



Perseverance Prevails

Female *Pseudechis butleri*
collected on 25 September
1985 from rubbish tip
at Leonora, WA. All
photographs supplied by
Brian Bush.

Captive Reproduction in the Spotted Mulga Snake (*Pseudechis butleri*).

How long do you envisage it will take for your latest breeding project to start showing some results? Herping legend **Brian Bush** reflects on a species that was to test his patience for fifteen years!

On 12 January 1982, I found a strange-looking mulga snake injured on the road at Kookynie, in the eastern Goldfields of Western Australia. It was delivered dead and in the early stages of decomposition to the Western Australian Museum where Mr Laurie Smith was at that time, coincidentally, preparing the manuscript describing and naming it. The decomposition, by the way, resulted from a lack of success obtaining a preservative while in the field. I was informed on several occasions by merchants in the regional towns that methylated spirits was rarely stocked because some of the locals enjoyed drinking it when they could not source more traditional spirits for that purpose.

It was after talking to Laurie Smith that I decided to obtain captive reproductive and

ontogenetic data on this WA endemic black snake, *Pseudechis butleri* (Smith, 1982). A lack of foresight can be a benefit though - if I had known then that it would take another fifteen years to eventually get results, I may have been discouraged. My endeavours were further frustrated at a later date by the then Western Australian Conservation and Land Management's (CALM) Wildlife Branch restricting me to a single pair of *P. butleri* for this study.

I had some difficulty in actually locating an adult pair. I did find several fresh and not so fresh roadkills south of Leinster, however it was not until 25 September 1985 that a Perth colleague, Brad Maryan, and I collected an adult female at the Leonora rubbish tip. This in itself was a fortuitous event brought about by my

need to make an urgent telephone call that night. However, as the only public telephone in Leinster at the time was out of service, we were forced to travel 130 kilometres south to Leonora so that I could make the call there. Afterwards, we headed out on the Laverton Road and subsequently camped on the outskirts of town at the local tip. Shortly after climbing out of our bedrolls the next day, Brad literally stumbled on the snake close to camp. I gave the coffee a miss that morning and had a beer to celebrate this success instead.

It was not to be until the same month two years later, on 29 September 1987, that an adult male would be located in a well at the Yalgoo rubbish tip. A comparatively barren, semi-arid, sparse mulga woodland is typical over most of



Above: Male *P. butleri* collected on 29 September 1997 from rubbish tip at Yalgoo, WA

the range of *P. butleri* – the true mulga snake.

If at first you don't succeed...

It was to be another ten years before I managed to successfully breed the pair, and of the several points of interest to emerge from this study, not least was the need for perseverance. An annotated list of dates was commenced shortly after I acquired the second individual of the study pair in 1987, and I have tabled some salient points here pertaining to the successful clutches. It is probable that *P. butleri* will eventually be found to have a greater fecundity than the maximum clutch size of fifteen eggs reported.

Also of interest is the longevity of the original pair that formed the basis of this article. The female was a large adult snake when collected, eleven years prior to the successful breeding in 1996, and is estimated to have been at least sixteen years old at that time. This snake eventually died in 2005 after twenty years in captivity. The male was subadult when removed from the Yalgoo well in September 1987 and died in September 2010. It had been with me for twenty-three years and commenced showing obvious signs of age, such as weight loss and impaired movement, about eighteen months before its demise.

There is also the possibility that the female was damaged by exposure to radiation during x-raying on 4 January 1988. If this was responsible for the several initial unsuccessful attempts to breed, then the successful breeding proves radiation damage is reversible. It is equally possible that there may have been no radiation

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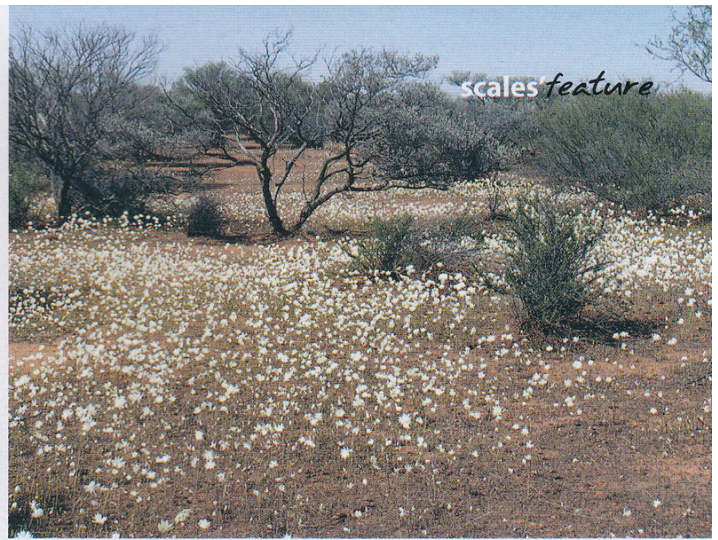
damage and that the infertile clutches were caused by a lack of motile sperm in the male. It is fortunate that I persevered with him, because he came good in the end, also inseminating two of his daughters. Long-term captive females remain nervous in their behaviour and are quick to attain a defensive flattening of the neck and exhibit violent thrashing when disturbed, while males rapidly become placid and more relaxed with their keeper.

Sexual colour dimorphism occurs in the adults of this species, with males being much more brightly marked than females. The pale spotting in males is primrose yellow to reddish-yellow contrasting with a vivid black background, while females have pale to dark greyish spotting contrasting with a dark bluish-black ground colour. This colour difference is not obvious in immature individuals, with all youngsters being

vividly coloured. Fitzgerald and Mengden (1987) reported considerable divergence in colour and pattern between neonatal and adult individuals in their study animals. They observed remarkable ontogenetic development, with adult colouration being attained at about twelve months. The divergence in appearance between neonates and adults and the degree of ontogenetic change was less obvious in my study, although neonatal colour/pattern was considerably different from some adults, but not all, for only a very short time immediately after birth. Once the first slough was completed within a couple of weeks, neonates became small replicas of their parents, although some were much more brightly marked.

The neonates, after post-natal sloughing, readily fed on lizards, but were extremely difficult to entice onto mice. However, by about twelve

Right: *Acacia* scrubland near Mount Magnet – typical Spotted Mulga Snake habitat.



SUCCESS AT LAST!

(Reprinted from 1998 WASAH Newsletter No. 15)

15 Oct 96 - Pair placed together, copulation observed.

12 Dec 96 - Female sloughed.

15 .. - Female ate three 20g mice. This was to be her last feed pre-parturition.

1 Jan 97 - 77 days post mating deposited eleven fertile eggs. Total mass 310.3g. Embryos obvious when candled (approximately 3 cm long) surrounded by a large area of dense blood vessels encompassing at least 25% of inner surface of egg. Female's weight immediately post-parturition 600g. RCM = 0.52.

9 Mar 97 - Female sloughed.

11 .. - First neonate pipped after 71 days at 30°C.

13 .. - Last pipped after 73 days at 30°C.

19 .. - 2nd sample: all pipped after 77 days at 29°C.

27 .. - First post-natal slough 16 days after parturition.

EGG & NEONATE DATA

Eggs were separated into two samples (five in one and six in the other) and incubated at 30°C and 29°C respectively. Those exposed to the lower temperature had an incubation period 4-6 days longer than the other sample. No difference in neonates was recorded, although **all were female**.

All measurements for size are in millimetres and mass in grams, with means in brackets.

Egg size 56-72 (62) x 25-30 (27.9) and mass 26.9-29.6 (28.2).

Neonate snout-vent length 275-322 (302) and mass 16.4-18.7 (17.8).

SECOND CLUTCH DATA

6 Dec 97 - Pair placed together, copulation observed.

3 Feb 98 - Female sloughed.

1 Mar 98 - 84 days post mating deposited fifteen eggs (12 healthy-looking, 3 undeveloped slugs). Total mass 292g. Female's weight immediately post-parturition 592g. RCM = 0.49.

14 May 98 - First neonate pipped after 75 days at 30°C.

15 .. - Last pipped after 77 days at 30°C.

27 .. - First post-natal slough 13 days after parturition

EGG & NEONATE DATA

Egg size 43-57 (51.4) x 24-30 (27.2) and mass 17.6-24.1 (22.4).

Neonate snout-vent length not recorded and mass 12.4-14.2 (13.3).

months of age, the sample I retained had all shifted to mice and immediately demonstrated a rapid increase in growth, attaining adult sizes of 70-100 centimetres within four years of age. At no time did the spotting density vary remarkably in individuals from that which they displayed respectively as neonates.

I distributed many of the captive-bred progeny to other keepers under appropriate wildlife authority licences without initially determining their sex. I was surprised to hear back that all of these animals proved to be female, as were those I retained. Because of this, I decided to change incubation temperature in the next clutch of eggs I had the opportunity to experiment with.

On 9 March 2002, a young captive-bred female deposited her first clutch of six eggs after being inseminated by her father on 21 November 2001. I suppose I should re-phrase that to read that I removed six eggs from her body using the handle of a teaspoon, shoe-horn-style. The eggs were well developed and healthy, but much too large for her to deposit in the normal way. Of the six eggs, one was damaged during extraction and three were undeveloped slugs. The two healthy eggs (76 x 26mm x 32gm and 67 x 28mm x 32gm) were incubated at 32°C, 2°C above previous successes, and went 71 days before pipping. Both neonates represented the first males I had bred.

A notable reproductive strategy recorded here in this species is the comparatively late breeding. Egg laying occurred in January (one record), February (two records) and March (four

records). Hatching took place in March through to mid-May. This may have evolved to allow neonates to avoid the extremely hot conditions experienced in their natural habitat when there would also be a corresponding reduction in lizard prey activity.

The Spotted Mulga Snake is truly an enigmatic species, being dark in colour and somewhat cold tolerant, but occupying a dry region of temperature extremes. Many individuals are observed in August and September, but the species then vanishes, as it no doubt aestivates during the high temperature period. American herpetologist, Bruce Means, observed an individual active at about 03.00 hours in September when conditions were extremely cool. Experience with this species can quickly lead to the notion that it is an arid-adapted, ecological equivalent of the more southern Tiger Snake (*Notechis scutatus*).

'Reluctant to bite.'

In January 2000 there were several interstate family members billeted at home. Because of the associated distraction, I did not secure a terrarium correctly after feeding the subadult Spotted Mulga Snake within. The snake subsequently escaped in the house, but (fortunately) at about the same time my wife and visitors left together on a trip for a few days, leaving me at home on my own.

Despite numerous searches of the house, the snake could not be found. Then, one evening a couple of days later, I walked into a room and saw it beating a hasty retreat for a narrow gap

down the side of a built-in robe. To avoid the job of dismantling the robe, I dived and grasped the snake's tail. Until that moment, my observations of this species suggested it was reluctant to bite, but not this time. It whipped around and grabbed my right hand – bugger!

I re-secured the snake in its terrarium and applied a pressure bandage, but already the changes I was experiencing in my body suggested it was going to be unpleasant – itchy scalp, running nose, light-headedness, dry mouth and eyeballs that had begun to feel like golf balls covered in sand! The fainting sensation made me get close to the floor to reduce the damage that could be caused by a fall.

Pushing myself along on my back, I was able to access some antihistamine pills, source the portable telephone, enter the bedroom and pull myself up onto the bed. I contacted my youngest daughter and steeled myself to speak to her in a manner that would reassure her that I was OK. I asked her to telephone me in a couple of hours to check that all was well. I fell asleep, or passed out, and she did call later in the day and dragged me back to reality. Although a bit unsteady on my feet, I felt much better and was glad I had not contacted my wife, who was at that time holidaying on Rottnest Island with her sisters. To this day she is unaware of this event.

Not a pretty picture.

Some reptiles are easy to photograph because of their skin texture and colour. Those species that either absorb or reflect light appear to cause the greatest difficulty, and *Pseudechis butleri* is one



01: Neonatal *P. butleri* prior to first slough. 02: The same individual immediately after postnatal slough. 03: Juvenile *P. butleri* after postnatal slough at two weeks old. 04: The same specimen at 12 months old. 05: Here, the same snake illustrated in the previous two photos is depicted as a captive-bred adult male at six years of age.

of the latter.

After photographing numerous individuals of this species, I am still to get the 'perfect' shot. After examining the few photographs of this species reproduced in books, I am of the opinion that I am not the only one with many unsatisfactory photographs. It is particularly difficult to photograph *P. butleri* on a substrate other than the reddish soils found in the *Acacia* dominated woodlands that it naturally occupies. Photographed on grey to whitish soils, the results are especially poor when attempting to portray this boldly coloured snake.

I have also been unable to achieve any degree of excellence with the use of a flash. For the best results, I suggest natural sunlight on a reddish substrate during the middle of the day, to reduce the width of the harsh shadow. Many of my photographs have been obtained by posing the individuals in fake environments; natural sunlight allows the snake to be portrayed as close as possible to its appearance in real life.

Acknowledgements

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I thank S & T's John McGrath for 'de-sterilising' the original article and transforming it into something much easier to read. For their sanity-keeping companionship on numerous, although usually unsuccessful, *P. butleri*-specific field trips, I thank Bill Miller, Brad Maryan and Robert Browne-Cooper. On one such trip to Coongan Hill, Brad got so geographically embarrassed he did not find his way back to camp until the following day. I would like to take this opportunity to apologise to him on behalf of RBC and myself for being so hasty in sharing his gear between us during his absence - I can assure you Brad, we would have eventually mounted a search party to find you!

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