

## **Record clutch sizes and record body sizes for Copperheads (*Austrelaps*, Worrell, 1963) (Serpentes: Elapidae).**

LSID URN:LSID:ZOOBANK.ORG:PUB:9B2732A4-E123-41A5-84C0-39D0A85E1C9C

RAYMOND T. HOSER

488 Park Road, Park Orchards, Victoria, 3134, Australia.

Phone: +61 3 9812 3322 Fax: 9812 3355 E-mail: snakeman (at) snakeman.com.au

Received 14 April 2019, Accepted 12 June 2019, Published 1 August 2019.

### **ABSTRACT**

After breeding in captivity both highland and lowland Copperheads (Genus *Austrelaps* Worrell, 1963) more than 12 times over a period spanning nearly 50 years, only twice has this author ever had more than 20 young born from a single female. This paper reports on two record-sized clutches of young from two captive female Lowland Copperheads *Austrelaps superbus* (Günther, 1858) in early 2019, numbering 27 and 35 young. Two over-sized wild caught male Copperheads measuring a total of exactly 135 cm are also reported as is the sex ratio of Copperheads caught in "call outs" by the Melbourne Snake Catcher.

**Keywords:** Snakes; captive breeding; Copperhead; Melbourne; Victoria; New South Wales; *Austrelaps*; *superbus*; *ramsayi*; live young; Australia; oversize; sex ratio; record clutch sizes; snake catcher.

### **INTRODUCTION**

I (Raymond Hoser) kept and bred Highlands Copperheads *Austrelaps ramsayi* (Krefft, 1864) when living in Lane Cove, New South Wales, Australia, getting litters of 13 and 14 young from two large females that originated within 10 km of Oberon, New South Wales. The three relevant snakes were captured in the wild in January 1974 at a time when it was legal to do so and they both produced litters in March 1976 having mated with a wild-caught in the autumn of 1975. Over the previous two years they had been kept in a particularly cold basement area, which was a modified under home garage.

In the period to 1983, I also became aware of several other cases of wild-caught *A. ramsayi* specimens giving birth and without exception all broods of young were in the range 8-17. Detailed scientific records were kept at the time, but were seized in an illegal armed raid by the New South Wales National Parks and Wildlife Service (NPWS), organised by John (Jack) Rex Giles working at NPWS at the time in mid 1983. In spite of an order the material be returned, it was not.

In the period 2003 to 2019, I have kept and bred Lowlands Copperheads *Austrelaps superbus* (Günther, 1858) from the Melbourne region, when living at Park Orchards, Melbourne, Victoria, including multi-generation snakes more than 10 times. These are ones that have been bred, raised and bred again.

I have also been able to view more than 10 freshly killed gravid Lowlands Copperheads, obtained in my role as the Melbourne Snake Catcher (see Australian Registered Trademark Number: 1436529, "Snake Catcher"). Unfortunately as the Melbourne Snake Catcher, it is not uncommon for me to be called to catch fatally injured snakes or deal with snakes that are simply dead on arrival due to circumstances beyond my control.

Well preserved and freshly killed snake specimens have been lodged at the National Museum of Victoria to allow others to use the specimens for scientific research, while those too decomposed to be useful have simply been discarded.

Until 2019, without exception, none have ever given birth to

more than 20 young at a time or had a number in excess of that within them. The most common number of young for Lowlands Copperheads around Melbourne is 8 at a time.

A clutch size under that number is virtually unheard of, although I do recall one freshly killed snake carrying just five young.

Clutch sizes above 8 snakes, are not particularly rare, but in my experience with Melbourne area snakes, this occurs less than 50 percent of the time.

They are also more likely in particularly large snakes, where numbers between 10 and 20 young are reasonably common.

In writing the preceding, I note that most female Lowland Copperheads in the Melbourne region are significantly smaller than males. Non-growing adult females average about 90 cm (total length) and males 100 cm, but within these numbers is hidden the fact that males are significantly more thick-set and robust in build than females and of about 2-3 times the weight in the normal non-growing adult state, even when of similar length. Snakes, including Lowlands Copperheads are bred at our facility to ensure we maintain a stock of healthy snakes for our Reptile Shows in Melbourne, Australia as well as to supply other wildlife demonstrators across Australia, to supply zoos and also for private hobbyist keepers. We have never sold any reptiles, preferring to give away all offspring. This paper summarizes the results of the 2018 / 2019 breeding of the Lowlands Copperheads.

### **MATERIALS AND METHODS**

The Lowlands Copperheads are kept at the facility here as detailed in Hoser (2009).

To breed the snakes, they are cooled over winter as brutally as we reasonably can. In the context of the Copperheads, this means their cage heating is literally switched off for as long as possible over the cooler months to enable sperm production, but notably the main mating season is in autumn and after the main summer heat. This is a period of relatively cool nights and warm days, meaning that planning to breed Copperheads (all species)

is effectively a two season job, in that cooling over one winter, will result in breeding after the next winter (see Hoser 2018). In March 2018 I artificially inseminated 5 female Lowlands Copperheads at our breeding facility using the method detailed in Hoser (2008) as outlined for this species in Hoser (2018). Semen was obtained from two captive born males and inseminated into five captive born females. All five snakes ultimately produced young including one (first of season) which produced 27 live young on 5 January 2019. The date of birth would have been ahead of wild counterparts in Victoria due to the fact that hibernation for the relevant snakes at our facility ended in August 2018, by way of us manually increasing the cage temperatures, whereas cold outside weather would have kept wild counterparts less active for some weeks after this time. At our facility, due to difficulties in keeping temperatures low in the winter, we are sometimes forced to end hibernation early in order to feed the snakes and prevent dangerous weight loss. The snakes are held in a room and not outdoors and at an average temperature of 15-20 deg C. versus 10-15 deg. C. or less likely for snakes outside in a hibernation spot in the wild, our snakes do noticeably lose condition over winter (when not being fed) whereas colder wild counterparts do not suffer the same loss of condition or at anything like the same rate. Further accelerating the potential loss of condition of our snakes is the use of some for live reptile shows and displays, although these are usually the bigger more robust male copperheads for which condition loss is not a limiting factor in determining timing of ending of hibernation. For some years we have held ten or more adult Copperheads and so invariably have more snakes than we need in terms of taking specimens to our reptile shows.

#### RESULTS

As mentioned already one female gave birth to a litter of 27 healthy live young on 5 January 2019. Two others gave birth to 8 young and another gave birth to 13 young. Significantly a very large 105 cm long (total length) and very thick and robust female gave birth to an unprecedented 35 live young all in perfect health (no unfertilized eggs, slugs or dead young) on 24 February 2019.

The female was of a yellowish-orange colour as shown on the front cover of this journal, being the said snake. She was inseminated from a black male with a red belly, this being one of the more common colour configurations in this species. The black phase is often described as "charcoal" and most accurately describes it. Young were born of all common colour forms, including black with red belly, black with white belly, red, yellow and orange and all were particularly large and robust like the female. The male from where the semen came from was of average size and build for a male.

I note here that Copperheads (of all Australian species) come in three main colours, being black (charcoal), red and yellow and combinations thereof. Each of these appear to be controlled by single alleles for each colour.

In terms of the female snakes at our facility, all are kept on their own (one per cage) and the design of the cages does not allow young snakes to escape the cage (or enter from elsewhere), meaning that counting young was a simple process. It was done by removing all newborn snakes from their cage.

On 16 February 2019, as the Melbourne Snake Catcher I was called to remove a snake from 1 Fairway Court, Rowville, Victoria. The snake was a large heavily built male Lowlands Copperhead (charcoal with red belly), measured at exactly 135 cm long (= four and half feet in length).

This is the largest of several hundred copperheads caught by myself as the Melbourne Snake Catcher over some decades. The snake was photographed in a box next to a ruler to confirm the size and bulk of the snake.

A male Highlands Copperhead of the same length (135 cm) also measured, of the yellow colour phase was caught by myself 10 km east of Oberon, New South Wales in 1977, being the largest of over 100 of that species I have caught and/or seen.

On 4 October 2017 I caught an adult female Lowlands Copperhead measuring exactly 110 cm at the Peninsula Kingswood Golf Club, Dingley, Victoria, this probably being the largest and most heavily built female Copperhead I have ever caught.

I should note that unmeasured large copperheads do appear significantly longer and thicker than they actually are, leading to easy over-estimation of size of unmeasured snakes. By way of example a relatively uncommon 120 cm long male Copperhead has a similar appearance to a 180 cm Red-bellied Black Snake *Pseudechis porphyriacus* (Shaw, 1794).

Anecdotal reports of larger Copperheads (i.e. over 135 cm long), especially from Tasmania are common among herpetologists. However there is little doubt that at least some of these claims are exaggerations. It would be helpful if herpetologists collecting or sighting particularly large specimens use some means of verification of their claims. However in Australia at the moment, the law forbids anyone from "interfering with wildlife", which is defined as any native vertebrate, meaning that useful citizen science is effectively outlawed.

While permits to trap or interfere with wildlife are obtainable, this is usually only for a limited number of people such as university based academics and well-known scientists, meaning that pretty much everyone else in Australia is legally at risk and may be jailed, should they "interfere with wildlife" in any way. See Hoser (1989, 1991, 1993 and 1996 for detail).

In terms of colouration of Copperheads and size, there appears to be no obvious correlation between colour and size (i.e. red, black, yellow or whatever), with oversized animals being of any given colour. On a year-round basis, the sex ratio of Copperheads caught by way of "call out" to homes and businesses around Melbourne is 10 males for four females.

The greatest number of Copperheads caught in "call outs" are in the months of February and March which is clearly mating season for the species, although there is a lesser spike in the period end August to October as well.

If non-adult snakes were removed from the sample, the ratio would skew even more heavily towards the males.

#### CONCLUSIONS

While I cannot claim that there are no cases of Copperheads (genus *Austrelaps*) giving birth to more than 35 young in history, there is certainly no such case in the published scientific record. Hence the publication of this paper. Same applies for a lower number of 27 young from an Australian Copperhead (*Austrelaps*) of any species as also happened at our facility in 2009.

Put another way, if a random person told me that they had possessed a Copperhead that gave birth to 35 young in a single litter, until 2019, I would have replied that such an event would be impossible.

In terms of size, any claim of Copperheads over 120 cm (= 4 foot) is generally not believed by myself in the absence of a body.

#### REFERENCES CITED

- Günther, A. 1858. *Catalogue of Colubrine snakes of the British Museum*. London, I-XVI+281 pp.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Mosman, NSW, 2088, Australia:238 pp.
- Hoser, R. T. 1991. *Endangered Animals of Australia*. Pierson Publishing, Mosman, NSW, 2088, Australia:240 pp.
- Hoser, R. T. 1993. *Smuggled: The Underground Trade in Australia's Wildlife*. Apollo Publishing, Australia:160 pp.
- Hoser, R. T. 1996. *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*. Kotabi Publishing, Australia:280 pp.
- Hoser, R. T. 2008. A technique for the artificial insemination of squamates. *Bull. of the Chicago Herpetological Soc.* 43(1):1-9.
- Hoser, R. T. 2009. One or two mutations doesn't make a new species ... The taxonomy of Copperheads (*Austrelaps*) (Serpentes:Elapidae). *Australasian J. of Herpetology* 1:1-28.
- Hoser, R. T. 2018. The deadly duo. Sperm storage and synchronized breeding, identified via the world's first captive breedings of Australian Copperhead Snakes (*Austrelaps* Worrell, 1963) and also in captive bred Tiger Snakes (*Notechis Boulenger*, 1896). *Australasian Journal of Herpetology* 36:6-10.
- Kreffit, G. 1864. Descriptions of three new species of Australian snakes. *Proc. Zool. Soc. London* 1864:180-182.
- Shaw, G. 1794. *The Zoology of New Holland*. London, 33 pp.
- Worrell, E. 1963. A new elapine generic name. *Australian Reptile Park Records* 1:1-7.

**CONFLICTS OF INTEREST - NONE.**