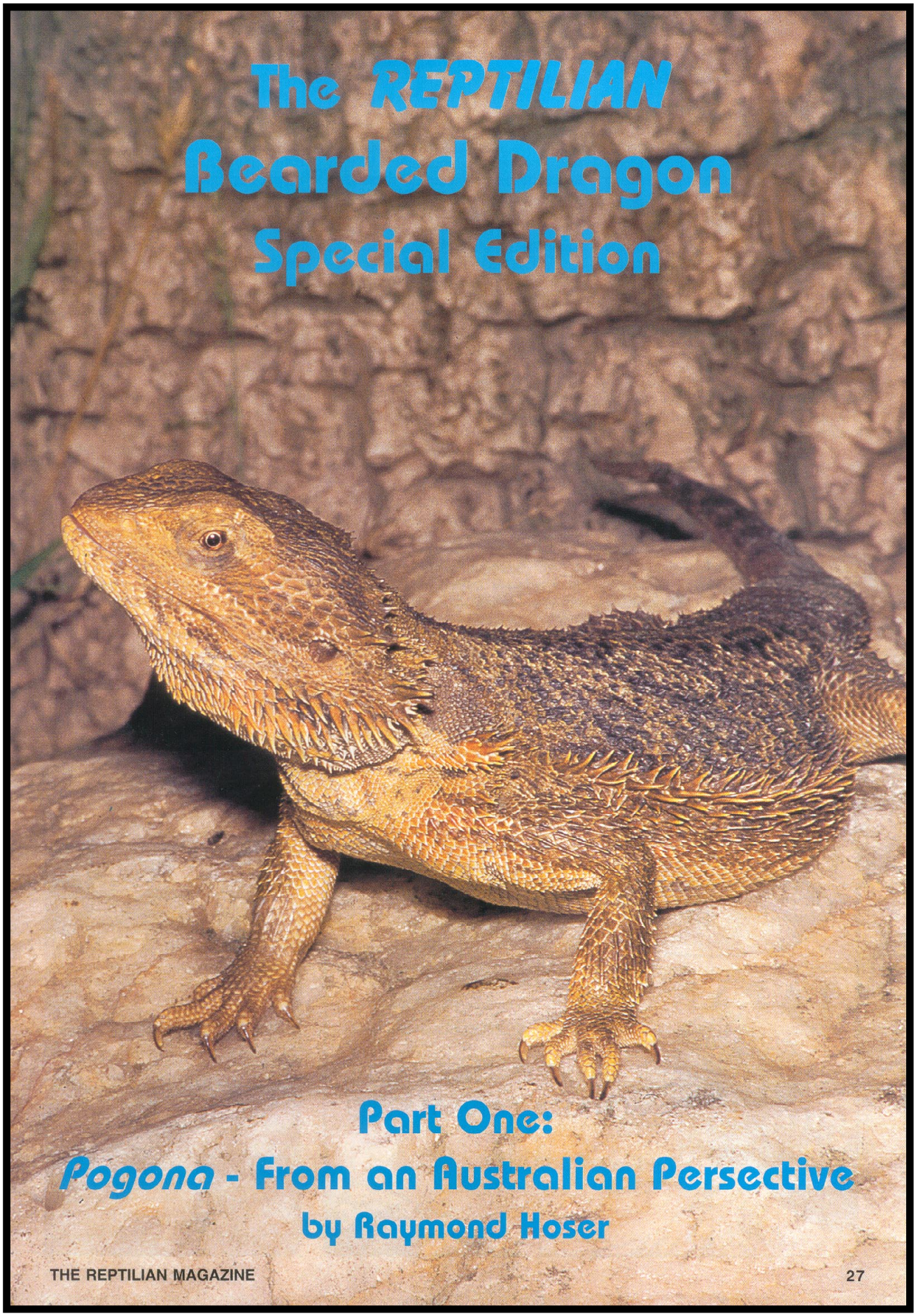


The *REPTILIAN* Bearded Dragon Special Edition

Part One:
Pogona - From an Australian Persective

by Raymond Hoser

***Pogona* -**
From an Australian Perspective

Within Australia, the Bearded Dragons or Jew Lizards are among the best-known lizards, with various species of this genus (*Pogona*) occurring in most parts of mainland Australia in all mainland states. These lizards and the Water Dragons (*Physignathus* spp.) are sometimes confused with or mis-identified as the Frill-necked Lizard (*Chlamydosaurus kingii*) by non-herpetological people. At almost every second party in the southern states, someone tells of the "Frill-necked Lizard" they found in their yard. Usually the "Frill-necked Lizard" is a Bearded Dragon of some form.

The first-described species of the genus now known as *Pogona* was the Bearded Dragon *Pogona barbata* of the wetter parts of the east and southeast of Australia, including parts of the Murray/Darling basin. Up until recent years, many other species in the genus were incorrectly diagnosed as this species. This is particularly for specimens of a related form *Pogona vitticeps*. That similar species is known to occur throughout inland and drier parts of Eastern Australia, extending into the central Australian deserts.

Besides these two more well-known species, there are some other described forms of *Pogona* as well as possibly undescribed forms. It is likely that lizards currently assigned to *vitticeps* or *barbata* may in fact comprise other species. Until a proper taxonomic evaluation of these lizards takes place, however, any such idea remains in the realms of speculation. In classical zoology different species cannot crossbreed and produce fertile young but it appears that different *Pogona* species can do so in captive conditions.

General

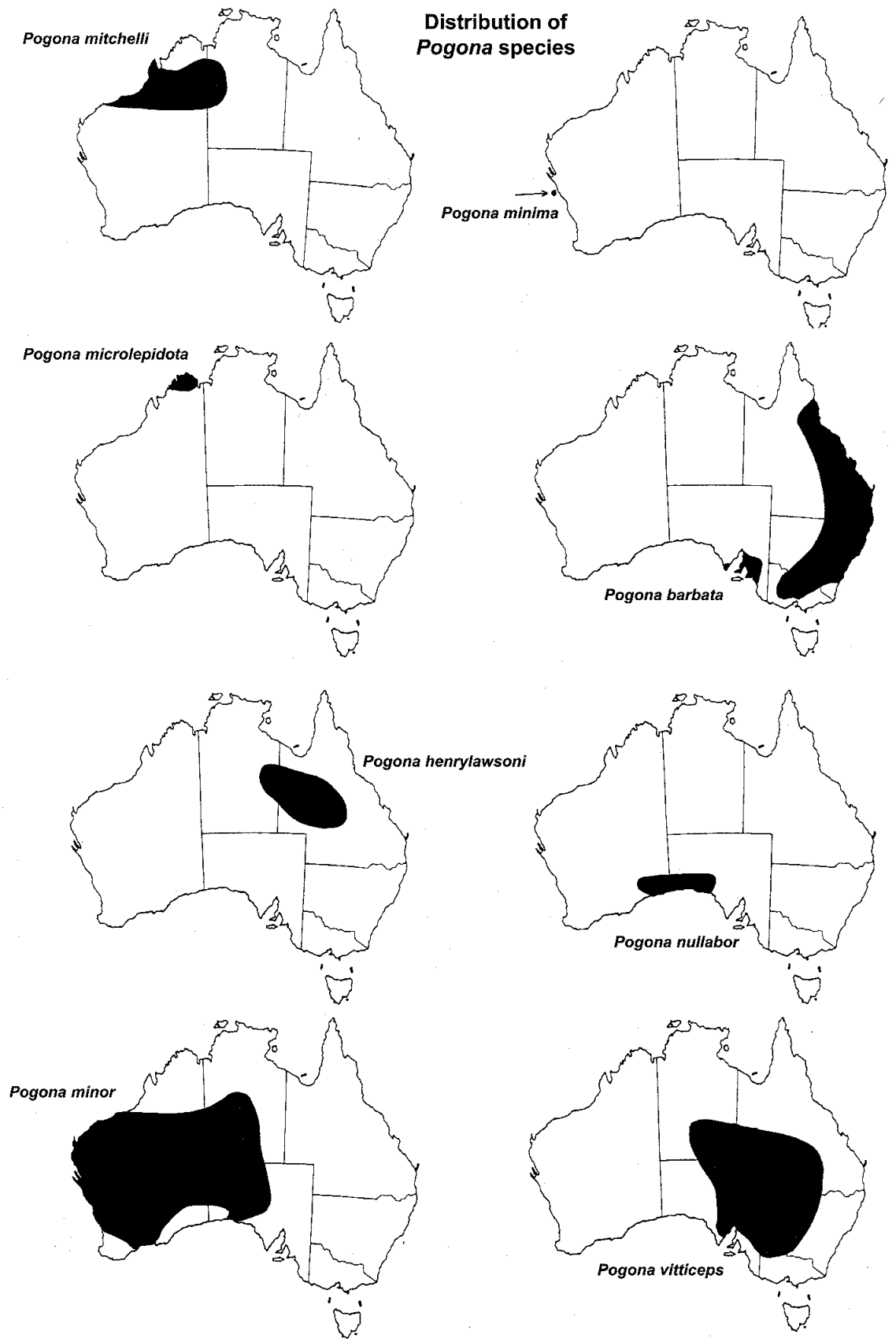
All *Pogona* are relatively large terrestrial and semi-arboreal lizards. They tend to have broad, triangular heads, heterogeneous body scales, flattened body and relatively short tail which has a distinctive lateral series of spinose scales on either side of the base (Cogger, 1992). The tympanum (eardrum) is exposed, while pre-anal and femoral pores are present, (see photos in order to better gauge the appearance of these lizards).

Although found in a variety of habitats, ranging from wet forests to deserts, these lizards are most commonly seen in open woodlands and similar habitats. While many reptile species are found in greater numbers in hilly or rocky areas, no such correlation appears to be the case with *Pogona*. While found at any time of year, these lizards are seen in largest numbers (in most areas) during the spring months of late August to late October, when they appear to be most active.

Specimens are usually seen when active or basking during the day, often when driving along roads in suitable areas. *Pogona* often bask on fence posts and other elevated spots. In parts of Western New South Wale, for example, the best way to find these lizards (in the appropriate weather) is for one person to drive a car along a road, with two passengers looking at fence posts on either side of the road. The large *Pogona* are easily seen sitting on top of often narrow wood, metal or concrete posts. It is usually easy to pick up the large (adult) lizards dolloping themselves on the top of relatively narrow posts.

It appears that *Pogona* species prefer open wooded habitats and often seem to be in largest numbers in recently-burnt areas. I recall some years ago finding a concentration of Bearded Dragons (*Pogona barbata*), in a relatively small, burnt-out part of the otherwise unburned Harold Reid Reserve, in the Sydney suburb of Middle Cove. These lizards seemed scarce in other parts of the reserve. Whether this abundance was due to greater visibility of these lizards in the burnt area, lizards moving in from outside, or increased breeding activity was never certain, but my gut feeling is that it was due to a combination of all three. Similar increased concentrations of Bearded Dragons (*Pogona barbata*) were noted in recently burnt areas of Terry Hills, on Sydney's northern outskirts. Other factors will increase numbers in given areas. The Cobar tip is a well-known area for finding *Pogona vitticeps*. Resting specimens shelter under sheets of tin. There certainly appears to be a far greater population-density of these lizards here than in surrounding bushland.

In the wild, diet is varied and this also varies with locality and time of year. Victorian herpetologist Fred Rossignoli noted that most wild *Pogona vitticeps* seen by him seemed to have eaten mainly seeds. That observation was based on looking at their faeces. I have noticed that at certain times of year, in some areas, beetles feature prominently in their diet. These lizards are known to feed on flowers and other vegetable matter, yellow Dandelions being a frequently-quoted item (e.g. Kennerson and Cochrane, 1981). Captives readily take cockroaches, crickets, mealworms, earthworms and other small animals. Small rodents are also taken.


Distribution of
Pogona species
Pogona mitchelli
Pogona minima
Pogona microlepidota
Pogona barbata
Pogona henrylawsoni
Pogona nullabor
Pogona minor
Pogona vitticeps

Mating behaviour has been observed mainly in captive specimens. Males will compete for mates and will use various forms of head-bobbing and other movements to communicate. These lizards commonly tail-bite and are known to injure one another in some circumstances, both in the wild and in captivity. In the wild, breeding activity starts with the onset of warmer weather, which in most parts of their range commences in late August or at worst by the end of September. All are egg-layers, sometimes producing more than one clutch per season. Incubation times for *Pogona* eggs incubated at about 28.9 degrees Celsius have been noted as ranging from 45-79 days (de Vosjoli and Mailloux, 1993). Weiss and Weiss (1994) noted that eggs of *Pogona* can be incubated at anywhere between 80 and 90 degrees Fahrenheit, resulting in a 45-70 day incubation. It is likely that incubation times for wild specimens will tend towards the longer end of the spectrum (or perhaps even longer) due to cooler (on average) conditions in the wild, although research in this area is lacking. The latitude of potential incubation temperatures for the eggs of most species of reptile is far wider than many hobbyists seem to realize.

Breeding in wild *Pogona* has been relatively rarely documented. In Sydney (at West Head), a *Pogona barbata* was observed laying eggs in a hole dug on a bush track on November 29th 1981, indicating this to be the breeding season in this part of Australia (Hoser 1991). Worrell (1970) gives an account of how eggs are laid in this species which appears to be in line with other reports (and what I have observed). He states 'The female scoops a hole and buries herself in it to deposit her eggs; these may number eight to twenty-four. Having deposited the clutch, the lizard emerges from the hole and carefully covers it.'

Where *Pogona* occur, it seems to be a rule that only one species occurs at a time. They appear to be mutually exclusive. This however may not always be the case. The question of relationships between species in the wild will only be answered with further observations and research. Because collecting of these animals in the wild is usually banned in Australia, few herpetologists will publish or admit that they have been travelling parts of Australia in search of these lizards.

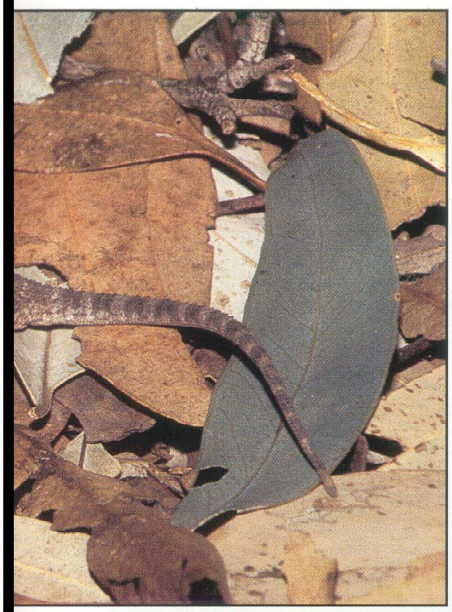
It has been noted that in parts of inland Eastern Australia both *Pogona barbata* and *P.vitticeps* occur in relatively close proximity. However within these areas, each species appears to be restricted to particular habitat and/or soil type and there appears to be no overlap. A study on the distribution patterns of both species is long overdue. Around Sydney there appears to be an interesting situation involving the Bearded Dragon (*Pogona barbata*) and the Jacky Lizard (*Amphibolorus muricatus*). That is that neither species seems to occur in the same areas. For example in Kurringai Chase, the bearded Dragon (*Pogona barbata*) seems to be the only species in the area. In Royal National Park in areas such as Engadine and Waterfall, it seems the Jacky is the species encountered. There may be exceptions to this trend, but at best they are relatively unusual. Other cases are Middle Harbor (*P. barbata* only), Southbank Lane Cove River/Gladesville, (*A.*

Above: *P. barbatus* (juvenile).

Above right: *Pogona mitchelli* from Shay Gap, Western Australia. This specimen was found in a termite mound.

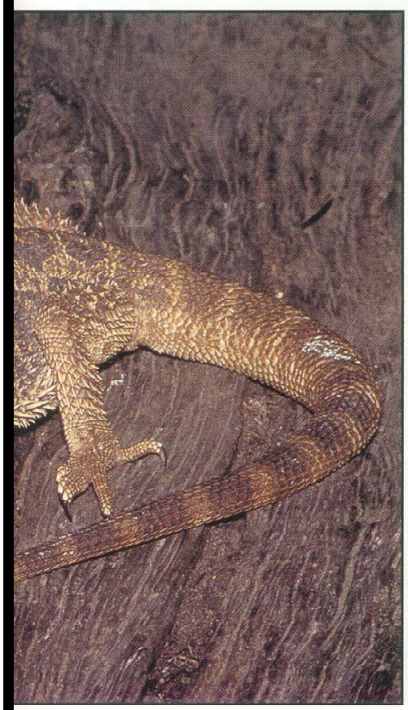
Below right: *Pogona muricatus* from Macquarie University (Sydney area). This species may compete with *P. barbata* around Sydney.

All photographs by Raymond Hoser.



Below: *P. barbatus* from Victoria.

Pogona barbatus habitat near Boggabri, New South Wales.



muricatus only), Long Reef (*A. muricatus* only), Wyee (*A. muricatus* only).

Jacky Dragons as adults are probably only a quarter of the weight of Bearded Dragons, but to an observer such as myself, it is hard to differentiate the habitat-preferences of either species. They both seem remarkably similar (including the fact that both like fence posts in farming areas). As it is presumed that both species must compete in some way, it would be an interesting course of study to work out what makes one species dominate in one area, while the other dominates in very similar habitat in nearby areas. (Relationships with other agamid species such as Eastern Water Dragons (*Physignathus lesueurii*) or Mountain Dragons (*Tympanocryptis diemensis*) appear irrelevant

Perhaps I should note that working out what occurs where in places like Sydney is getting harder all the time. As far back as 20 years ago, I caught an adult *P.vitticeps* in a lightly wooded paddock in the then outer Sydney suburb of Bankstown. Clearly the lizard had come from elsewhere (*P. vitticeps* come from nowhere near Sydney), but if I had known no better, I would have concluded it was a native inhabitant. As another example, around Sydney, the only native Cunningham's Skink (*Egernia cunninghami*) is the Sandstone form (for at least 100 km in all directions). However, it is not rare to find specimens of the Granite (or highland) form in bushland around Sydney which have descended from specimens released in the past by persons who had collected them from places west of Sydney, such as Oberon, Bathurst and Lithgow.

In Sydney, areas with *P. barbata* and other areas with *A. muricatus* tend to be separated by urban sprawl. This would not have always been the case. A useful study area would be the interactions between the two species in areas where both occur. In parts of western New South Wales such as Dubbo, a similar situation seems to exist in many areas with *Pogona barbatus* and the dragon *Amphibolorus nobbi*. The former species tends to be found in lower, open woodland habitats, while the latter is usually seen in sandy and elevated habitats. However in these cases, both species occur in close proximity when preferred habitats meet. An investigation into competing relationships between both species would be useful.

The ecology of *Pogona* in the wild has been studied by Badham (now Caughley) and others, with several papers being published in the journal *Copeia* and elsewhere, including Warburg (1965), Badham (1971), Brattstrom (1971), Bartholomew and Tucker (1963) and Carpenter, Badham and Kimble (1970). In the wild state, these lizards adopt the behaviour of shuttling heliotherms. Their activity-patterns are largely dictated by ambient temperatures and the lizards' ability to operate at optimal temperatures within the environment. In cooler weather, the lizards bask until optimal temperature is reached, before other activity is commenced. Basking is resumed when temperature falls below a certain level. At higher temperatures, the lizards avoid the heat of the day and alter activity-periods accordingly. Therefore, most active lizards are seen when temperatures fall within the preferred range, which often equates with spring and autumn.

For example, when searching for reptiles in South Australia on two days

***P. barbatus* (adult) from St. Claire, New South Wales.**

Raymond Hoser

when the temperature was about 40 degrees Celsius, no bearded dragons were seen. On the following, cooler day, when the temperature was in the low 20's, a Bearded Dragon (*P. vitticeps*) was seen active and crossing a road, near Port Augusta. Bradshaw and Main (1968) published results of a study of thermoregulatory behavior in *Pogona* species. Richard Wells was perhaps the first to detail 'true' hibernation in *Pogona* (Wells 1970). It has since been determined to be routine in areas such as Sydney (which is in one of the cooler parts of the lizard's range. For example in 1973, when searching for reptiles in bushland near Campbelltown in Sydney's southwest with Gary Stevenson, I lifted a large slab of sandstone to find a large, sleeping *Pogona barbata* resting under the rock. The rock was well embedded and the lizard had dug a lengthy burrow to get to where it was resting. The weather at the time was sunny, it was mid winter, the site was sheltered by large bushes and the lizard was in an obviously torpid state.

With all *Pogona* species, there is significant variation in colour between locality and to a lesser extent within a single locality. Likewise for characteristics such as spinoseness and other details which may be used to differentiate between species. It is also assumed that seasonal and other behavior varies between locality and perhaps among individual specimens within a given area.

Taxonomy

A number of papers have been published in relation to the taxonomy of *Pogona* in Australia, including Badham (1976), Storr, (1982) and Wells and Wellington (1985). However, it is likely that there may be further changes in nomenclature in the future. The name *Pogona* is itself relatively new. Before Glen Storr of the Western Australian Museum assigned these lizards this name, in 1982, they were lumped into the genus *Amphibolorus* with a number of other Australian agamid species.

Even now, a number of forms are regarded by some as subspecies, while others treat them as full species. I have no strong opinions either way and what follows is the majority (consensus) view and not what is necessarily correct. There are currently eight species of *Pogona* recognized, all restricted to continental Australia. A number of keys have been devised which detail the key diagnostic characteristics of species, enabling people to differentiate species. These keys do not work 100% of the time. A key is provided in Cogger (1992). Distribution maps published in the recent literature have been republished here. However it is probable that the details of these maps are inaccurate due to past misidentification of *Pogona* species, (particularly with the smaller varieties) resulting in wider-than-actual distributions being documented in some cases, while in other cases specimens may not have been found in areas where they occur.

The 8 species recognized to date are as follows:-

Pogona barbata - Found in wooded parts of Eastern Australia, including cleared areas, except for very cool regions and Cape York. It is a large species of variable colour distinguished from its relative *P. vitticeps* by its less robust body and the possession of an orderly row of spines along the lateral edge of the body, which continues over the forearm (Cogger, 1992). It tends to be more cryptic in its behavior than *P. vitticeps*. It has an adult snout-vent length of about 25 cm.

Pogona vitticeps - Found in drier parts of Eastern Australia, to the red centre. This large species of variable colour is perhaps the most variable of all *Pogona*. For example those from parts of the Eyre Peninsula are red in colour (when excited), while in other areas, specimens are reddish or grey. In some areas, specimens have red heads, in other areas, red eyes are common, while these are absent elsewhere. De Vosjoli and Mailloux (1996a) show a number of morphs of *P. vitticeps* in USA herpetoculture. The geographical origins of these morphs is not given, while some of the specimens depicted may in fact be hybrids of morphs from more than one area. Adult snout-vent length is usually about 20 cm, but larger specimens occur in some areas. It is presumed that *P. vitticeps* and *P. barbata* have been cross-bred in captivity outside of Australia, but this doesn't appear to have been documented in the literature (see account of *P. henrylawsoni* below).

Pogona microlepidota - Presently known only from the Kimberley area, in Northwest Western Australia in the vicinity of the Drysdale River and nearby areas in the Kimberley. It is essentially similar in many respects to *P barbata*, from which it is separated by the fact that it is smaller as an adult and lacks a series of transverse spines across the throat. It lacks nuchal

spines parallel to the vertebral column as found in *P. minima*. It is separated from *P. minor* by the fact that the occipital row of spines on each side fails to meet the temporal row of spines. Adult snout-vent length is thought to average about 14 cm. In 1985, Richard Wells and Ross Wellington proposed that this species should be placed in a genus by itself, namely *Uxoriousauria*. To date, however, few if any other authors have adopted use of the name. Richard Wells maintains that this species is substantially different in several ways from the other *Pogona* but if such is the case, to me it doesn't seem readily noticeable from photos I have seen. (I've never seen a live animal).

Pogona nullarbor - Known from the Nullarbor Plain and nearby areas in Western Australia and South Australia. The species was described as recently as 1976, by Judy Badham. It is a medium-sized *Pogona* distinguished from other small Western Australian *Pogona* by having 3-7 rows of large spines rather than just one or a broken row along the dorso-ventral angle of the body. Adults average 140 cm in snout-vent length. This species has been bred in captivity in Australia, but remains rarely kept due to restrictive licensing laws here. Most specimens are found in the immediate vicinity of the main Eyre Highway.

Pogona minor - (Also known as Dwarf Bearded Dragon). Some authorities believe that this species includes those lizards otherwise known as *Pogona minima* and *P. mitchelli*, (e.g. Storr, Smith and Johnstone 1983, Wilson and Knowles 1988). I am unable to offer an opinion one way or the other, so here tentatively treat all three as separate (but very similar) forms/species. All three are found in the western half of the country in a variety of habitats ranging from heaths and woodlands to extremely arid deserts. *Pogona minor* occurs in most parts of Western Australia, except for parts of the Kimberley and Pilbara as well as the far south and adjoining parts of the Northern Territory and South Australia. It is differentiated from *P minima* by it's lack of nuchal rows of spines parallel to the vertebral column, while it is differentiated from *P. mitchelli* by its lack of contiguous, stout, conical spines in the spine rows of the head. It averages about 16 cm in adult snout-vent length. Distribution information for *P.minor, P. minima* and *P. mitchelli* is essentially that given by Storr, Smith and Johnstone, 1983.

Pogona minima - (see above). It is known from the Houtman Abrolhos (North east Wallabi Island and West Wallabi Island). It is distinguishable from the above species by its much longer limbs and tail. Averages 16 cm in adult snout-vent length.

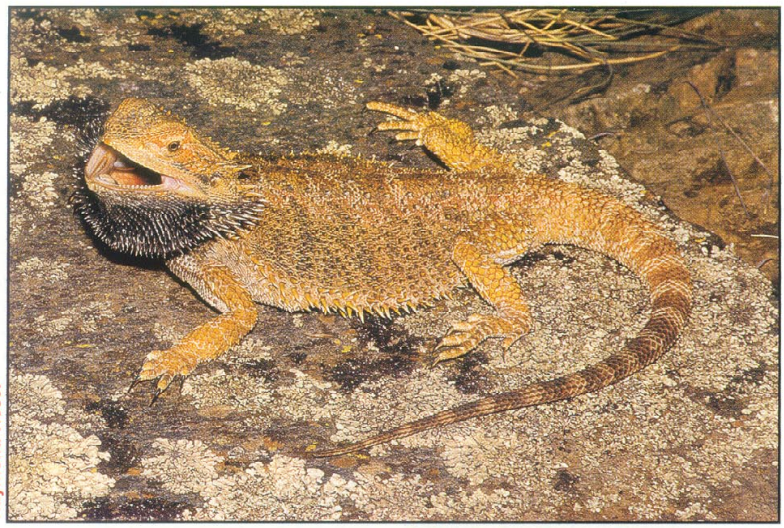
Pogona mitchelli - (also see *P.minor* -

Raymond Hoser

Juvenile *P. henrylawsoni*, Florida Reptile Expo. 1993.

Raymond Hoser

Pogona barbatus from Green Valley, New South Wales.



Raymond Hoser

Pogona vitticeps from Port Augusta, South Australia.

Raymond Hoser

Pogona vitticeps from Alice Springs, Northern Territory.

Raymond Hoser

Habitat near Cunnamulla (Queensland). Large numbers of *Pogona vitticeps* occur in the area.

above). Known from arid parts of Northwest Australia, including most of the Pilbara and adjoining parts of the Great Sandy Desert and possibly the Northern Territory. In common with many other remote area reptiles, little is known of this species. My only experience with this lizard has been some seen dead on roads near Port Hedland in Western Australia, except for a single live specimen found by myself sheltering during the day inside a large termite mound, (that is the specimen previously depicted in *The Reptilian Magazine*, (Hoser, 1996). Although in my travels in the Pilbara I did not see very many of these lizards, this does not mean they are uncommon. The time of year and weather conditions were probably not optimal for these lizards, which probably meant most took to shelter/cover and were therefore not visible to me. Average adult snout-vent length is about 14 cm.

Pogona henrylawsoni - This species was first formally described in 1985 by Wells and Wellington, even though it had been known to herpetologists in Australia and elsewhere for many years. The name (*henrylawsoni*) took some years to become widely accepted for a number of reasons. Following publication of two papers in 1984 and 1985, a number of rival herpetologists petitioned the International Commission for Zoological Nomenclature (ICZN) to formally suppress all new names adopted by Wells and Wellington in their papers. This application took some time to be heard and was eventually rejected, with the decision being taken to allow each name to be decided on a case-by-case basis by peers, and using the usual rules of taxonomy and priority. Therefore although Wells and Wellington stood accused of having conducted taxonomic vandalism and given excessively brief descriptions of species, the fact remained that in the main they had assigned names to previously unnamed species within accepted rules and therefore the names they assigned were to remain in force. Among these species was *Pogona henrylawsoni*. Wells and Wellington also correctly countered critics by stating that their descriptions were substantially more detailed than those of a number of other prominent Australian herpetologists including Glen Storr. Much of the dispute revolved around personality conflicts; you see Richard Wells had experienced a falling-out with several academics including some at Sydney's Australian Museum, with whom he'd worked closely for many years.

Prior to formally describing the species, the name *Pogona greeri* had been proposed by Richard Wells, but he was later talked out of the idea by Allen Greer himself at the Australian Museum. The name *Pogona rankini* was mooted around 1978, which is about when Richard Wells first made it widely known he intended describing the

species, (Ross Wellington later became co-describer). However news got out of the proposed name and *rankini* has become a commonly-used name for the species, even though it has no validity. The first specimens sold in the USA in the early 1980's were offered as *P. rankini*. The name *Pogona brevis* was later proposed for the species under the false assumption that *henrylawsoni* was not valid, so it (*brevis*) is now regarded as a junior synonym for *henrylawsoni*, (*henrylawsoni* is the correct name). Even as recently as 1997, many publications and price lists list this species erroneously as either *rankini* or *brevis*.

In 1994, G. J. Whitten published a pair of papers in which he asserted that Wells and Wellington had made a wrong description based on immature *Pogona vitticeps* and not the new species. He relied on evidence in a 1990 paper he had co-written to back up his assertion. He further falsely asserted that the Type specimen of *P. henrylawsoni* had been lost by the Australian Museum. That Wells and Wellington had got their species correct could be seen by a cursory glance at their original description, which at length differentiates both species. In terms of the allegedly missing specimen, Glen Shea published a note later in 1995 rebutting Whitten's assertion that the Type specimen of *P. henrylawsoni* had been lost and that the lizard was in fact a different species to *P. vitticeps* (a new species). Furthermore as the name *henrylawsoni* had been widely published by Greer in 1989 and others, Whitten's proposed name had no validity and was therefore a junior synonym. Shea also went further and published a photo of the allegedly missing animal complete with appropriate museum tag.
The species is found on black soil plains of inland Queensland, although Richard Wells has informed me that it also occurs in nearby parts of the Northern Territory of like habitat. It readily retreats into cracked earth when chased. Known predators include the Collett's Snake (*Pseudechis colletti*). This lizard has a relatively small 'beard' and is the only dwarf species from the northeast inland of Australia. Its relationship to other *Pogona* is not certain. Captive populations have been maintained for some time both in Australian zoos and overseas collections (see below), although within Australia, few private keepers have the species. Current laws, mean that this scenario is likely to remain for some time into the future.

Richard Wells decided at the last minute not to name the species he was describing as *rankini* on the basis that he had not viewed all the specimens being traded overseas under that name and that it was possible they may in fact be of different species and/or origins. It is still possible that specimens routinely traded as *henrylawsoni*/*brevis*/*rankini* outside Australia are not the same taxa. Although *henrylawsoni* is only known from the black-soil areas of Queensland and nearby, Richard Wells has caught a similar animal in northwest Australia.

The species is being bred in the USA and Europe, but in nowhere near the numbers of the more widely known *P. vitticeps*. Marcia Ryback (of the USA) has crossbred *Pogona henrylawsoni* with *P. vitticeps* and now markets the progeny as '*vittikens*', the name being a hybrid of '*rankini*' and '*vitticeps*' (Ryback, 1996). Hybrid offspring are able to reproduce but it is thought that such hybridization of *Pogona* species does not occur in wild animals, although this is not yet certain.

Captivity in Australia.

In terms of captive husbandry, the fact is that here in Australia we are far behind keepers in the United States and Europe. There are several reasons for this, including:-

Less people here keeping the species.

The restrictive keeping/licensing laws here which exacerbate the situation.

The relative abundance of wild specimens, negating much incentive to breed animals

due to the ease with which they can be replaced.

The relative abundance of *Pogona* species has led reptile-keepers here to concentrate their energies on other more 'prestigious' species such as monitors and snakes.

In our experiences here, *Pogona* are easy to keep, particularly since the book *The General Care and Maintenance of Bearded Dragons* by de Vosjoli and Mailloux became widely available here in Australia a few years ago (Brian Barnett of the Victorian Herpetological Society imported huge quantities of them). Any person contemplating keeping *Pogona* would have rocks in their head if they didn't have the above book. The keeping guidelines in that book have proven easy to read and adopt, and in effect are a recipe for the successful keeping of *Pogona*. Noting the reasons given above, however, it is unlikely that Bearded Dragons will ever become as popular here as in North America and Europe.

Sprackland (1994) noted how much of what is known about *Pogona* has come from the rapidly growing body of information being collected by serious amateur reptile-keepers. However, the accumulation of recorded information about *Pogona* goes back a long way. Kinghorn documented mating in a pair of Bearded Dragons as far back as 1931!

Kinghorn's detailed account of mating in wild bearded dragons follows:-

'*I came upon a pair of bearded dragons whose appearance and attitude was so unusual that I retired to watch with field glasses from 6-8 yards off. The female was coloured a dull slaty-black with a few faint mottlings of greyish-white. The only bright touch about her was a patch of dull red on the side of the body near the base of the tail and opposite the inner side of the thigh. This sexual colour patch was only seen later on, however, when she moved.*

'The male appeared to be totally black underneath the body and head, including the beard and the whole of the lower jaw; not the dull black of the female, but a rich, glossy purplish-black. The upper surface was in marked contrast, varying from a light mottled grey and yellow on the back to a bright light green on the head, especially on the snout near the nostril. He had a conspicuous patch of light green on the spot which was red in the female. The basal half of the tail was grey and light yellow, but the last four or five inches were dull black, the junction between the yellow and black being clearly marked.

'The female when first seen was lying motionless and quite flattened out, and the male was lying across her, the midline of his body crossing her back about the region of the vent. There was no movement for about three minutes except that the male appeared to yawn once, opening wide his yellow mouth. Suddenly he became active. First he stamped loudly two or three times with one or both of his forelegs, making a much louder sound than one would have thought possible. Then he ran quickly round in front of the female, taking up a position almost at right angles to, and some two feet in front of her. He now stamped once with the left foot and proceeded to jerk his head up and down in a most ludicrous manner, each jerk being followed by a pause of perhaps a second. (It looked as if the skull had been dislocated from the atlas, allowing a ventro-dorsal movement of the whole head upon the rigid vertebral column.) The beard was stretched to its fullest extent, and the trunk raised high on the forelegs while the mouth was opened at intervals. Suddenly he moved forward with a swift little run until his head was held exactly over that of the female, who was still crouched flat on the ground. This position was maintained for a few seconds, when the male threw himself in a lightning-like leap so that he lay at full length on the female's back and was gripping with his jaws either the spines on the back of her head or the skin covering the nape.

'His forelegs were quite off the ground, and his hind legs barely touching. His body was no longer slim like that of the female but it was widened out giving the round "carapace" appearance so familiar to anyone who ever angered these reptiles by submitting them to the undignified ordeal of being held up by the tail. The female, now for the first time, gave indication that she was actually alive; till now she literally had not blinked an eyelid. She ran along, keeping flat to the ground, while the male's legs beat the air frantically as he hung on with his jaws, and his colour became even brighter than before. The female went about six feet before she stopped but the male continued to paw the air and lash his tail from side to side. After a minute or two he scrambled off and ran out of sight of the female behind a low bush. Here, with his trunk raised high off the ground on his forelegs, he began to jerk his head again, but after about thirty seconds quietened down, and in three or four minutes had almost regained his normal colour. Finally he ran about two feet up a small sapling while the female lay where he had left her without any movement.'

Astute and documented observations such as the one given above, can be extremely useful to herpetology, however government policy in recent years in Australia has actively discouraged people, particularly 'amateurs' from publishing their observations for fear of being targeted and pursued by 'the authorities'.

De Vosjoli and Mailloux (1996b)

noted how Bearded Dragons will, if not fed enough, engage in intraspecies mutilation and cannibalism, particularly in the case of young and growing animals. This may involve one lizard attacking the moving tail of another and attempting to eat it as food. Here in Australia a keeper had an unusual experience in this regard. A bearded dragon attacked another's tail and commenced swallowing, making its way up the rear end of the body. By the time the keeper found the two lizards, the larger one had all but swallowed the other, with only the head protruding from the mouth of the other. The smaller lizard was only marginally smaller! The experience killed it.

Incubating eggs seems to pose few problems with many authors detailing their successful methods, including Bustard (1966), Smith (1974) and others already cited. Bustard (1970) noted how the eggs of this species are able to absorb large amounts of moisture from the incubation substrate if given the opportunity. How this affects incubation success rates or other factors is not entirely certain, but it has been ascertained that a high absorption rate of moisture is not always essential to a successful hatching of eggs, although eggs kept too dry may dehydrate and fail.

Although I am unaware of 'rare' mutations in bearded dragons, such as albinos, there is little doubt that such specimens sometimes occur. With vast numbers now being routinely bred in captivity, it is probably only a matter of time before albino and other strains become firmly established in captivity. Reptiles magazine published a photo of a two-bodied Bearded Dragon (*P. vitticeps*) (Swanson 1997). The author claimed it was the second such lizard he had hatched as well as a similarly-formed Kingsnake. The author jokingly speculated that the local New York drinking water may have been part of the problem.

Conservation

For *Pogona*, there is no conservation effort required at this stage. Excluding heavily-urbanized areas, most populations in Australia are secure and under no known threat. Even areas of heavily degraded and modified habitat still retain large numbers of *Pogona* (examples of which are shown in the book *Australian Reptiles and Frogs* (Hoser 1989)). These populations may in fact exceed those originally present. Feral animals such as foxes and cats, while preying on these lizards, do not appear to cause problems for populations as a whole. It is likely that the toll taken by feral pests probably roughly equates with the toll that would have been taken by the native predators displaced by the feral ones, meaning no net difference for the lizards.

Licensing laws in Australia have not protected a single population of these lizards, nor are they likely to. However, in their restrictive nature, they have discouraged many in Australia from wanting to keep these lizards and finding more out about them. Why risk jail for a bearded dragon? It is a well-known fact that all of Australia's most prominent herpetologists began their careers as keepers of common species such as Bearded Dragons. Most were able to do so without the present fear of going to jail for keeping pet reptiles. Meanwhile the carnage of lizards on the nation's roads continues unabated, a point noted by Bustard as far back as 1970. Each year tens of thousands of *Pogona* would be killed on the nation's roads. But in reality, it is doubtful if even this has any real impact on numbers.

In the United States it has been suggested that troubles in breeding *Pogona henrylawsoni* over the long term may be a result of insufficient numbers of founder animals exported. Noting that the species is common in the wild, it is crazy that the Australian government will not allow legal export of further specimens to assist keepers in the USA establishing the species there in herpetoculture. Likewise for Europe. It also makes sense to allow other *Pogona* species to be legally exported from Australia.

It has been suggested that in recent years, *Pogona barbata* has been on the decline in non-Australian collections, while *P. vitticeps* has tended to become far more prevalent. While this is no doubt true, due to the fact that *vitticeps* is usually slightly easier to maintain and breed than *barbata,* it is also true that in past years many specimens attributed to *barbata* were in fact *vitticeps*.

There is perhaps some good news on the horizon for reptile-keepers in Australia's most populous state, New South Wales. Following the release of *Smuggled-2*, NPWS/NSW have come under renewed and sustained criticism not only for their endemic corruption, but also for their refusal to allow licenses to allow people to keep common species such as *Pogona* dragons. As a result of speeches in Parliament by several politicians using *Smuggled-2* to highlight deficiencies in N S W

wildlife laws and policies, NPWS have responded by proposing a new licensing system roughly in line with that used in the State of Victoria (this has happened in March 1997)(Hardy, 1997). If this change gets off the ground, it could herald a reawakening of herpetoculture and herpetology in New South Wales.

References Cited:

Badham, J. A. (1971), 'Albumin formation in eggs of the agamid *Amphibolorus barbata barbata*.', *Copeia*, 1971:543-545.

Badham, J. A. (1976), 'The *Amphibolorus barbata* species group (Lacertilia: Agamidae).' *Australian Journal of Zoology*, 24:423-443.

Bradshaw, S. D. and Main, A. R. (1968), ' Behavioural attitudes and regulation of temperature in *Amphibolorus* lizards.', *Journal of Zoology*, 154:193-221.

Bartholemew, G. A. and Tucker, V. A. (1963), 'Control of changes in body temperature, metabolism and circulation by the agamid lizard *Amphibolorus barbata*.', *Physiological Zoology*, 36:199-

Brattstrom, B. H. (1971), 'Social and thermoregulatory behavior of the bearded dragon *Amphibolorus barbata*. *Copeia*, 1971: 484-497.

Bustard, H. R. (1966), 'Notes on the eggs, incubation and young of the Bearded Dragon, *Amphibolorus barbatus barbatus* (Cuvier).', *British Journal of Herpetology*, 3:252-259.

Bustard, H. R. (1970), *Australian Lizards*, Collins, Sydney, Australia. 162 pp.

Carpenter, C. C., Badham, J. A. and Kimble, B. (1970), 'Behavior patterns of three species of *Amphibolorus* (Agamidae).', *Copeia*, 1970: 497-505.

Cogger, H. G. (1992), *Reptiles and Amphibians of Australia*, Reed Books, Chatswood, NSW, Australia.

de Vosjoli, P. (1996), 'Step by step vivarium design: A naturalistic vivarium for Small Bearded Dragons', *The Vivarium*, 7 (6):36-37.

de Vosjoli, P. and Mailloux, R. (1993), *The General Care and Maintenance of Bearded Dragons*, Advanced Vivarium Systems, Lakeside, California, USA. 64 pp.

de Vosjoli, P. and Mailloux, R. (1996a), 'Species and Morphs of Bearded Dragons *Pogona* in U. S. Herpetoculture', *The Vivarium*, 7 (6).

de Vosjoli, P. and Mailloux, R. (1996b), 'A simple system for raising juvenile Bearded Dragons (*Pogona*) indoors', *The Vivarium*, 7 (6).

Greer, A. E. (1989), *The Biology and Evolution of Australian Lizards*, Surrey Beatty and Sons, Chipping Norton, NSW, Australia. 280 pp.

Hardy, J. W. (1997), 'Proposed Reptile Keepers' Licensing System: Community Discussion Paper', National Parks and Wildlife Service of NSW, Hurstville, NSW, Australia. March 14th.

Hoser, R. T. (1989), *Australian Reptiles and Frogs*, Pierson and Co., Mosman, NSW, 2088, Australia.

Hoser, R. T (1991), 'Observations of egg-laying by a Bearded Dragon (*Pogona barbata*) Cuvier, *Newsletter of the Australian Herpetological Society*, Spring:11.

Hoser, R. T. (1997), *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*, Kotabi Publishing, Doncaster, Victoria, Australia. 280 pp.

Hoser, R. T. (1996), 'Reptiles encountered Collecting in the Pilbara - Australia', *The Reptilian*, 4 (2): 25-35.

Kennerson, K. J. and Cochrane, G. J. (1981), 'Avid appetite for Dandelion blossoms *Taraxarun officinale* by a Western Bearded Dragon *Amphibolorus vitticeps* Ahl.', *Herpetofauna*, 12(2): 34-35.

Kinghorn, J. R. (1931), 'Herpetological Notes - 2', *Records of the Australian Museum*, 18:85-91.

Ryback, M. (1996), 'Vittikins Dragons', *The Vivarium*, 7 (6):26-27.

Shea, G. M. (1995), 'The holotype and additional records of *Pogona henrylawsoni* Wells and Wellington, 1985.', *Memoirs of the Queensland Museum*, 38(2):574.

Smith, J. (1974), 'Hatching bearded dragon eggs', South Australian Herpetologist, 2 (1):10.

Sprackland, R. G. (1994), 'Australia's Bearded Dragons', *Reptiles*, 1 (6):44-53.

Storr, G. M. (1982), 'Revision of the bearded dragons (Lacertilia: Agamidae) of Western Australia with notes on the dismemberment of the genus *Amphibolorus*.', *Records of the Western Australian Museum*, 10: 199-214.

Storr, G. M., Smith, L. A. and Johnstone, R. E. (1983), *Lizards of Western Australia: 2: Dragons and Monitors*, Western Australian Museum, Perth, WA, Australia. 120 pp.

Swanson, A. (1997), 'Two-bodied Bearded Dragon', *Reptiles*, 5 (4):8.

Warburg, M. R. (1965), 'The influence of ambient temperature and humidity on the body temperature and water loss from two Australian lizards, *Tiliqua rugosa* (Gray) (Scincidae) and *Amphibolorus barbata* Cuvier (Agamidae).', *Australian Journal of Zoology*, 13:331

Weis, P. and Weis, P. (1994), 'Breeding Bearded Dragons', *Reptiles*, 1(6):32-33.

Wells, R. W. (1971), 'Hibernation - Bearded Dragons', *Herpetofauna*, 3(1):4-6.

Wells, R. W. and Wellington, C. R. (1984), 'A synopsis of the class Reptilia in Australia', *Australian Journal of Herpetology*, 1(3-4):73-129.

Wells, R. W. and Wellington, C. R. (1985), 'A classification of the Amphibia and Reptilia of Australia', *Australian Journal of Herpetology*, Supplementary Series No. 1:1-61.

Whitten, G. J. (1994), 'Taxonomy of *Pogona* (Reptilia: Lacertilia: Agamidae).', *Memoirs of the Queensland Museum*, 37(1):329-343.

Whitten, G. J. (1994), 'Relative growth in *Pogona* (Reptilia: Lacertilia: Agamidae).', *Memoirs of the Queensland Museum* 37(1):345-356.

Whitten, G. J. and Coventry, A. J. (1990), 'Small *Pogona vitticeps* (Reptilia: Agamidae) from the Big Desert, Victoria, with notes on other *Pogona* populations.', *Proceedings of the Royal Society of Victoria* 102(2):117-120.

Wilson, S. K. and Knowles, D. G. (1988), *Australia's Reptiles - A Photographic Reference to the Terrestrial Reptiles of Australia*, Collins, Sydney, Australia.

Worrell, E. (1970), *Reptiles of Australia*. Angus and Robertson, Sydney, Australia. 184 pp.