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HERPETOLOGICAL ASSOCIATION OF AFRICA

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The HAA is dedicated to the study and conservation of African reptiles and amphibians. Membership is open to anyone with an interest in the African herpetofauna. Members receive the Association's journal, *African Journal of Herpetology* (which publishes review papers, research articles, short communications and book reviews – subject to peer review) and newsletter, *African Herp News* (which includes short communications, life history notes, geographical distribution notes, venom and snakebite notes, short book reviews, bibliographies, husbandry hints, announcements and news items).

NEWSLETTER EDITOR'S NOTE

Articles will be considered for publication provided they are original and have not been published elsewhere.
Articles may be submitted for peer review (al least two reviewers) at the Editor's discretion. Lists of reviewers will be published in the newsletter from time to time.
Authors are requested to submit long manuscripts on disc or by e-mail in Word 6.0/7.0 format.

The views and opinions expressed in articles are not necessarily those of the Editor.

Articles and news items appearing in *African Herp News* may be reprinted, provided the author's name and newsletter reference are given.

COVER ILLUSTRATION: White-throated monitor (*Varanus albigularis*). Photograph by Herbert Jauch.
HERP CARTOONS: C.A. Searby

EDITORIAL

Last year ended on a high note, as can be attested by all delegates who attended the 6th HAA Symposium held at the University of Stellenbosch in September 2001. The conference was hugely successful as a wide variety of relevant herpetological topics were presented, stimulating debate until the late evening hours when delegates had the opportunity to learn the enjoyable art of wine tasting at select wine farms in the district. Eddie van Dijk was the recipient of the Association's award for *Exceptional Contribution to African Herpetology*, handed over during an afternoon function during which Alan Channing provided a brief synopsis of Eddie van Dijk's research achievements. The only shadow cast on the proceedings were the unfortunate events of September 11th, necessitating our international delegates to contact family members and reschedule flights back home. On the whole, though, the 6th HAA Symposium was a memorable one, thanks to the hard work and efficient organization of Alison Leslie and Aliki Strydom.

Alison is currently in Botswana overseeing the launch of her Okavango Crocodile Project, thus I am temporarily standing in as newsletter editor. She will be back in the country by March, and contributions for future newsletter editions can still be e-mailed to aleslie@land.sun.ac.za. If any of your contact details have changed and need to be updated, details should also be sent to this e-mail address. In the meantime we would like to wish Alison the best of luck with her project.

Louise Visagie
Newsletter Editor (Co-opted)

and amphibians do not spend extended periods resting, it would appear that the term quiescent (quiescence, quiescency) best describes both short-term summer and winter resting states. Long-term summer resting states would be covered by aestivation, and long-term winter resting states by brumation. Extended resting states where aestivation merges into brumation would best be described as dormancy. Brumation would be largely confined to long-term over-wintering states in colder climates, while hibernation should be excluded completely from usage in relation to reptiles and amphibians. If found acceptable, the term retraherence, although not widely used, may be a suitable substitute for quiescence.

BREEDING OF WHITE-THROATED MONITORS (*VARANUS ALBIGULARIS*) UNDER SEMI-NATURAL CONDITIONS

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INTRODUCTION

Varanus albigularis occurs throughout the dry savanna areas of Namibia, particularly in the country's central, northern and eastern regions. Field studies by Alberts and Phillips in the early 1990s in the Etosha National Park in Northern Namibia have shown that male *V. albigularis* occupy large home ranges of about 18 km^2. Adult females occupy a home range of 6 km^2 (Alberts 1994). *Varanus albigularis* consumes a wide variety of food items in the wild, the main ones being land snails, beetles, grasshoppers and crickets (Phillips 1994). In addition, they are known to consume small tortoises, toads, small mammals and carrion (Branch 1988; own observations). The studies by Alberts and Phillips revealed that *V. albigularis* only feeds in the rainy season for about five months and then undergoes fasting for seven continuous months. During the fasting period, mating and egg laying take place (Phillips 1994). Females usually deposit 26 - 32 eggs that hatch in the wild after 135 - 150 days at temperatures of 27 - 29 °C (Phillips and Packard 1994).

BREEDING GROUP

The author collected eight *V. albigularis* specimens in the Windhoek area between March 1994 and June 1999. Most were caught as juveniles and raised in indoor terraria for 1 - 2 years. Thereafter they were transferred into four outdoor cages, covering floor spaces of 3.5 - 15.0 m^2. The cages

contained a layer of natural soil 30 - 40 cm deep, into which the monitors were able to dig burrows. A layer of mesh prevented the animals from digging further. The cages were supplied with thick branches, which the lizards used for basking, and large pieces of rock under which the animals could hide. They were exposed to natural temperatures, which ranged from close to freezing point in winter nights to about 40 °C during hot summer days. The diet of the juvenile monitors consisted of grasshoppers, crickets, boiled and soft-boiled eggs, pieces of chicken necks and mice. Adults were fed mainly on chicken necks and boiled eggs. Raw eggs should only be given if they are embryonated because the egg white of non-embyonated eggs contains avidin, which can induce a biotin (vitamin B4) deficiency. Raw eggs also pose a great risk of causing Salmonella infection (Balsai 1997). Occasionally, mice and rats were offered as additional food items. Juveniles received food every 2 - 3 days while adults were fed only once a week between November and May. Fasting periods during the winter and spring season lasted from June until October.

UNSUCCESSFUL BREEDING ATTEMPTS

Sexing *V. albigularis* was very difficult and the only indication of sex obtained from observations was that males occasionally exposed their hemipenes when defecating. However, not all males display such behaviour and, as a result, the sexing of monitors of breeding size became a matter of 'trial and error'. Branch suggested x-raying the tail base, as male varanids have an ossified hemipenis that is well visible in adult specimens (pers. comm. 1999).

The three specimens used for breeding purposes in August / September 1998 turned out to be males. When introduced into the breeding cage (4 x 2 x 1.2 m), they initially threatened each other for about 15 minutes before relaxing. During the following days the largest male displayed mating behaviour and showed interest in one of the other males, flicking his tongue around the other male's cloaca, displaying 'exited' head movements and chasing after the male. After one month the males were separated again as no mating could be observed. One of the males was released back into the wild while the other two remained in the cage.

In June 1999 an adult female with a total length of 120 cm was caught in Windhoek and introduced into the cage with the two males. On 16 August copulation was observed between the largest male (150 cm) and the female, followed by daily copulations between the same female and the smaller male (130 cm) from 17 - 20 August. These copulations lasted several hours, sometimes beyond sunset. Thereafter no mating attempts were observed. Between 19 - 22 September 1999, the largest male tried to copulate

with the smaller one, inflicting slight wounds with its sharp claws. Thereafter all mating behaviour ceased.

Towards the end of September the female started to look very thin at its tail base but had a fat belly, which indicated that she was gravid. She refused to accept any food and was removed to a smaller cage of 2 x 2 x 2 m. During October she started digging holes at various sites in the cage and deposited 27 eggs on 22 October 1999. The following day, another four eggs were found lying on the surface of the cage.

All eggs were removed and placed into containers with vermiculite. Several eggs turned brown and mouldy within ten days and had to be discarded. By the end of November, several more eggs had to be discarded for the same reason. None of them contained any sign of an embryo and only nine eggs were left by December 1999. By mid-January, six more eggs turned brown but were left in the container. The incubation temperature ranged from 24 - 33 °C, as it was not controlled by a thermostat. A heating pad served as a permanent heat source but temperatures changed depending on changes in room temperature. At the end of February 2000 all eggs had turned brown and were opened. None of them contained any sign of embryonic development.

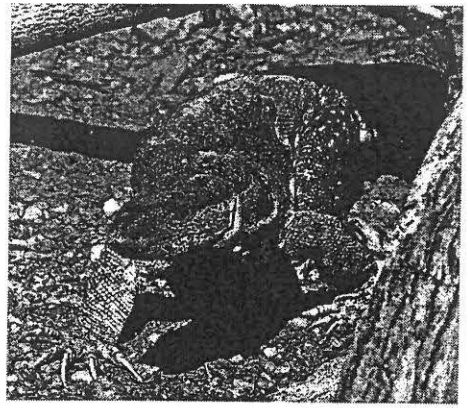
SUCCESSFUL BREEDING

Breeding success was finally achieved in the 2000 / 2001 breeding season. In line with recommendations emanating from the Alberts / Phillips study, adult lizards (more than 100 cm total length) were separated according to sex (as far as the author could establish). As in previous years, the monitors were fed from November until May and then entered the fasting period at the onset of winter (late May 2000). On 26 August 2000 the female that had laid the eggs in 1999, together with a smaller female of 110 cm, was introduced into the males' cage (5 x 3 x 1.3 m). Mating occurred immediately as the males tongue-flicked around the cloaca and hind legs of the females. A male would move his body on top of the female, push his tail under the tail base of the female and insert his penis. Both males were highly agitated and stayed outside their burrows until late at night (after 22h00), which had never been observed before. After five days the mating behaviour subsided. The females avoided the males and just emerged briefly in the morning to bask, but disappeared into their burrows as soon as a male approached.

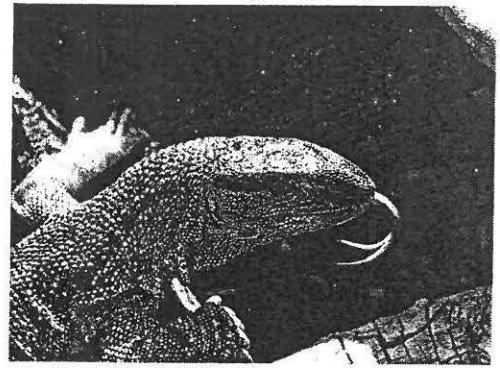
On 23 September 2000 (four weeks after mating) the smaller female was moved to a smaller cage (3 x 2 x 1.2 m) where she deposited her eggs on 29 September. At the same time the larger female deposited her eggs in the cage of the larger male. She had dug several 'test holes' before actual egg deposition took place. The eggs were difficult to locate and were therefore

left to incubate at the site where the females had deposited them. The cages were still inhabited by the adults (separated according to sex).

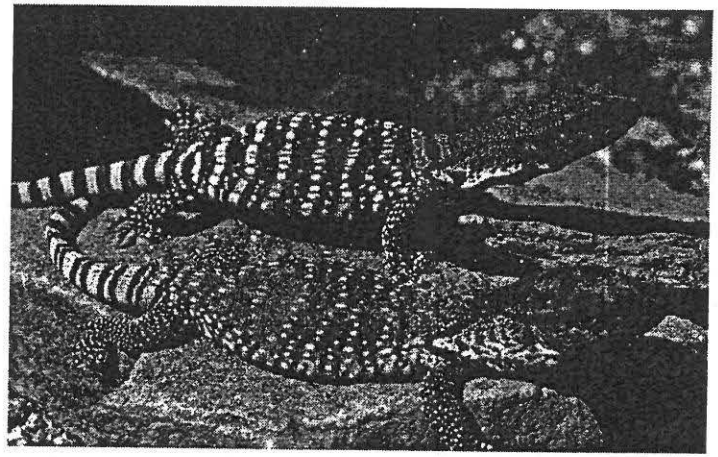
On 28 February 2001 (after an incubation period of 153 days) and following several days of heavy rains, 17 hatchlings emerged in the cage where the smaller female had deposited her eggs. The hatchlings had a snout-ventral length (SVL) of 10.5 - 12.5 cm, a total length of 9.5 - 12.0 cm and mass 18.15 - 30.45 g. The average hatchling had a total length of 23.3 cm and a mass of



Adult male *V. albigularis*



V. albigularis subadult



V. albigularis hatchlings with "bands" (back) and "dots" (front).

28.5 grams. The relatively large discrepancy in body mass may be accounted for by a varying amount of egg yolk the hatchlings had absorbed before hatching.

Between 10 - 13 March 2001 (after an incubation period of 163 - 166 days) another 28 hatchlings emerged in the cage where the larger female had deposited her eggs. They had a SVL of 12 - 13 cm with a total length of 24 - 26 cm. Although their size should have made them an attractive food source for the adult monitors, no adults attempted to catch and eat the hatchlings. The hatchlings were collected and housed for a few days in an indoor terrarium. They were very agile and readily started feeding on grasshoppers. Some even accepted a mince-egg mix offered in a small dish.

Although the incubation temperature was not monitored, Phillips and Packard (1994) had measured soil temperatures in the Etosha National Park during natural egg incubations of *V. albigularis*. They found natural nests at soil depths of 102, 95 and 88 cm. Soil temperature at a depth of 120 cm were almost constant at 27.7 °C while temperatures of 25.8 - 33.1 °C were recorded at 60 cm soil depth. At a soil depth of 20 cm, temperatures varied between 22.3 - 41.0 °C. Natural nests thus produced fairly constant incubation temperatures of 27 - 28 °C. In my cages the monitors could only deposit their eggs at a depth of 30 - 40 cm, which probably resulted in incubation periods of 24 - 36 °C. However, air temperatures in Windhoek tend to be a few degrees lower than those in the Etosha National Park and the incubation temperature can only be estimated.

Forty-one of the 45 hatchlings were released into the wild within two weeks, while four have been retained in captivity. Interestingly, the two batches of hatchlings had distinct patterns of coloration. The first batch showed clear patterns of yellow bands while the second batch displayed yellow dots (see photos).

CONCLUSION

Juvenile *V. albigularis* can be kept in small groups in captivity but care needs to be taken that the dominant animals do not prevent the weaker ones from obtaining sufficient food items. Separate feeding might be necessary, which also prevents the dominant animals from becoming obese. *Varanus albigularis* readily feeds on a variety of food sources. Insects and snails should be offered whenever possible but chicken necks are an easily obtainable and nutritious food source. The occasional sprinkling (2 - 4 times per month) of food items with a calcium-multivitamin powder is recommended. Adult *V. albigularis* should be separated according to sex throughout the year and only be placed together for the breeding season in August / September. Keeping

groups of same-sex animals together does not seem to have a negative effect on the animals, as long as the dominant monitors do not prevent the weaker ones from obtaining sufficient food items.

Monitor lizards should be exposed to direct sunlight as often as possible. Alternatively, the use of UV Lamps (such as the Osram Ultra Vitalux, 300 W, for 30 minutes daily from a distance of 80 - 100 cm) is highly recommended. A cool period preceding the mating season seems essential for breeding success with *V. albigularis*. In the wild, August / September represent the first warm weeks after a winter period of 2 - 3 months. Visser (1981) noted at the Rotterdam Zoo that copulation of *V. albigularis* occurred after a central heating failure resulted in temperatures of 15 - 18 °C for a period of eight days.

Periods of abundant feeding and fasting should be observed similar to the cycles that *V. albigularis* individuals experience in the wild. Juveniles should undergo fasting periods of at least 2 - 3 months at reduced temperatures while adults can be exposed to fasting periods of 5 - 6 months. Such fasting periods also serve to prevent obesity among captive monitors who cannot undertake their natural walks through the savannah.

Under artificial conditions eggs can be incubated at 27 - 31 °C, but hatchlings incubated at the lower end of this range tend to be larger than those incubated at higher temperatures. Phillips and Packard (1994) also noted that wetter substrates tend to produce larger hatchlings than dryer conditions.

Regarding the conservation of *V. albigularis*, it seems fairly easy to breed these monitors under semi-natural conditions within their home range. Hatchlings can be released in suitable areas where they are safe from human predation. Given the large home range of these lizards, they should always be released at least 20 km away from human settlements. It might be useful to raise hatchlings for about one year in captivity before releasing them into the wild. This has been done with great success with farm-bred leguans (*Iguana iguana* and *Ctenosaura bakeri*) in Central America (Koehler 1998, 2000). Larger animals are far less exposed to predation by mammals (e.g., mongooses) and birds. Provided that the young of *V. albigularis* are offered live food on a regular basis (especially insects), they should be able to adapt to natural conditions upon their release. A field study to examine this assumption should be undertaken as it might be of great importance for the conservation of one of Southern Africa's most interesting reptiles.

Acknowledgements

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THE HERPETOFAUNA OF SUN CITY, NORTH WEST PROVINCE, SOUTH AFRICA

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INTRODUCTION

Sun City is a popular and long established vacation and entertainment complex nestled in the valleys of the long extinct volcanic mountains of the Pilanesberg, now a beautiful National Park. Construction of the resort has created a multitude of artificial habitats for numerous species of amphibians and reptiles. Where once was a bushveld valley now stands huge rock outcrops and water features, artificial forests and a range of new microhabitats that were previously non-existent. While the alteration of the

environment by man is often destructive and leads to annihilation of species, the opposite seems to hold true for Sun City.

During the period from 1 March 1997 to 31 March 1999 I worked as a farm manager for the Kwena Gardens Crocodile Sanctuary, situated within the Sun City resort. Over these two years I had the opportunity to observe and record many species of amphibians and reptiles during daily working procedures. The following is a brief summary of species recorded during this time, both in the Sun City resort and from the immediate surroundings within 25 km from Sun City.

AMPHIBIA

Bufonidae

***Bufo poweri* (Hewitt, 1935) - Western Olive Toad**

This is a common toad during the summer rainy season. It is active on the roads in evenings and is commonly seen at Kwena Gardens both during the day and night. Hundreds were observed calling and in amplexus from a shallow pan across the road at the front of Sun City after the first heavy rainfalls of the season.

***Schismaderma carens* (Smith, 1848) - Red Toad**

It is a very common toad throughout the region. Specimens are seen during the day on many of the walkways and in gardens and are common on roads in the evening when many are killed by traffic.

Pipidae

***Xenopus laevis laevis* (Daudin, 1802) - Common Platanna**

This species is common in all the waterways and ponds in Sun City. Several of these frogs made their home in the water bowl of the Burmese Python enclosure and, despite constant evictions, would find their way back again.

Microhylidae

***Phrynomantis bifasciatus* (Smith, 1847) - Banded Rubber Frog**

These frogs are heard calling from marshy wetlands after heavy rains. One was collected on the road on 05/03/97.

Ranidae

***Cacosternum boettgeri* (Boulenger, 1882) - Common Caco**

This is a common species, usually encountered after heavy rains have flooded pans and marshes. Thousands can be heard calling from waterlogged vegetation during the summer months.