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Australia's Death Adders Genus *Acanthophis*

By
RAYMOND T. HOSER

INTRODUCTION.

Elapids are the front-fanged venomous land snakes. Within this family are the most deadly snakes in the world, including, Cobras (*Naja* spp.), Coral Snakes (*Micruroides*), and Mambas (e.g. *Dendroaspis*). It is only within the Australian continent that this family dominates the snake fauna. Elsewhere in the world, Colubrids are the dominant snakes.

Convergent evolution in the Australian Elapidae, when compared to snakes in other places is obvious. Small innocuous lizard eating species such as Whip snakes (e.g. Genus *Demansia*, *Uroechis*) appear to mimic small colubrid snakes elsewhere. In Australia, there are burrowing elapids, (e.g. *Simoselaps*), tree-dwellers (e.g. *Hoplocephalus bitorquatus*) as well as the large well-known deadly varieties, such as Taipans (*Oxyuranus* spp.), Black Snakes (*Pseudechis* spp.) and Tiger Snakes (*Notechis* spp.).

Only one group of snakes, the Death Adders (genus *Acanthophis*) seems to have had convergent evolution with the Viperidae. Death adders are characterised by a broad, somewhat flattened, triangular head, short stout body and a thin rat-like tail ending in a curved soft spine. This spine and the presence of subocular scales separate the Death Adders from all other Aus-

knowledge of snakes. Unless otherwise stated, the following information applies to all species of Death Adder, all of which are similar in most respects.

Adults average between 50 and 90 cm in length, usually reaching adult size in 2 to 3 years. Females tend to be the larger sex. All are live-bearers.



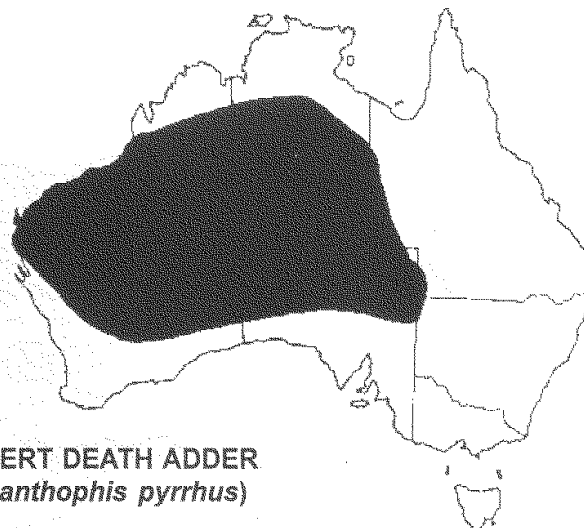
Death Adder (*A.antarcticus*), male from Glenbrook, NSW.
The specimen that bit author (see article)
Photo By: R.T.Hoser

tralian elapids. Death Adders couldn't possibly be confused with other Australian snakes by anyone with the vaguest

Colour is variable, ranging from red, to brown, grey, greenish-grey, yellow or variants thereof, usually with somewhat

irregular crossbands, sometimes dark-edged. The tail tip is often a distinctive cream, white or black colour. They have 19-23 mid body scale rows, 110-170 ventrals, single anal, and 35-65 subcaudals (paired and single). Colour pattern is most brilliant in younger specimens and tends to fade with age.

Within Australia there are three species currently recognised. These are the Death Adder, also sometimes erroneously called the "Common" Death Adder (*Acanthophis antarcticus*), Northern Death Adder (*A. praelongus*) and Desert Death Adder (*A. pyrrhus*). There may be undescribed subspecies or even species within Australia. New Guinea Death Adders have been variously assigned to *A. praelongus* (e.g. Storr 1981, Cogger, 1992), *A. laevis* (e.g. Worrell, 1972), and *A. rugosus* (e.g. Wells and Wellington, 1983). Northern and New Guinea Death Adders are in need of further work to resolve their true status. New Guinea Death Adders are most like Australian *A. praelongus* in form. However like Australian *A. praelongus*, New Guinea Death Adders seem to show strong variation in appearance between



DESERT DEATH ADDER
(*Acanthophis pyrrhus*)

localities and sometimes within a single locality. Adders (presumably a New Guinea variant) are found in various islands to the north of Australia as far west as Ceram and Tanimbar. Unless otherwise stated, I shall here treat New Guinea *Acanthophis* and those from adjacent islands as a variant of *A. praelongus*.

praelongus, in particular New Guinea specimens is a raised supraciliary scale above the eye. This feature is often particularly pronounced in immature specimens. It is occasionally seen to a limited degree in young *A. antarcticus*. A similar trait (often even more exaggerated) is seen in some of the true vipers.

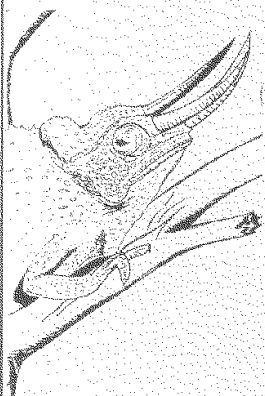
A trait common to many *A.*

No *Acanthophis* species are rare

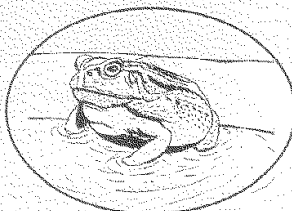


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KEY TO AUSTRALIAN SPECIES OF ACANTHOPHIS.

- 1a Head scales smooth or weakly rugose: anterior dorsals weakly keeled or smooth: upper lips boldly patterned with white and black or dark brown.....*A. antarcticus* (Death Adder)
- 1b Head scales moderately or strongly rugose: anterior dorsals strongly keeled (except in juveniles): upper lips not usually boldly patterned.....2
- 2a Head and body usually bright reddish-brown (or reddish brown with blackish markings): head scales strongly rugose: midbody scale rows usually 19 or 21, usually more than 130 ventrals.....*A. pyrrhus* (Desert Death Adder)
- 2b Head scales usually moderately rugose: midbody scale rows usually 23, usually fewer than 130 ventrals.....*A. praelongus* (Northern Death Adder)

or endangered. All are widely distributed and common in their preferred habitats. Their preferred habitats vary, but are essentially undisturbed bushland with some form of ground cover. The cover doesn't have to be leaf litter, but can be rocks, native grasses or almost anything else. However any disturbed habitat or grazed areas tend not to have *Acanthophis*. *Acanthophis* are most vulnerable to any form of human disturbance and therefore only occur in virgin bush. The construction of a road through such a habitat (with no other development) is not counted as disturbance. Due to the steady removal of bushland throughout Australia, all *Acanthophis* are in decline. For a number of reasons, the Death Adder (*A. antarcticus*), often called "the southern variety", never is found in the same numbers as the other two species. It is for this reason that the name "common" Death Adder really is a misnomer.

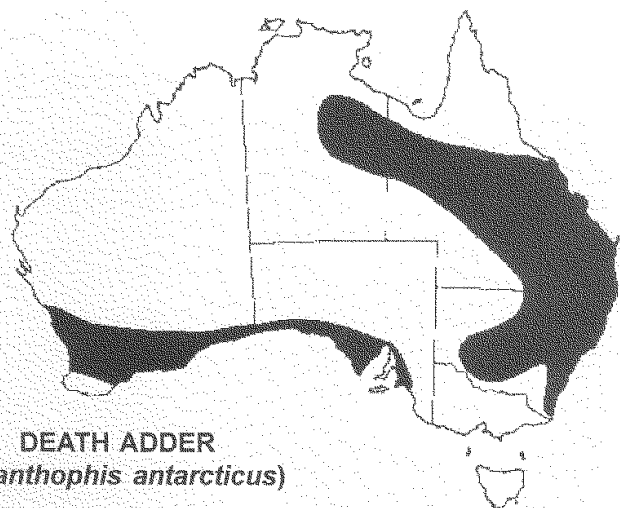
All *Acanthophis* are mainly noc-

turnal and are highly secretive snakes. They spend most of their time half-buried in ground litter waiting in an ambush position for food, or simply sheltering. Unlike most other Australian snakes, they tend not to flee when approached, relying instead

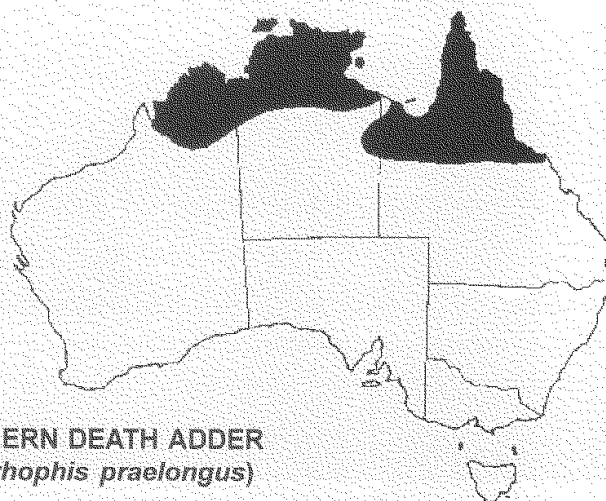
on their cryptic colouration and camouflage to avoid detection. That this works is indicated by the fact that most bites from *Acanthophis* seem to occur when they are trodden on. Shine (1991) documented a radio-telemetry study on an *A. antarcticus* near Sydney, where although guided by his equipment as to the exact location of the snake, he was still unable to see the half buried snake due to its excellent camouflage.

If an *Acanthophis* is teased and agitated it will flatten its body, revealing (what is usually) lighter-coloured edges of its scales. The snake may bite from a rigidly-held, striking position.

From their typical coiled resting position, these snakes are able to make lightning-fast strikes at prey or potential aggressors. When they bite a target, they tend to hang on. *Acanthophis* possess the longest fangs (up to 6 mm) and most



DEATH ADDER
(*Acanthophis antarcticus*)



NORTHERN DEATH ADDER
(*Acanthophis praelongus*)



Centre: Barkly Tableland Adder,
sub-adult from Anthony's Lagoon NT

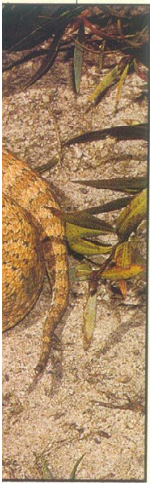
Above: Death Adder (*A. antarcticus*),
female from Terry Hills, NSW.
(Note black end of tail, used in caudal
luring)

Left: Northern Death Adder
(*A. praelongus*), female from Tully, Qld.

Centre: Northern Death Adder
(*A. praelongus*), female from Weipa,
Qld.

Far Right: Northern Death Adder
(*A. praelongus*), male from near
Kunnanurra, WA.
(Note raised scale above the eye)





Far Left: Barkly Tableland Adder, sub-adult from Anthony's Lagoon NT

Centre: Death Adder (*A. antarcticus*), female from Dutchess, Qld. (Note the large cyst in the snake's neck)

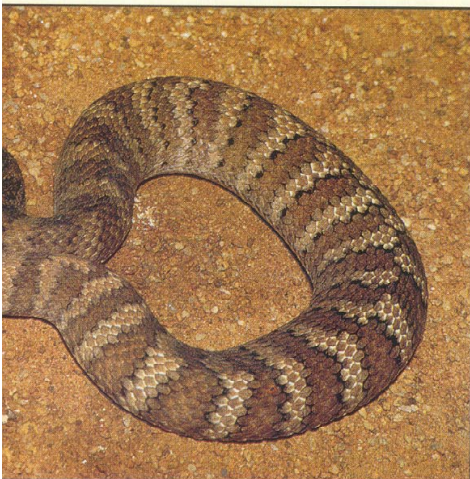
Left: Death Adder (*A. antarcticus*), female from Port Pirrie, South Australia

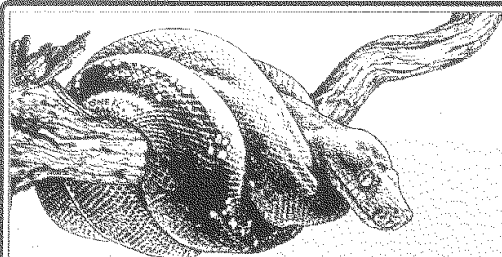
Below: Death Adder (*A. antarcticus*), male from Glenbrook, NSW. The specimen that bit author (see article).

(Note white end of tail, used in caudal luring)



All photos Taken By:
Raymond T.Hoser





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developed biting apparatus of any Australian snake. In line with other venomous snakes, fangs are regularly shed and replaced with new fangs. Old fangs are sometimes seen in faeces and appear to pass through the digestive tract without incident (Hoser and Williams 1991).

Due to the toxicity of their venom (about 2,285 mouse-lethal doses per milking in *A. antarcticus* (Worrell, 1972)), Death Adders are regarded as deadly species. (Various publications quote different yields and toxicities. This reflects results of a number of different studies by different researchers, often using different experimental parameters).

Prior to development of a specific anti-venom for *Acanthophis*, about half of all recorded bites were fatal (Fairley, 1929). The venom is mainly neurotoxic (attacks the nervous system and voluntary muscular system) and about 1.5 times more toxic than that of the Indian Cobra (*Naja naja*). It is thought that Desert and Northern Death Adders are not quite as dangerous due to their smaller average sizes and venom-yields. However, they are still regarded as deadly species. All *Acanthophis* are presumed to have similar venom (Mirtschin and Davis, 1991). The world's deadliest snake, the Australian Taipan (genus *Oxyuranus*) kills about 23,529 mice per bite (Worrell, 1972).

Acanthophis bites differ from those of other Australian elapids in that it often takes a long time for symptoms to peak (Mackay 1989, Campbell, 1966). Roy

Mackay had a moderately bad bite in New Guinea and his symptoms peaked nearly a day after the bite. According to Dr. Bart Currie of Port Moresby Hospital, the venom usually progresses to maximum symptoms about 24-48 hours after the bite - the danger period.

I was once bitten (if that's the correct word) by a 60 cm (approx.) male Death Adder (*A. antarcticus*) I was measuring, when I stuck my finger down his throat by accident. Although the snake tried to spit out my finger, its fangs still pierced my skin and I received a decent envenomation. (That was the male snake on plate 26 and the rear cover of Australian Reptiles and Frogs).

That was at about mid-day. I experienced local swelling and pain, in line with the bite of a small moderately venomous elapid (E.g. *Demansia psammophis*), although the pain was not as acute and piercing. The local pain was duller and more tolerable. After some six hours the only new symptoms were a pain moving up my arm and a distinct reddish colour in the veins reaching up my arm and to my chest.

I was admitted to Sydney's North Shore Hospital as a precautionary measure and observed for about 2 days. Symptoms peaked about 20 hours after the bite. By that stage I was barely conscious or able to speak or do much of anything else. When I attempted to speak it was with an uncontrollable slur and others could barely understand what

I was attempting to say...my mind was still 100 per cent. I was also barely able to open my eyes. Physically I was very weak (resting in a bed). My pulse and breathing rate, which were being constantly monitored had declined markedly, indicating a substantial bite. At one stage my breathing rate as measured by air-flow through my oesophagus was just 10 per cent of normal. In spite of much tension among hospital staff and my parents, I wasn't injected with anti-venom, which was on hand.

I made a gradual recovery and when I left hospital after 2 full days, had almost totally recovered. The bite area itself continued to ache for some time (a few more days) and I had a persistent itch for about 2-3 weeks. Recovery was total.

I received a bite from a young male *A. pyrrhus* 60 km north of Port Hedland in Western Australia, but symptoms failed to progress beyond local stinging. Similar symptoms occurred with the bite from a captive sub-adult *A. praelongus* from Kunnanurra, W.A.

Acanthophis have highly varied diets, including frogs, birds, small mammals and lizards. Captive *A. antarcticus* and *A. pyrrhus* have been known to take live goldfish placed writhing in their cages. Diet obviously also varies with locality. West Head Adders (*A. antarcticus*), have been known to disgorge frogs (*Crinia signifera*), while such prey would be absent from areas where other *Acanthophis* may occur. One 86.5 cm female Death Adder (*A. antarcticus*) was caught in the wild, having just fed on a large 80 cm Water Dragon Lizard (*Physignathus leseurii*). The snake died shortly afterwards due to the lizard's spines penetrating the digestive tract (see Hoser 1981).

Acanthophis attempt to capture prey by wriggling their tails (caudal luring), (Carpenter, Murphy and Carpenter, 1978). When the prey animal (such as a native mouse) goes for the tail, the snake strikes at the animal with great accuracy. Even if the animal struggles aggressively, *Acanthophis* will tend to hang on until the animal is totally subdued (dead).

That a caudal luring snake like *Acanthophis* often has a different and more brightly-coloured tip to its tail to as-

sist in luring food isn't unique. Other caudal luring snakes such as the Mexican Cantil (*Agkistrodon bilineatus*) have bright coloured ends of their tail.

Some *Acanthophis* are slow in striking...or so it seems. Specimens with tips of tails missing aren't rare. I have noticed this in a number of wild-caught adult *A. antarcticus* from around the Sydney area, in particular the Blue Mountains. Although I don't recall seeing *A. pyrrhus* or *A. praelongus* with similar "stumpy tails", no doubt such specimens occur.

Hungry *Acanthophis* will sit in their cages twitching their tails even when there is no food immediately available. However this twitching (which appears largely involuntary in such circumstances) becomes more vigorous when an animal like a mouse is walking around one end of the cage.

It is because of this caudal luring habit that resting *Acanthophis* always seem to have their tails positioned just next to their heads. These resting positions aren't arrived at by chance alone!


When I kept *Acanthophis* I would often throw a mouse (live or dead) across the cage to where the snake was resting. It would be common for the snake to strike at and take the mouse while flying in mid-air. An American film crew teamed up with Herpetologist Graeme Gow to do a slow motion sequence of a Barkly Adder striking at prey, but was unable to get the desired footage due to the speed of its strike.

DISTRIBUTION

In any given part of Australia there only seems to be one type of *Acanthophis*. The three recognised species all appear to have mutually exclusive distributions. However a lack of detailed fieldwork in many parts of Australia, in particular the northern half, has yet to resolve the exact distributions of all three species. Hence currently published distribution maps may not be entirely accurate.

The Death Adder *A. antarcticus* is the southern form. It oc-


curs in well-watered parts of the southern two-thirds of Australia, extending inland in Eastern Australia, with populations extending through inland Queensland to the Barkly Tableland in the Northern Territory. These snakes occur along the southern rim of the Nullarbor plain and some nearby offshore islands. They do not occur in the coldest parts of the south-east, including all of Victoria, Tasmania, and the highland areas of south-east NSW. Heavy agriculture has all but eradicated populations west of the Great Divide in New South Wales, although it is presumed Death Adders were common there before Europeans came to Australia. (If the species occurs in Victoria, they would be in either the coastal area adjacent to New South Wales (near Mallacoota) or the far north-west of the state. No populations are known and the rest of the state is apparently too cold).



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Various geographical races are recognised. Those from the Barkly Tableland are sometimes treated as a different sub-species or even species. They are allegedly the largest Death Adders, although I haven't seen any that are larger than large southern *A. antarcticus*. Non-Australian readers should note that in Australia, Death Adders are like the big fish that got away...everyone reckons they've seen the biggest Adder of all. For the record, Barnett and Gow (1992) state that the largest female Barkly Adders are known to attain 1300 mm (over 4 feet), making them far larger than anything lodged in Australian museums to date. (New-born Barkly Adders appear to far larger on average than other *A. antarcticus*, based on the records of Barnett and Gow).

Barkly Adders tend to have a more bluntly-shaped head than southern *A. antarcticus* and other differing characteristics. There is however a strong overlap in these characters between Barkly Adders and southern specimens. Wells and Wel-

lington (1985), called the Barkly Tableland Adder *Acanthophis hawkei*, after the then Prime Minister, Bob Hawke. Chromosomal tests by Greg Mengden at Australian National University have revealed differences between Barkly and Southern Death Adders, but most people still regard both as being *A. antarcticus*.

Those from Dutchess or Djarra, (towns in hill country south of Mount Isa, Queensland), appear to be slightly more rugose than other *A. antarcticus*, but are otherwise similar. Another variant occurs near Camooweal on the Queensland/NT border.

Although some colour-variants are widespread, others appear to be more restricted in distribution. These variations sometimes correlate with soil or vegetation regimes, but are in fact genetically determined. Natural selection pressures would dictate which colour-variants predominate in a given area.

For example around Sydney, *A. antarcticus* are either red or grey in base-colour. There are no other variants or intermediates. A study of a typical population in Sydney's Kurringai Chase National Park revealed 28% homozygous grey (grey morph), 50% heterozygous red/grey (red morph) and 22% homozygous red (red morph) (Hoser, 1985). (A similar scenario seems to be seen in some north Queensland populations of *A. praelongus*, including those around Cairns). Shine (1991) seemed to think that in warmer climes, selection pressure favoured reddish individuals over greys, but in *Acanthophis* this may not be so, other factors being more important.

The Northern Death Adder (*A. praelongus*) is found in the tropical north of Australia (see map). This species also displays strong regional variation in size and colours. North Queensland specimens are different to those from the Northern Territory and Western Australia. Those from the Northern Territory are divided by some local reptile people into the lowland/flood plain form (brown with darker crossbars) and the supposedly smaller hill-country form (lighter and without the distinct brownish crossbars). I have seen specimens of both forms and



All Photos T
Raymond





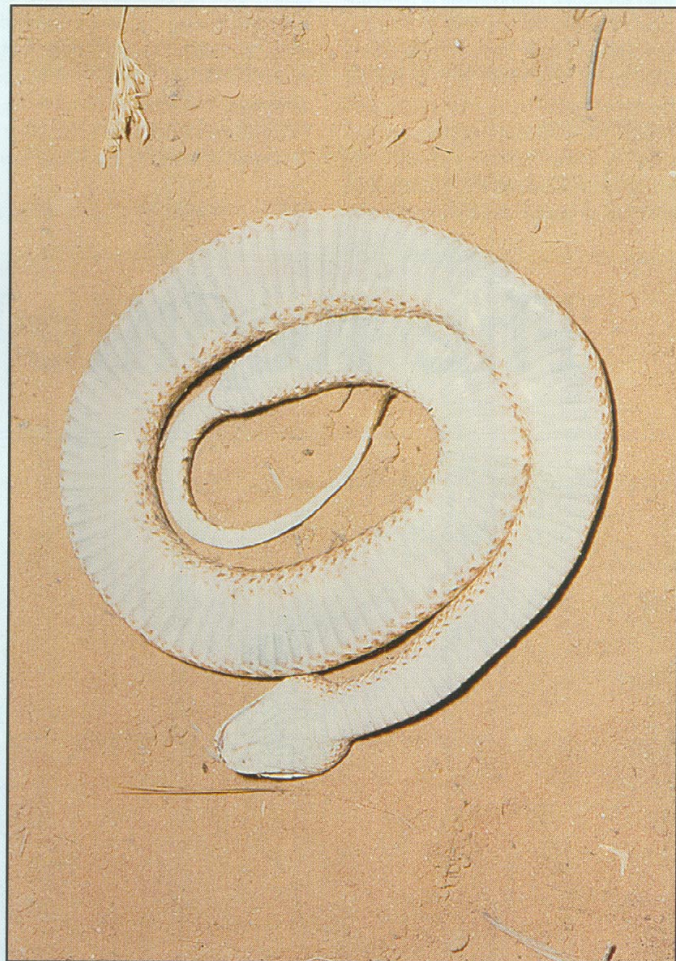
Top Left: Desert Death Adder (*A.pyrrhus*), female, from the Tits, WA. Snake has just sloughed.

Top Right: Amelanistic Daeth Adder (*A.antarcticus*) from Gosford, NSW.

Bottom Left: Northern Death Adder (*A.praelongus*), females, Grey from Tully, Qld, Red from Weipa, Qld.

Bottom Centre: Death Adder (*A.antarcticus*), female from West Head, NSW.

Bottom Right: Desert Death Adder (*A.pyrrhus*), male (roadkill). The white ventral surface typical of this species is an adaptation to minimise impact from crawling over very hot ground.



they are clearly different in colour. However I am uncertain as to whether intermediates occur, or if these are simply genetically-determined variants within a single or adjacent populations. Those I have seen from the Kimberley area in Western Australia appear to be similar to the N.T. hill country form.

British Herpetologist, Mark O'Shea speculates that within New Guinea, there may be up to three species of Adder, but he stresses that he really doesn't know the true status of these snakes and that further work is urgently needed. Most Adders seen in Europe and the USA are from New Guinea and Islands to the West.

Desert Death Adders (*A. pyrrhus*) appear to be restricted to arid parts of Australia, including arid parts of Western Australia (most of that state), the southern two thirds of the Northern Territory and northern South Australia. Texts such as Cogger (1992) and others state that they are found in arid areas of all mainland states except for Victoria. If they are found in New South Wales, they would only be found in a small part of the far north-west of that state. Swan (1990) does not record Desert Death Adders as occurring in New South Wales. Any populations in Queensland would also have to be in the far south-west of that

state.

No photos of greyish specimens of *A. pyrrhus* are known. Nor are any grey specimens lodged in Australian museums. This is probably due to strong selection pressures against this gene; most of the range for this species is red soil areas. However I have been advised that greyish specimens do in fact exist.

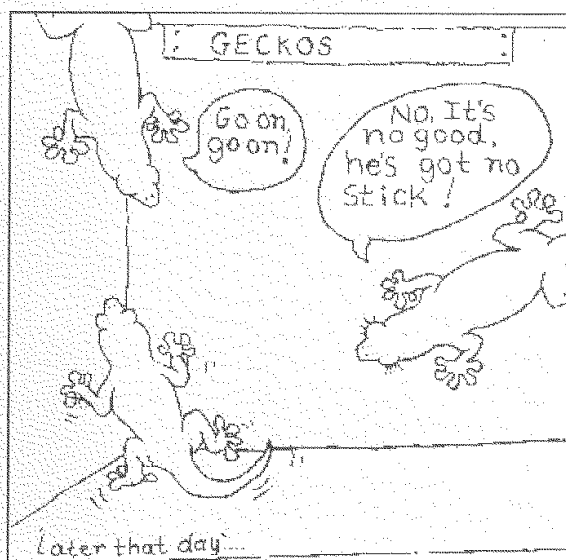
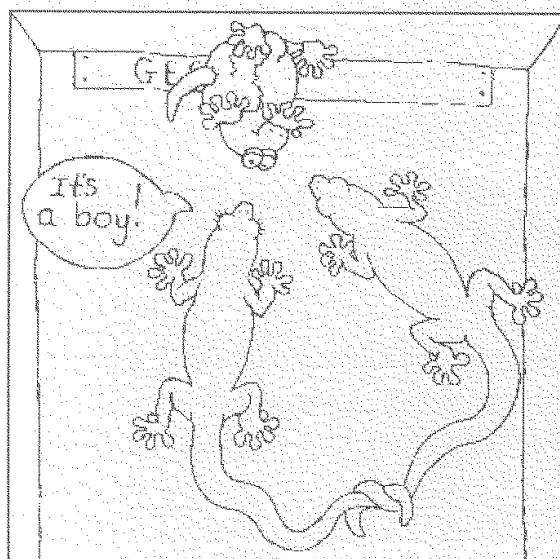
In the Millstream, Pannawonica and Newman areas of the Pilbara in Western Australia some Desert (?) Death Adders appear to have strong blackish markings, especially on the head, which may be almost completely blackish-brown dorsally. Mirtschin and Davis (1992) and Ball (1993) speculated that this was an undescribed species, but that view hasn't been shared by everyone who has seen these snakes. Normally-patterned red-morph Desert (?) Death Adders and some with intermediate markings have been found in the same area. Laurie Smith of the Western Australian Museum, has stated that he believes that there are at least two species of snake currently identified as Desert Death Adder, but as yet hasn't published anything to support that assertion. He doesn't believe the darker Pilbara snakes are different to other Desert (?) Death Adders in the same area.

Within dry and arid areas,

Acanthophis are most commonly found in large numbers in relatively undisturbed areas of spinifex (*Triodia* sp.) grasslands, particularly when associated with rocky hills. Most other areas have of course been trampled by domestic and feral animals. In Western Australia, Northern Death Adders are also most common on spinifex covered hills.

Besides habitat destruction causing a major impact on *Acanthophis* populations throughout Australia, other factors are hastening their decline in numbers. The introduced Cane Toad (*Bufo marinus*) has also decimated numbers. Snakes that feed on the toads die as they have no protection from their poison glands. Collectors have seen dead adult *Acanthophis* with toads still in their mouths. Young snakes are eaten by larger toads. To date the most serious declines caused by toads have been in coastal Queensland north of Brisbane, where the toads are most numerous. Toads have been the principal cause of decline in Death Adder (*A. antarcticus*) numbers around Mount Glorious, Queensland (near Brisbane). Formerly common in the area, they are now infrequently seen. Near Mount Glorious, most *A. antarcticus* are now seen near Samford, which has the least toads.

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FINDING ACANTHOPHIS IN THE WILD.

To capture *Acanthophis* in Australia, one needs a permit issued by the relevant state wildlife department. This is true even if the snake happens to be walking through your living room at home or back yard. Failure to have the correct "paperwork" can result in prosecution, heavy fines and even jail. Assuming one has overcome the legal problems, which is an achievement in itself, finding *Acanthophis* in the wild isn't too hard, provided one uses the following guidelines. (See Hoser (1984a) for how NOT to go about looking for *Acanthophis*).

The best way to find these snakes is by driving along a road at night through preferred habitat and catching

them as they cross. To find just one of these snakes at night would please most snake enthusiasts. In the case of *A. antarcticus*, to find one alone on a good night (optimal weather conditions), is in fact a lucky haul. The highest numbers of each species I am aware of being found by a single collector on a single night are as follows:-

A. antarcticus: 15 in South Australia, near Eucla (5 on West Head/Cottage Point, 7 Near Dutchess/Djarra, Queensland)

A. praelongus: 75 South of Darwin in Northern Territory during a flood - the road was the highest point in a flooded area.

A. pyrrhus: 125 near Sandfire Flat/Goldsworthy, Western Australia. (100 during day near Marble Bar, WA, during a burnoff at a disused airport runway).

Also bear in mind that when these

snakes were found, other species of reptile were also seen.

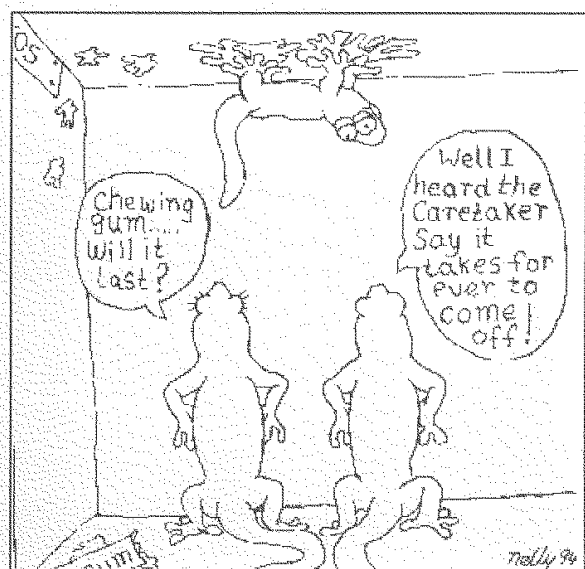
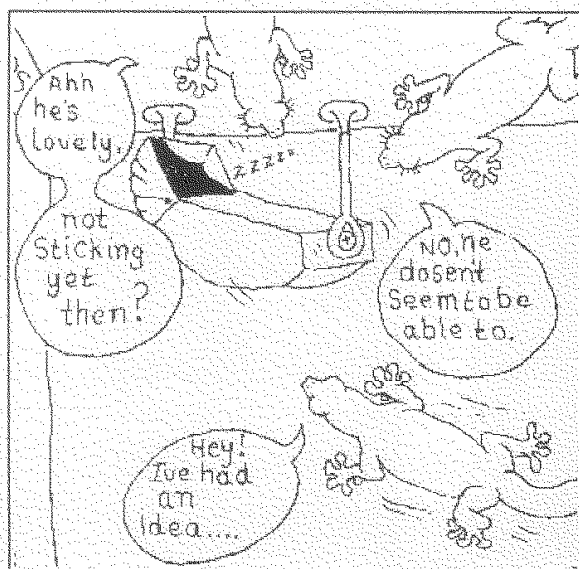
A check with herpetologists, or a number of reptile books will yield locations where Adders are known from. Near Sydney, the National Parks to the north, south and West (Kurrungai, Royal and Blue Mountains) all have *Acanthophis*. Good spots can also be found close to Brisbane, Perth and Darwin, while a few hours drive will get you into good *Acanthophis* country if in Adelaide. Photos of optimal habitat (all three species) is shown in the book Australian Reptiles and Frogs (Hoser, 1989).

To run around during the day looking for these snakes is usually a waste of time. You really need to fluke it to find a one during the day. It does happen, but is very, very rare.

Acanthophis is the ultimate "front snake". That is when the weather is unstable (usually hot) and a cold front is approaching, the snakes will move about. For those in the southern half of Australia, to go hunting *Acanthophis* at any other time is usually pointless.

There is usually a minimum temperature below which it is rare to find *Acanthophis* active at night. Around Sydney, the minimum is about 24 degrees

By Helen Neave

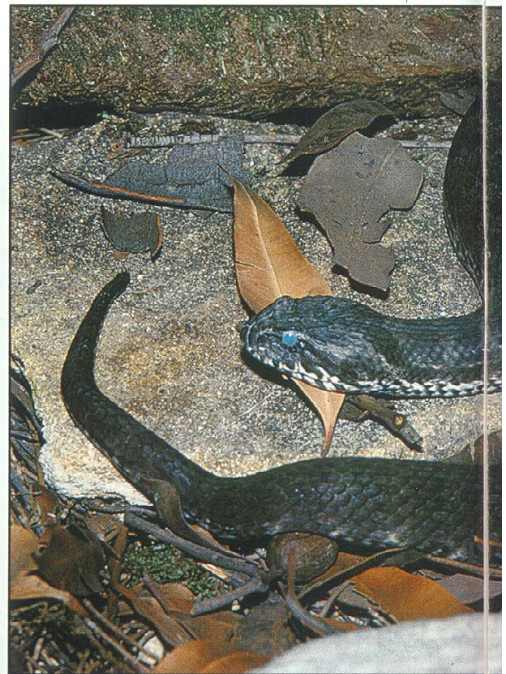
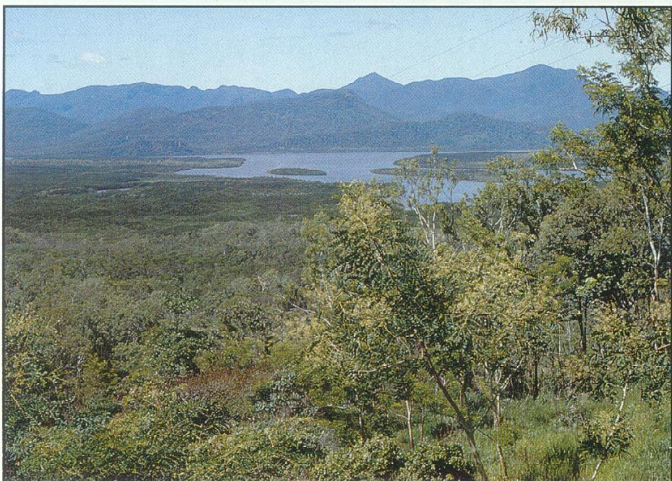




Above and Below: Habitat for Death Adder (*A.antarcticus*), near West Head Road, Kurringai Chase Nat. Park, NSW



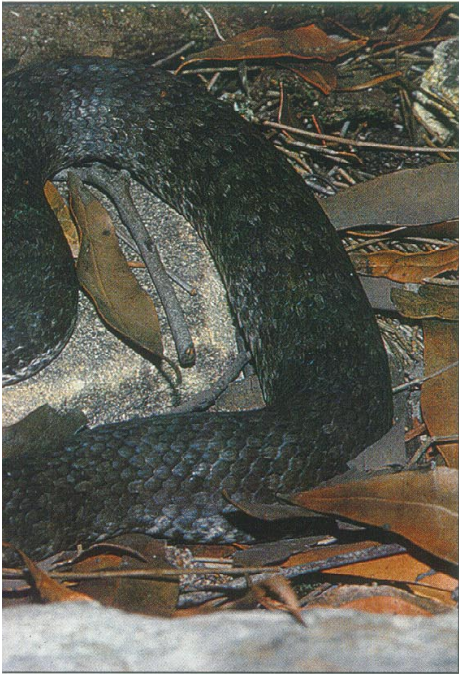
Below: Habitat for Northern Death Adder (*A.praelongus*), north of Townsville, Qld.



Above : Death Adder (*A.antarcticus*) prior to sloughing - r

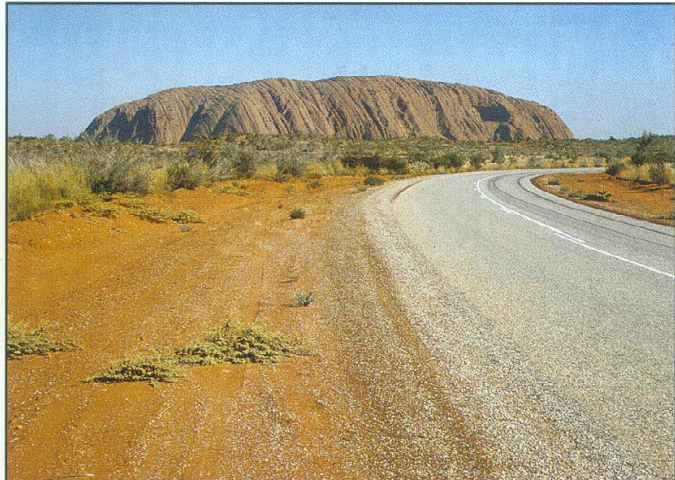
Below: Desert Death Adder Goldswort
(Note similarity of colour of f





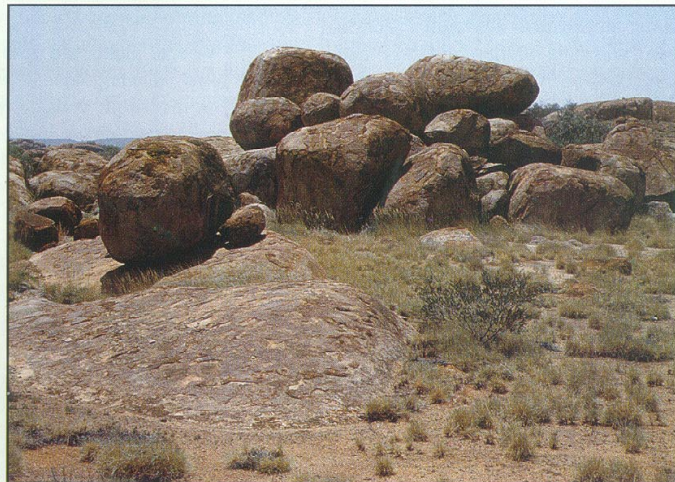
s), male from West Head, NSW,
ote clouded eyes.

(*A.pyrrhus*), male, from
y, WA.
snake to background soil)



Above : Habitat for Desert Death Adder (*A.pyrrhus*), near Ayers Rock,
NT. Spinifex is the dominant grass.

Below: Habitat for Desert Death Adder (*A.pyrrhus*), near Devils
Marbles, NT. Spinifex is the dominant grass.



Below: Habitat for Northern Death Adder (*A.praelongus*), near Lake
Argyle, WA.
(Note spinifex covering the hills)



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celsius. In Brisbane it is higher, (26 degrees), and in far northern Australia, usually higher again. Remember these temperatures are minimums, not preferred. Preferred temperatures are higher. Around Sydney, the preferred activity temperature for Death Adders (*A. antarcticus*) is probably closer to 26 degrees celsius (Hoser, 1984b).

In the West Head (Sydney) area, the coldest temperature I have found an active Death Adder (*A. antarcticus*) was 17 degrees celsius. This adult male was found at night immediately following arrival of a cold front (less than ten minutes) and the air temperature had rapidly dropped from 25 to 17 in that period. Two other Adders had been caught earlier the same night. The hottest air temperature I have caught a Death Adder (*A. antarcticus*) active in was 38 degrees when a sub-adult female was caught at dusk five minutes prior to the arrival of a cold front. It is notable that both snakes had

been hit by a car immediately in front of my own and both snakes died within a few hours of capture. Most Adders are caught at night in the West Head area, when the air temperature is in the mid to high 20's (celsius). Over 30 degrees it is usually too hot for the snakes and they don't seem to move (around Sydney anyway); under 24 it starts getting too cold (captive snakes display altered activity patterns in relation to outdoor air temperatures).

Moonlit nights are also bad for most snakes, including *Acanthophis* (Ball, 1993). The moonlight enables nocturnal birds of prey to feed on the snakes and so the snakes don't move about. Birds of prey are particularly numerous on moonlit nights. As the hottest part of the night is immediately after dusk and the moon goes in monthly cycles, the best time to go *Acanthophis* hunting is in the fortnight starting a few days after the full moon (when there is no moon in the sky for at least the first part of the night). The same applies for most other snakes, except those that are black and white in colour which often

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appear not to worry about the moon so much. This is apparently because their colour helps them avoid detection by birds of prey as they move about at night. Although Worrell (1972) records *Acanthophis* in New Guinea being most active at the end of the Wet season (around Feb-Apr), my own experiences suggest that temperature is more important in determining activity than humidity. In times of drought when other species appear to become scarce, *Acanthophis* numbers and activ-

ity patterns appear to remain normal. Ball (1993) believed some Adders (*A. pyrrhus*?) became active and prevalent in an area in response to the presence of frogs as food. Such may also explain increased activity by *Acanthophis* in New Guinea at the end of the wet season. Nights of extremely low humidity appear to yield just as many *Acanthophis* as humid nights provided temperature and other criteria are met (i.e. darkness of night, falling air-pressure, etc.). Around Sydney it is common for the lowest humidity nights to also be the warmest (with north-west winds, as opposed to the more common and cooler sea breezes), and those are the nights you find Adders!

When night-driving in the Pilbara, nights with most rain were often too cool for Desert Death Adders to be active (after the rain), thus less tended to be caught on these nights (if the rain fell before and during dusk). These nights were also usually the best frog nights.

As cold fronts accompany/follow most hot nights in Southern Australia, the need to worry about them isn't usually necessary, provided the temperature is right. However the temperatures indicated (above) apply to the time of driving (after dusk), NOT what the temperature gets to during the day preceding the night hunt.

As already stated, the best way to find *Acanthophis* (and many other nocturnal snakes) is to drive along little-used roads through suitable (known) habitat. Bitumen roads are strongly preferred over dirt roads for several reasons, the main one being that it is easier to see snakes crossing the roads and one can travel faster along them.

Snakes do not tend to bask on roads, contrary to popular belief. For those who may think that roads tend to store heat better than ground elsewhere (in adjacent bush), I suggest they try putting their hands on the road surface at night and then do the same on an open patch of dirt away from the road. There will be little if any difference. At night a (quiet) road effectively becomes a simple strip of bush and snakes cross them as they need to. The snakes are usually very easy to see, so to maximise the number caught it is advisable to drive as fast (legally and safely) as one possibly can.

Snakes seen coiled up on a road as opposed to the usual "crawling somewhere mode", have almost certainly been

hit by a passing car and been terminally injured. A snake coiled on a road is NOT a natural position. Tens of thousands of snakes, including thousands of *Acanthophis* die on Australia's roads annually.

Acanthophis are relatively slow-moving and therefore easy to capture when found crossing roads. The only exception to this is with Desert Death Adders, which move with surprising speed in a sidewinder-like motion when startled crossing a road. My own experience is that I usually miss at least one in ten Desert Death Adders seen crossing roads. Those snakes disappear into roadside vegetation before they are caught.

Most *Acanthophis* caught crossing roads are males. These snakes are presumably looking for mates. The sex ratio for adults found crossing roads is about 1 female for every ten males seen. For juveniles the ratio is more even. This approximate ratio has been arrived at over many hundreds of specimens. Ball (1993) only found one female out of 20 Adders caught crossing roads in the Pilbara.

This night-hunting sex ratio is not necessarily a true picture of *Acanthophis* numbers. My own breeding results showed an even sex ratio at birth. Assuming males to be the more mobile sex (they are the ones looking for mates), there could in fact be a marginal skewing of populations in favour of females, with more males being vulnerable to predation). Shine's studies have indicated similar skewing.

When breeding Barkly Adders, Gow and Barnett appeared to get a 2F:1M sex ratio in offspring. Whether their results were unusual or typical of the "race" is yet to be determined. The 2F:1M result documented came from two

separate breedings of related snakes that were housed in collections 3,000 km apart.

Acanthophis found during the day are usually found by chance. One enterprising man (Kaj Bulliard) claimed success in finding Death Adders (*A. antarcticus*) near Sydney by using a Ryobe™ Leaf Blower to clear leaf-litter in likely spots (under Blackboy (*Xanthorrhoea* sp.) bushes and similar) to expose resting Death Adders. Others, including myself have spent many hours using rakes to clear leaf litter, without success.

West of Sydney, there is a creek called Fitzgerald Creek, near Glenbrook, which runs into the Nepean River. It flows through a gorge. At the bottom of the gorge about ten Death Adders (*A. antarcticus*) were caught resting on ground near the creek by a number of reptile people. All were caught in the period February-May. Although none were found in immediate proximity to one another (as in a few feet apart) these finds did represent the closest thing known to date to aggregation in

Death Adders. Aggregation as such in *Acanthophis* is unknown.

Male combat in the wild or captivity has never been observed. My own males, when housed together, usually appeared to ignore one another, although I did note it was relatively unusual for two males to attempt to mate the same female at once. Stettler (1985) believed that his male *Acanthophis* did have social interactions and formed some sort of social hierarchy. Further study is required.

No specimens have ever been taken from inside termite mounds - even in areas where (Desert) Death Adders are common and many termite mounds were opened up (Hoser, 1992).

When capturing wild *Acanthophis* it is best to pin the snake with a "jigger" stick, which consists of a long stick with a small fork at the end and stretched rubber between the ends of the fork. The snake is pinned somewhere on its mid or forebody with the jigger and using a second similar stick, the head and neck is pinned. The snake is then picked up and placed in a bag.

Captive *Acanthophis* will become used to being picked up and moved about with a simple hook, negating the repeated need to roughly handle the snakes in a manner likely to upset them. As captives they become relatively easy to handle, although Desert Death Adders may remain "flighty" after some time in captivity - particularly if rarely handled and kept in a spacious cage.

Non-Australian readers do have access to *Acanthophis*. Larger American reptile dealers and those who specialise in venomous snakes do occasionally get specimens. I have seen all three species on price lists in the United States. The most commonly sold are "Indonesian" specimens, which usually sell for about US\$ 100-500 each.

PART 2 Next Month

INFORMATION REQUEST

All Public and private collectors holding live reptiles and/or amphibians in captivity is asked to contribute to this annual report

REPTILES AND AMPHIBIANS IN CAPTIVITY BREEDING, LONGEVITY & INVENTORY CURRENT JANUARY 1st OF EACH YEAR

by Frank & Kate Slavens

Breeding, longevity, & inventory information current as of January 1st of each year is being solicited for inclusion in our next annual edition. The current edition contains 534 pages of information on 49,618 specimens held in 295 collections. Longevity and inventory information should be current as of January 1st, and breeding information should be complete for the previous year. Information does not need to be typed, nor does it have to be in any kind of order, just try to make it legible and as complete as possible.

Please send the following information:

- (1) A complete inventory of all reptiles and amphibians living in your collection as of January 1. Include numbers of males, females, and unknown sex.
- (2) A list of all species bred during the previous year. Bare minimum would be to mark the species bred and indicate if they laid eggs or gave live birth. If possible include more detailed notes of a paragraph or more. Be as detailed as possible.
- (3) A list of all specimens in your collection which you believe may set longevity records for the species. List those species, living or dead which you believe may be of record length.
- (4) Please be sure to list your name, address and telephone number, fax as you want them listed. Please be legible. Anonymous submissions will be considered, try to at least list your name and state.
- (5) If you know of a person keeping reptiles and amphibians in captivity that has not responded, please encourage them to do so. All collectors should respond.

Please do respond.

All information should be sent to:
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PLEASE PASS THIS ON TO ANY PERSON KEEPING LIVE REPTILES AND/OR AMPHIBIANS IN CAPTIVITY.

