

## External eardrum

This feature helps the toad to listen for breeding choruses and home in on them.

## Webbing

As is common in most toads, the hind feet are webbed for swimming during the breeding season.

*Rhinella marina*

## MARINE TOAD

**The marine toad**, so-called because it can tolerate brackish water, is also known as the cane toad, especially in Australia, where it was introduced to control beetle pests of sugar cane. However, it failed to be effective, and became a serious pest itself, preying on native wildlife, competing with local frogs and toads for shelter and breeding sites, and poisoning predatory animals with its toxic secretions. The toad has spread over much of the eastern half of the country and occurs in massive numbers in places. It is now more common in Australia than within its natural range, and great efforts are being made to limit its spread westwards.

The marine toad has a pair of very large poison glands behind its eyes as

well as other large glands on the thighs and dorsal surface. These glands produce toxins that are strong enough to kill a dog or a snake. A voracious feeder, the marine toad eats almost anything, including dog food, rice, and scraps, making it one of the most adaptable amphibians. It has also been found sitting at the entrances of beehives, snapping up bees as they come and go, although some individuals seem to have learnt to avoid stinging insects.



**Robust species**

The marine toad is extremely robust, and has a massive head with bony ridges above the eyes.

**BEHAVIOUR**

This is an extremely adaptable toad that can breed in almost any body of water, including brackish pools, hence its common and scientific names. It thrives in disturbed habitats because it can hunt more easily when vegetation has been cleared and there are more ponds and ditches in which to breed. It is incredibly prolific, probably laying more eggs than any other amphibian.

**Mating embrace**





Amplexus is axillary in this species, and it breeds throughout the year if conditions are suitable.




*tough, leathery,  
warty skin*





PROFILE

-  N. South America
-  Lowland rainforest
-  3–4 cm (1¼–1½ in)
-  Eggs laid on land

-  2–12
-  Diurnal
-  Least Concern

Striking appearance

Sometimes known as bumble-bee frogs, these poison dart frogs are easily identified by the yellow and black markings on their body.



SIMILAR SPECIES



**Green and black poison dart frog (*Dendrobates auratus*)** Found in Central America; adapts well to captivity and is bred in large numbers

*Dendrobates leucomelas*

YELLOW AND BLACK POISON DART FROG

**One of the easiest species to keep** and breed in captivity, this poison dart frog has yellow and black markings that, like fingerprints, are unique to each individual. The toxins in its skin are derived from its diet, which comprises mostly of ants; captive frogs lose the ability to produce toxins unless they are fed on ants, and are relatively harmless.

Males make a variety of buzzing trills to attract females. An elaborate courtship follows, which involves the two frogs circling each other in a series of short hops. Eventually, the female lays the eggs and the male fertilizes them. The clutch size is small, with females laying many clutches in a single year. The male frog attends the eggs, keeping them moist and rolling them occasionally so that they receive enough oxygen. When the eggs begin to hatch, the male carries them to a small pool of water, often at the base of a bromeliad plant.

**Bright coloration**

The bright blue coloration of the blue poison dart frog is unique among frogs, and is intended to warn off predators. It also makes it popular among frog enthusiasts.

**PROFILE**

-  N.E. South America
-  Tropical rainforest
-  3–5 cm (1¼–2 in)
-  Lays eggs on land
-  5–10
-  Diurnal
-  Least Concern

*Dendrobates tinctorius azureus*

## BLUE POISON DART FROG

**The blue poison dart frog** is a subspecies of the dyeing poison frog, *D. tinctorius*. Its colour is startling blue with a pattern of black oval spots on its back. Its limbs are dark blue and unmarked. As in most poison dart frogs, this is a warning coloration, signalling that it produces toxins in its skin. For this reason, it has little to fear from predators and is active by day.

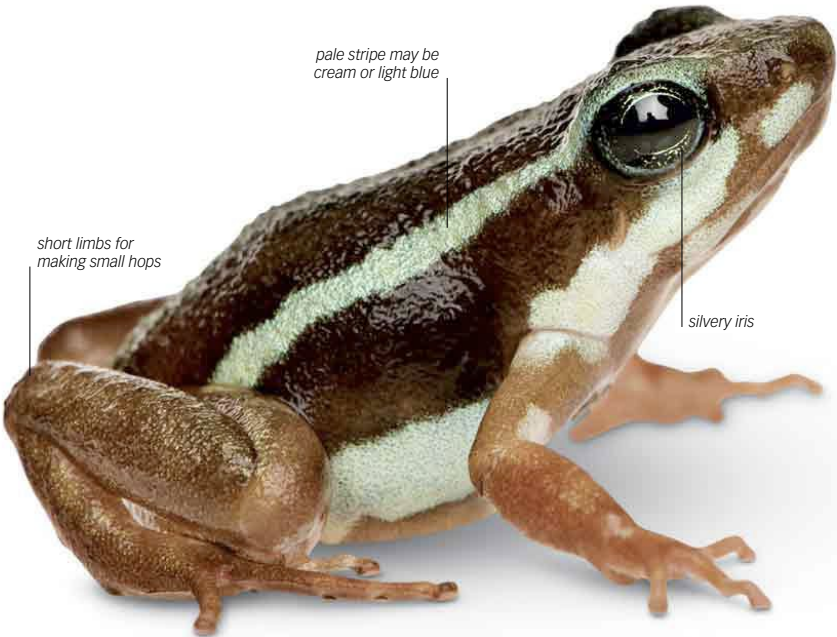
During the breeding season, males call to attract females. The eggs are laid on the ground and are attended by both sexes until they hatch. The parents encourage the tadpoles to crawl up on to their back, and take them to the water-filled centre of a plant such as a bromeliad, where they continue their development.


**Dyeing poison frog**  
*(D. t. tinctorius)*

The nominate subspecies of *D. tinctorius*, this frog has yellow markings and is less blue in colour.

Muted colour

This species is not as brilliantly coloured as some of the other poison dart frogs. However, it produces toxins and has similar breeding habits.



PROFILE

Ecuador

Lowland rainforest

2 cm (¾ in)

Eggs laid on land

About 10

Diurnal

Endangered








*Epipedobates tricolor*

PHANTASMAL  
POISON FROG

**This small, striped frog is endangered** as its natural habitat is being destroyed by logging, conversion to banana plantations, and water pollution. It has disappeared from several of the localities where it was formerly known. It was used for medical research in the 1990s, as one of the substances extracted from its skin secretions, epibatidine, was found to be beneficial as a non-addictive painkiller. However, the species was protected owing to its rarity, and medical research came to a halt until a synthetic version of the substance was developed.

These frogs breed readily in captivity and can be very prolific, but captive-raised individuals do not produce epibatidine because their diet is different from wild individuals. Members of this genus are not considered to be among the most poisonous frogs in the Dendrobatidae family and can be handled safely.

## PROFILE

- |   |  |
|---|--|
|  Colombia             |  Up to 20   |
|  Rainforest           |  Diurnal    |
|  4.5–4.7 cm (1½–2 in) |  Endangered |
|  Eggs laid on land    |  |

## Black-tipped toes

The poison dart frog has a uniform body coloration, which is typically golden yellow, but it can also be pale green or orange. The lips and toes have prominent black markings.



## SIMILAR SPECIES


**Black-legged poison dart frog (*Phylllobates bicolor*)**

Slightly smaller, with more black markings and less powerful skin toxins

*Phylllobates terribilis*








## GOLDEN POISON DART FROG

**The skin toxins** produced by the golden poison dart frog are among the most powerful in the animal kingdom and up to 20 times as toxic as those from other poison dart frogs. Secretions from a single frog are enough to kill several people, and this species is one of three used by native South Americans to tip their blowgun darts when hunting, using folded leaves or short sticks to handle the frogs themselves. Despite their toxicity, a certain species of snake, *Erythrolamprus epinephelus*, is apparently immune to the toxins and preys on these frogs.

The female lays eggs on the ground and the newly hatched tadpoles are carried to small pools of water by the male. The tadpoles are black, and the recently metamorphosed young frogs have a pair of golden stripes down their back; the full adult coloration does not appear until they are about 4–6 months old. Related species retain a striped pattern throughout their lives.



## PROFILE

 Central America	 3–17
 Tropical forest	 Diurnal
 2–2.5 cm (¾–1 in)	 Least Concern
 Eggs laid on land	

compact body

dark blue  
hind limbsslender  
forelimbs**Bright red**

This tiny frog's bright red coloration warns predators that its skin contains powerful toxins, including one called pumiliotoxin, named after this species.

*Oophaga pumilio*

## STRAWBERRY POISON DART FROG

**The typical colour** of this small frog is bright red with dark blue legs, sometimes known as the “blue jeans” form, although there are several colour variations. The strawberry poison dart frog feeds almost entirely on ants and mites, eating roughly equal numbers of each; the poison in its skin is derived from its insect food.

An active and lively species, males call constantly to advertise their territories and fight with other males that challenge them. Receptive females approach a calling male and they move to a fallen leaf for courtship. There is no amplexus and the pair face away from each other with their vents touching. The female lays a small clutch of eggs, which are fertilized by the

male. He tends to the eggs until they hatch seven days later, at which point the female returns. The tadpoles wriggle on to her back and she carries each one to a small pool of water that collects in the centre of bromeliad plants. The female returns to each tadpole every two or three days and lays one or more unfertilized eggs, which the tadpole eats. Their development takes 6–8 weeks. Eight other species in this genus have similar breeding habits.

**Colour variation**

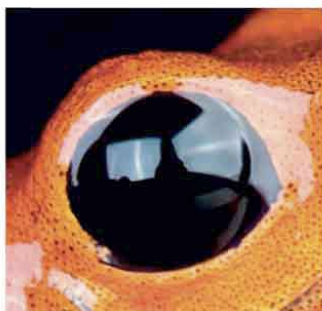
A highly variable species, some colonies are mainly blue, brown, or green; others are completely red.



rounded snout

moist skin gives a  
glossy appearancetoes with  
adhesive pads**Eye**

Poison dart frogs have large, dark eyes set on either side of their head. They use vision, as well as sound, during their displays.

**Parental care**

The female poison dart frog feeds and cares for her tadpoles until they metamorphose. They cannot survive without her attention.

**Toe pads**

The adhesive toe pads of poison dart frogs have an unusual underlying structure of T-shaped bones.







**HABITAT**

Strawberry poison dart frogs come from lowland rainforests and are most numerous in forest clearings, including abandoned plantations and gardens. Males require small patches of sunlight to display and females require bromeliad plants in which to raise their tadpoles. These urn-shaped plants with a central well in which rainwater collects provide safe nurseries for tadpoles.

**Bromeliad plant**

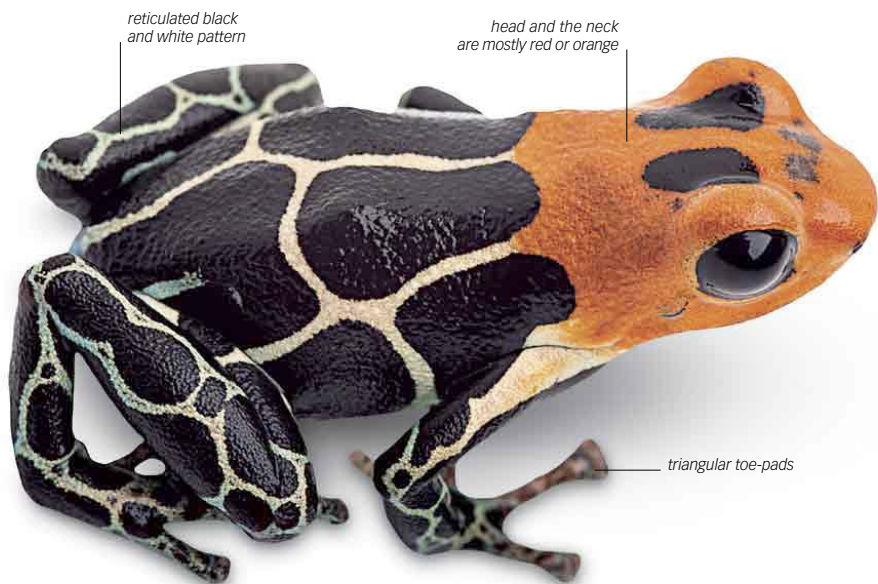
Almost exclusively tropical American, bromeliad plants grow among rainforest branches.

## PROFILE

 Peru	 2–5
 Rainforest	 Diurnal
 2 cm (¾ in)	 Near Threatened
 Egg-laying	

## Small but stunning

The red-headed poison dart frog is not only one of the smallest poison dart frogs, but also one of the most strikingly coloured species.



## SIMILAR SPECIES



**Mimic poison dart frog**  
(*Ranitomeya imitator*)

Variable frog that is identical to the red-headed poison dart frog in areas where they are both found

*Ranitomeya fantastica*

## RED-HEADED POISON DART FROG

**The red-headed poison dart frog** occurs only in primary and secondary rainforests where there are plenty of bromeliads (air plants), as it uses the central “urns” formed by the plants’ leaves to raise its tadpoles. The female lays the eggs on a leaf near the ground and the male guards them. When the eggs hatch, the tadpoles wriggle on to his back and he takes them to a suitable bromeliad to continue their development.

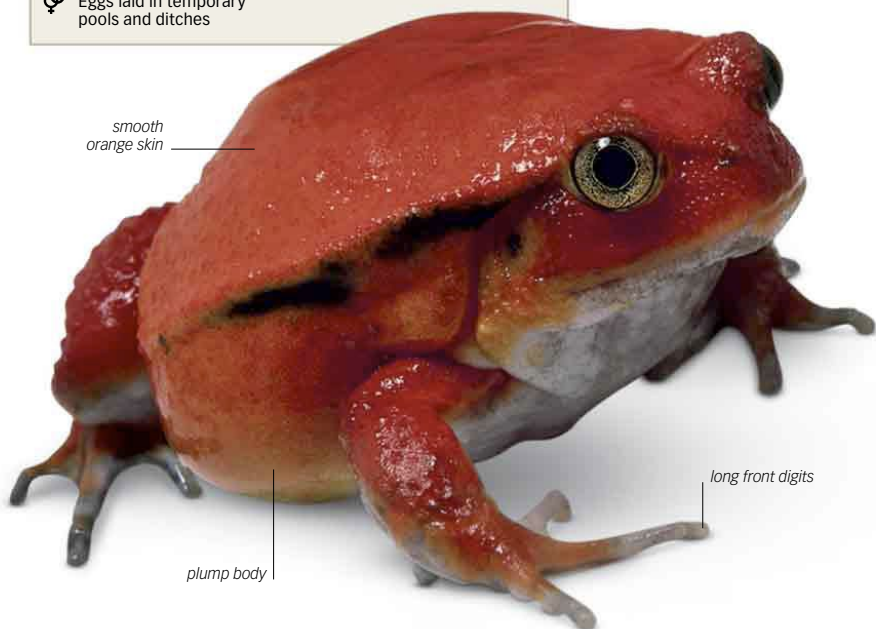
The markings on this species are very similar to that of another poison dart frog, *R. imitator*. In regions where their ranges overlap, they are thought to be Müllerian mimics of each other. This is a type of mimicry in which two or more distasteful or poisonous species benefit by having similar markings – predators learn to avoid both species after encountering either one.

## PROFILE

-  N. Madagascar
-  Wet forests and fields, and gardens
-  6–10.5 cm (2¼–4¼ in)
-  Eggs laid in temporary pools and ditches
-  1,000–1,500
-  Nocturnal
-  Near Threatened

## Conspicuous female

Female tomato frogs, such as the one shown here, are larger and more brightly coloured than males.



smooth  
orange skin

plump body

long front digits

## SIMILAR SPECIES

*Dyscophus antongilii*



less brightly coloured  
than the tomato frog

## Sabava tomato frog

**(*Dyscophus guineti*)** Very similar; some authorities believe that the two are geographic variations of a single species

## TOMATO FROG

**A large, heavy-bodied species,** the tomato frog is bright orange in colour. Females are larger and more brightly coloured than males. Their coloration warns predators that these frogs can secrete irritants from their skin – these can also cause swellings and rashes in humans. When threatened, their first line of defence is to inflate their bodies to make themselves look larger than they are, which also makes it difficult for predatory snakes to swallow them.

Tomato frogs breed during the rainy season, with the male calling loudly to attract a female. The female lays the eggs in temporary bodies of water, including drains and ditches. The small eggs float on the surface and many perish as their pools and puddles dry out. Although this species is classed as threatened, it is commonly found in the towns and villages around the Bay of Antongil in northeastern Madagascar, where the local people often catch them to show to tourists.



PROFILE



S. Asia



Cultivated fields and villages



5.5–7.5 cm (2¼–3 in)



Eggs laid in temporary pools



Unknown



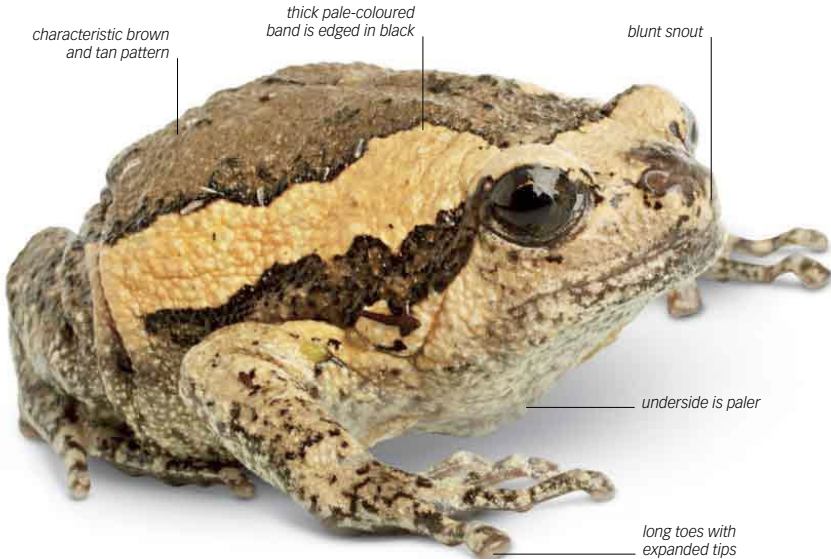
Nocturnal



Least Concern

Distinctive band

The painted bullfrog can be identified by its cream or orange band, which extends from each eye and along the side of its brownish body.



characteristic brown and tan pattern

thick pale-coloured band is edged in black

blunt snout

underside is paler

long toes with expanded tips

SIMILAR SPECIES



**Kinabalu sticky frog**  
(*Kalophrynus baluensis*)

Resembles a dead leaf when resting



**Rufous-sided sticky frog**  
(*Kalophrynus pleurostigma*)

Has a pointed snout; releases a sticky substance when threatened

*Kaloula pulchra*

PAINTED BULLFROG

The **painted bullfrog** is invariably found in areas that have been altered by human activities, and even occurs in villages, towns, and cities. It hides underground or beneath logs and debris in the dry season and emerges in large numbers during rain storms. When threatened, the bullfrog inflates its body and secretes a sticky substance from its glands, which appears to be distasteful to predators, but is not toxic.

Painted bullfrogs generally breed during the rainy season, and large choruses can be heard during and after rainfall. Males float on the surface of temporary pools and puddles, even under buildings, and make a loud groaning call, similar to a bull bellowing. The eggs are laid separately and the tadpoles are small when they first hatch but develop quickly. Voracious eaters, bullfrogs emerge at night from their hiding places to feed almost exclusively on ants and termites in the wild, but will eat other small invertebrates in captivity.








**Warty texture**

This small and selective treehole frog is typically mottled brown with a slightly warty texture and eyes that match its body coloration.

slightly  
warty skin

blunt  
snout

**PROFILE**

-  Peninsular Malaysia
-  Montane forest
-  2–3 cm (¾–1¼ in)
-  Eggs laid in tree holes
-  Unknown
-  Nocturnal
-  Least Concern

*Metaphrynella pollicaris*




## MALAYSIAN TREEHOLE FROG

**This frog is found only** in the highland forests of the Malaysian Peninsula, where it lives in tree holes, and is rarely seen. Its repetitive piping calls, however, can be heard over long distances.

These frogs breed in tree holes that are partially filled with water. Males find a suitable site and call to attract a mate. They have the ability to alter the pitch of their call to suit the acoustics of the particular hole in which they live, and this is thought to amplify it. Females hear the call and home in on the tree hole, where amplexus takes place. The eggs and tadpoles of this species have not been described. The only other member of its genus, *M. sundana*, lives in the lowland forests of Borneo, where it also breeds in tree holes. Although currently classed as Least Concern by the IUCN, development of the Malaysian highlands could have a negative effect on the population of the treehole frog.

PROFILE

-  S. Madagascar
-  Rocky gorges
-  2–4 cm (¾–1½ in)
-  Eggs laid in temporary pools

-  Unknown
-  Nocturnal
-  Endangered

Adaptable species

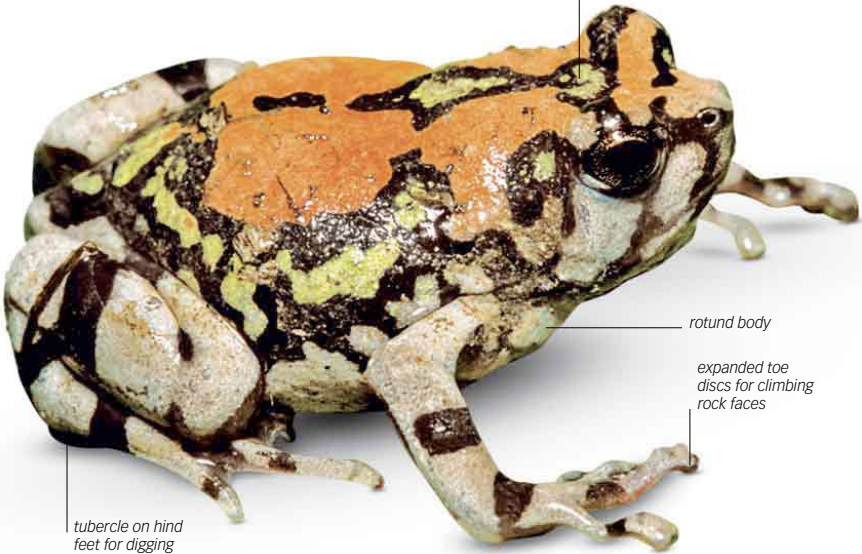
The brightly coloured Madagascan rainbow frog lives in a very specific habitat, and is well adapted for both a climbing and burrowing lifestyle.

distinctive red, green, and black pattern on a greyish body

rotund body

expanded toe discs for climbing rock faces

tubercle on hind feet for digging



SIMILAR SPECIES



**Marbled rain frog**  
(*Scaphiophryne marmorata*) More widespread; lives in forests where it burrows into leaf litter; breeds in stagnant pools

*Scaphiophryne gottlebei*

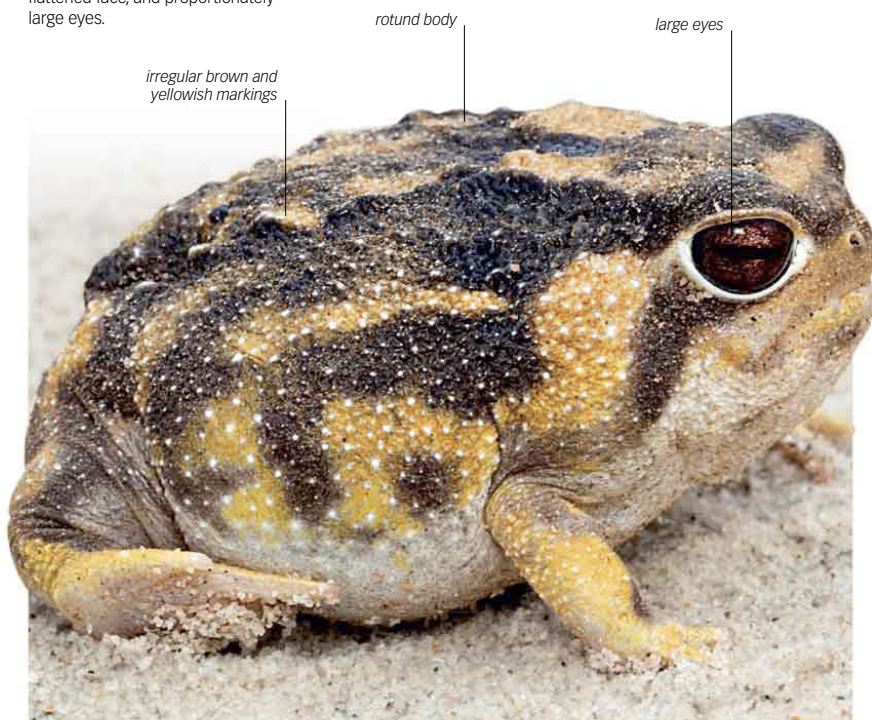
MADAGASCAN RAINBOW FROG

**This frog was only recently discovered** in the Isalo Massif, a remote part of southern Madagascar. It lives in deep limestone gorges with vertical walls and sandy bottoms. It uses the spade-like horny tubercles on its hind feet to dig down into the sand, emerging at night to climb the rock walls in search of food. If the gorges flood following heavy rains, it hides in rock crevices above the water line.

The Madagascan rainbow frog breeds in small temporary pools that form in the sand following rainfall, and is rarely seen at other times. The tadpoles have a unique pattern of feeding. During the day, they push their heads into the sandy bottom and filter out edible particles that have been trapped between grains. At night, however, they leave the bottom of the pool and swim around, filtering small particles from the water. If more rain falls, many tadpoles are swept away and may complete their development downstream.

**Globular body**

The small Namaqua rain frog has a rotund body, short dumpy legs, a flattened face, and proportionately large eyes.

**PROFILE**

-  Namaqualand, (S.W. Africa)
-  Sandy, vegetated dunes
-  3–4.5 cm (1¼–1¾ in), females being larger than males
-  Eggs probably laid underground
-  Unknown
-  Nocturnal
-  Least Concern

*Breviceps namaquensis*

## NAMAQUA RAIN FROG

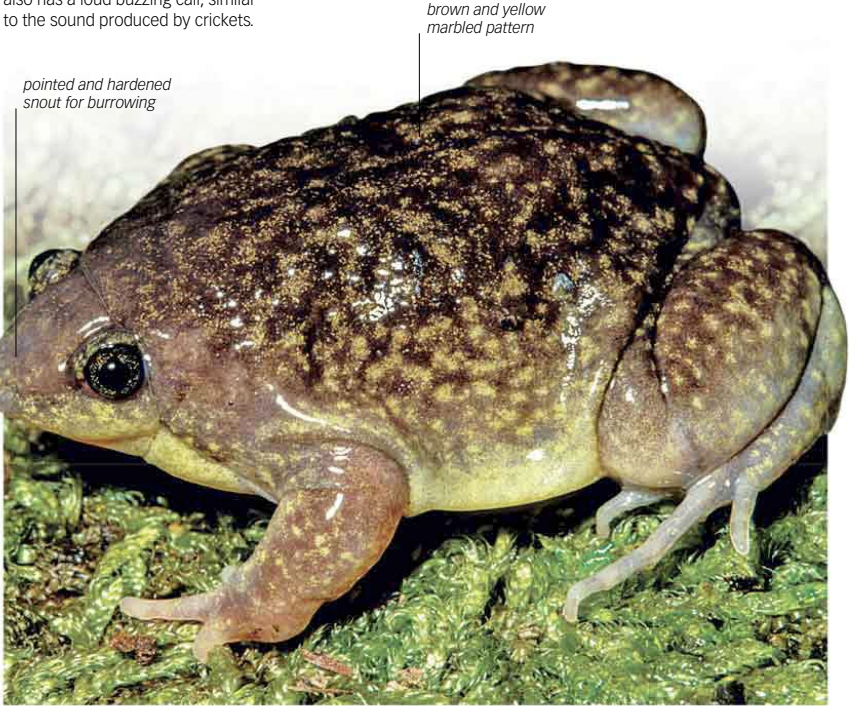
**An effective burrower**, the Namaqua rain frog uses the hardened “spades” on its hind feet to dig backwards. It spends most of its life below the surface, emerging after rains, hence its common name. During dry weather, it secretes a layer of mucus over its entire body to waterproof the skin, and can remain in this state of suspended animation for many months.

Namaqua rain frogs feed on insects, and if threatened they inflate their body to deter predators. Their breeding habits are unknown, but in related species, mated pairs glue themselves together with a secretion from the male’s chest, as the female is too large and the male’s arms are too short for conventional amplexus to be possible. They burrow down into the sand in this position, and form a nest chamber underground, where the eggs are laid and fertilized. The eggs develop directly into small froglets, without undergoing a free-living tadpole stage.










**Loud call**

The plump-looking marbled shovel-nosed frog has a small head with a prominent pointed snout. It also has a loud buzzing call, similar to the sound produced by crickets.



**PROFILE**

-  Africa (south of the Sahara)
-  Grassland
-  3.5–5.5 cm (1½–2¼ in), females being larger than males
-  Eggs laid in wet soil
-  150–200
-  Nocturnal
-  Least Concern

*Hemisus marmoratus*

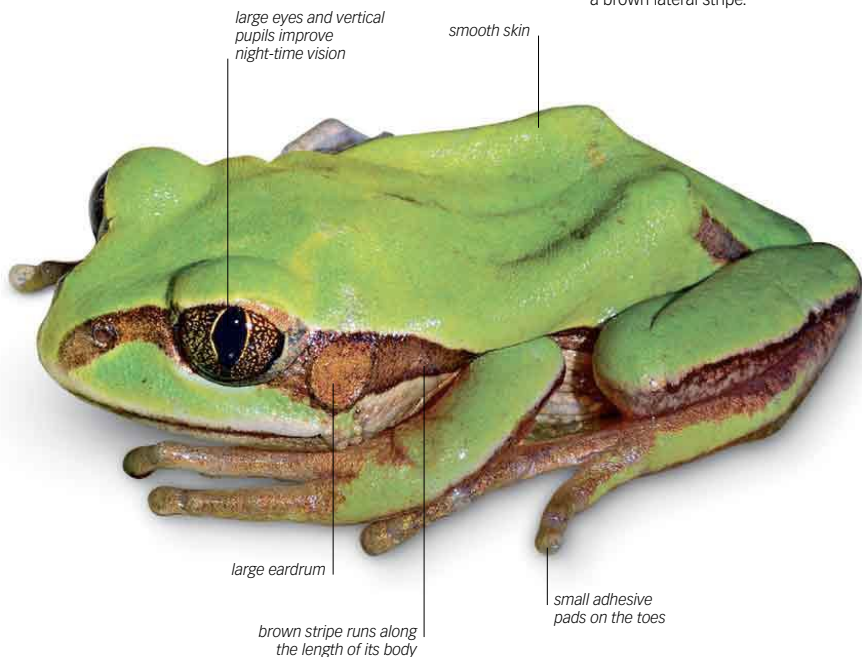
# MARBLED SHOVEL-NOSED FROG

**This is a burrowing frog** with a difference: it digs head-first, using its muscular front limbs and the hardened, pointed snout to drive itself forward through leaf litter and wet soil. The frog feeds only on ants and termites, and has a specialized rod-like tongue that it can shoot out rapidly to the front and sides, allowing it to feed in a confined space.

This frog’s breeding habits are equally interesting. The male calls from under a leaf at the muddy edge of a pool. When a female appears, he grasps her in amplexus, and is then dragged beneath the surface as she digs a burrow in the mud. The eggs are laid at the bottom of the burrow, sometimes under a log or rock, with a layer of infertile egg masses over them to prevent them from drying out. When rains flood the nest, the tadpoles get washed out into the main pool or stream; in some cases, the female digs a channel between the nest and the water to release the tadpoles.

**Distinguishing features**

This tree frog has large eyes, a short head, and a blunt snout, typical of the genus. Its bright green coloration is marked with a brown lateral stripe.

**PROFILE**

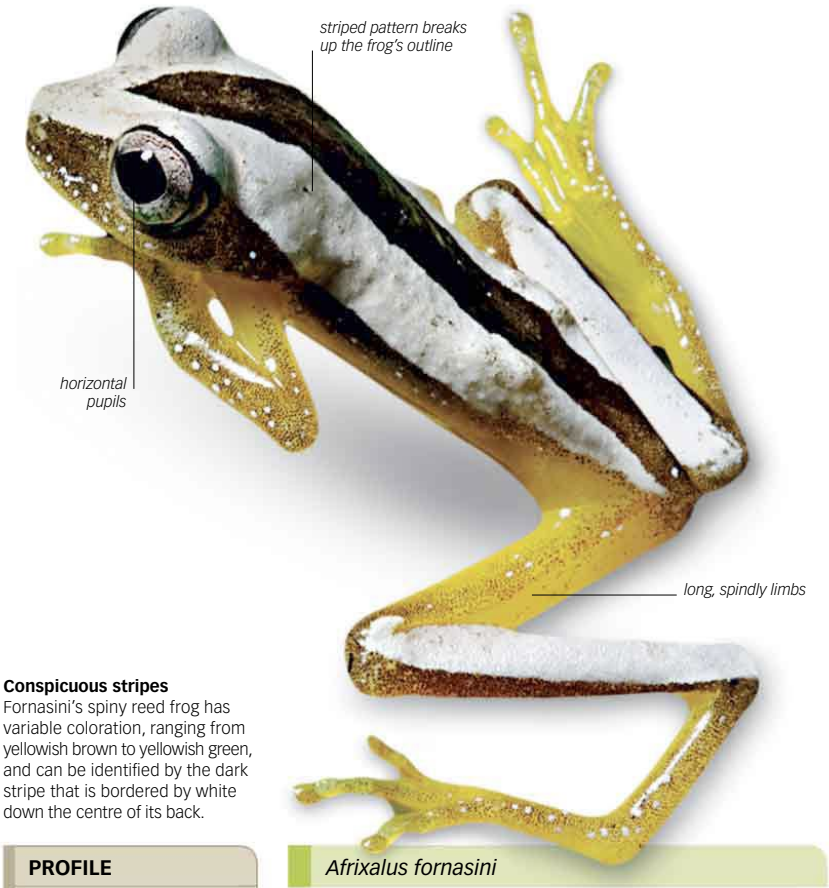
-  W. Africa
-  Savanna
-  4–5.4 cm (1½–2¼ in)
-  Egg-laying
-  Unknown
-  Nocturnal
-  Least Concern

*Leptopelis nordequatorialis*

## WEST CAMEROON FOREST TREE FROG

**Sometimes collectively known as** bush frogs, the *Leptopelis* species are found throughout Africa, south of the Sahara, but many species have restricted ranges. The West Cameroon forest tree frog has a limited range in Cameroon, and is found only in upland savanna between 1,100 and 2,000 m (3,610 and 6,560 ft).

Males call from small bushes with a loud clacking sound. Hence, these frogs are sometimes known as “clackers”. The breeding habits of the West Cameroon forest tree frog are unknown, but closely related species bury small clutches of eggs in the soil or in a depression that fills with water after the rain. The tadpoles are eel-shaped when they hatch, and wriggle across wet ground until they find a suitable place to continue their development.



**Conspicuous stripes**

Fornasini's spiny reed frog has variable coloration, ranging from yellowish brown to yellowish green, and can be identified by the dark stripe that is bordered by white down the centre of its back.

PROFILE	
	E. Africa
	Reedbeds and savanna
	3–4 cm (1¼–1½ in)
	Eggs laid on vegetation above water
	30–80
	Nocturnal
	Least Concern

*Afrixalus fornasini*

# FORNASINI'S SPINY REED FROG

**Spiny reed frogs** are also known as leaf-folding frogs or banana frogs. They live among reeds or tall grasses and sedges, where their light weight and adhesive toe pads give them great agility – after leaping they often hang by a single toe until they can pull themselves up to a more secure position.

These frogs breed in stagnant pools with plenty of emergent reeds and sedges. They spawn on leaves about 1 m (3¼ ft) above the water level, and the female folds the edges of the leaf over the eggs as she lays them. They hatch after about five days and the long, thin tadpoles wriggle down into the water. They are carnivorous, feeding on mosquito larvae and similar aquatic invertebrate prey. The adult frogs also feed on invertebrates but have been known to eat the eggs of other frogs that lay them out of water.

**Prominent snout marking**

Although variable in coloration, the small Madagascar reed frog has a distinguishing dark band between its snout and eyes, orange-coloured feet, and a whitish yellow underside.

**PROFILE**

- |   |  |
|---|--|
| 📍 Madagascar  | 🥚 Eggs laid in permanent and temporary pools |
| 🌳 Trees and bushes in fields, dunes, and often near water | 👤 Unknown                                    |
| 📏 3.5–4 cm (1½ in)  | 🌙 Nocturnal                                  |
|   | ⊗ Least Concern                              |

**SIMILAR SPECIES**

**White-spotted reed frog,**  
(*Heterixalus alboguttatus*)

Dark with white or cream spots; habits are similar to those of *H. madagascariensis*

*Heterixalus madagascariensis*

## MADAGASCAR REED FROG

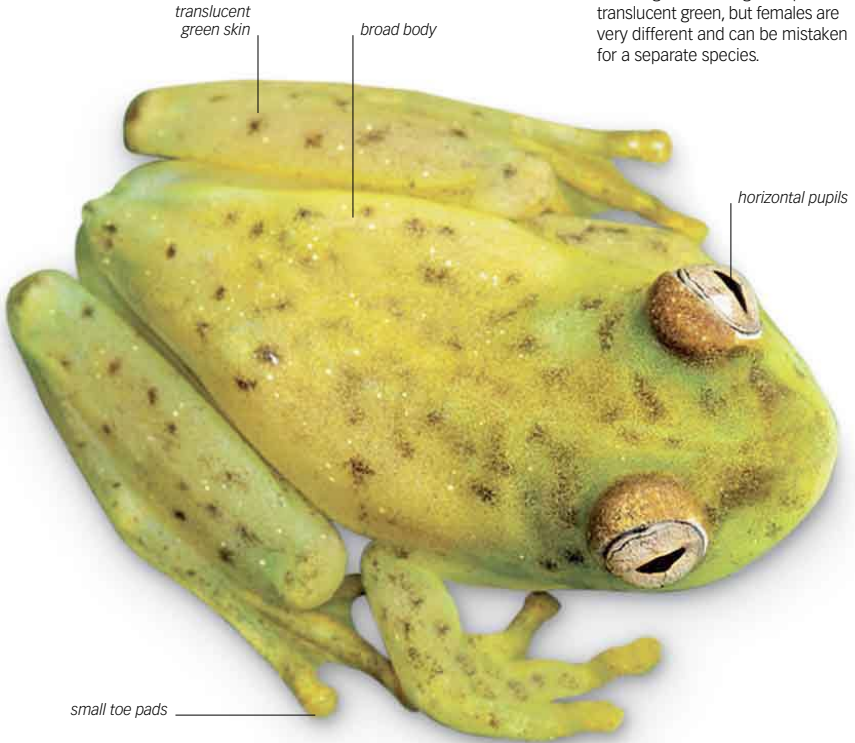
**By far the most common reed frog** in Madagascar, this frog is often found in places with human activity: gardens, parks, ricefields, and villages. It usually lives in trees and shrubs close to water and, in the daytime, sits motionless in an exposed position, usually on top of a leaf in full sun. There are many colour forms, and even in the same locality they may be bright blue, yellow, brown, or white by day, changing at night to become yellowish brown, sometimes with many black spots.

This frog breeds throughout the year and is dependent on rainfall; it rests during the dry season and becomes active after rains. The eggs are laid in clusters in temporary or permanent pools, which may contain eggs as well as tadpoles at all stages due to the more-or-less continuous breeding season. This is a very common species that has probably benefited from land clearance for agriculture.



**Sexual dimorphism**

Male argus reed frogs are pale translucent green, but females are very different and can be mistaken for a separate species.

**PROFILE**

-  E. and S. Africa
-  Temporary and permanent pools
-  3.5cm (1½ in)
-  Eggs laid in temporary pools
-  200
-  Nocturnal
-  Least Concern

*Hyperolius argus***ARGUS REED FROG**

**This species**, as well as others in the *Hyperolius* genus, are known as reed frogs or sedge frogs because of their ability to climb stems with their expanded toe pads. Unusually for frogs, it displays sexual dimorphism – the colour varies between the sexes; the bold markings of the females are highly variable and no two are alike.

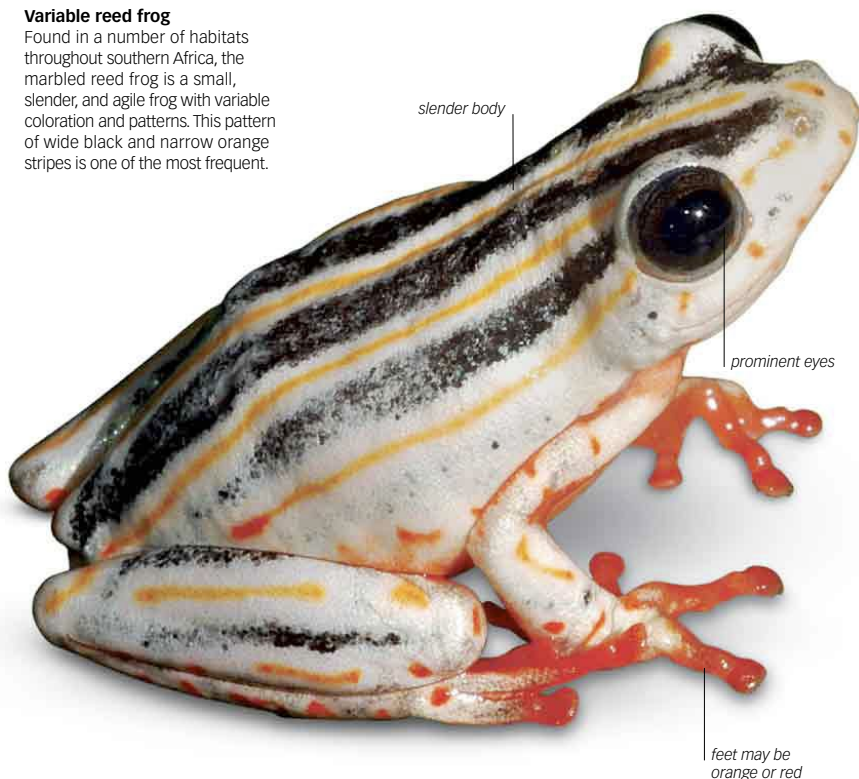
Argus reed frogs are associated with water lilies, and males frequently call from the surface of a lily pad. The species breeds in temporary pools that form in shallow depressions after rain, probably choosing such sites due to the absence of predatory fish. The breeding season is extended, and females produce eggs every few weeks for as long as there is water in the pool. The eggs are laid in clusters of about 30.

**Female**

Females are brown with a cream V-shaped marking on the head and a number of dark-edged cream spots on the back.

**Variable reed frog**

Found in a number of habitats throughout southern Africa, the marbled reed frog is a small, slender, and agile frog with variable coloration and patterns. This pattern of wide black and narrow orange stripes is one of the most frequent.

**PROFILE**

-  S. Africa
-  Ponds, reedbeds, savanna, and river margins
-  4.3cm (1¾in)
-  Egg-laying
-  150–600; in small clumps
-  Nocturnal
-  Least Concern

*Hyperolius marmoratus*

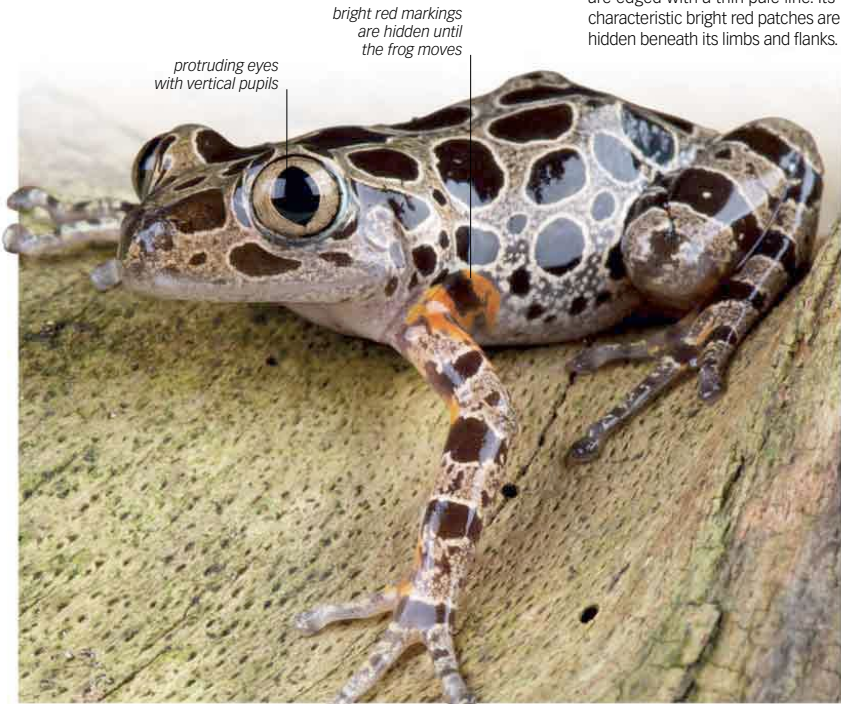
## MARBLED REED FROG

**This is a highly variable frog** with at least 14 colour patterns, all of which can occur within the same population; individuals may be striped, plain, speckled, or spotted in a number of different colours and combinations but, as far as is known, they will all interbreed to produce viable offspring. During the breeding season, males call repeatedly to attract females, making a sound like a squeaky wheelbarrow being moved. Females lay their eggs in small clumps in water, and the tadpoles take about two weeks to hatch.

This species often sits out in full sun, but may use several techniques to reduce the amount of water it loses. For example, it stores water in its bladder or sits in a hunched position to cover the thin skin on its underside. The frog also makes good use of light showers or dew by absorbing water quickly through the thin skin on its feet and flanks, and it can change colour to become almost white to reflect the sunlight on very hot days.

**Concealed flash colours**

The spotted running frog has smooth greyish brown skin with dark brown or black oval spots that are edged with a thin pale line. Its characteristic bright red patches are hidden beneath its limbs and flanks.



protruding eyes with vertical pupils

bright red markings are hidden until the frog moves

**PROFILE**

- E. Africa
- Permanent pans and lakes in grassland
- 5–6.5 cm (2–2½ in)
- Egg-laying
- Unknown
- Nocturnal
- Least Concern

*Kassina maculata*

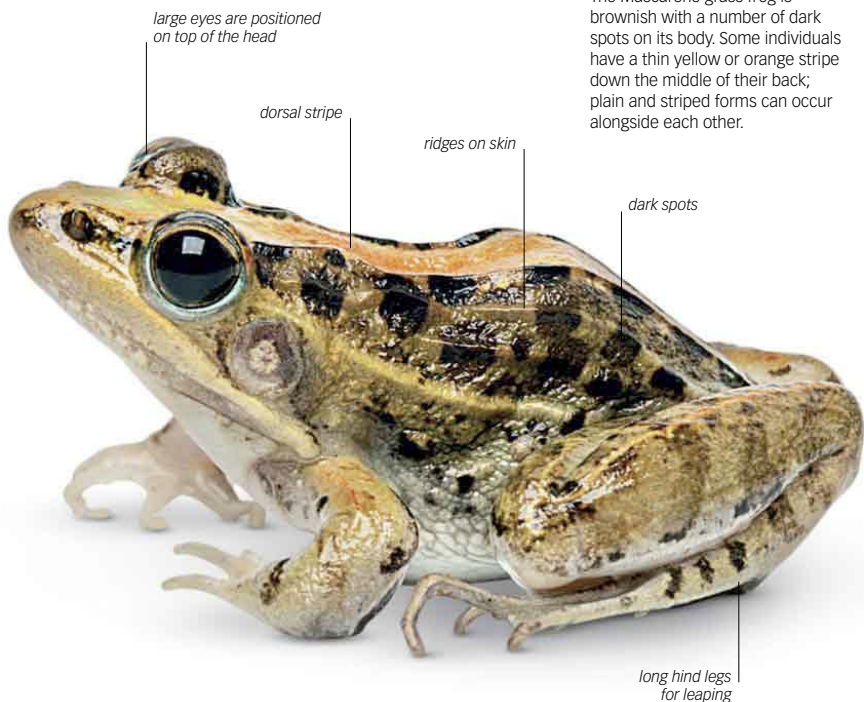
# SPOTTED RUNNING FROG

**This frog is common** in low-lying grasslands, where it hides among the dead vegetation or in the curled-up leaves of banana plants. As its name suggests, it prefers to run rather than hop, and although its expanded toe discs are small, it can climb quite well. The frog is heavily spotted with bright red patches on its armpits, thighs, and lower flanks. The red patches are normally hidden while the frog is resting and act as flash colours when it moves. This may help to momentarily confuse or startle predators, giving the frog enough time to escape. A second line of defence is provided by skin secretions, which give the frog a characteristic smell.

This species feeds largely on reed frogs, which share its habitat. It breeds in well-vegetated, shallow lakes and ponds. The eggs are attached to submerged vegetation, and the tadpoles have high fins and bold markings.

**Spots and stripes**

The Mascarene grass frog is brownish with a number of dark spots on its body. Some individuals have a thin yellow or orange stripe down the middle of their back; plain and striped forms can occur alongside each other.

**PROFILE**

📍 Madagascar and introduced to Mascarene and Seychelles Islands; individuals from mainland Africa may belong to several distinct species

🌿 Ponds, swamps, grassland, and fields

📏 4–5.5 cm (1½–2¼ in)

🥚 Eggs laid in small bodies of water

👥 Probably about 1,000

🌙 Diurnal and nocturnal

ⓧ Least Concern

*Ptychadena mascareniensis*

## MASCARENE GRASS FROG

**Apart from primary rainforests,** Mascarene grass frogs are abundant throughout Madagascar. They are especially common near villages and cultivated fields, and have benefited from the clearance and degradation of forests. The frogs are extremely agile and avoid capture by making a series of jumps in rapid succession, often changing direction with each jump, but usually heading away from water. They are preyed upon by snakes, birds of prey, and possibly small mammals.

The frog breeds in shallow water, often in temporary puddles and wheel ruts but also at the shallow edges of large lakes or swamps. The eggs are small and are laid throughout the year. Frogs belonging to the genus *Ptychadena* are collectively known as ridged frogs, as they have ridges of folded skin running down their back.



**Mimicking nature**

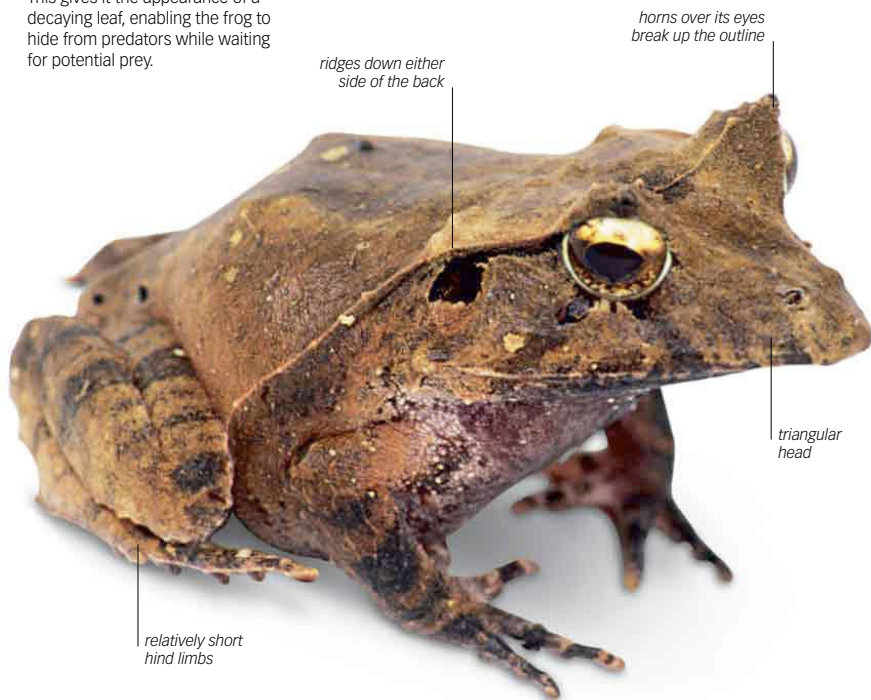
The Solomon Island horned frog has an earthy, mottled coloration. This gives it the appearance of a decaying leaf, enabling the frog to hide from predators while waiting for potential prey.








ridges down either side of the back

horns over its eyes break up the outline

triangular head

relatively short hind limbs

**PROFILE**

-  Solomon Islands
-  Lowland forests and plantations
-  8–12 cm (3¼–4¾ in)
-  Eggs laid on land
-  8–22
-  Nocturnal
-  Least Concern

*Ceratobatrachus guentheri*

## SOLOMON ISLAND HORNED FROG

**This species has several common names**, including the triangle frog and eyelash frog. Its shape and colour are cryptic, making it difficult to see when it is resting among dead leaves on the forest floor. The horns over its eyes also help to disguise its outline; a feature that is reminiscent of the Asian horned frog (p.264). The leaf frog varies in colour, from brown and reddish brown to yellow ochre, while some individuals also have a stripe along their back.

Armed with a pair of tusks in its lower jaw, the Solomon Island horned frog ambushes prey that wander within striking distance, including other frogs and its own species. Females lay a small cluster of large eggs in a damp place. This species undergoes direct development; they skip the free-living tadpole stage and hatch after about 32 days as fully formed froglets, measuring 1 cm (¾ in) in length.

**Elusive frog**

Found along river banks in West Africa, the Goliath frog is an alert species and is difficult to catch.

massive hind limbs  
help make long leaps

dark greenish  
coloration

long front toes  
lack webbing

heavily webbed  
hind feet

**PROFILE**

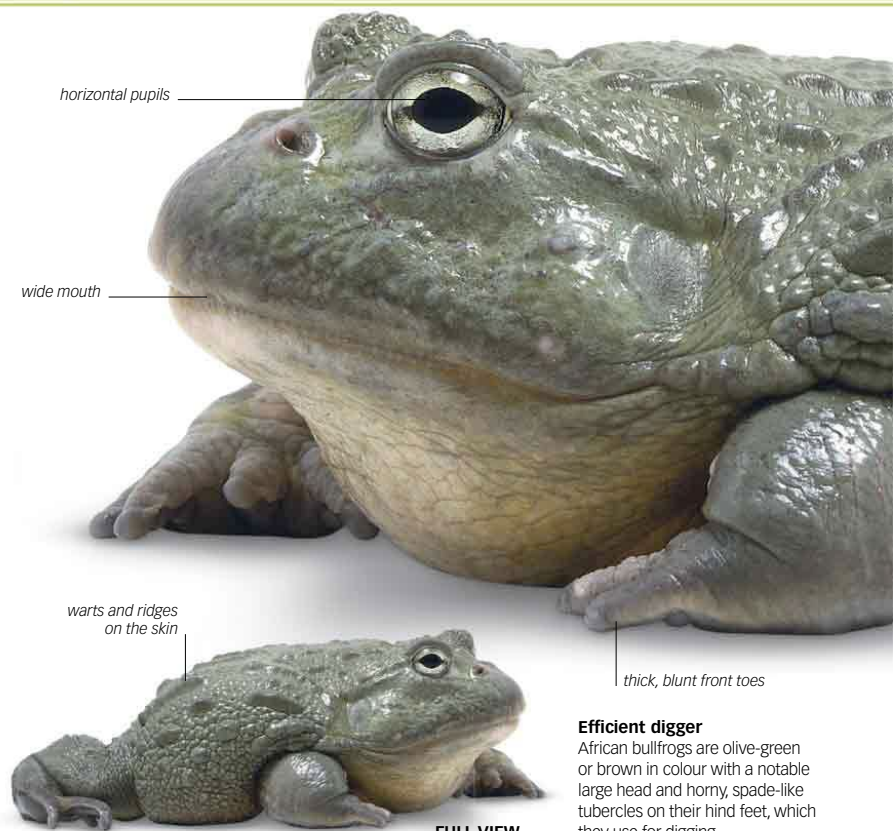
-  W. Africa
-  Fast-flowing rivers and streams
-  17–32 cm (6½–12½ in)
-  Eggs laid in water
-  Several hundred
-  Nocturnal
-  Endangered

*Conraua goliath*

## GOLIATH FROG

**Thought to be the largest frog in the world**, the Goliath frog is more than 30cm (12 in) in length and weighs about 3 kg (6½ lb); males are larger than females. They live on rocks along rapids and cascades in the remote rainforests of West Africa. Armed with heavily webbed hind feet, they are powerful swimmers, leaping into the water at the slightest disturbance. Their smooth, slippery skin allows them to move efficiently through the water while also making it difficult for predators to grab hold of them.

Adult Goliath frogs feed on a variety of invertebrates and vertebrates, including other frogs. They breed in fast-flowing, well-oxygenated water, attaching their eggs to underwater vegetation. For the first few weeks, the tadpoles feed on a particular plant, *Dicraea warmingii*, that covers the rocks where they live. The large sucker-like discs on the underside of the tadpoles prevent them from being washed away. This species is widely hunted for its meat by the local people. Small numbers are also collected for the pet and zoo trade.

**Efficient digger**

African bullfrogs are olive-green or brown in colour with a notable large head and horny, spade-like tubercles on their hind feet, which they use for digging.

**PROFILE**

-  S. Africa
-  Dry grassland (savanna)
-  Up to 23 cm (9 in)
-  Eggs laid in shallow water
-  Unknown (usually a large number)
-  Mainly nocturnal
-  Least Concern

*Pyxicephalus adspersus*

## AFRICAN BULLFROG

**A massive amphibian**, the African bullfrog can grow to a weight of 1.4 kg (3 lb). Males are larger than females; a result of natural selection, as larger individuals are more successful at attracting mates. Breeding takes place after heavy rains, with the males forming breeding arenas, or leks. The female approaches the largest individual in the group, and the mating pair swim to shallow water. As the female lays her eggs, she arches her back so that they are expelled above the surface and fertilized by the male before they enter the water.

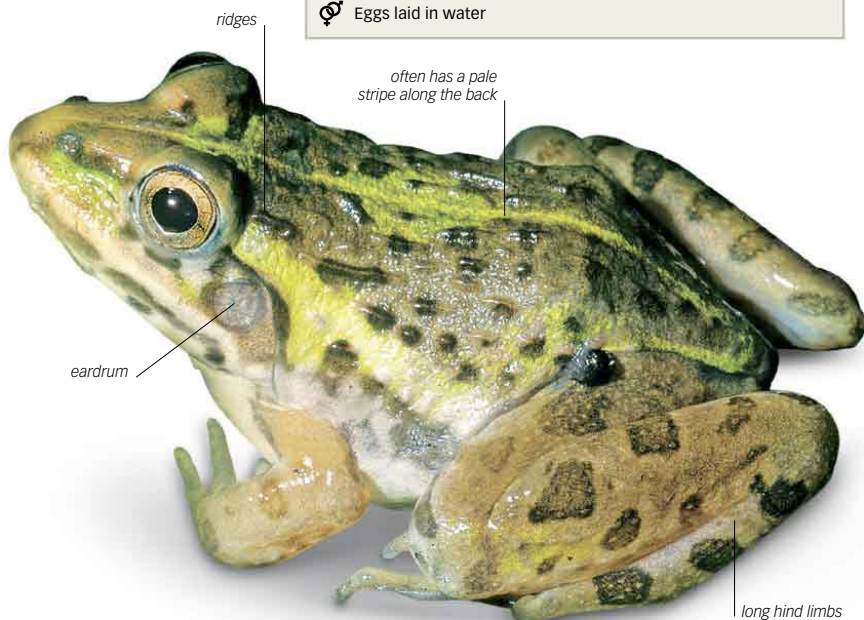
A dominant male may mate with several females and fertilize a large number of eggs, which he guards. He may remain in the water after they have hatched to protect the tadpoles. If they become isolated in a drying pool, he digs a channel opening to a larger body of water so that they can escape. The newly metamorphosed froglets have a varied diet, and may even eat one another. Adults are voracious and eat a wide variety of prey, including venomous snakes.

**Spots and ridges**

This large frog has yellowish or olive skin with dark spots. It has conspicuous eardrums, a pointed snout, and long hind limbs. Folds of skin form short ridges running down its back.

**PROFILE**

- 📍 S. Asia; introduced elsewhere
- 🌿 Wetland of all types
- 📏 12–17 cm (4¾–6½ in)
- ♂ Eggs laid in water
- 👤 Unknown
- 🌙 Mainly nocturnal
- ⚠️ Least Concern

**SIMILAR SPECIES**

**John's groove-toed frog**  
(*Rana johnsi*) Forest species;  
breeds in nearby rice paddy  
fields and streams

*Hoplobatrachus tigerinus***INDIAN BULLFROG**

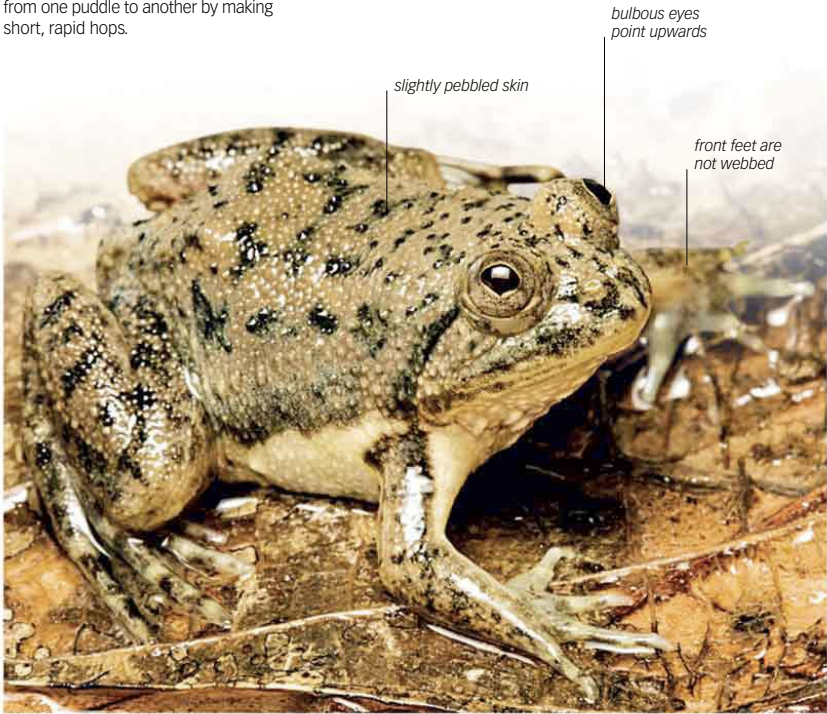
**This semi-aquatic frog** is highly adaptable, and is found in most places where there is water nearby. It is extremely voracious and eats anything it can find, including other frogs, small mammals, snakes, and lizards, even those with spiny scales. Vegetable material has also been found in its stomach.

Indian bullfrogs live on land for much of the year, burrowing down into mud during dry weather. However, breeding activity takes place during the monsoon season, and they return to ponds, swamps, lakes, and reservoirs. Breeding males turn bright yellow and their blue vocal sacs become more prominent. Their loud choruses attract females and the males fight over them, each one trying to grab a female and hold it in amplexus while other males try to dislodge their rival. The eggs are large and laid in batches, attached to submerged grass. The tadpoles are as voracious as the adults, and eat one another as well as carrion.



Body coloration

The spotted puddle frog has greenish brown coloration speckled with small dark spots, and a whitish belly. It moves from one puddle to another by making short, rapid hops.



PROFILE

-  S and S.E. Asia
-  Semi-aquatic
-  4 cm (1½ in)
-  Egg-laying
-  Unknown
-  Diurnal and nocturnal
-  Least Concern








*Occidozyga lima*

SPOTTED  
PUDDLE FROG

**This small, stocky frog** is well adapted to an aquatic life with fully webbed hind feet and eyes and nostrils situated on top of its head. It is sometimes known as the floating frog, and both common names are appropriate as it is often seen floating on the surface of paddy fields and slow-moving creeks, as well as ponds and ditches. If disturbed, the frog quickly dives to the bottom, stirring up the mud to provide somewhere to hide. The spotted puddle frog appears in great numbers after rain and can even be seen in puddles that form in pot-holes and roadside gullies.

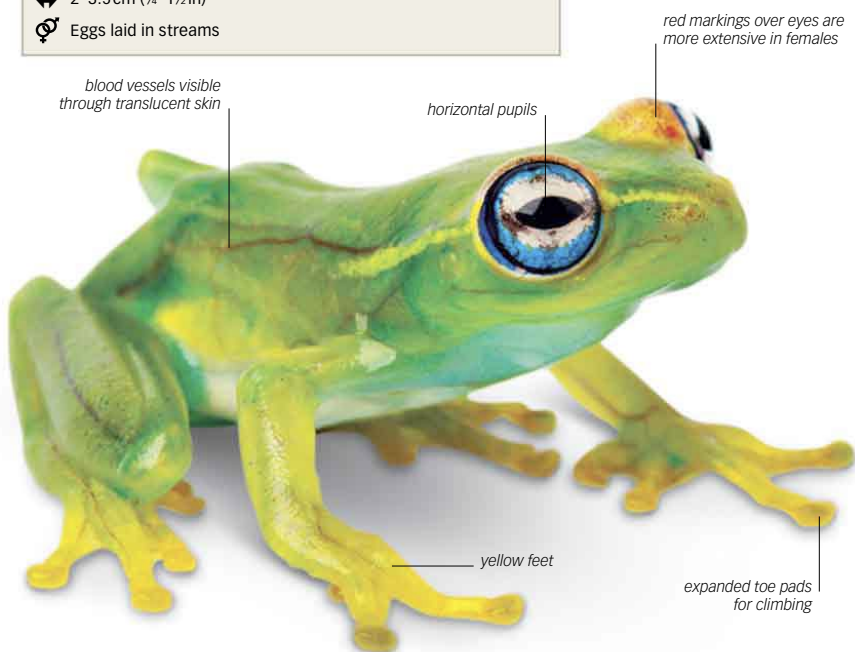
Mating pairs often arrive at the breeding site already in amplexus, with the male tightly grasping the slightly larger female. They spawn in shallow water, but not much is known about the eggs. The tadpoles are long and thin, and prey on small aquatic invertebrates; they often hunt in water that barely covers their back.

## PROFILE

-  Madagascar
-  Rainforest and near streams
-  2–3.5 cm (¾–1½ in)
-  Eggs laid in streams
-  200–300
-  Nocturnal
-  Least Concern

## Distinctive eyes

The central bright-eyed frog has bright blue rims to its irises, which helps distinguish it from all but a few closely related species.



## SIMILAR SPECIES



**Red bright-eyed frog**  
(*Boophis luteus*) Slightly larger and brighter green; has red-rimmed irises



**Green bright-eyed frog**  
(*Boophis viridis*) Translucent green with red flecks; has bright blue rims around its irises

*Boophis rappiodes*

## CENTRAL BRIGHT-EYED FROG

The **central bright-eyed frog** is a dainty, translucent green frog with red and yellow markings. These markings vary in extent, according to the population they come from and depending on whether they are male or female; females are more colourful than males. They have expanded toe pads for climbing, and live in vegetation along slow-moving forest streams. The males are territorial and call from perches 1–4 m (3¼–13 ft) above the water.

The eggs are laid on the sides of streams, in small backwaters where they will not get washed away. The tadpoles are black with distinctive green spots, and live in areas that are shaded by overhanging vegetation. The red bright-eyed frog, *Boophis luteus*, and the green bright-eyed frog, *Boophis viridis*, have habits similar to the central bright-eyed frog, and all three may be found together.

Evading predators

The bright warning coloration of this small species keeps it safe from predators, allowing it to be active by day.

skin has the colour and texture of an orange

slender limbs

black eyes



PROFILE

-  E.C. Madagascar
-  Swamps
-  2–2.5 cm (¾–1 in)
-  Eggs laid on land
-  10–60
-  Diurnal
-  Critically Endangered

*Mantella aurantiaca*

GOLDEN MANTELLA

**The small golden mantella** is a uniform orange in colour. Some of its internal organs can be seen through the translucent ventral skin. It secretes toxic substances, hence the bright warning coloration, and there is an obvious parallel between the mantellas and the poison dart frogs from South America which, however, are in a different family. Mantellas mate during the rainy season. The eggs are laid in damp places on the ground, and take about two weeks to hatch. The tadpoles rely on rain to wash them into small pools, emerging from the water after about 70 days. The young froglets are brown at first, attaining their orange coloration some weeks later.

Golden mantellas prefer patches of open ground exposed to the sun. Their only known localities are swamps in which *Pandanus* trees grow. However, these sites are dwindling in size, and together with the fact that they have been collected in large numbers for the pet trade has led to a drastic decline in the population.

**Striking colours**

The small green-backed mantella has striking coloration. Its yellowish green head and upper back contrast with its dark flanks and limbs that have coppery and metallic blue patches.

**PROFILE**

-  Madagascar
-  Rainforest
-  2.2–2.9 cm (¾–1 in)
-  Eggs laid in tree holes
-  Unknown
-  Diurnal
-  Near Threatened

*Mantella laevis*


## GREEN-BACKED MANTELLA

**Like other mantellas**, this species is very active, constantly making short hops within a well-defined territory, with several individuals forming small colonies. As an adaptation to its semi-arboreal lifestyle, however, it has larger toe pads than other mantellas.

The green-backed mantella's reproductive mode is remarkably similar to that of the poison dart frogs of South America. The female lays a single large egg on the inside wall of a water-filled tree hole or in a broken bamboo, just above the water level. The tadpole drops into the water when it hatches, and may feed on the eggs of the other frogs that also breed in tree holes or on the unfertilized eggs laid specifically by the female for this purpose. If there are no other eggs in the tree hole, the tadpole feeds on algae and detritus.



## PROFILE

-  S. and S.E. Asia
-  Swamps, forests, buildings, and gardens
-  4–7.5 cm (1½–3 in)
-  Eggs laid out of water in a foam nest
-  100–400
-  Nocturnal
-  Least Concern

## Widespread and variable

The Asian foam-nest frog has variable brown coloration and pattern, depending on locality. It also has a characteristic large head and flattish body.



## SIMILAR SPECIES



**File-eared tree frog**  
(*Polypedates otitophus*)

Larger species with a serrated ridge over its eardrum; restricted to Borneo and Sumatra

*Polypedates leucomystax*

## ASIAN FOAM-NEST FROG

**This species is very common** over much of its range and may be a composite of several, as yet undescribed, species. It is brown or tan in colour, and individuals from Borneo have four dark lines down their back.

This species breeds in small pools of water, and the eggs are laid in a foam nest on a muddy bank or in vegetation above the water level. Spawning can take all night, and the pair are often still together the following morning. During mating, the female secretes a jelly-like substance, which the male whips up into a foamy mass with his hind feet. The eggs are distributed through the foam, which protects the developing tadpoles from predators and keeps them from drying out. Upon hatching, the tadpoles fall into the water. They feed on almost anything, including invertebrates that fall into the water and drown, and take about seven weeks to completely develop.

## PROFILE

Indonesia, Malaysia, and Thailand

Rainforest

8–10 cm (3¼–4 in)

Eggs laid in foam nests

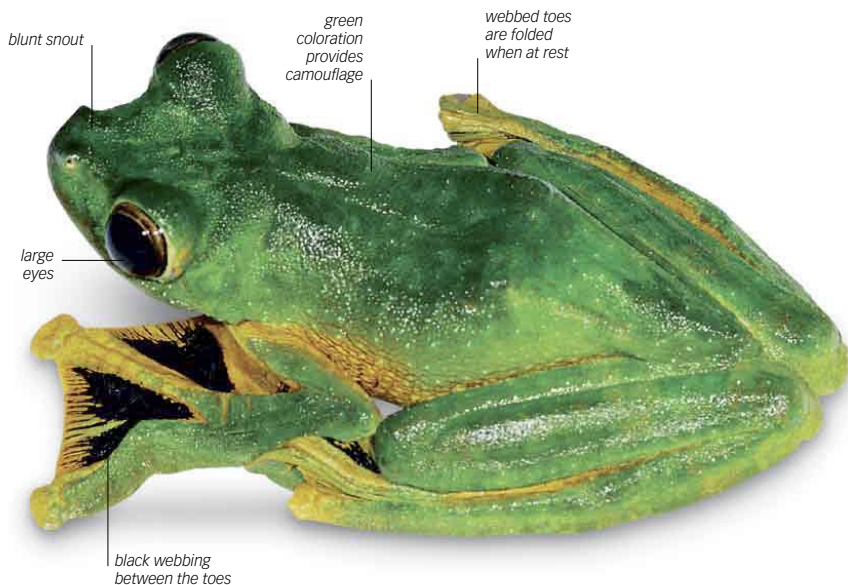
Unknown

Nocturnal

Least Concern

## Flying colours

Wallace's flying frog has distinctive bright green dorsal coloration with yellow and black webbed feet. It has a blunt snout and protruding eyes.



## SIMILAR SPECIES



**Reinwardt's flying frog**  
(*Rhacophorus reinwardtii*)

Smaller, with black patches on its flanks; juveniles are pale blue at first





*Rhacophorus nigropalmatus*




## WALLACE'S FLYING FROG

**Wallace's flying frog** is named after its discoverer, Alfred Russell Wallace, the naturalist who, with Charles Darwin, shares the credit for the theory of evolution by natural selection. This large frog has heavily webbed hands and feet with black and yellow skin. The limbs have additional narrow ridges that increase their surface area. The frog "flies" by spreading all four limbs as it launches itself from trees, parachuting to the ground. It controls where it lands by tilting its feet and spilling air, in much the same way as a human parachutist or a bird of prey.

Quite common, but rarely seen, this species spends most of its life in the forest canopy, coming down to ground level only to breed. It lays its eggs in foam nests on the muddy banks of pools or in shrubs overhanging water. The male, which is smaller than the female, uses his hind feet to whip up the foam, and the eggs are evenly distributed within the foam nest.

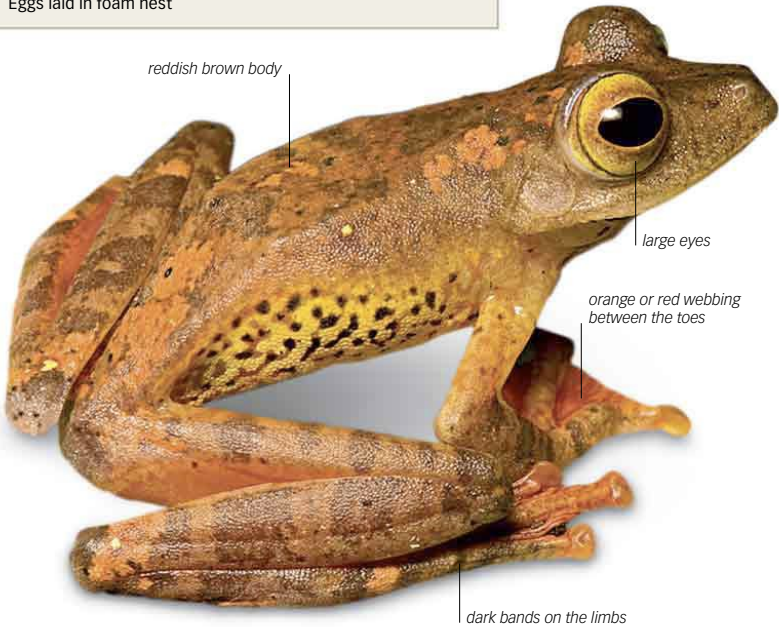
PROFILE

-  Indonesia (Borneo and Sumatra) and Philippines
-  Rainforest
-  5.5–7 cm (2¼–2¾ in)
-  Eggs laid in foam nest

-  Unknown
-  Nocturnal
-  Least Concern

Easily identifiable

The harlequin tree frog is easy to identify. It has a reddish brown body, bright orange or red webbed feet, yellow flanks with black spots, and narrow dark bands along its limbs.



SIMILAR SPECIES



**Jade tree frog**  
*(Rhacophorus dulitensis)*  
Translucent green with some internal organs visible through its skin; limb bones are bright turquoise green








*Rhacophorus pardalis*

# HARLEQUIN TREE FROG

**This is the most common “flying frog”** in the areas where it occurs. Although a canopy dweller, it appears to be more inclined to forage at lower levels than many other flying frogs and may therefore be more easily found outside the breeding season. It also has a wider range of breeding sites, including small temporary puddles, pools formed from blockages in slow-moving streams, and the margins of large lakes.

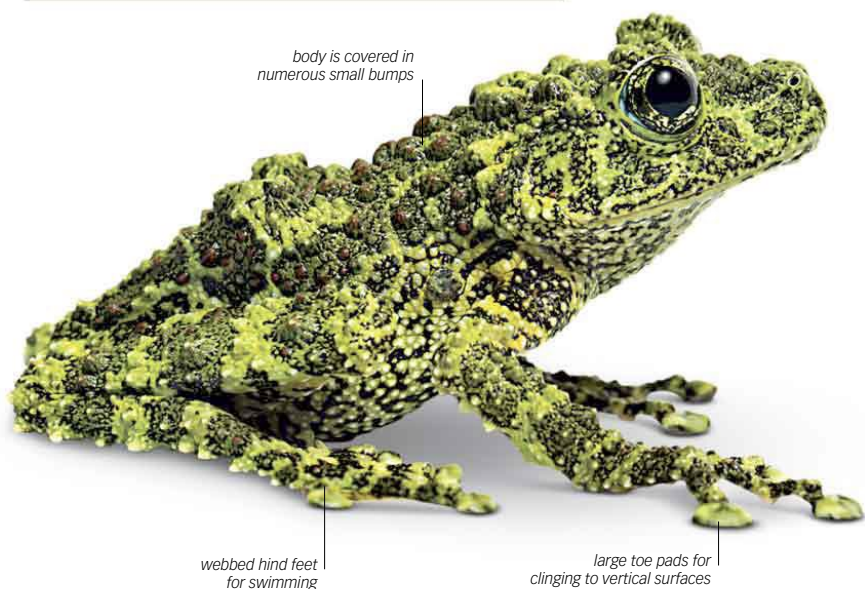
Like many members of its family, the harlequin tree frog’s eggs are protected in a foam nest, which is created by the male from the jelly mass secreted by the female. The nest is normally attached to vegetation overhanging water. Although common at present, its numbers are decreasing due to logging; the harlequin tree frog often remains in the disturbed forests for a while, but does not adapt to them in the long term.

## PROFILE

- |   |  |
|---|--|
|  Vietnam                                      |  5–30         |
|  Rainforest                                   |  Nocturnal    |
|  7–8 cm (2¼–3¼ in)                            |  Not assessed |
|  Eggs laid out of water on a vertical surface |  |

## Superb camouflage

With its amazing mottled green moss-like coloration and uneven texture, the mossy frog blends in perfectly with its habitat.



## SIMILAR SPECIES

*Theloderma corticale*



**Pied mossy frog**  
(*Theloderma asperum*)

Smaller than the mossy frog; markings suggest that it often rests on lichen








## MOSSY FROG

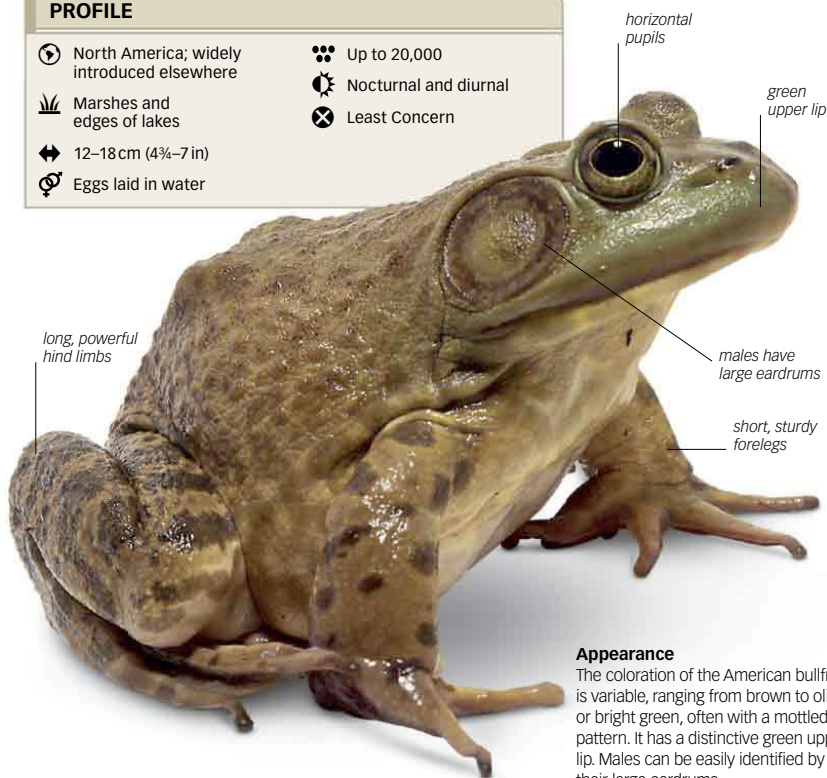
**The most remarkable characteristic** of this unusual frog is the colour and texture of its body, head, and limbs; they are predominantly green and covered with prominent ridges and raised tubercles. Even its eyes are green and mottled. When it is resting on a bed of moss, the frog is almost impossible to see. Juveniles and young adults are often bright green with reddish tips to some of their protuberances, but they become dark green as they get older. If threatened, these frogs curl up with their feet and head tucked into their belly and pretend to be dead.

Mossy frogs breed in small bodies of water that collect in rocky cavities in cliffs or in tree holes. A single tree hole may contain a pair of adults, some juveniles, and tadpoles in the water. Males are very vociferous and have a range of different calls. The eggs are sticky and laid just above the water's surface. Once the tadpoles hatch, they slide down into the water to continue their development. The juveniles are thought to disperse through the forest when they become sexually mature.



## PROFILE

-  North America; widely introduced elsewhere
-  Marshes and edges of lakes
-  12–18 cm (4¾–7 in)
-  Eggs laid in water
-  Up to 20,000
-  Nocturnal and diurnal
-  Least Concern



horizontal pupils

green upper lip

long, powerful hind limbs

males have large eardrums

short, sturdy forelegs

## Appearance

The coloration of the American bullfrog is variable, ranging from brown to olive or bright green, often with a mottled pattern. It has a distinctive green upper lip. Males can be easily identified by their large eardrums.

## SIMILAR SPECIES



**Green frog (*Lithobates clamitans*)** Found in shallow waters, especially streams and brooks

*Lithobates catesbeianus*

## AMERICAN BULLFROG


**The largest frog in North America**, this species gets its name from its low, moaning call, which resembles the roar of a bull, and choruses can be heard over great distances. Males have paired vocal sacs, opening at each corner of their mouth. They are very aggressive towards each other in the spawning season and fight over the most favourable places for spawning. Females lay as many as 20,000 eggs. In some northern areas, the large tadpoles take up to four years to develop.

Bullfrogs were first introduced in western parts of North America as part of a scheme to farm them for food. They have also been introduced in other parts of the world, usually in an attempt to provide food for people and also for the pet trade (as tadpoles). They became established in the wild and have had an adverse effect on local species; not only do they eat native frogs and other small vertebrates but they are carriers of the chytrid fungus that affects other frogs. Importing bullfrogs has now been banned in most parts of the world.

**Spotted frog**

The leopard frog's coloration can be greenish or brown with roundish spots, and a prominent ridge is always present on each side of its back. It feeds mainly on terrestrial invertebrates.

**PROFILE**

-  N. and C. North America
-  Grassland, woodland, swamps, ponds, canals, and ditches
-  5–11 cm (2–4¼ in)
-  Eggs laid in water
-  Up to 6,500
-  Nocturnal and diurnal
-  Least Concern








*Lithobates pipiens*

## NORTHERN LEOPARD FROG

**This heavily spotted frog** is very familiar over much of North America, although it is replaced in the south by closely related species. It lives in a variety of habitats, often far from water.

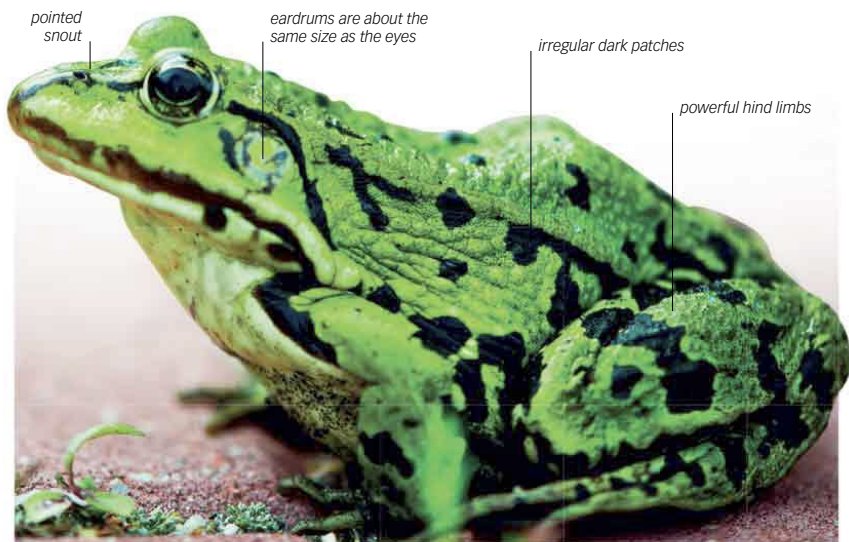
Northern leopard frogs breed in still, shallow water in open areas. The males' loud "snoring" calls can often be heard in spring and summer, even when they cannot be seen. The tadpoles feed mainly on algae. They sometimes overwinter if their growth has been slow. Adults hibernate underground or at the bottom of ponds; they can survive cold temperatures but not freezing. For many years, thousands of these frogs were collected for dissection in schools and universities. In recent years, their numbers have declined in some areas as a result of the presence of agricultural pesticides in water, from traffic deaths, and increased ultraviolet radiation.

## PROFILE

-  C. Europe; was extinct in Britain, but has recently been reintroduced there
-  600–3,000
-  Mainly diurnal, but also active at night
-  Very aquatic
-  Up to 8 cm (3¼ in)
-  Least Concern
-  Eggs laid in clumps attached to aquatic plants

## Rare amphibian

The relatively large pool frog is one of the rarest amphibians in Britain. However, it is still common in other parts of its range.



## SIMILAR SPECIES



**Edible water frog**  
(*Pelophylax esculenta*)

A hybrid offspring of the pool frog and the marsh frog








*Pelophylax lessonae*

## POOL FROG

**The pool frog is a heavily built species** with a pointed snout and pear-shaped body. It is usually green, bronze, or brown in colour; some specimens have a light stripe along the centre of the back and other pale areas on the flanks. Some males develop an overall yellow coloration during the breeding season. This species is well adapted to an aquatic lifestyle with powerful hind limbs and eyes located relatively high on top of the head. It typically stays near the edges of large bodies of water with just its head showing.

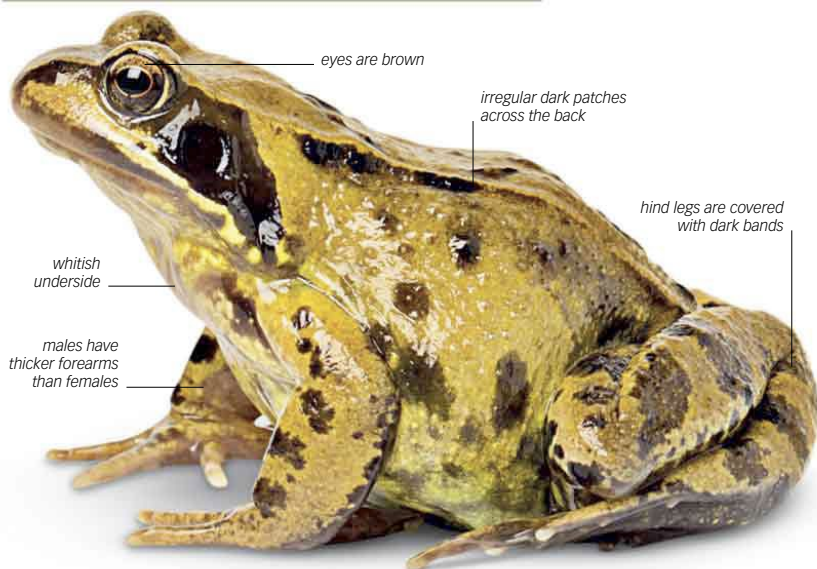
In the breeding season, large congregations of males call during the day; the choruses sound very similar to quacking ducks. There are up to 10 additional species of water frog in parts of Europe, some of which are distinguishable only by their proteins and DNA; the genetics of this group of species is very complicated and has only recently been fully understood.

## PROFILE

-  N. and C. Europe, and into C. Asia
-  Moist, shady places, including woods, gardens, and fields; outside the breeding season, often close to water
-  Up to 11 cm (4¼in)
-  Eggs laid in clusters
-  700–4,500
-  Nocturnal and diurnal
-  Least Concern

## Spring migration

Also called the grass frog, this species lives most of its life on land, but migrates to ponds in early spring to breed. It is a relatively large frog with a robust body and powerful hind limbs.



## SIMILAR SPECIES

pointed snout

**Moor frog (*Rana arvalis*)**

Similar to European common frog but more pointed snout; males turn blue during the breeding season

**Agile frog (*Rana dalmatina*)**

Similar, but more slender and with longer legs

*Rana temporaria*

## EUROPEAN COMMON FROG

**Common frogs may be** almost any shade of brown or yellowish brown, usually with darker blotches, and invariably a black “mask” across the eyes, covering the eardrums. They are the most familiar frogs over much of Europe and are often found in gardens and other disturbed habitats. Some remain near the ponds in which they breed throughout the year, but others disperse widely after the spring breeding season, which can last from a few days to a few weeks, depending on the weather.

Over much of their range they are explosive breeders, and clumps of spawn are often laid adjacent to each other, forming large rafts containing thousands of eggs. Spawn is usually found in temporary pools, ditches, flooded fields, or in the shallow areas of larger ponds and lakes. Tadpoles usually develop and metamorphose at the end of their first summer, but a proportion may overwinter and emerge the following year.



# GLOSSARY

## ADAPTATION

Behavioural or physical characteristic that has evolved to improve an organism's chances of survival in a particular environment.

## AESTIVATION

Period of inactivity brought about by long, hot, and dry conditions. Some desert reptiles and amphibians aestivate, becoming active again only after rain.

## AMBUSH PREDATOR

A predator that waits in a concealed position until its prey comes within range. Many ambush predators are well camouflaged and may enhance their chances by using a lure.

## AMPHIBIOUS

Able to live both on land and in water.

## AMPLEXUS

A position in which male frogs and salamanders grasp females during mating. Amplexus in frogs may be inguinal or axillary.

## APOSEMATIC COLORATION

The use of bright colours, often in conjunction with black, by an animal to warn predators that it is dangerous, toxic, or distasteful.

## ARBOREAL

Adapted for living in trees.

## ARID

Descriptive of a dry area, such as a desert.

## AXILLARY

In zoology, the area of the body that corresponds to the armpit. For instance, in axillary amplexus, the male frog grasps the female beneath her armpits.

## AQUATIC

Living or growing in or near water.

## BARBEL

A long, fleshy projection, usually under the chin of a tortoise or turtle.

## BASK

To acquire heat, usually from the sun. Some reptiles bask by positioning themselves under a flat rock.

## BINOCULAR VISION

The ability to focus both eyes on an object. This kind of vision allows an animal to judge distance.

## BROMELIAD

A plant of the family Bromeliaceae, many of which have central water-holding urn-like structures. These urns may be used by certain frogs, including poison dart frogs, as nurseries for their tadpoles.

## CALCAREOUS

Containing calcium carbonate. The hard shell of the eggs of some reptiles, such as turtles and some geckos, is calcareous.

## CAMOUFLAGE

A general term describing the colour and patterns of some species that help them to blend in with their environment.

## CANNIBAL

Eating members of one's own species (but not eating a different species in the same order, so snakes that eat other types of snakes are not cannibalistic).

## CAPTIVE BREEDING

A way of helping endangered animals by breeding them in captivity. Sometimes their young are released back into the wild.

## CARAPACE

In turtles and tortoises the carapace is the upper part of the shell.

## CARNIVORE

Any animal that specializes in eating meat.

## CARRION

The remains of a dead animal.

## CASQUE

A bony crest on a lizard or frog's head; many chameleons have casques.

## CAUDAL AUTOTOMY

Discarding a part of the tail usually in self-defence.

## CHELONIAN

Collective name for turtles and tortoises.

## CHEMICAL COMMUNICATION

Communicating by smell, as in the case of reptiles and amphibians.

## CHYTRID FUNGUS

A fungal disease, *Batrachochytrium dendrobatidis* (Bd), affecting amphibians. It was identified in recent years as a major cause of species decline and extinction on a global scale.

## CLASS

A taxonomic unit containing one or more orders, but below the hierarchical unit phylum.

## CLOACA

A common opening of the excretory and reproductive systems.

## CONSTRUCTOR

A snake that kills its prey by coiling around it tightly until it suffocates.

## CREPUSCULAR

Active at dusk and/or dawn.

## CREST

A ridge of skin or scales running along the top of the head and/or the body and tail of some lizards and newts.

**CROCODILIAN**

Generic term for all alligators, caimans, crocodiles, and gharials.

**CRYPTIC COLORATION**

Colour or pattern that breaks up the outline of an animal, helping it to blend in with its surroundings and making it difficult to see.

**CRYPTIC SPECIES**

Two or more species that look identical but which differ genetically. They are often prevented from interbreeding by distinct patterns of courtship behaviour.

**DESERT**

A region that experiences little rainfall.

**DEWLAP**

A flap of skin under a lizard's throat, sometimes retractable, and may be used in displays. It is often larger and more colourful in males.

**DIMORPHISM**

Existing in two different forms. Males and females of a species are said to be sexually dimorphic if they differ in shape, size, or colour.

**DISPLAY**

Pattern of behaviour in which a reptile or amphibian attracts attention while it is courting or defending its territory.

**DIURNAL**

Animals that are active during the day and sleep at night.

**DORSAL**

Referring to the back. Dorsal scales, for instance, are the tile-like scales that cover the back and flanks of a snake's body.

**ECOSYSTEM**

A collection of living things and their environment. An ecosystem can be as small as a pond or as big as a forest.

**ENVIRONMENT**

The physical setting inhabited by an animal.

**EXTERNAL FERTILIZATION**

A method of reproduction in which the eggs and sperm are fused after the female has laid her eggs, as in most frogs and some salamanders.

**EXTINCT**

There are no known living members remaining in the wild or in captivity. A species is said to be locally extinct when a particular population has become extinct even though it may survive elsewhere.

**EXTINCT IN THE WILD**

An IUCN category that indicates a species that exists only in captivity.

**FAMILY**

A taxonomic unit that forms part of an order and is subdivided into one or more genera.

**FANG**

A long tooth; in the case of venomous snakes fangs are often grooved or hollow to inject the venom.

**FLASH COLORATION**

A patch of brightly coloured skin or scales that is only visible when an animal moves. The purpose of this coloration is to confuse predators.

**FORAGE**

The activity of looking for food.

**GENUS**

A taxonomic unit that contains one or more closely related species. The level genera comes between species and families in the taxonomic hierarchy. Species belonging to the same genus have the same first name – the generic name – which must be unique; for instance, *Rana* and *Agama*.

**GRUB**

A legless larva of an insect, such as a beetle.

**HABITAT**

The natural home of any particular species.

**HABITAT DESTRUCTION**

A change to the environment that has an impact on the natural habitat, usually with negative results for the inhabitants.

**HEAT-SENSITIVE PIT (OR HEAT PIT)**

An organ found in the face of some snakes that are used for detecting small temperature changes, such as the radiant heat given off by warm-blooded animals. In boas and pythons, these are situated within or between the labial (lip) scales, and in pit vipers a pair of pits are located between the eyes and the nostrils.

**HERBIVORE**

An animal that specializes in eating plants.

**HIBERNATION**

An extended period of inactivity during which an animal's metabolism slows down. Reptiles and amphibians from cool regions often hibernate for several months in the winter.

**INGUINAL AMPLEXUS**

A form of amplexus in which the male frog grasps the female just in front of her hind limbs. Also known as pelvic amplexus.

**INTERNAL FERTILIZATION**

A method of reproduction in which the fusion of the egg and sperm takes place inside the female's body. This method is common to all reptiles, caecilians, most salamanders, and a small number of frogs.

**INTRODUCED SPECIES**

A species that has been introduced, either deliberately or by accident, to a region where it does not occur naturally.

**INVERTEBRATE**

An animal that does not have a backbone or bony skeleton. Invertebrates are often small and include insects, crustaceans, and molluscs.

**IRIDESCENT**

Colours that appear to change and flicker according to the direction of the light. Some snakes and lizards have particularly iridescent scales.

**IUCN**

The initials used to designate the International Union for Conservation of Nature. This organization assesses the threats to wildlife on a species by species basis.

**IUCN RED LIST**

A list prepared by the IUCN that identifies the conservation status of species. The status can be Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, and Extinct. Many species are not yet assessed.

**JACOBSON'S ORGAN**

In reptiles, a pair of organs that open on to the roof of the mouth and connect to the olfactory part of the brain. The forked tongue of snakes and some lizards picks up scent particles from the environment and passes them to the Jacobson's organ, which then transfers the information to the brain.

**KEELED SCALE**

A scale that has one or more longitudinal ridges, usually down the centre, giving a rough appearance and texture.

**LABIAL SCALE**

A scale bordering the mouth.

**LARVA**

The young form of all amphibians, before undergoing metamorphosis into the adult form (the larvae of frogs and toads are more commonly called tadpoles).

**LATERAL**

Referring to the side. Laterally compressed, for instance, means flattened from side to side, as in the tails of crocodilians and other aquatic reptiles, and in the cross-section of some arboreal snakes.

**LURE**

Some ambush predators use certain parts of their body as lures to entice their prey to move within range. Examples include several snakes that have brightly coloured tails that they move to simulate a grub or caterpillar, and the alligator snapping turtle with its worm-like appendage on the floor of its mouth.

**METAMORPHOSIS**

The transformation of a larva, such as a tadpole, into the adult form.

**MIGRATION**

The movement of animals from one place to another to find food or to breed.

**MOULT**

To shed the outer layer of skin (epidermis).

**NEOTENY**

Retaining juvenile characteristics throughout life.

**NEW WORLD**

A shorthand way to describe the Americas and its associated islands. See also *Old World*.

**NOCTURNAL**

Active at night.

**NOMINATE SUBSPECIES**

If there are more than one subspecies, the nominate subspecies is the one that represents a species when it was first described. The subspecific name of the nominate subspecies repeats the specific name. For instance, *Vipera aspis aspis* is the nominate subspecies of *Vipera aspis* (the asp viper). Other subspecies described later must have different subspecific names, such as *Vipera aspis montecristi*.

**NUPTIAL PAD**

A dark and rough swelling that forms on the hands, forearms, and occasionally the chest of male frogs during the breeding season. This helps the frog to grasp the female in amplexus.

**OCELLUS (PL. OCELLI)**

The eye-like spot found in the body patterns of some reptiles and amphibians.

**OLD WORLD**

Europe, Asia, Africa, and Australasia and its associated islands. See also *New World*.

**OMNIVORE**

An animal that eats both plants and other animals as its primary food source.

**ORDER**

A taxonomic unit containing one or more families, but lower in the hierarchy than class.

**OSTEODERM**

A bony plate below the scales of most crocodilians and some lizards.

**OVIPAROUS**

Reproducing by laying eggs.

**OVO-VIVIPAROUS**

Reproducing by means of eggs that hatch as they are laid or soon afterwards. In an ovo-viviparous animal, the eggs are retained inside the mother's body until they hatch, but they do not receive any nourishment from the mother. Most live-bearing reptiles are ovo-viviparous.

**PAROTID GLAND**

In amphibians, the large swollen accumulation of poison-secreting pores, usually found behind the eyes, but sometimes found in other positions, such as the thighs.

**PARTHENOGENIC (OR PARTHENOGENETIC)**

Referring to a species in which the females can produce viable offspring without the need to mate with a male. Some species are fully parthenogenic whereas others may have both parthenogenic and normal populations.

**PELAGIC**

Inhabiting the upper and middle layers of the ocean.

**PHASE**

One of several genetically controlled variants, such as colour.

**PHEROMONE**

A substance released by an organism that produces a response in another individual of the same species. Pheromones are a form of chemical communication.

**PIGMENT**

A substance that gives an animal its colour. In reptiles and amphibians, pigments are usually embedded in cells in the skin or scales.

**PLASTRON**

The lower part of a turtle or tortoise shell.

**PREHENSILE TAIL**

A tail that can be used to curl around objects and grip them; a characteristic of arboreal animals.

**PROBOSCIS**

Extended snout, as in a few frogs, lizards, and snakes.

**RAINFOREST**

Forest, usually in the tropics, which has high rainfall and high humidity. Tropical rainforests are especially rich in reptiles and amphibians.

**RATTLE**

A structure on the tail of rattlesnakes, consisting of loosely interlocking segments of dead skin, which makes a sound when vibrated.

**RATTLESNAKES**

Vipers of the genera *Crotalus* and *Sistrurus* that have a warning rattle at the tip of their tail.

**REAR-FANGED SNAKE**

Snakes that have enlarged fangs positioned towards the rear of the upper jaw. They may be used to introduce venom.

**ROSTRAL SCALE**

A scale at the tip of a reptile's snout.

**SADDLE**

Markings, usually on snakes, in which a wide blotch passes over the animal's back.

**SCUTE**

A large scale, especially the sections covering a turtle's shell.

**SPECIES**

A group of similar organisms that are capable of interbreeding in the wild, producing fertile offspring that resemble themselves. The species is the fundamental unit used in biological classification.

**SPECTACLE**

A transparent scale covering the eyes of snakes and some lizards, such as geckos.

**SPUR**

A pointed scale either attached to a limb or, in pythons and boas, positioned on each side of the cloaca and forming vestigial limbs. It is sometimes used in courtship.

**SUBADULT**

Stage of life between a juvenile and an adult.

**SUBSPECIES**

A taxonomic unit that is subordinate to species. Different subspecies within a species are capable of breeding with each other, but do not do so under natural conditions because subspecies are geographically separated.

**TADPOLE**

A term for a frog or toad larva.

**TAXONOMY**

An arrangement of plants and animals into groups based on their natural relationships.

**TEMPERATE**

A region that has a climate that never gets very hot or very cold.

**TERRAPIN**

A term for certain species of freshwater turtles.

**TERRESTRIAL**

Living on the ground.

**TERRITORIAL**

Defending an area from other members of the same species.

**THERMOREGULATION**

Regulation of the body temperature by physiological or behavioural means to ensure that it remains within a preferred temperature range.

**TOAD**

A member of the family Bufonidae, although the term is also applied to numerous other dry-skinned, warty frogs.

**TORTOISE**

A terrestrial turtle.

**TROPICAL**

Climate in the region of the world north and south of the equator that undergoes very little seasonal change in either day length or temperature.

**TUBERCLE**

A small fleshy pimple or protuberance on an animal's body.

**VENOM**

Fluid containing toxins that are injected into prey, by snakes, for example.

**VENTRAL**

Referring to the underside, as in ventral scales, for instance.

**VERTEBRATE**

An animal with a backbone.

**VESTIGIAL**

A part of an animal that is in the process of being lost through the evolutionary process. This part is small and often serves no function. See also *spur*.

**VIVIPAROUS**

Reproducing by giving birth to live young, which develop in, and are nourished by, the mother.

**VOCAL SAC**

A structure in the throat of frogs and toads that can be inflated to amplify sound.



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(Key: a-above; b-below/bottom; c-centre; f-far; l-left; r-right; t-top)

**10 Dorling Kindersley:** Jan Van Der Voort (br); Rough Guides (c, bl). **11 123RF.com:** Manop Leklai (br). **Photolibrary:** Photodisc / White (tr). **12 Dreamstime.com:** Martinkaxox (b). **13 123RF.com:** Kjersti Jorgensen (tr). **14 Dorling Kindersley:** Natural History Museum, London (b); Jerry Young (cl). **Chris Mattison:** (cr). **16 Dreamstime.com:** Jeff Gabert (b). **17 Dreamstime.com:** Tjkhphotography (cl). **18 Dreamstime.com:** Branex (cla); Timbrk (cb). **22 Dorling Kindersley:** Natural History Museum, London (b). **Chris Mattison:** (cra). **23 Dreamstime.com:** Allocricetulus (br); David Davis (bl). **24 Dorling Kindersley:** Jan Van Der Voort (t). **25 Chris Mattison:** (t). **26 Chris Mattison:** (t). **27 Chris Mattison:** (t). **28 123RF.com:** petervick167 (t).

**Dreamstime.com:** Amwu (clb). **29 Dreamstime.com:** Amwu (t). **30 Dreamstime.com:** Amwu (t). **31 Dreamstime.com:** Amwu (t). **32 Dreamstime.com:** Amwu (clb). **33 123RF.com:** Ameng Wu (br). **37 Getty Images:** John Abbott / Visuals Unlimited, Inc. (t). **38 123RF.com:** Eric Isselee (br). **39 Photoshot:** Andrea & Antonella Ferrari / NHPA (tr). **41 Dreamstime.com:** Amwu (clb); Dennis Donohue (t). **42 Dreamstime.com:** Amwu (t). **43 Dreamstime.com:** Amwu (t). **44 123RF.com:** Banjong Khanyai (clb). **46 Chris Mattison:** (t). **47 Dreamstime.com:** Amwu (t, clb). **49 Corbis:** Jason Isley - Scubazoo / Science Faction (t). **50 Photoshot:** Andrea & Antonella Ferrari / NHPA (t); Imagebroker (clb). **54 Dorling Kindersley:** Jan Van Der Voort (clb). **Dreamstime.com:** Tiberiu Sahlean (c). **55 Chris Mattison:** (t). **56 Photoshot:** E. R. Degginger (t). **58 Chris Mattison:** (t, c). **59 Dorling Kindersley:** Diego Reggianti (clb). **Dreamstime.com:** Geographicasrl (tr). **60 Chris Mattison:** (t). **61 Dreamstime.com:** Mkguijpers (br). **62 Dorling Kindersley:** Jan Van Der Voort (clb); Paolo Mazzei (bl). **Photoshot:** Daniel Heudin / NHPA (c). **65 Dreamstime.com:** Amwu (t). **66 123RF.com:** Eric Isselee (bl). **67 Dorling Kindersley:** Jan Van Der Voort (t, cr). **68 Chris Mattison:** (t). **69 Chris Mattison:** (t). **70 123RF.com:** Eric Isselee (t). **71 Dreamstime.com:** Iulian Gherghel (t); Kcmatt (clb). **72 Dreamstime.com:** Iulian Gherghel (c). **73 Dreamstime.com:** Kcmatt (t). **75 Dorling Kindersley:** Mike Read (t). **76 Dreamstime.com:** Tiberiu Sahlean (t); Kornel Toth (br). **77 Chris Mattison:** (t). **78 Chris Mattison:** (t). **79 Chris Mattison:** (tr, clb). **80 Dreamstime.com:** Mkguijpers (br). **Getty Images:** Michael Kern / Visuals Unlimited, Inc. (t). **82 Dreamstime.com:** Pablo Mendez Rodriguez (clb). **84-85 Chris Mattison:** (t). **84 Dreamstime.com:** Mkguijpers (crb). **85 Dreamstime.com:** Jason P Ross (cr). **Chris Mattison:** (clb). **86 Chris Mattison:** (t). **87 Chris Mattison:** (t). **88 Dreamstime.com:** Amwu (tr, c). **Chris Mattison:** (clb). **89 Dorling Kindersley:** Twan Leenders (c, tr). **90 Chris Mattison:** (t). **91 Dreamstime.com:** Isselee (t, c). **92 Photoshot:** Robert Pickett / NHPA (clb); Karl Switak / NHPA (c). **94 Photoshot:** Karl Switak / NHPA (t). **95 123RF.com:** Willem Frost (t).

**97 Dreamstime.com:** Sylvie Lebcheb (c). **Chris Mattison:** (clb). **98 Chris Mattison:** (t). **99 FLPA:** Pete Oxford / Minden Pictures (t). **100 Robert Harding Picture Library:** Reinhard Dirscherl (c). **101 Photoshot:** Ken Griffiths / NHPA (c, clb). **102 Dreamstime.com:** Ondreicka (clb). **103 Dreamstime.com:** Mkguijpers (t). **104 Dreamstime.com:** Fischer0182 (clb). **105 Chris Mattison:** (t). **107 Chris Mattison:** (crb). **Photoshot:** Daniel Heudin / NHPA (bc). **108 Dreamstime.com:** David Davis (c). **109 Dreamstime.com:** Amwu (c, tr). **Robert Harding Picture Library:** Blaine Harrington / age fotostock (br). **111 Dorling Kindersley:** Jerry Young (br). **112 Photoshot:** Andre Baertschi / NHPA (c). **113 Dreamstime.com:** Kcmatt (t). **114 Chris Mattison.** **Photoshot:** Aamad Zambre / Bruce Coleman (clb). **115 Dreamstime.com:** Amwu (tc). **116 Chris Mattison:** (clb). **119 123RF.com:** petervick167 (t). **120 Photoshot:** Huetter, C. / Picture Alliance (clb). **121 Dorling Kindersley:** Mike Read (br). **Chris Mattison:** (t). **122 Dorling Kindersley:** Diego Reggianti (t). **123 Dorling Kindersley:** Jan Van Der Voort (br). **Dreamstime.com:** Allocricetulus (clb). **Chris Mattison:** (t). **124 Fotolia:** Eric Isselee (bl). **125 Dorling Kindersley:** Jan Van Der Voort (bl). **Chris Mattison:** (tr). **126 Chris Mattison:** (tr, cl). **127 Dreamstime.com:** Johannes Mayer (cr). **128 Dreamstime.com:** Madozi (clb). **130 Alamy Images:** Premaphotos (l). **131 Dreamstime.com:** Dirk Ercken (clb); Oakdalecat (bl). **132 Fotolia:** Steve Lovegrove (t). **134 Dreamstime.com:** Dmitrij (clb). **135 Dreamstime.com:** Mkguijpers (bl); Martin Žák (clb). **Chris Mattison:** (tr, c). **136 Chris Mattison:** (t). **137 Chris Mattison:** (c, clb). **138 Dorling Kindersley:** Thomas Marent (t). **Dreamstime.com:** Mogens Trolle (clb). **139 Dreamstime.com:** Nika Lerman (clb). **140 Dreamstime.com:** Mkguijpers (t). **141 Dreamstime.com:** Mkguijpers (t). **Chris Mattison:** (clb). **143 Dreamstime.com:** Oxana Brigadirova (bl). **144 Dreamstime.com:** Amwu (t). **145 Dreamstime.com:** Rudy Umans (clb). **146 Dreamstime.com:** Mkguijpers (clb). **147 Dreamstime.com:** Andy Rhodes (clb). **148 Dreamstime.com:** David Castillo Dominici (clb); Misha Shiyonov (bl). **149 Dorling Kindersley:**

Rough Guides (t). **Dreamstime.com:** Honourableandbold (clb); Gilles Malo (br). **150 Dreamstime.com:** Kcmatt (c); Jamie Macneil (clb). **151 Dreamstime.com:** Kcmatt (clb). **152 Dorling Kindersley:** Twan Leenders (t, c). **Dreamstime.com:** Steve Byland (clb). **153 Dorling Kindersley:** Paolo Mazzei (t). **155 123RF.com:** Suvisite Supakome (br). **Dorling Kindersley:** Jerry Young (cb). **156 Chris Mattison:** (t). **159 Dreamstime.com:** Eastmanphoto (t); Mkguijpers (clb). **160 123RF.com:** Ameng Wu (clb). **Chris Mattison:** (tc, cl). **161 Dreamstime.com:** Hakoar (clb); Rob0004vivien (bl). **163 Dreamstime.com:** Mkguijpers (clb). **Chris Mattison:** (t). **164 Dreamstime.com:** Ashley Whitworth (clb). **Chris Mattison:** (t). **165 Dreamstime.com:** Mkguijpers (bl). **Chris Mattison:** (clb, t). **166 Chris Mattison:** (tl, c, clb). **167 Chris Mattison:** (t). **168 Chris Mattison:** (cl). **169 Corbis:** Joe McDonald (t). **Chris Mattison:** (crb). **170 Dreamstime.com:** Mkguijpers (clb). **171 Getty Images:** Auscape / UIG (t). **172 123RF.com:** Daniel Budiman (clb). **Photoshot:** Anthony Bannister (t). **174 Chris Mattison:** (t, c). **177 Dorling Kindersley:** Jan Van Der Voort (clb). **178 123RF.com:** Marcel Kudláček (tr, c). **Dorling Kindersley:** Jan Van Der Voort (clb). **179 Dorling Kindersley:** Jan Van Der Voort (clb); Paolo Mazzei (tr, c). **180 Chris Mattison:** (t). **181 Dorling Kindersley:** Natural History Museum, London (clb). **Chris Mattison:** (t). **183 Dreamstime.com:** Ashley Whitworth (clb). **Chris Mattison:** (tl, cr). **184 123RF.com:** Michal Sikorski (tl, c). **185 Chris Mattison:** (tl, cr). **186 Chris Mattison:** (tr, c). **188 Dreamstime.com:** Kcmatt (tr). **189 Dreamstime.com:** Pnwnature (clb). **Chris Mattison:** (cr, tl). **191 Dreamstime.com:** Amwu (clb). **192 Photoshot:** ANT Photo Library / NHPA (br). **194 Dorling Kindersley:** Jerry Young (tr, c). **195 Dreamstime.com:** Amwu (l). **198 Dorling Kindersley:** Jan Van Der Voort (t). **Chris Mattison:** (clb). **199 Chris Mattison:** (t). **200 Getty Images:** iStock Exclusive / Ina Peters (b). **202 FLPA:** Michael & Patricia Fogden / Minden Pictures (clb). **205 Alamy Images:** edward rowland (cb). **Dreamstime.com:** Whitcomberd (bc). **Photolibrary:** Photodisc / White (bl). **206 Dreamstime.com:** Stephanie Rousseau (c). **208 Dorling Kindersley:** Natural History Museum, London (t). **209 Dreamstime.com:** Amwu (clb). **Chris Mattison:** (tr, c).

**210 Dreamstime.com:** Jason P Ross (clb). **212 Chris Mattison:** (tr, cl, clb). **213 Dreamstime.com:** Amwu (br). **Chris Mattison:** (t). **215 Dorling Kindersley:** Jerry Young (clb). **Dreamstime.com:** Robhainer (t). **217 Dreamstime.com:** Rico Leffanta (tr). **219 Dreamstime.com:** Kcmatt (c). **221 Dreamstime.com:** Isselee (clb). **222 123RF.com:** marigranula (bl). **Chris Mattison:** (clb). **224 Photoshot:** Robert Pickett / NHPA (t). **226-227 Dorling Kindersley:** Jerry Young (c). **227 Dorling Kindersley:** Jerry Young (c, cb, bc, br, crb). **228 123RF.com:** Steve Byland (c). **230 Dreamstime.com:** Mikhail Blajenov (c); Carol Buchanan (tr). **234 Dorling Kindersley:** Twan Leenders (br). **236 Dreamstime.com:** Isselee (clb). **237 Dreamstime.com:** Mikelane45 (t). **238 Dreamstime.com:** Kcmatt (br). **239 Dorling Kindersley:** Paolo Mazzei. **240 Dorling Kindersley:** Paolo Mazzei (tl, c). **241 Dorling Kindersley:** Jan Van Der Voort (t, clb). **242 Dorling Kindersley:** Jan Van Der Voort (clb). **243 Chris Mattison:** (bl, clb). **244 Chris Mattison:** (br). **245 123RF.com:** Nils / Julia Weymann / Pfeifer (br). **246 Dorling Kindersley:** Twan Leenders (t). **247 Chris Mattison:** (t). **248 Dorling Kindersley:** Paolo Mazzei (clb). **Dreamstime.com:** Jason P Ross (c). **249 Dreamstime.com:** Jason P Ross (c). **250 Chris Mattison:** (t). **251 Chris Mattison:** (t). **252 Chris Mattison:** (b). **253 Dorling Kindersley:** Twan Leenders (br). **254 Getty Images:** Jared Hobbs / All Canada Photos (t). **255 Chris Mattison:** (t). **256 Chris Mattison:** (t). **259 Chris Mattison:** (clb). **260 Chris Mattison:** (c, clb). **261 Dreamstime.com:** Isselee (clb); Viter8 (c). **262 Dorling Kindersley:** Jerry Young (c). **Chris Mattison:** (clb). **263 Dorling Kindersley:** Jan Van Der Voort (c, clb). **264 Chris Mattison:** (clb). **265 Dorling Kindersley:** Twan Leenders (c, clb). **266 Chris Mattison:** (t). **267 Chris Mattison:** (t). **268 Alamy Images:** Premaphotos (t). **269 Photoshot:** Ken Griffiths / NHPA (t). **270 Chris Mattison:** (t). **271 123RF.com:** Morley Read (t). **272 Dorling Kindersley:** Jan Van Der Voort (clb). **Dreamstime.com:** Gucio55 (c). **273 Dreamstime.com:** Sdbower (clb). **274 Dreamstime.com:** Kcmatt (c); Gerald Marella (clb). **275 Dorling Kindersley:** Dr. Peter Janzen (t). **Chris Mattison:** (clb, bl). **277 Dreamstime.com:** Sdbower (c). **278 Dreamstime.com:** Brendan Thornton (t). **282 Chris Mattison:** (clb). **283 Dorling**

**Kindersley:** Twan Leenders (t). **284 Chris Mattison:** (c, clb). **285 123RF.com:** Morley Read (clb). **Dreamstime.com:** Isselee (c). **286 Dorling Kindersley:** Twan Leenders (c). **287 Dreamstime.com:** Steven Prorak (t). **288 Chris Mattison:** (t). **Photoshot:** James Carmichael Jr / NHPA (clb). **289 123RF.com:** (clb). **Chris Mattison:** (c). **290 Chris Mattison:** (c). **291 FLPA:** Pete Oxford / Minden Pictures (t). **292 Photoshot:** Michael Leach and Meriel Lland / NHPA (t). **293 Chris Mattison:** (c). **294 Dreamstime.com:** Daniel Mccauley Iv (clb); Kcmatt (t). **295 Dreamstime.com:** Mkguijpers (t). **296 Dorling Kindersley:** Paolo Mazzei (c). **297 Dreamstime.com:** David Liao (c). **299 Chris Mattison:** (tr, c). **300-301 Dorling Kindersley:** Barrie Watts. **300 Dorling Kindersley:** Barrie Watts (c, ca). **301 Dreamstime.com:** Johan Larson (tr). **302 Dorling Kindersley:** Rough Guides (clb). **Dreamstime.com:** Amwu (c). **303 Dreamstime.com:** Isselee (c). **304 Dreamstime.com:** Isselee (c). **305 Dreamstime.com:** Mkguijpers (c, clb). **306-307 Dorling Kindersley:** Twan Leenders (ca). **307 Dreamstime.com:** Mkguijpers (crb, br). **Photoshot:** Glenn Bartley / NHPA (bl); Adrian Hepworth / NHPA (cra). **308 Dreamstime.com:** Dirk Ercken (c). **309 Dreamstime.com:** Isselee (clb). **310 Chris Mattison:** (clb). **311 Chris Mattison:** (t). **312 Dreamstime.com:** Mkguijpers (clb). **Chris Mattison:** (c). **313 Chris Mattison:** (t). **314 Chris Mattison:** (t). **316 Chris Mattison:** (t). **317 Dreamstime.com:** Mkguijpers (clb). **Photoshot:** Chris Mattison / NHPA (c). **318 Chris Mattison:** (t, br). **320 Dreamstime.com:** Mkguijpers (t). **321 Chris Mattison:** (t). **325 Chris Mattison:** (clb). **326 Chris Mattison:** (t). **327 Chris Mattison:** (t, clb, bl). **329 Chris Mattison:** **330 123RF.com:** natursports (clb). **Dreamstime.com:** Tiberiu Sahlean (c). **331 Dreamstime.com:** Mkguijpers (clb). **332 Chris Mattison:** (t, clb). **333 Chris Mattison:** (t, clb). **334 Dreamstime.com:** Michieldewit (clb). **335 Dreamstime.com:** Kris Holland (t). **336 Dreamstime.com:** Antos777 (t). **337 123RF.com:** Aliaksei Hintau (clb). **Dorling Kindersley:** Jan Van Der Voort (bl). **Chris Mattison:** (c)

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