Australia's real dragons

For many, dragons are make-believe fantasy creatures—mythical beasts of the imagination found only within the pages of a fairytale or the inner mysterious mists of the human psyche. However, there are real-life dragons thriving in the deserts of Western Australia's arid interior.

by Amy Prendergast

The dragons that live in Western Australia have a superficial and miniaturised resemblance to the mythical dragons of fantasy. Dragons are the common name given to a group of lizards within the family Agamidae. About 73 species from approximately 14 genera of these dragons (agamids) occur across the continent, of which about 66 species occur in Western Australia. New species are still occasionally discovered and described.

WA is home to some of the most distinctive of Australian dragons such as the bearded dragons (*Pogona* spp.), netted dragons (*Ctenophorus* spp.), the frilled neck lizard (*Chlamydosaurus kingii*), and the thorny devil (*Moloch horridus*). This last species is a bizarre dragon and is certainly evocative of the dragons of fantasy. Its unique nature has warranted scientists to recognise it as evolutionarily distinct among the agamids and to classify it as the sole member in its genus, *Moloch*. While completely harmless to humans, and any other creature except ants, the dragon's extremely spiny body and pair of devil-like horns prompted the generic name *Moloch*, derived from a fearsome ancient near-eastern deity to whom children were sacrificed, and the specific name *horridus*, Latin for 'frightful'.

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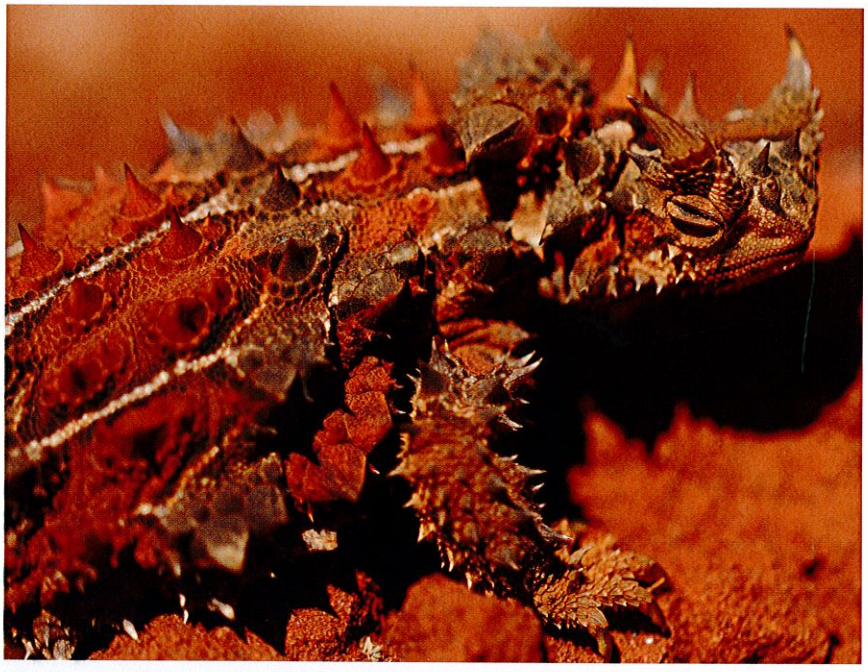
Main Gilbert's ta-ta dragon (*Amphibolurus gilberti*).
Photo – David Bettini
Insets Frilled neck lizard scales.

Above right Western netted dragon.

Below Thorny devil.
Photos – Simon Cherriman



Characterising dragons

Dragons are a charismatic reptile group. They are characterised by rough, ridged-keeled scales producing a body surface like sandpaper; robust, richly patterned bodies; relatively powerful legs which they use to dig burrows for shelters and egg chambers; and often long-clawed toes which confer them great skill in scaling trees and boulders. They have large, well-defined heads with large eyes bordered by moveable eyelids, and often engage in complex social behaviours.

A unique characteristic of the agamid dragons is that their posterior teeth are fused to the outer rim of their jaws and cannot be replaced, a condition known as 'acrodont dentition'. Chameleons, the group to which agamids are most closely related in an evolutionary sense, are the only other lizard group that possess acrodont teeth. However, unlike chameleons, agamids (except for the thorny devil) also possess front (anterior) teeth typical of other lizards—known as pleurodont teeth—which are borne on the inner margin of the jaw and are replaced continuously throughout life.

Dragon species range in size from the pebble dragon (*Tympanocryptis cephalus*) and mallee military dragon (*Ctenophorus fordi*), with bodies less than five centimetres long, to the largest dragons such as the frilled neck lizard and water dragons (*Physignathus* spp.). These have body lengths of about 30 centimetres and tails stretching another 30 centimetres.

Australia's dragons are an impressive sight. Their bodies often sport spines, crests, and erectable frills and gular (throat) pouches, or prickly beards. These body ornamentations may serve in camouflage, defence, to startle predators, to impress or attract

Right The long-nosed ta-ta dragon earned its common name from the way it holds its limb as if waving goodbye.

Below right Spotted military dragon.
Photos – Janine Guenther

Bottom right Central netted dragon.
Photo – Jiri Lochman

mates, or to assert dominance against competitors during feuds over territory or mating rights.

In addition to their eye-catching appearance, dragon lizards display complex behavioural repertoires, using various postures, poses and movements—like head-bobbing or hand-waving—to communicate. Tail-lashing, push-ups and head-dipping are performed to display territorial claims, sexual or reproductive status, and dominance or subservience. One common Western Australian species, *Amphibolurus longirostris*, is so prolific in its hand-waving antics that it has earned the common name of the long-nosed ta-ta dragon ('ta-ta' being Australian slang for goodbye).

Dragons on the hunt

Boasting the keenest vision among Australian lizards, agamids exploit their visual acuity to detect both prey and predators, as well as for communication between individuals. This makes them proficient hunters. However, rather than being active predators, dragons are typically 'sit-and-wait' or ambush predators, lunging at prey when it comes within range and using their broad, sticky tongues and strong jaws to catch it. They feed primarily upon arthropods (insects and spiders), but various larger species and individuals may include small vertebrates or plant matter in their diet.

While most are opportunistic and take whatever insects are readily available, the thorny devil is a highly selective eater, with a diet composed exclusively of small black ants in the genus *Iridomyrmex*. A thorny devil is able to devour more than 1,000 ants in a single feeding bout, yet it consumes just one ant at a time, picking each one up individually with its tongue. The thorny devil is highly adapted to what

Above Long-nosed ta-ta dragon.
Photo – Simon Cherriman

Left A superb two-lined dragon's colouring helps it blend in with its surroundings.
Photo – Jiri Lochman

would otherwise be an unpalatable and indigestible diet. It has specialised tricuspid teeth that form a very efficient shearing apparatus, enabling it to puncture the hard, chitinous exoskeleton of its ant prey to access the nutritious inner tissue.

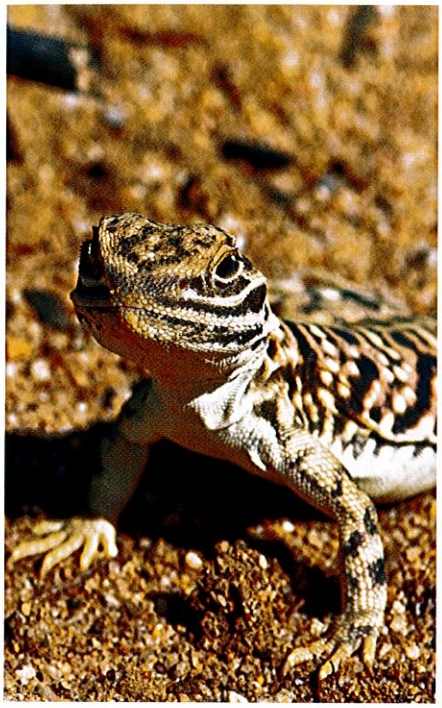
Masters of adaptation

While sharing the same basic body plan, various dragon species developed adaptations to suit their diverse ecological niches. Species occupy a range of habitats, and may be ground dwelling, arboreal (tree dwelling), semi-arboreal, or found primarily in rocky outcrops. The body of the arboreal superb two-lined dragon (*Diporiphora superba*) is extremely slender and green, providing excellent camouflage in trees. And, like many other arboreal species, it has an extraordinarily long tail, measuring more than four times its body length. This probably helps it balance as it clambers among shrubs. It is physiologically adapted to withstand high body temperatures with a record of up to 46 degrees Celsius. It copes with excessive heat through its long, thin body which gives it a high surface area to volume ratio, maximising heat loss. It can also keep cool by seeking respite in shady foliage.

Other species feature body characteristics which enable them to hide in burrows, rock crevices or cracks in the sun-baked earth to escape desiccation and predation. These include the ring-tailed dragon (*Ctenophorus caudicinctus*), which has a flattened body that enables it to live beneath rocks; and the painted dragon (*C. pictus*), saltpan ground-dragon (*C. salinarum*) and western netted dragon (*C. reticulatus*), which have robust limbs adapted to digging.

Dragons are numerous both in species and numbers in arid environments. They zip between the clumps of spinifex that dominate sandy and stony deserts, and perch like kings on top of termite mounds. Other species inhabit a wide diversity of environments, ranging from the rainforest of northern Queensland to along watercourses. One even lives in alpine regions of Tasmania. In Western Australia, only one species appears to have a high affinity for water—the long-snouted water dragon (*Lophognathus longirostris*). This species inhabits areas close to water, but may also range further afield. Common along the banks of the Murchison River, this dragon also often decides to set up residence among well-watered gardens in the area.

Fresh water is scarce over much of Australia and some dragons exhibit particular adaptations to this. The thorny devil has highly modified scales with a micro-honeycomb appearance. This sculptured skin surface enables the uptake of water in rain or dew. Little channels between



Above Saltpan ground-dragon.
Photo – Ann Storrie

Right An example of 'stilting' by an eyrean earless dragon (*Tympanocryptis tetraporophora*). Here only its hind feet and tail are touching the hot surface.
Photo – Gunther Schmida/Lochman Transparencies

the scales direct water to the corners of the thorny devil's mouth so it can drink just by having one foot in a puddle.

Temperature control

Dragons are generally active by day. The typical daily routine of a dragon starts with a morning sunbath—it selects a sunny spot, darkens its skin, and flattens and orients its body to maximise heat uptake. This basking enables the dragon to raise its body temperatures to a level where body functions are most efficient. Once warm enough, it starts the rest of its daily activities—foraging for food, finding mates and defending territories.

Sometimes, during the middle of the day when the sun is at its peak, temperatures become too extreme. In these cases, a dragon will retreat to cool shaded micro-habitats such as a burrow, beneath a boulder, underneath bark or within vegetation. For desert species where such refuges are scarce, dragons avoid overheating by blanching (becoming paler) and raising their bodies as high as possible above the scorching substrate, known as 'stilting'. In this position, only the tips of the toes and heels of the feet make contact with the hot earth and the dragon may rock back and forth between its toes and heels to cool them, or balance and lift a foot off the ground.

Dragons can change colour markedly in response to environmental conditions, to aid their thermoregulation (becoming darker to better absorb solar radiation and warm up, or lighter to reflect solar radiation and reduce overheating). Agamids are heliothermic, primarily deriving their body heat from the sun. They can precisely regulate their bodies at their optimal functioning temperature of about 35.5 to 38.2 degrees Celsius for most species.

Dragons also can brighten or fade in response to social situations to indicate mood, aggression or reproductive status. Body pattern and colouration may also vary depending upon sex, age and season, and can serve in camouflage or communication. Some species, such as the red-barred dragon (*Ctenophorus vadnappa*), broadcast ultraviolet signals that most other animals cannot see. This provides a specific channel for communicating to members of the same species without drawing the unwanted attention of predators.

Outwitting predators

Agamids adopt a variety of methods of defence to escape predators. While some rely on speed to flee from threats,

Above Ornate dragon sunning itself in camouflage.
Photo – Ann Storrie

Left Frilled neck lizard displaying a defensive posture.
Photo – Marie Lochman

others scare off would-be attackers by putting on displays rivalling those of the fearsome beasts of their namesakes, involving gaping, hissing, tail-lashing, and darkening and inflating their bodies. The frilled neck dragon is a well-known example—when faced with a threat, it hisses menacingly, gapes its mouth wide and spreads its frill. When extended the frill, which usually lies like a cape draped over its shoulders, makes the dragon appear to double in size. Should this fearsome display fail to terrify its attackers, a frilled neck dragon will rise up on its hind legs and rapidly run away. This two-legged escape technique enables it to attain high speeds and outpace a pursuing predator. Other long-legged dragon species can put on impressive bursts—sprinting long-nosed dragons (*Amphibolurus longirostris*) can travel at up to 22 kilometres an hour.

In contrast, the thorny devil moves very slowly with measured, deliberate steps, its body rocking back and forth. However, this species can afford to be sluggish—if a predator sees past its camouflage, its impressive spines are a clear warning that a thorny devil would not be pleasant to chew on. Moreover, the thorny devil features a distinctive hump on the back of its neck, which many believe creates the illusion of another head, and thus distracts predators from its comparably diminutive real head.

Creating the next generation of dragons

Australia's dragon lizards often exhibit strong sexual dimorphism. That is, males are often larger, brighter in colour and pattern, and bear more prominent ornamentation than females, likely a result of sexual selection. Along with their attractive physical appearance, males often attempt to woo

Right A bearded dragon (*Pogona minor*) buries its eggs in a sandy burrow.
Photo – Simon Cherriman

Below right Thorny devil.
Photo – Janine Guenther

Bottom right Canegrass dragon (*Diporiphora winneckei*) ambushing pollinating insects on mulla mulla (*Ptilotus* sp.) flowers.
Photo – Jiri Lochman

females, as well as ward off male rivals, by accompanying courtship displays with behavioural shows of 'fitness', including doing 'push-ups'.

Dragon lizards are oviparous—they lay eggs rather than give birth to live young. Clutch size varies with the body size of the mother. Most agamids lay clutches of four to 10 eggs, but small species such as the mallee military dragon (*Ctenophorus fordi*) lay only two eggs per clutch, while females of large species such as bearded dragons (*Pogona* spp.) can lay clutches with as many as 35 eggs. Most agamids, after laying a clutch in a burrow, provide no further parental care. Moreover, once the hatchlings emerge, adults may harass them, driving the juveniles into marginal habitat.

When defending territories, males will often change colour to signal strength, dominance and behavioural condition. During the breeding season (often spring) when competition is intense, males select perching sites and defend their territories atop vegetation, termite mounds, rocks and even fence posts. From up high, dominant males decked out in full regalia broadcast via colour and movement signals, stake their claims to prime sites and ward off rivals. While face-offs between competing males are largely ritualised displays of bluff, when they do escalate to physical sparring they can be ferocious, with serious damage inflicted. Along with dragon lizards' striking appearance, it is such behaviour that contributes to this group of reptiles earning the label assigned to fantasy creatures of myth and legend.

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